Undergraduate BSc Dissertation

A Comparison of Analytical Methods Testing Soils for Gold Exploration in West Wales, Pembrokeshire

By

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Abstract

Pembrokeshire has experienced a resurgence in gold exploration, with Sarn Helen Gold (SHG) seeking to find new gold resources across the region. Plumstone Mountain has been an area of focus from prior exploration efforts by the British Geological Survey (BGS), revealing several prospective features through regional-scale geochemical and geophysical surveys. From July to October 2021, Sarn Helen Gold completed a soil sampling, rock chip sampling and gold panning programme to follow-up on these initial findings by the BGS. This report will synthesis the data analysis conducted to address a series of aims: (1) assess the prospective nature of the Plumstone Mountain study area; (2) evaluate the effectiveness of pXRF, fire assay, multi-element and ionic leach analytical techniques; (3) determine if initial mapping completed by the BGS can be improved upon with new geochemical data.

An approach that integrates geochemistry, geophysics and conceptual thinking is required to explore the mineral potential of Plumstone Mountain due to the lack of surface exposure. Through digital mapping and wider literature, the geological boundaries determined by the BGS can be adjusted to align with new geochemical data. The pXRF has the ability to provide quick and more cost-effective data over the alternative commercial lab techniques. These advantages are critical during an early-stage exploration programme despite the higher limits of detection provided (LOD), with continued pXRF use recommended for future exploration work undertaken by SHG.

Plumstone Mountain contains intensely altered portions of the Roch Rhyolite Group, a rock package which has previously been revealed to contain enriched concentrations of base metals and trace gold mineralisation. A geochemical soil anomaly is present in the north of the study area, corresponding with high concentrations of pathfinder elements (As, Ba, Cu, Fe, Pb, Zn), alongside an Au anomaly identified using ionic leach data. When assessed and compared to other known deposits, the analysis indicates bimodal-felsic volcanogenic massive sulphide mineralisation. However, insignificant gold assay results have limited the potential in supporting further exploration within the study area.

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List of Abbreviations

Ag – Silver

Al – Aluminium

Au – Gold

As – Arsenic

Ba – Barium

BGS – British Geological Survey

BH – Borehole

Ca – Calcium

Cu – Copper

FA – Fire Assay

Fe – Iron

FGDC – Federal Geographic Data Committee

ICP-AES – Inductively Coupled Plasma Atomic Emission Spectrometry

IDW – Inverse Distance Weighted Interpolation

IL – Ionic Leach

K – Potassium

LOD – Limit of Detection

ME – Multi-Element

Mn – Manganese

MRP – Mineral Reconnaissance Programme

Na – Sodium

OS – Ordnance Survey

Pb – Lead

ppb – Parts per billion

ppm – Parts per million

pXRF – X-Ray Fluorescence Spectrometry

QAQC – Quality Assurance and Quality Control

Rb – Rubidium

REE – Rare Earth Elements

SHG – Sarn Helen Gold

S **–** Sulphur

Sr – Strontium

SSSI – Site of Special Scientific interest

Te – Tellurium

VMS – Volcanogenic Massive Sulphide

Zn – Lead

1. Introduction

1.1 Project Outline

This placement project is in collaboration with Sarn Helen Gold (SHG), a Welsh-based gold exploration company, founded by Dr. Mike Armitage (SHG managing director) and three major stakeholders with extensive experience in the mining industry. In 2021, Sarn Helen Gold secured funding and acquired four Crown Option Agreements as potential targets for economic gold deposits (see Figure 1), determined by the analysis of historical mining data and previous exploration activity. The 2021 field season was led by two graduate geologists and involved six Cardiff University students to help with the collection, analysis and interpretation of geochemical data, with guidance from SRK Exploration Services.

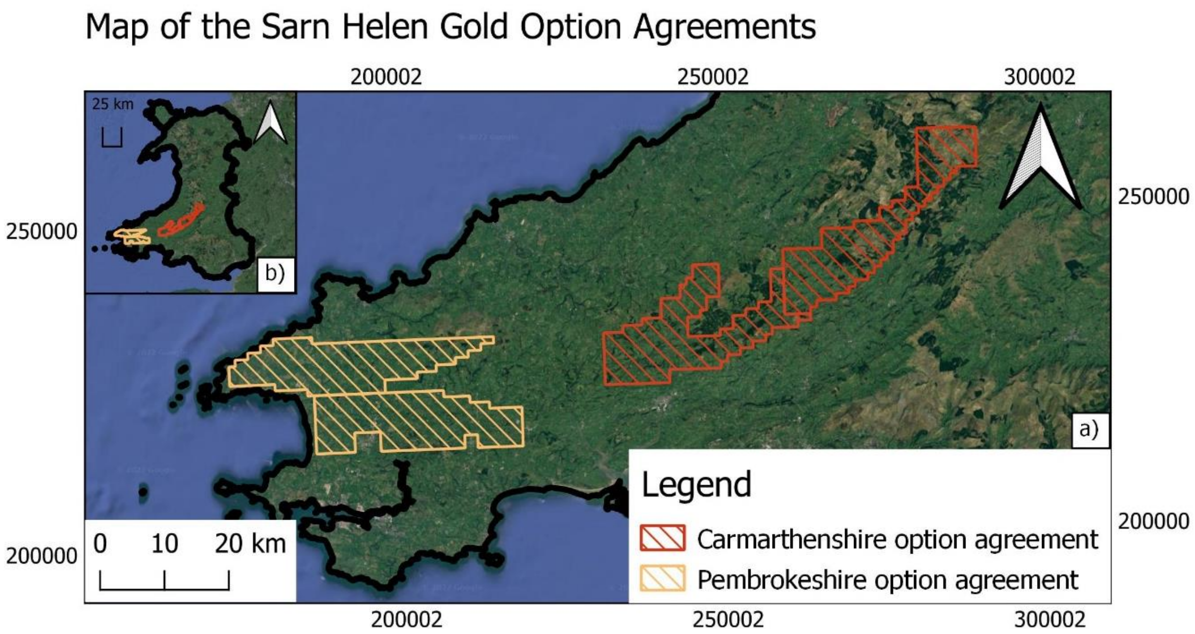


Figure 1: a) *Map highlighting the option agreements owned by SHG in 2022, totalling over 1,000km2 of land* ***b)*** *Location of the option agreements relative to the Welsh border (data provided by SHG and Edina Digimap, 2021)*

1.2 Property Description

A total of 5 areas were targeted during the fieldwork season: Plumstone Mountain, Clarbeston, Treffgarne, Roch and the Preseli Hills. This project will focus on results collected during an orientation survey at Plumstone Mountain in 2021 (see Figure 2). The land encompassing this area is owned by various farmers and contains a protected SSSI site known as 'Plumstone Head', containing a 25m^2 outcrop of Flinty Rhyolite. The terrain varies in topography, including farmers' fields, gorse and public footpaths.

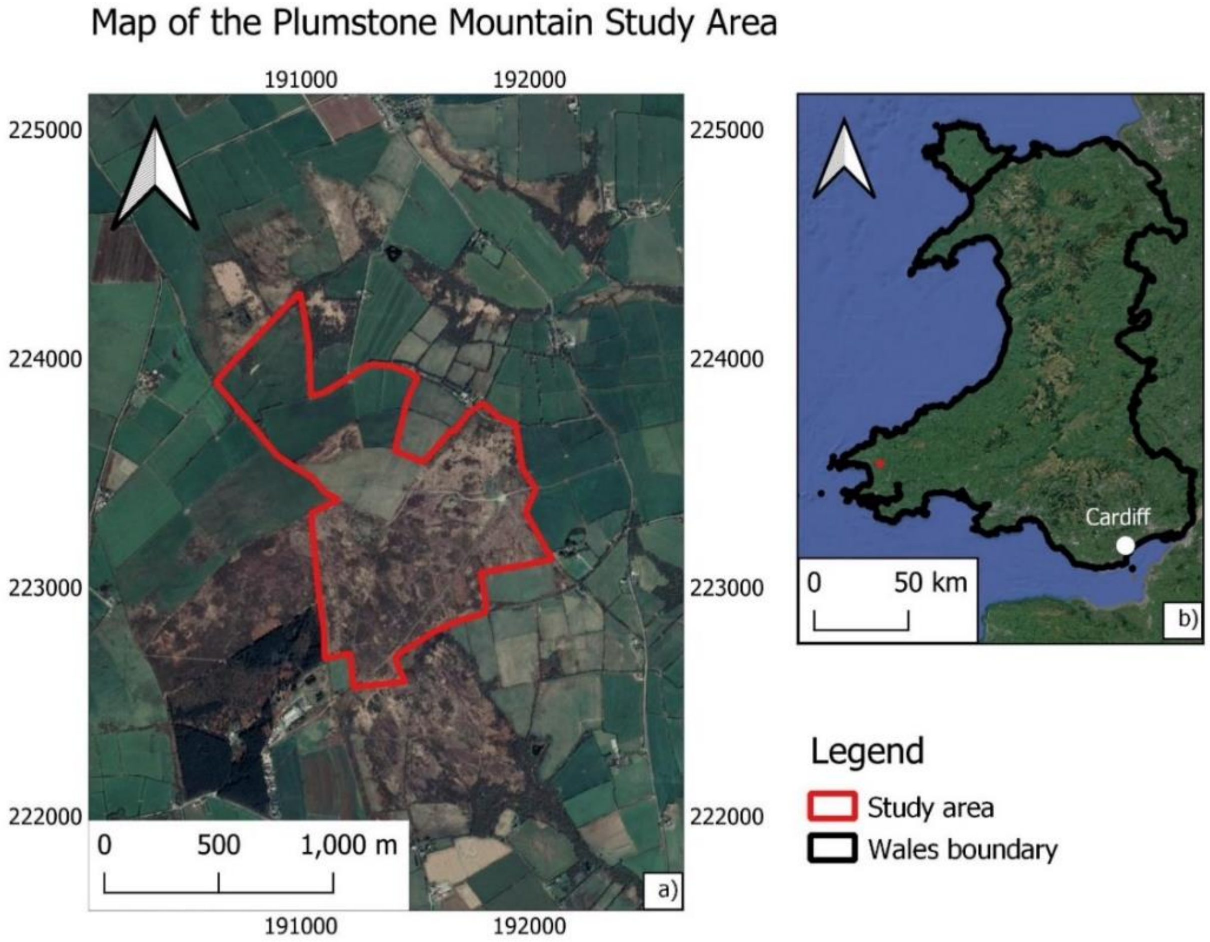


Figure 2: a) *Map showing the selected study area known as 'Plumstone Mountain', an area forming one of the largest blocks of heathland in Pembrokeshire* ***b)*** *Location of the study area relative to the Welsh border (data provided by SHG and Edina Digimap, 2021)*

1.3 Company Background

Sarn Helen Gold (SHG) is a Wales-based and Welsh-run gold exploration company focusing on the Pembrokeshire and Carmarthenshire regions in West Wales. The first field season took place between July and October 2021, focusing on gold exploration in Pembrokeshire using soil geochemistry and gold panning. During 2021, over 4,000 soil samples and 150 rock chip samples were collected by students and geologists (see Figure 3). A second field season has taken place between July and October 2022 with additional students, following up on sites of significant interest and expanding the scope of the project to include the Dolaucothi mining region.

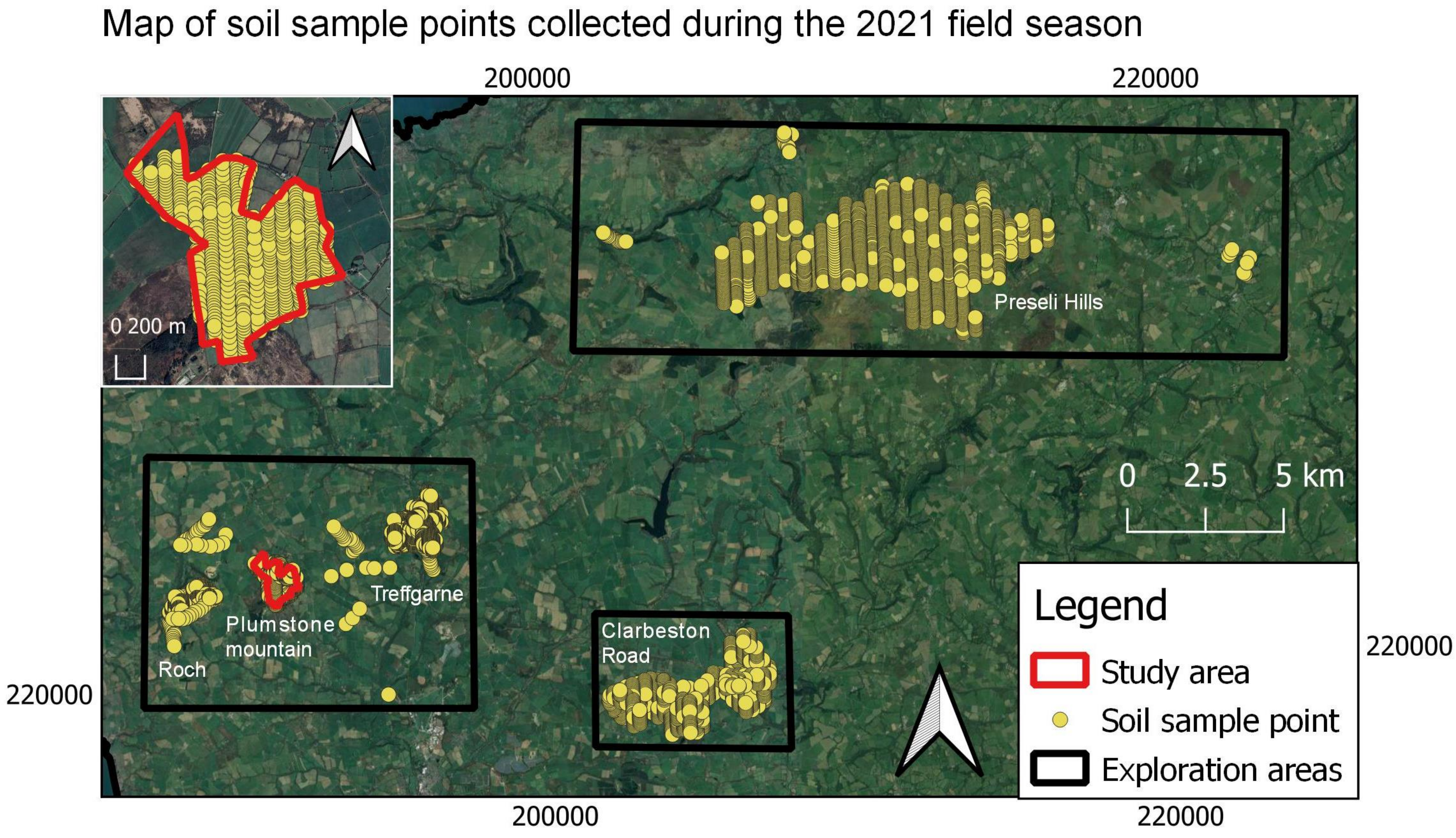


Figure 3: *Map of all soil samples collected during the 2021 field season, with over 4000 samples collected in total (data provided by SHG and Edina Digimap, 2021)*

1.4 Exploration History

Mineral deposits have been prospective in the Welsh Basin since pre-Roman times. Significantly producing gold deposits include the Parys Mountain VMS deposit located at Anglesey, and the Dolgellau Gold Belt, yielding 90% of Great Britain's gold production (Brown, 1993). There was a more recent resurgence in exploration activity in Wales through the Mineral Reconnaissance Programme (MRP), which was carried out by the British Geological Survey (BGS) between 1974 and 1997, completing more than 20 projects involving a combination of geochemical and airborne geophysical surveys (Norton et al., 2000). These surveys revealed multiple pyrite-bearing and sparse chalcopyrite bearing localities within the Treffgarne area in West Wales.

The Treffgarne area has been previously considered prospective for VMS mineralisation during BGS exploration from 1979 to 1982, due to the presence of extreme silicification and abundant pyrite mineralisation in Ordovician volcaniclastic rocks. A combination of weak geochemical anomalies in overburden and strong IP chargeability anomalies were used to site 3 boreholes along the Roch Rhyolite Group (see Figure 4). The drilling results for borehole 1 (BH1) revealed abundant disseminated pyrite, and up to 3.9% Ba over 4.5m was found in the rhyolitic tuffs (Brown et al., 1987). Furthermore, borehole 2 (BH2) revealed extensive hydrothermal alteration and trace gold mineralisation (2.4 g/t over 3m).

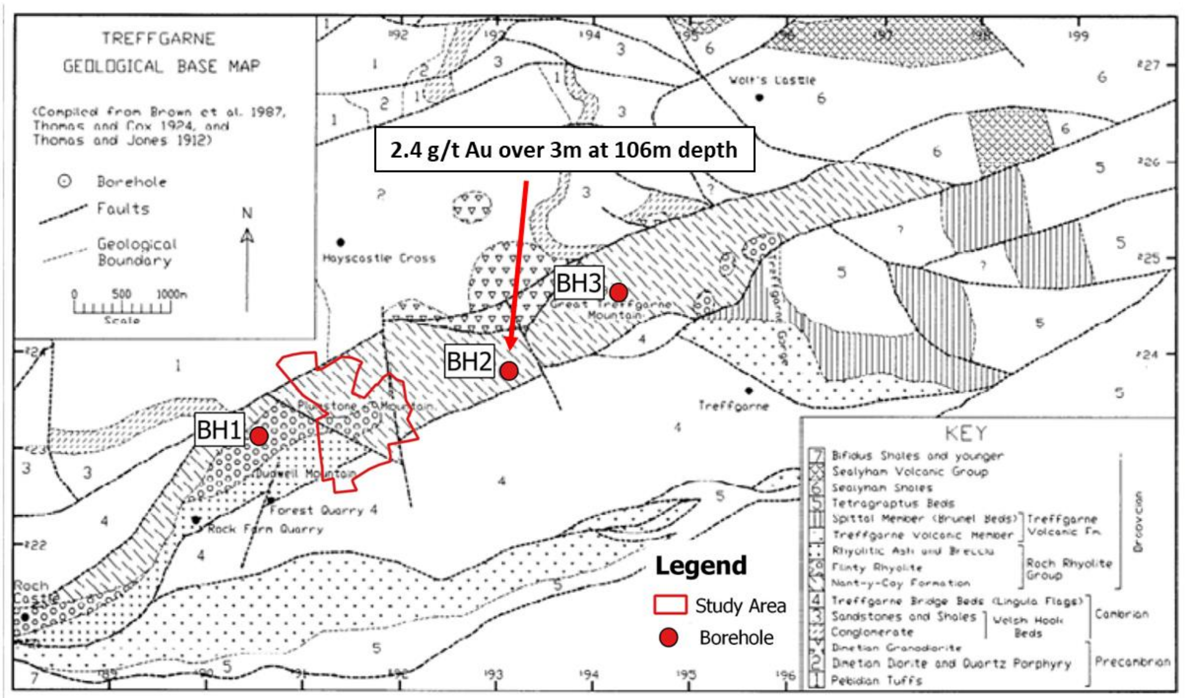


Figure 4: *Annotated geological map of Treffgarne with locations of drillholes sited by the BGS, relative to the Plumstone Mountain study area. These boreholes helped identify the Roch Rhyolite Group as one of the most prospective mineral horizons for future exploration (modified from Brown et al., 1987)*

1.5 Student Responsibilities

During the field season from July to August 2021, the student collaborated with geologists and fellow students to complete soil sampling, float sampling, gold panning and QAQC tasks. Sampling was conducted in pairs and involved navigation to a planned series of points using a portable GPS, followed by the collection of the sample immediately beneath the organic horizon, as shown in Figure 5. Upon completion of the field season, the role of the student shifted to focus on data analysis and interpretation to provide insight into the gold prospectivity of the Plumstone Mountain.

Figure 5:* *a) *Photograph showing the required equipment needed for soil sampling, including an auger, shovel and sample bag* ***b)*** *Soil sample extracted via the auger* ***c)*** *Geologist extracting gold grains from panned concentrate (photos taken by author from 12/08/21 to 13/08/21)*

1.6 Aims and Objectives

This dissertation project will focus on the analysis of primary geochemical data, with the aim of comparing pXRF, multi-element analysis, fire assay and ionic leach datasets to assess the gold prospectivity of Plumstone Mountain and provide exploration recommendations to SHG. Another aim will be to determine whether the geochemistry can be used to map lithological boundaries to improve on current BGS geological maps (see Table 1 for a synthesis of aims, objectives and goals).

Aim	Objectives	Goal
1. Assess the gold prospectivity at Plumstone Mountain	• Use GIS to map the distribution of element concentrations for all analytical techniques • Plot correlation matrices to determine the relationship between different elementals • Plot histograms to graphically represent element concentrations • Interpret the potential deposit type at Plumstone Mountain	To provide exploration recommendations to Sarn Helen Gold for future investigation at Plumstone Mountain
2. Evaluate different geochemical analytical techniques used for exploration	• Establish the limitations of pXRF, fire assay, ionic leach and multi-element analysis within the scope of the project • Identify effective elemental pathfinders for each geochemical technique	To suggest which techniques would be most appropriate for future exploration in the study area
3. Improve the current BGS geological map for the study area	• Analyse the pXRF datasets of soil and float samples and relate this to their geospatial locations • Make detailed observations and analyses of hand specimens collected in the field	To constrain geochemical anomalies within specific lithological boundaries for future exploration

Table 1: *The aims, objectives and goals decided for the placement project*

2. Geological Setting

2.1 Regional Geology

Pembrokeshire is located in south-west Wales and lies within the Palaeozoic Welsh Basin, containing rocks that range from Neoproterozoic to Carboniferous in age. The Welsh Basin experienced subsidence from the Cambrian to late Silurian. A back-arc setting was developed by the basin, resulting in extensive volcanism and developed the potential for mineralisation associated with this setting (Brown et al., 1987). The tensional stage of the Welsh Basin has created a series of horst and graben structures on the basin margins, and faults relating to these structures may have acted as pathways for the mobilisation of hydrothermal fluids. In northern Pembrokeshire there is a structural grain that runs approximately ENE-WSW (see Figure 6), originating from the Caledonian Orogeny (Cameron et al., 1984).

A significant proportion of rocks within Pembrokeshire are igneous in origin, with resistant intrusive and extrusive rocks outcropping to form craggy hills such as the Preseli Hills. Precambrian rocks that were formed by volcanic arcs, along with Cambrian sedimentary rocks, occur in the core of two anticlines: one being aligned along St David's Peninsula, and the other trending towards the east from Brawdy (John, 2019). Pembrokeshire contains an Ordovician succession which is dominated by argillaceous sedimentary rocks and interspersed with dominantly submarine volcanic rocks, cut with intrusions associated to volcanic events (Allen et al., 1985). These volcanic rocks are associated with voluminous epiclastic sedimentary rocks which includes black shales and turbidite mudstones, which are occasionally pyritic and may preserve stratiform mineralisation (Cooper et al., 2000).

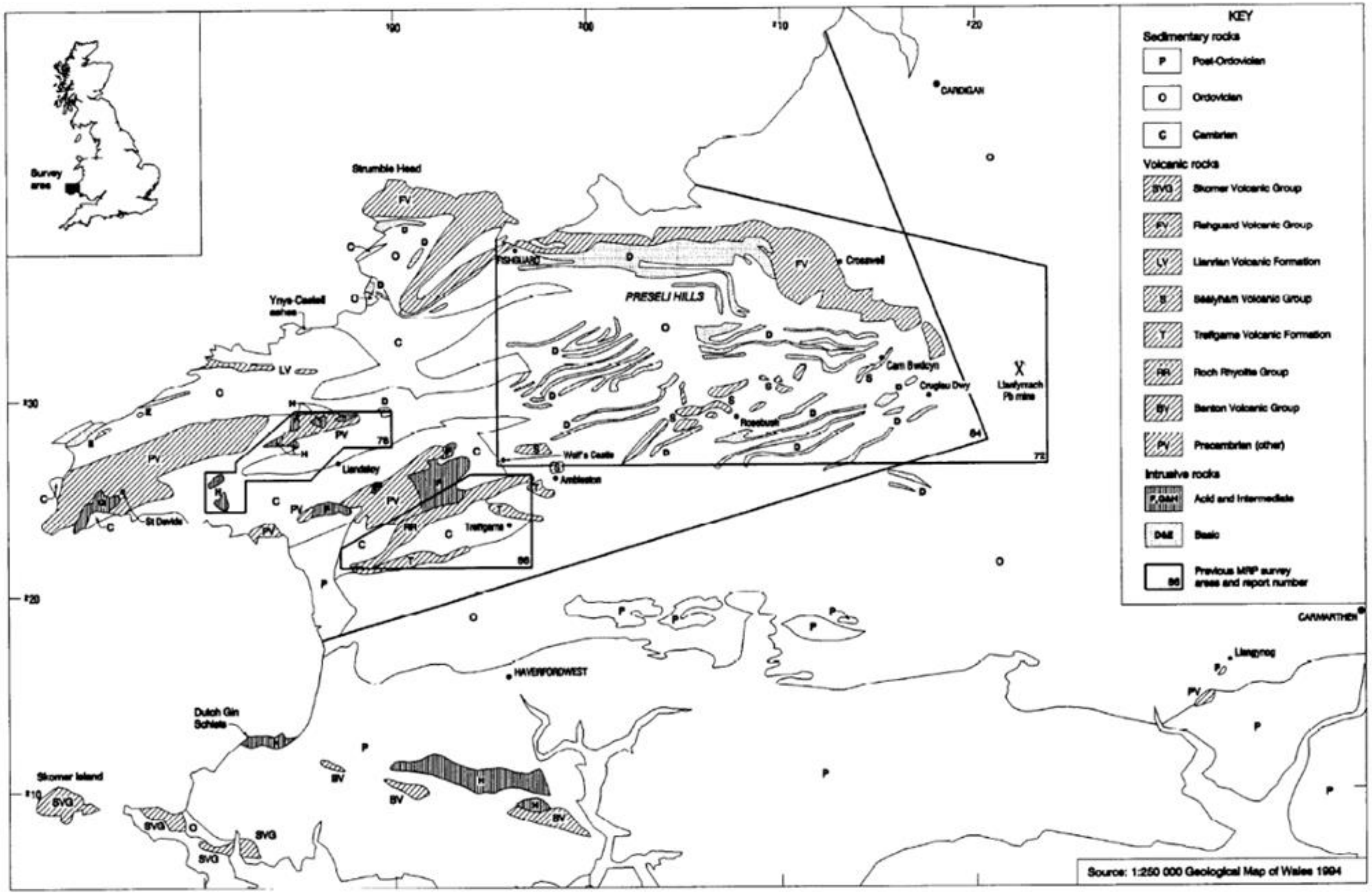


Figure 6: *Simplified geological map of Pembrokeshire, with black outlines highlighting previous MRP survey areas. Volcanic rocks highlight ENE-WSW structural grain (Colman et al., 1995)*

2.2 Local Geology

Plumstone mountain is located towards the western part of the Treffgarne region, containing rocks that range from Ordovician to Precambrian in age (see Figures 4 and 8). The oldest of these is the Precambrian Ramsey Sound Group, an andesitic tuff that is situated towards the north-west of the study area. This unit is intruded by an unnamed igneous unit, which has a quartz-feldspar porphyritic composition (Cameron et al., 1984). Next in the stratigraphy (see Figure 7) is the Cambrian Lingula Flags Formation (often referred to as the Treffgarne Bridge Beds). This a succession of grey micaceous shales with sandy mudstones and occupies the majority of South Treffgarne (Colman et al.,1995).

Next in sequence is the Ordovician Roch Rhyolite Group, a large grouping of volcanic and sedimentary rocks. This group lacks significant exposure in the study area, likely due to extensive drift cover and has made the discovery of mineralisation from surface outcrop unlikely (Cooper et al., 2000). Within this group is a succession of siliceous siltstones with thinly muddy bands and volcaniclastic material known as the Nant-y-Coy Formation. This unit is frequently altered and contains abundant disseminated pyrite, being identified as a potential mineralisation horizon (Brown et al., 1987). The Roch Rhyolite Formation is also part of the Roch Rhyolite group and contains an intensely silicified ‘Flinty Rhyolite’, in addition to laharic breccias with abundant rhyolite blocks (Rhyolitic Ash and Breccia).

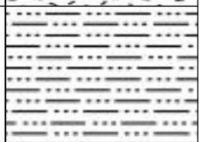
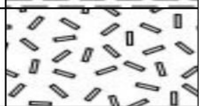
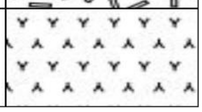
<table>
<tr><th>Age</th><th colspan="3">Group/Formation</th><th colspan="2">Lithology</th></tr>
<tr><td rowspan="3">Ordovician</td><td rowspan="3">Roch Rhyolite Group</td><td rowspan="2">Roch Rhyolite Formation</td><td>Rhyolitic Ash and Breccia</td><td>Laharic, silicified breccia composed of angular to subangular blocks of up to 1m long of rhyolitic rocks and mudstone in a muddy matrix and ash</td><td></td></tr>
<tr><td>Flinty Rhyolite</td><td>Yellowish Grey, silicified rhyolite with blocky pseudo brecciated texture</td><td></td></tr>
<tr><td colspan="2">Nant-y-Coy Formation</td><td>Thinly laminated siliceous siltstones with muddy bands and volcaniclastic material. Frequently altered and contains abundant disseminated pyrite</td><td></td></tr>
<tr><td>Cambrian</td><td colspan="3">Lingula Flags Formation</td><td>Green-grey micaceous shales with black, sandy mudstones</td><td></td></tr>
<tr><td rowspan="2">Precambrian</td><td colspan="3">Unnamed Igneous Intrusion</td><td>Quartz-Feldspar porphyry</td><td></td></tr>
<tr><td colspan="3">Ramsey Sound Group</td><td>Andesitic tuff</td><td></td></tr>
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Figure 7: *Simplified lithological column of the geology at Plumstone Mountain (created using data from Brown et al., 1987, Colman et al., 1995 and FGDC, 2006)*

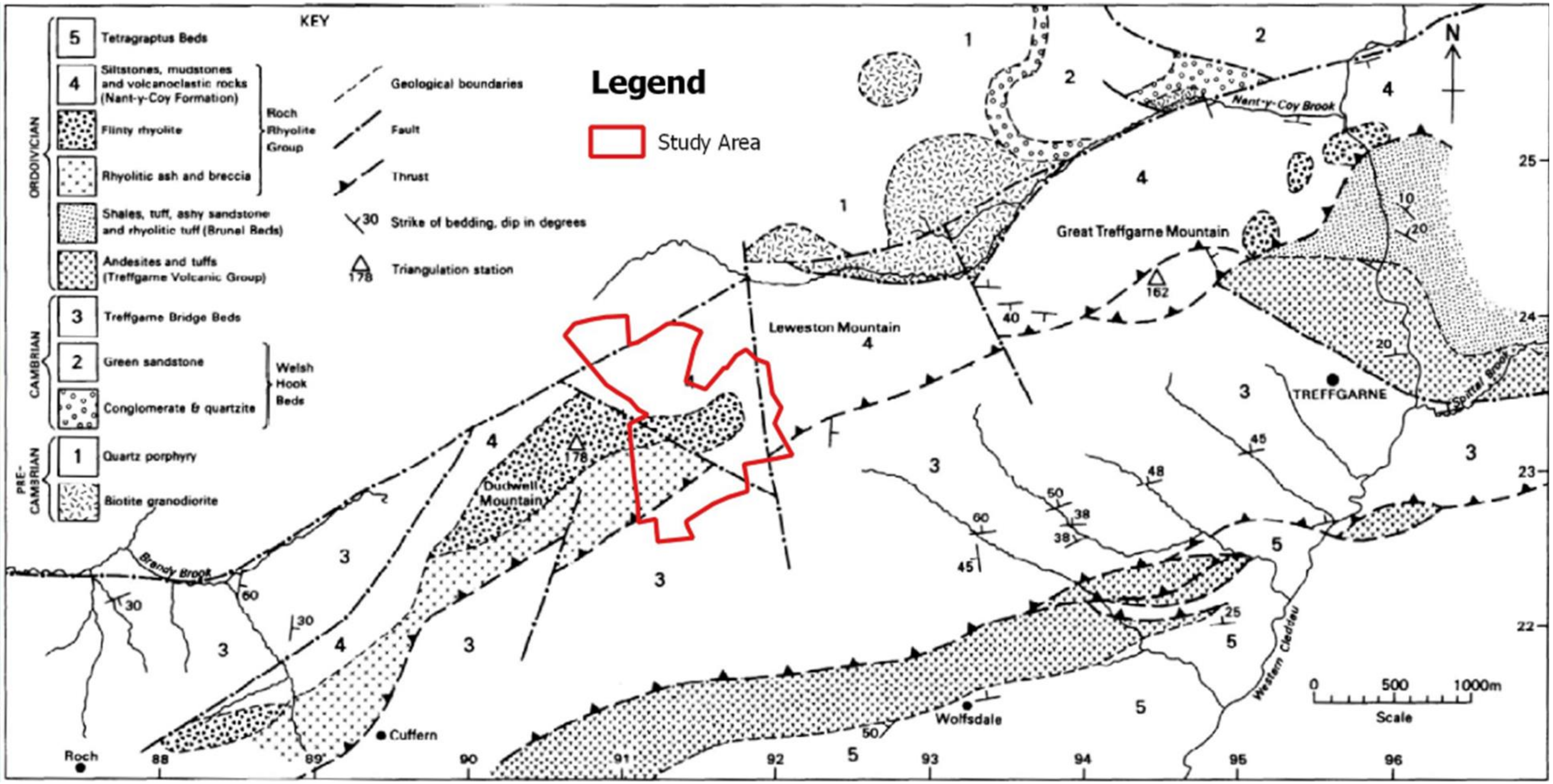

Figure 8: *Geological map of the Treffgarne area, including the geology of the Plumstone Mountain study area (modified from Brown et al., 1987)*

3. Methodology and Data Collection

3.1 Land Access

Land ownership was initially identified using the HM Land Registry. Sarn Helen Gold communicated with private landowners at Plumstone Mountain to gain permission for sample collection. Once permission was granted from an owner, details for neighbouring owners were often provided to help acquire all of the needed approvals. The study area also contained common land where it was not required to gain permission.

3.2 Sample Collection

3.2.1 Soil Sampling

Soil sampling was the primary method used to collect data as a cost-effective, non-invasive method of covering large target areas, with a total of 294 samples being collected in the study area. Sample points were planned along north-south orientated lines on a grid, with these lines having spacings of 200m east-west. Each sample point had spacings of 20m north-south along a planned line. These orientations allowed the sampling lines to cut across the major east-west structural trend.

The location of sample points were stored on a Garmin GPS and the sample number was recorded on the sampling datasheet (see Figure 9). Samples were collected using a combination of an auger, shovel and trowel and it was critical to pre-contaminate the equipment with material from the corresponding sample location. A 150-200g sample was collected at approximately 1m depth at the target B-horizon to prevent contamination from roots in the organic horizon (see Figures 11 and 12).

Sampling controls for ionic leach were more specific, which required the majority of air in a sample bag to be removed, then sealed and kept airtight. Additionally, only plastic instruments could be used to extract the soil because the technique is sensitive to metal ion contamination. In order to be cost-effective, a selection of ionic leach samples was collected with 40m spacing instead of 20m for standard soil samples.

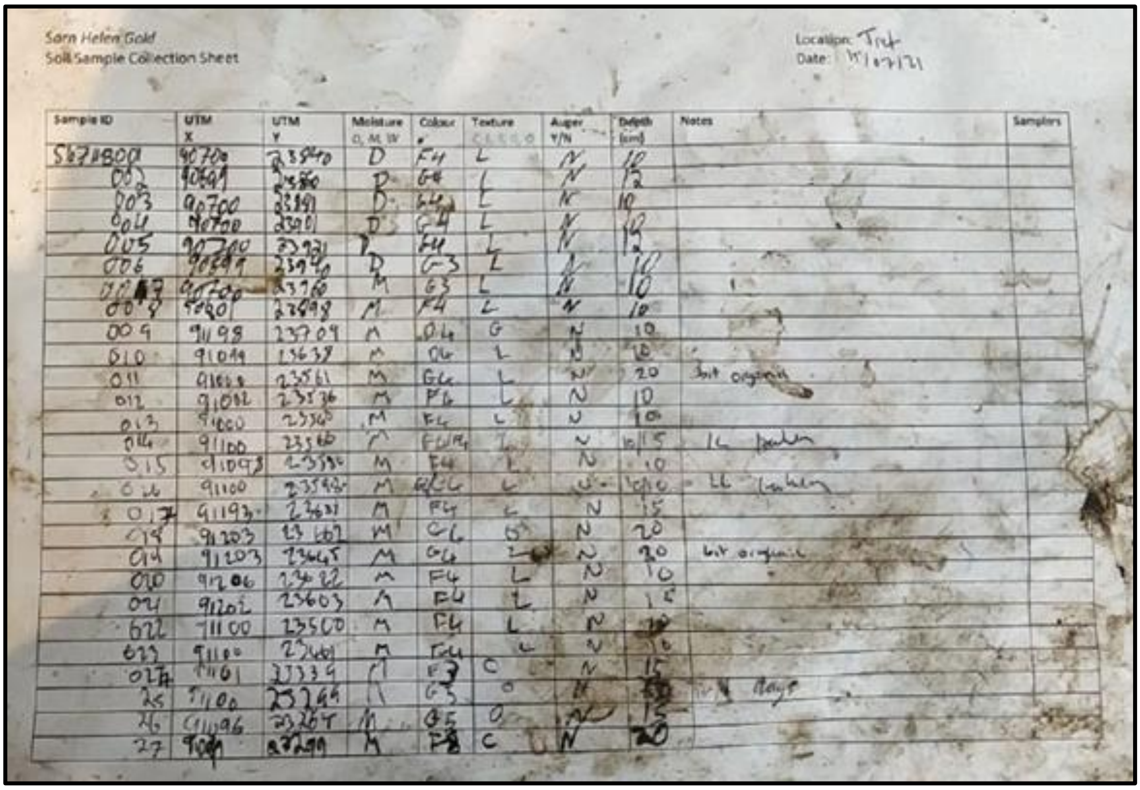

Figure 9: *Completed sampling sheet used in the field. The recorded features of the soil include texture (sand, clay, loam, gravel or organic), moisture (wet, moist or dry), colour through comparison with a Munsell colour chart and depth (photo taken by Jake Bhakta on 13/08/21)*

Figure 10: *Soil samples laid out for appropriate QAQC procedure involving photography, weighing of samples, digitizing paper data sheets onto Microsoft Excel and uploading GPS tracks (photo taken by author on 13/07/21)*

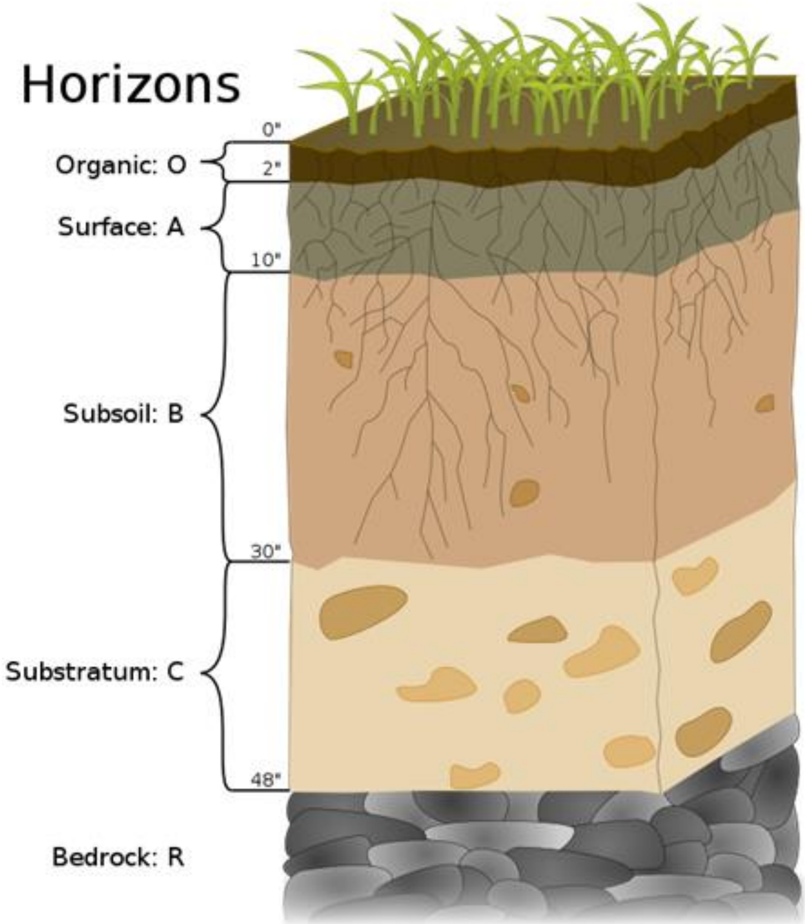

Figure 11 (left): *Schematic diagram of soil horizons and the typical distances at which different horizons are found. In cases where there were larger rocks or particularly thick organic layers, it was required to adjust the sample point to a few metres away so that a sufficient quantity of soil from the B-horizon could be taken. (Natural Resources Conservation Service, 2021)*

Figure 12: *Auger being used in the field, with an annotated soil sample to highlight different soil horizons seen in the field (photos taken by author on 13/08//21)*

3.2.2 Float and Rock Chip Sampling

During soil sampling, there were particular localities that warranted follow-up investigation and collection of rock samples. This involved the use of a geological pick where outcrop was visible, or fist-sized samples of float could be collected. In total, 4 float and rock chip samples displaying significant alteration and pyrite mineralisation (see Figure 13) were collected and analysed by pXRF and fire assay.

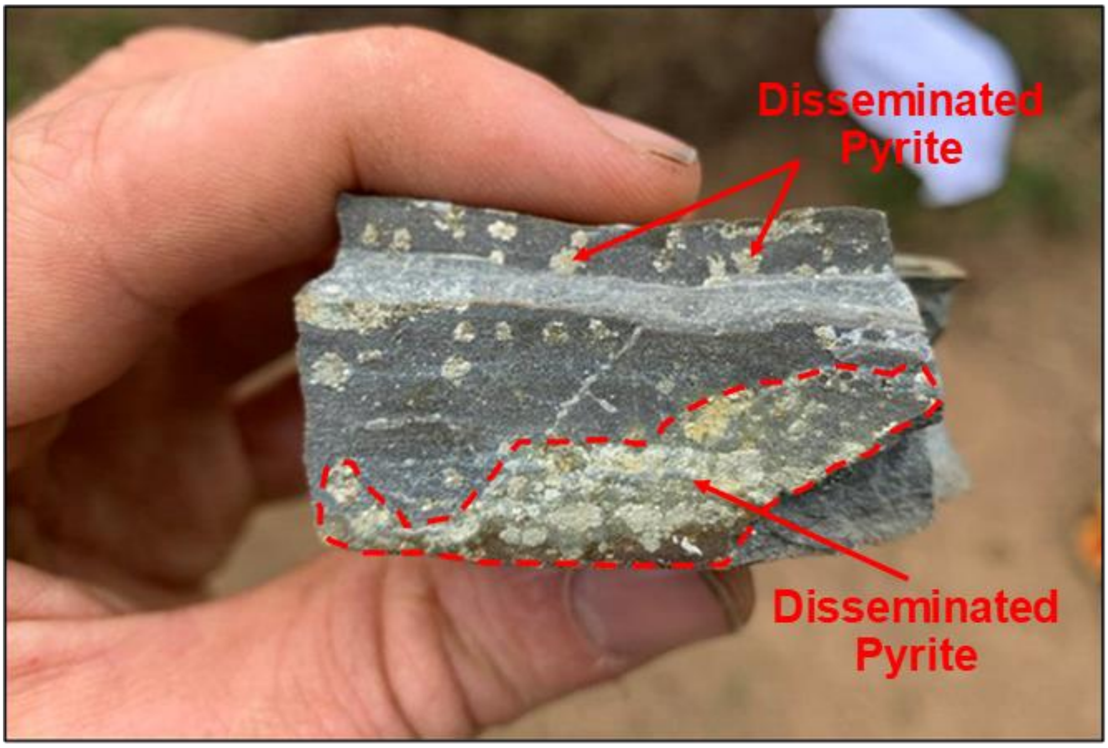

Figure 13: *Photo of a rock chip sample collected at an outcrop of the Nant-y-Coy Formation. The sample is a laminated, siliceous siltstone with abundant disseminated pyrite. Thumbnail is 1cm for scale. (photo taken by author on 27/07/21)*

3.3 Geochemical Analysis Methods

3.3.1 Portable X-Ray Fluorescence (pXRF)

Portable X-Ray fluorescence spectrometry (pXRF) was selected as the main geochemical analytical technique for the programme (see Figure 14), due to the advantage of pXRF being able to rapidly screen samples whilst being cost-effective and versatile. The pXRF was used to measure major and trace element concentrations within a sample, with limits of detection (LOD) being as low as a few parts per million (ppm). An X-Ray beam is generated from the device which excites secondary X-Rays in a selected sample (see Figure 15), causing the fluorescence of atoms to produce an X-Ray spectrum (Rollinson, 1993).

Figure 14 (left): *The SHG Olympus Delta Premium Alloy Plus Analyser (DP2000) being calibrated by Geologist Jamie Price. Prior to sample analysis, the pXRF device was calibrated by scanning 3 samples of known composition that were created by SHG. The pXRF was set to soil mode which ran two 30kv beams each lasting 15 seconds. (photo taken by author on 09/07/21)*

Figure 15 (right): *Schematic configuration of an Olympus DELTA handheld XRF. The X-Ray spectrum produced contains characteristic wavelengths that correspond to specific elements present in the sample (Olympus IMS, 2022)*

3.3.2 Fire Assay (FA)

Fire assay was selected as a reliable and robust analytical technique to provide Au concentrations, providing consistent detection levels with a lower limit of 0.001ppm (ALS Global, 2014). This a two-stage process involving fusion with a reagent and cupellation to yield a precious metal bead (see figure 16). This bead is then digested using nitric acid and hydrochloric acid and analysed by ICP-AES to provide results for Au recovery.

ALS Geochemistry

September 2014
REVISION 2.0
Geochemical Procedure

Au-ICP21/Au-ICP22 – Fire Assay Fusion – ICP-AES Finish

Sample Decomposition:

Fire Assay Fusion (FA-FUSPG1 & FA-FUSPG2)

Analytical Method:

Inductively Couple Plasma – Atomic Emission Spectrometry

A prepared sample is fused with a mixture of lead oxide, sodium carbonate, borax, silica and other reagents as required, inquarted with 6 mg of gold-free silver and then cupelled to yield a precious metal bead.

The bead is digested in 0.5 mL dilute nitric acid in the microwave oven. 0.5 mL concentrated hydrochloric acid is then added and the bead is further digested in the microwave at a lower power setting. The digested solution is cooled, diluted to a total volume of 4 mL with de-mineralized water, and analyzed by inductively coupled plasma atomic emission spectrometry against matrix-matched standards.

Method Code	Element	Symbol	Units	Sample Weight (g)	Lower Limit	Upper Limit	Default Overlimit Method
Au-ICP21	Gold	Au	ppm	30	0.001	10	Au-GRA21
Au-ICP22	Gold	Au	ppm	50	0.001	10	Au-GRA22

Figure 16: *ALS geochemical procedure for fire assay fusion with an ICP-AES finish. Multi-element analysis and ionic leach geochemical procedures included in Appendix 2. (ALS Global, 2014)*

3.3.3 Multi-Element Analysis (ME)

Multi-element analysis was assessed as a potential exploration technique because it can provide concentrations for large suites of pathfinder elements with significantly low detection limits (ALS Global, 2019). This technique uses a four acid digest on a prepared 0.25g sample, which is combined with dilute hydrochloric acid and then analysed by ICP-AES.

Four acid digestions are able to dissolve most minerals and has provided an increased suite of 35 elements compared to the 25 elements provided by pXRF.

3.3.4 Ionic Leach (IL)

Ionic leach has been selected because it enhances signal to noise ratios and is designed to detect subtle yet diagnostic responses at the surface level, which can be used to characterise mineral systems at both the subsurface and at greater depth (SGS, 2021). Ionic element species are particularly mobile but element mobility is strongly controlled by soil pH conditions, and a concern is that the technique is particularly sensitive to contamination. The methodology for ionic leach uses a static sodium cyanide leach (see Figure 17), with an ultra-sensitive ICP-MS being used to provide sub-ppb detection limits for critical pathfinder elements (ALS Global, 2013).

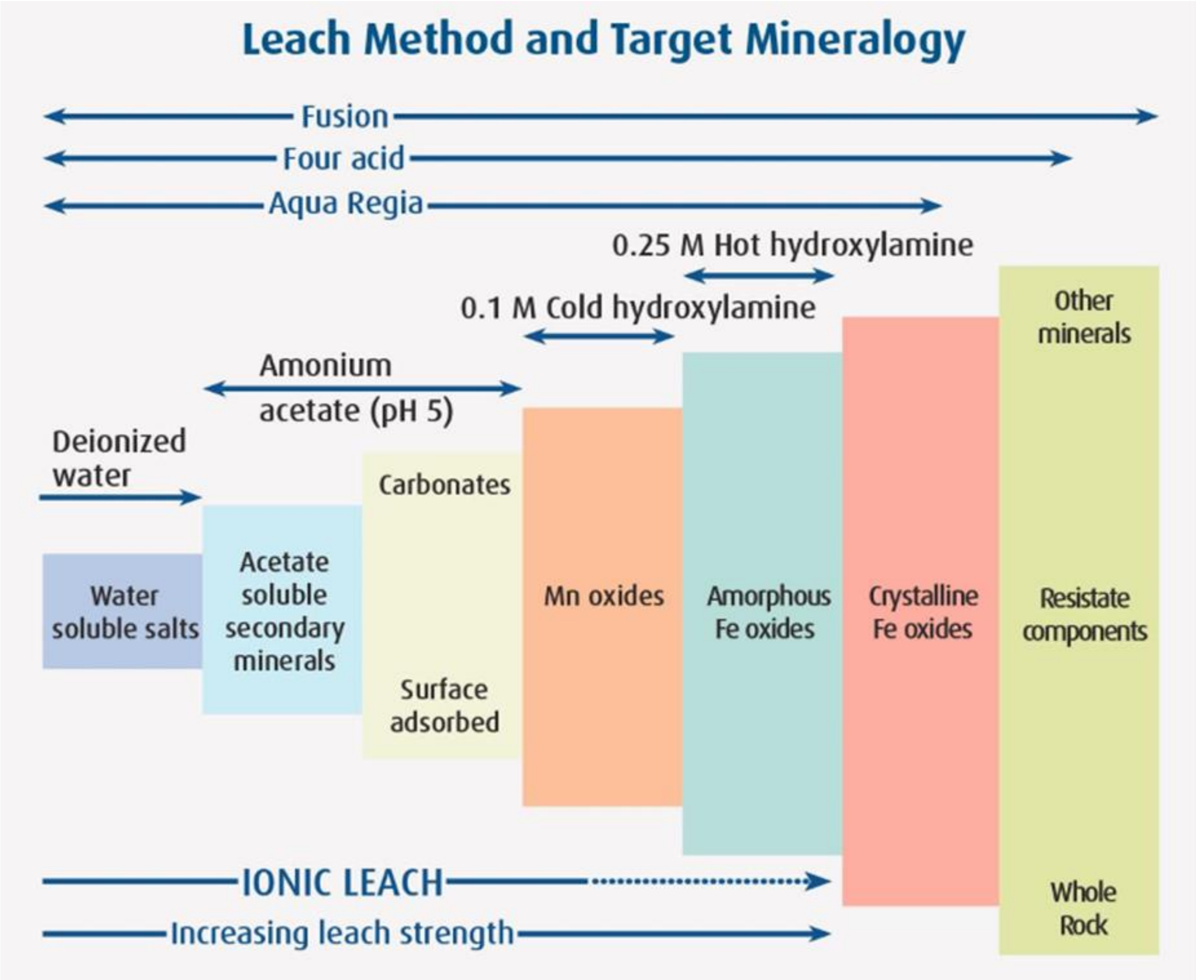

Figure 17: *Schematic diagram of ionic leach method and target mineralogy. Ionic leach has the advantage of measuring elements that have been released at depth and then mobilised to the surface (ALS Global, 2013)*

3.4 Software Utilised

Name	Version	Use
Garmin Basecamp	4.7.4	Installation of pre-determined sample points onto handheld GPS device
Avenza Maps	4.1.1	Navigation to sample points using downloaded maps
Google Earth Pro	7.3	Check terrain and navigation routes at study area
Microsoft Excel	2016	Statistical analysis (Summary statistics, Pearson's correlation matrices, log-probability plots, histograms)
PAST	4.11	Statistical analysis (Box and whisker plots)
Microsoft Word	2016	Report writing
QGIS	3.16.12	Spatial analysis

Table 2: *Table of software with corresponding versions utilised during the project*

4. Results

In total, 294 soil samples were analysed using a pXRF device and a selection of 93 soil samples were sent for further analysis to ALS Life Sciences, Ireland (full list of elements analysed listed in Table 3 below). These further analysis methods included fire assay with an ICP-AES finish (Au-ICP21), trace level methods using conventional ICP-AES analysis (ME-ICP61) and pH controlled ionic leach with ICP-MS finish (ME-MS23). Full copies of the raw data are listed in Appendix 3-5.

Technique	Samples Analysed	Elements Analysed
pXRF	294	Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Rb, Sr, Y, Zr, Mo, Ag, Cd, Sn, Sb, W, Hg, Pb, Bi, Th and U.
Fire Assay	93	Au
Multi-Element Analysis	93	Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Th, Ti, Tl, U, V, W and Zn.
Ionic Leach	93	Ag, As, Au, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Dy, Er, Eu, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, I, In, La, Li, Lu, Mg, Mn, Mo, Nb, Nd, Ni, Pb, Pd, Pd, Pr, Pt, Rb, Re, Sb, Sc, Se, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, and Zr.

Table 3: *Table summarising the number of soil samples and elements analysed for each analytical technique (Data from SHG and ALS Global)*

5. Data Analysis

5.1 Rationale of Data Analysis

Data analysis was focused on identifying and mapping the concentration of typical Au pathfinders, which have a higher mobility than Au and may provide haloes around Au mineralisation. Although the initial focus was directed to As as a pathfinder element (due to associations with arsenopyrite at Dolaucothi), the focus was expanded to other elements that correlate with Au to assist in defining vectors towards potential Au mineralisation. Statistical analysis has been used to determine which elements correlate strongly with Au, and the spatial analysis component has focused on establishing geochemical anomalies within the data to guide mapping and exploration recommendations.

5.2 Statistical Analysis

5.2.1 Pearson's Correlation Matrices

Pearson's correlation matrices were used to determine significant correlations between elements for all analytical techniques, including Au by both FA and IL (see Tables 4-7). Table 7 highlights that Au (IL) correlates strongly with Cu (IL) at 0.74, Ni (IL) at 0.68 and Mn (IL) at 0.59. However, all Au (FA) and remaining Au (IL) correlation values are below the significance threshold of 0.55. The highest values for Au (FA) are with Cu (FA) at 0.16, Cu (pXRF) at 0.22, Zn (IL) at 0.21. The highest values for Au (IL) are with As (pXRF) at 0.21, Mn (ME) at 0.42 and Zn (ME) at 0.47. As has significant correlations with Al, Ca, Fe, K, Mn, Na, Ni, Rb and Zn. Both Cu and Pb have a lack of significant correlations across the majority of the data, but correlate significantly with each other at 0.56 for pXRF. Both Mn and Zn correlate significantly with each other, in addition to both As and Fe.

Pearson's Correlation Matrix for pXRF Soil Data

	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Se	Rb	Sr	Y	Zr	Mo	Cd	Sb	Pb	Bi	Th	U
V	0.30	0.30	0.40	0.51	0.09	0.30	0.29	0.39	0.52	0.11	0.63	-0.15	0.54	0.03	0.06	-0.01	0.06	0.13	-0.09	0.42	0.01
Cr			0.42	0.35	-0.03	0.34	0.20	0.35	0.45	0.02	0.45	-0.16	0.45	0.04	-0.03	0.01	0.05	0.07	-0.08	0.31	-0.05
Mn	0.40	0.42		0.61	-0.02	0.64	0.25	0.81	0.80	-0.07	0.65	-0.33	0.57	0.29	-0.04	-0.06	-0.04	0.17	-0.33	0.47	-0.07
Fe	0.51	0.35	0.61		0.00	0.55	0.20	0.63	0.74	0.24	0.81	-0.38	0.38	-0.15	0.00	-0.04	0.03	-0.01	-0.27	0.43	-0.13
Co	0.09	-0.03	-0.02	0.00		0.06	0.26	0.04	-0.03	0.23	0.01	-0.02	0.04	-0.03	0.00	0.00	0.00	0.26	-0.03	0.05	-0.01
Ni	0.30	0.34	0.64	0.55	0.06		0.18	0.64	0.57	-0.02	0.50	-0.22	0.42	0.21	-0.03	-0.05	-0.03	0.12	-0.23	0.38	-0.05
Cu	0.29	0.20	0.25	0.20	0.26	0.18		0.27	0.23	0.12	0.27	-0.19	0.37	0.12	0.00	0.01	0.00	0.56	-0.07	0.25	-0.06
Zn	0.39	0.35	0.81	0.63	0.04	0.64	0.27		0.70	-0.05	0.67	-0.34	0.58	0.23	-0.04	-0.07	-0.02	0.17	-0.34	0.43	-0.09
As	0.52	0.45	0.80	0.74	-0.03	0.57	0.23	0.70		-0.03	0.81	-0.36	0.59	0.08	-0.01	-0.05	0.00	0.06	-0.29	0.50	-0.10
Se	0.11	0.02	-0.07	0.24	0.23	-0.02	0.12	-0.05	-0.03		-0.02	0.04	0.00	-0.04	0.20	-0.03	-0.02	0.15	0.02	-0.02	-0.03
Rb	0.63	0.45	0.65	0.81	0.01	0.50	0.27	0.67	0.81	-0.02		-0.46	0.66	-0.15	-0.05	-0.04	0.07	0.01	-0.25	0.55	-0.13
Sr	-0.15	-0.16	-0.33	-0.38	-0.02	-0.22	-0.19	-0.34	-0.36	0.04	-0.46		-0.17	0.04	0.14	-0.01	-0.01	0.05	0.00	-0.12	0.52
Y	0.54	0.45	0.57	0.38	0.04	0.42	0.37	0.58	0.59	0.00	0.66	-0.17		0.33	-0.02	-0.03	0.06	0.21	-0.20	0.53	-0.07
Zr	0.03	0.04	0.29	-0.15	-0.03	0.21	0.12	0.23	0.08	-0.04	-0.15	0.04	0.33		0.01	0.03	-0.07	0.16	-0.10	0.09	0.01
Mo	0.06	-0.03	-0.04	0.00	0.00	-0.03	0.00	-0.04	-0.01	0.20	-0.05	0.14	-0.02	0.01		0.00	0.00	0.01	0.10	-0.06	-0.01
Cd	-0.01	0.01	-0.06	-0.04	0.00	-0.05	0.01	-0.07	-0.05	-0.03	-0.04	-0.01	-0.03	0.03	0.00		0.00	-0.07	0.11	-0.08	-0.01
Sb	0.06	0.05	-0.04	0.03	0.00	-0.03	0.00	-0.02	0.00	-0.02	0.07	-0.01	0.06	-0.07	0.00	0.00		-0.04	-0.03	0.06	-0.01
Pb	0.13	0.07	0.17	-0.01	0.26	0.12	0.56	0.17	0.06	0.15	0.01	0.05	0.21	0.16	0.01	-0.07	-0.04		0.01	0.07	0.08
Bi	-0.09	-0.08	-0.33	-0.27	-0.03	-0.23	-0.07	-0.34	-0.29	0.02	-0.25	0.00	-0.20	-0.10	0.10	0.11	-0.03	0.01		-0.23	-0.06
Th	0.42	0.31	0.47	0.43	0.05	0.38	0.25	0.43	0.50	-0.02	0.55	-0.12	0.53	0.09	-0.06	-0.08	0.06	0.07	-0.23		-0.03
U	0.01	-0.05	-0.07	-0.13	-0.01	-0.05	-0.06	-0.09	-0.10	-0.03	-0.13	0.52	-0.07	0.01	-0.01	-0.01	-0.01	0.08	-0.06	-0.03	

Table 4: *Pearson's correlation matrix for pXRF data. Values greater than 0.55 have been classed as significant. Green = 0.55-0.60, Yellow = 0.61-0.70, Orange = 0.71-0.80, Red = 0.80+. The pXRF has significantly higher detection limits relative to the lab-based techniques used and required the removal of some elemental data that was below the LOD (Ag, Sn, W and Hg) (Data from SHG and ALS Global)*

Pearson's Correlation Matrix for pXRF Soil Data with Au

	Au (FA)	***Au (IL)***	***V***	***Cr***	***Mn***	***Fe***	***Ni***	***Cu***	***Zn***	***As***	***Se***	***Rb***	***Sr***	***Y***	***Zr***	***Pb***	***Bi***	***Th***	***U***
Au (FA)		-0.10	-0.08	-0.03	0.07	**-0.21**	0.10	**0.16**	-0.09	-0.04	-0.02	-0.15	-0.04	-0.05	0.11	**0.19**	0.00	-0.11	0.05
Au (IL)	-0.10		0.00	**0.27**	0.11	0.05	0.14	-0.05	0.13	**0.21**	-0.05	0.19	0.00	**0.26**	-0.08	0.02	0.06	0.02	-0.07
V	-0.08	0.00		0.43	0.57	0.59	0.40	0.30	0.50	0.63	0.05	0.71	-0.27	0.59	0.16	0.06	-0.24	0.54	0.07
Cr	-0.03	**0.27**	0.43		0.57	0.38	0.44	0.24	0.49	0.46	0.04	0.47	-0.27	0.47	0.21	0.10	-0.11	0.31	-0.06
Mn	0.07	0.11	0.57	0.57		0.66	0.59	0.29	0.82	0.80	-0.04	0.73	-0.42	0.61	0.31	0.22	-0.34	0.55	-0.08
Fe	**-0.21**	0.05	0.59	0.38	0.66		0.57	0.20	0.66	0.79	0.22	0.88	-0.46	0.36	-0.11	-0.16	-0.39	0.57	-0.11
Ni	0.10	0.14	0.40	0.44	0.59	0.57		0.11	0.51	0.56	0.04	0.54	-0.28	0.39	0.17	-0.07	-0.17	0.45	-0.05
Cu	**0.16**	-0.05	0.30	0.24	0.29	0.20	0.11		0.32	0.31	0.00	0.34	-0.26	0.40	0.26	0.39	-0.16	0.20	0.06
Zn	-0.09	0.13	0.50	0.49	0.82	0.66	0.51	0.32		0.71	-0.03	0.74	-0.42	0.58	0.18	0.19	-0.40	0.52	-0.07
As	-0.04	**0.21**	0.63	0.46	0.80	0.79	0.56	0.31	0.71		0.01	0.86	-0.43	0.58	0.13	0.06	-0.40	0.63	-0.08
Se	-0.02	-0.05	0.05	0.04	-0.04	0.22	0.04	0.00	-0.03	0.01		0.05	0.02	-0.09	0.00	-0.20	-0.07	0.09	-0.03
Rb	-0.15	0.19	0.71	0.47	0.73	0.88	0.54	0.34	0.74	0.86	0.05		-0.54	0.66	0.01	-0.01	-0.40	0.59	-0.07
Sr	-0.04	0.00	-0.27	-0.27	-0.42	-0.46	-0.28	-0.26	-0.42	-0.43	0.02	-0.54		-0.26	-0.07	0.03	0.06	-0.18	0.10
Y	-0.05	**0.26**	0.59	0.47	0.61	0.36	0.39	0.40	0.58	0.58	-0.09	0.66	-0.26		0.50	0.12	-0.25	0.46	-0.11
Zr	0.11	-0.08	0.16	0.21	0.31	-0.11	0.17	0.26	0.18	0.13	0.00	0.01	-0.07	0.50		0.15	-0.10	0.18	0.05
Pb	**0.19**	0.02	0.06	0.10	0.22	-0.16	-0.07	0.39	0.19	0.06	-0.20	-0.01	0.03	0.12	0.15		-0.04	-0.17	0.19
Bi	0.00	0.06	-0.24	-0.11	-0.34	-0.39	-0.17	-0.16	-0.40	-0.40	-0.07	-0.40	0.06	-0.25	-0.10	-0.04		-0.31	-0.06
Th	-0.11	0.02	0.54	0.31	0.55	0.57	0.45	0.20	0.52	0.63	0.09	0.59	-0.18	0.46	0.18	-0.17	-0.31		-0.10
U	0.05	-0.07	0.07	-0.06	-0.08	-0.11	-0.05	0.06	-0.07	-0.08	-0.03	-0.07	0.10	-0.11	0.05	0.19	-0.06	-0.10	

Table 5: *Pearson's correlation matrix for pXRF data, including Au for fire assay (Au FA) and ionic leach (Au IL). Values greater than 0.55 have been classed as significant. Green = 0.55-0.60, Yellow = 0.61-0.70, Orange = 0.71-0.80, Red = 0.80+. Numbers in bolded red text highlight the highest correlations with Au that are below 0.55. (Data from SHG and ALS Global)*

Pearson's Correlation Matrix for Multi-Element Analysis Soil Data

	Au (FA)	*Au (IL)*	*Ag*	*Al*	*As*	*Ba*	*Be*	*Bi*	*Ca*	*Cd*	*Co*	*Cr*	*Cu*	*Fe*	*Ga*	*K*	*La*	*Mg*	*Mn*	*Mo*	*Na*	*Ni*	*P*	*Pb*	*S*	*Sb*	*Sc*	*Sr*	*Th*	*Ti*	*Tl*	*V*	*Zn*
Au (FA)		-0.08	-0.04	-0.01	-0.06	0.10	-0.02	0.02	0.07	-0.10	0.12	0.02	0.22	0.00	0.05	0.01	0.05	0.09	0.00	0.18	0.09	0.10	-0.05	0.05	-0.14	0.03	0.00	-0.16	0.05	0.05	-0.06	-0.03	0.04
Au (IL)	-0.08		-0.07	0.18	**0.35**	0.09	0.25	-0.02	0.26	0.07	0.27	**0.32**	0.04	0.22	0.21	0.27	0.17	0.27	**0.42**	-0.15	0.28	0.31	**0.47**	-0.14	-0.06	-0.02	0.21	-0.25	-0.01	-0.12	-0.01	0.22	**0.47**
Ag	-0.04	-0.07		-0.02	-0.13	-0.12	-0.06	0.05	-0.10	-0.02	-0.11	0.01	0.00	-0.12	-0.12	-0.11	-0.19	-0.10	-0.08	0.00	-0.11	-0.12	-0.02	0.20	0.03	-0.05	-0.03	0.08	-0.01	0.00	-0.02	-0.07	-0.11
Al	-0.01	0.18	-0.02		0.75	0.73	0.92	0.01	0.66	0.18	0.34	0.81	0.29	0.82	0.80	0.90	0.61	0.61	0.45	0.38	0.80	0.38	0.34	-0.04	-0.32	0.28	0.97	-0.40	0.31	-0.39	-0.02	0.87	0.45
As	-0.06	**0.35**	-0.13	0.75		0.52	0.85	-0.07	0.68	0.34	0.41	0.83	0.09	0.80	0.72	0.86	0.57	0.64	0.70	0.18	0.74	0.48	0.52	-0.06	-0.23	0.24	0.73	-0.50	0.26	-0.59	0.04	0.80	0.61
Ba	0.10	0.09	-0.12	0.73	0.52		0.72	-0.10	0.47	0.09	0.18	0.55	0.32	0.59	0.64	0.77	0.65	0.44	0.25	0.37	0.64	0.22	0.13	-0.21	-0.51	0.18	0.77	-0.51	0.22	-0.10	0.01	0.65	0.23
Be	-0.02	0.25	-0.06	0.92	0.85	0.72		-0.01	0.74	0.20	0.47	0.91	0.24	0.87	0.82	0.98	0.65	0.73	0.61	0.31	0.91	0.54	0.48	-0.06	-0.33	0.23	0.92	-0.56	0.25	-0.49	0.02	0.86	0.63
Bi	0.02	-0.02	0.05	0.01	-0.07	-0.10	-0.01		0.11	0.04	0.00	0.04	0.08	-0.06	0.01	-0.05	-0.13	0.05	0.11	-0.10	-0.03	0.08	0.04	0.27	0.01	0.09	-0.01	0.13	0.05	0.05	-0.03	0.06	0.05
Ca	0.07	0.26	-0.10	0.66	0.68	0.47	0.74	0.11		0.23	0.45	0.76	0.07	0.64	0.61	0.73	0.50	0.68	0.71	0.05	0.70	0.60	0.51	-0.02	-0.20	0.21	0.64	-0.41	0.24	-0.37	0.13	0.67	0.64
Cd	-0.10	0.07	-0.02	0.18	0.34	0.09	0.20	0.04	0.23		0.05	0.29	-0.01	0.16	0.16	0.20	0.15	0.19	0.42	-0.06	0.11	0.14	0.23	0.03	-0.07	0.13	0.13	-0.16	-0.02	-0.20	-0.04	0.24	0.21
Co	0.12	0.27	-0.11	0.34	0.41	0.18	0.47	0.00	0.45	0.05		0.55	0.22	0.56	0.39	0.48	0.19	0.84	0.61	-0.03	0.68	0.86	0.34	0.14	-0.27	0.12	0.28	-0.50	-0.03	-0.47	0.08	0.32	0.74
Cr	0.02	**0.32**	0.01	0.81	0.83	0.55	0.91	0.04	0.76	0.29	0.55		0.20	0.83	0.76	0.88	0.58	0.79	0.78	0.20	0.86	0.66	0.58	0.01	-0.25	0.22	0.78	-0.56	0.15	-0.55	0.06	0.83	0.72
Cu	**0.22**	0.04	0.00	0.29	0.09	0.32	0.24	0.08	0.07	-0.01	0.22	0.20		0.12	0.20	0.24	0.06	0.25	0.08	0.31	0.28	0.21	0.13	0.42	-0.19	-0.13	0.31	-0.26	-0.03	-0.17	-0.05	0.16	0.19
Fe	0.00	0.22	-0.12	0.82	0.80	0.59	0.87	-0.06	0.64	0.16	0.56	0.83	0.12		0.77	0.86	0.49	0.75	0.60	0.28	0.85	0.58	0.38	-0.11	-0.29	0.31	0.78	-0.52	0.19	-0.59	0.05	0.80	0.60
Ga	0.05	0.21	-0.12	0.80	0.72	0.64	0.82	0.01	0.61	0.16	0.39	0.76	0.20	0.77		0.83	0.58	0.58	0.48	0.34	0.75	0.39	0.40	-0.01	-0.28	0.24	0.78	-0.48	0.26	-0.40	0.10	0.79	0.49
K	0.01	0.27	-0.11	0.90	0.86	0.77	0.98	-0.05	0.73	0.20	0.48	0.88	0.24	0.86	0.83		0.68	0.74	0.61	0.28	0.91	0.54	0.47	-0.08	-0.37	0.25	0.90	-0.60	0.27	-0.47	0.03	0.86	0.63
La	0.05	0.17	-0.19	0.61	0.57	0.65	0.65	-0.13	0.50	0.15	0.19	0.58	0.06	0.49	0.58	0.68		0.38	0.35	0.19	0.56	0.20	0.29	-0.23	-0.42	0.13	0.66	-0.41	0.17	0.00	0.11	0.66	0.30
Mg	0.09	0.27	-0.10	0.61	0.64	0.44	0.73	0.05	0.68	0.19	0.84	0.79	0.25	0.75	0.58	0.74	0.38		0.75	0.13	0.88	0.90	0.41	0.14	-0.35	0.24	0.54	-0.60	0.07	-0.57	0.08	0.61	0.79
Mn	0.00	**0.42**	-0.08	0.45	0.70	0.25	0.61	0.11	0.71	0.42	0.61	0.78	0.08	0.60	0.48	0.61	0.35	0.75		-0.11	0.64	0.72	0.70	0.06	-0.21	0.14	0.41	-0.52	0.01	-0.51	0.08	0.62	0.81
Mo	0.18	-0.15	0.00	0.38	0.18	0.37	0.31	-0.10	0.05	-0.06	-0.03	0.20	0.31	0.28	0.34	0.28	0.19	0.13	-0.11		0.22	-0.05	-0.08	0.19	-0.14	0.17	0.36	-0.16	0.10	-0.16	-0.01	0.36	-0.07
Na	0.09	0.28	-0.11	0.80	0.74	0.64	0.91	-0.03	0.70	0.11	0.68	0.86	0.28	0.85	0.75	0.91	0.56	0.88	0.64	0.22		0.71	0.40	-0.04	-0.39	0.26	0.78	-0.62	0.25	-0.48	0.03	0.73	0.68
Ni	0.10	0.31	-0.12	0.38	0.48	0.22	0.54	0.08	0.60	0.14	0.86	0.66	0.21	0.58	0.39	0.54	0.20	0.90	0.72	-0.05	0.71		0.42	0.14	-0.24	0.14	0.32	-0.53	-0.07	-0.51	0.09	0.39	0.78
P	-0.05	**0.47**	-0.02	0.34	0.52	0.13	0.48	0.04	0.51	0.23	0.34	0.58	0.13	0.38	0.40	0.47	0.29	0.41	0.70	-0.08	0.40	0.42		0.15	0.09	-0.06	0.36	-0.27	-0.05	-0.45	0.08	0.51	0.79
Pb	0.05	-0.14	0.20	-0.04	-0.06	-0.21	-0.06	0.27	-0.02	0.03	0.14	0.01	0.42	-0.11	-0.01	-0.08	-0.23	0.14	0.06	0.19	-0.04	0.14	0.15		0.16	-0.09	-0.09	0.01	-0.12	-0.31	-0.03	-0.04	0.16
S	-0.14	-0.06	0.03	-0.32	-0.23	-0.51	-0.33	0.01	-0.20	-0.07	-0.27	-0.25	-0.19	-0.29	-0.28	-0.37	-0.42	-0.35	-0.21	-0.14	-0.39	-0.24	0.09	0.16		-0.07	-0.30	0.70	-0.07	-0.01	-0.04	-0.33	-0.12
Sb	0.03	-0.02	-0.05	0.28	0.24	0.18	0.23	0.09	0.21	0.13	0.12	0.22	-0.13	0.31	0.24	0.25	0.13	0.24	0.14	0.17	0.26	0.14	-0.06	-0.09	-0.07		0.21	-0.07	0.25	-0.05	0.14	0.26	0.05
Sc	0.00	0.21	-0.03	0.97	0.73	0.77	0.92	-0.01	0.64	0.13	0.28	0.78	0.31	0.78	0.78	0.90	0.66	0.54	0.41	0.36	0.78	0.32	0.36	-0.09	-0.30	0.21		-0.40	0.28	-0.28	-0.02	0.86	0.43
Sr	-0.16	-0.25	0.08	-0.40	-0.50	-0.51	-0.56	0.13	-0.41	-0.16	-0.50	-0.56	-0.26	-0.52	-0.48	-0.60	-0.41	-0.60	-0.52	-0.16	-0.62	-0.53	-0.27	0.01	0.70	-0.07	-0.40		-0.01	0.41	-0.08	-0.44	-0.52
Th	0.05	-0.01	-0.01	0.31	0.26	0.22	0.25	0.05	0.24	-0.02	-0.03	0.15	-0.03	0.19	0.26	0.27	0.17	0.07	0.01	0.10	0.25	-0.07	-0.05	-0.12	-0.07	0.25	0.28	-0.01		-0.04	-0.02	0.19	-0.05
Ti	0.05	-0.12	0.00	-0.39	-0.59	-0.10	-0.49	0.05	-0.37	-0.20	-0.47	-0.55	-0.17	-0.59	-0.40	-0.47	0.00	-0.57	-0.51	-0.16	-0.48	-0.51	-0.45	-0.31	-0.01	-0.05	-0.28	0.41	-0.04		-0.07	-0.41	-0.59
Tl	-0.06	-0.01	-0.02	-0.02	0.04	0.01	0.02	-0.03	0.13	-0.04	0.08	0.06	-0.05	0.05	0.10	0.03	0.11	0.08	0.08	-0.01	0.03	0.09	0.08	-0.03	-0.04	0.14	-0.02	-0.08	-0.02	-0.07		0.07	0.07
V	-0.03	0.22	-0.07	0.87	0.80	0.65	0.86	0.06	0.67	0.24	0.32	0.83	0.16	0.80	0.79	0.86	0.66	0.61	0.62	0.36	0.73	0.39	0.51	-0.04	-0.33	0.26	0.86	-0.44	0.19	-0.41	0.07		0.52
Zn	0.04	**0.47**	-0.11	0.45	0.61	0.23	0.63	0.05	0.64	0.21	0.74	0.72	0.19	0.60	0.49	0.63	0.30	0.79	0.81	-0.07	0.68	0.78	0.79	0.16	-0.12	0.05	0.43	-0.52	-0.05	-0.59	0.07	0.52	

Table 6: *Pearson's correlation matrix for multi-element data, including Au for fire assay (Au FA) and ionic leach (Au IL). Values greater than 0.55 have been classed as significant. Blue = 0.55-0.60, Green = 0.61-0.70, Yellow = 0.71-0.80, Orange = 0.80-0.90, Red = 0.90+. U and W have been removed as all data points were below the LOD. Numbers in bolded red text highlight the highest correlations with Au that are below 0.55. (Data from SHG and ALS Global)*

Pearson's Correlation Matrix for Ionic Leach Soil Data

	Au (FA)	*Au (IL)*	*As*	*Ba*	*Ca*	*Cu*	*Fe*	*Hg*	*Mn*	*Ni*	*Pb*	*Rb*	*Sm*	*Sr*	*Te*	*Ti*	*Zn*
Au (FA)		-0.08	0.02	0.00	-0.03	**0.17**	0.13	0.00	-0.02	-0.09	-0.03	0.15	-0.09	-0.05	**0.20**	-0.02	**0.21**
Au (IL)	-0.08		0.21	-0.07	0.53	0.74	0.09	0.47	0.59	0.68	0.23	0.38	0.54	0.37	0.25	-0.03	0.22
As	0.02	0.21		0.29	-0.26	0.23	0.52	0.69	0.11	0.15	0.24	0.06	0.38	-0.09	0.59	0.60	0.25
Ba	0.00	-0.07	0.29		0.01	-0.08	0.05	0.30	0.03	0.17	-0.06	0.31	0.47	0.21	0.21	0.58	-0.09
Ca	-0.03	0.53	-0.26	0.01		0.45	-0.38	-0.07	0.43	0.63	0.13	0.34	0.39	0.80	-0.15	-0.40	0.13
Cu	**0.17**	0.74	0.23	-0.08	0.45		0.02	0.33	0.41	0.56	0.41	0.33	0.48	0.26	0.31	-0.04	0.35
Fe	0.13	0.09	0.52	0.05	-0.38	0.02		0.54	0.02	-0.17	-0.21	0.25	-0.12	-0.28	0.70	0.29	0.11
Hg	0.00	0.47	0.69	0.30	-0.07	0.33	0.54		0.21	0.26	0.12	0.27	0.37	-0.06	0.62	0.46	0.09
Mn	-0.02	0.59	0.11	0.03	0.43	0.41	0.02	0.21		0.81	0.15	0.58	0.56	0.49	0.18	-0.22	0.47
Ni	-0.09	0.68	0.15	0.17	0.63	0.56	-0.17	0.26	0.81		0.34	0.49	0.78	0.64	0.11	-0.09	0.38
Pb	-0.03	0.23	0.24	-0.06	0.13	0.41	-0.21	0.12	0.15	0.34		0.02	0.35	0.18	0.01	-0.08	0.41
Rb	0.15	0.38	0.06	0.31	0.34	0.33	0.25	0.27	0.58	0.49	0.02		0.32	0.39	0.38	-0.10	0.49
Sm	-0.09	0.54	0.38	0.47	0.39	0.48	-0.12	0.37	0.56	0.78	0.35	0.32		0.44	0.21	0.37	0.13
Sr	-0.05	0.37	-0.09	0.21	0.80	0.26	-0.28	-0.06	0.49	0.64	0.18	0.39	0.44		-0.12	-0.30	0.23
Te	**0.20**	0.25	0.59	0.21	-0.15	0.31	0.70	0.62	0.18	0.11	0.01	0.38	0.21	-0.12		0.43	0.29
Ti	-0.02	-0.03	0.60	0.58	-0.40	-0.04	0.29	0.46	-0.22	-0.09	-0.08	-0.10	0.37	-0.30	0.43		-0.16
Zn	**0.21**	0.22	0.25	-0.09	0.13	0.35	0.11	0.09	0.47	0.38	0.41	0.49	0.13	0.23	0.29	-0.16	

Table 7: *Pearson's correlation matrix for selected ionic leach data (As-Ba-Ca-Cu-Fe-Hg-Mn-Ni-Pb-Rb-Sm-Sr-Te-Ti-Zn), including Au for fire assay (Au FA) and ionic leach (Au IL). Values greater than 0.55 have been classed as significant. Green = 0.55-0.60, Yellow = 0.61-0.70, Orange = 0.71-0.80, Red = 0.80+. Numbers in bolded red text highlight the highest correlations with Au that are below 0.55. (Data from SHG and ALS Global)*

5.2.2 Summary Statistics

Summary statistics were calculated to assist in determining the distribution of the data (see Figure 18). The highest Au concentrations include 0.007ppm for fire assay and 0.14ppb for ionic leach. As (pXRF), As (IL), Cu (pXRF), Cu (IL), Mn (pXRF), Mn (ME), Mn (IL), Pb (IL) and Zn (IL) all had significantly different arithmetic means, geometric means and medians. In addition, all ionic leach data and the majority of other datasets had skewness factors above one. This analysis suggests that the majority of the data is not normally distributed and has required log-probability plots to determine different data populations.

5.2.3 Histograms

Histograms were created to visualise the distribution of the data and highlight anomalous values. In particular, Figures 19 and 20 show that histograms for Au (FA) and Au (IL) have negatively skewed distributions. Additionally, Figures 21 and 22 show that As and Cu have negatively skewed distributions across all analytical techniques. For Cu, Fe, Mn and Zn pXRF histograms, the first class typically had an anomalously high frequency due to higher LODs. See Appendix 6 for a complete set of histograms.

5.2.4 Box and Whisker Plots

Box and whisker plots were constructed to determine potential outliers within the data and assist in determining different classes for the mapped elements. Figures 23 and 24 highlight the spread of anomalies for both Au (FA) and Au (IL). Figure 25 shows that more anomalies are present for As and Cu analysed by Ionic leach compared to multi-element analysis and pXRF. See Appendix 7 for a complete set of Box and Whisker plots.

5.2.5 Log Probability Plots

Log probability plots have been constructed to determine different data populations within each elemental dataset. The majority of the log probability graphs show populations that move into distinct background, anomalous and highly anomalous populations, delineated by inflection points in the curve (see Figures 28-33). This information is critical to implement spatially by using different class ranges, assisting with the visual interpretation of the data. See Appendix 8 for a complete set of log-probability plots.

XRF Summary Statistics

	As (ppm)	Cu (ppm)	Fe (%)	Mn (ppm)	Pb (ppm)	Zn (ppm)
Geometric Mean	6.760	6.138	1.076	10.593	15.000	12.019
Mean	10.405	9.537	1.806	66.561	16.251	15.863
Standard Error	0.471	0.493	0.077	5.182	0.424	0.688
Median	9	10	1.856	24.5	15.15	11.3
Mode	1	1	0.065	1	16	1
Standard Deviation	8.078	8.450	1.323	88.854	7.266	11.792
Sample Variance	65.261	71.404	1.750	7895.100	52.800	139.057
Kurtosis	0.364	43.457	-0.881	0.791	16.808	2.139
Skewness	0.862	4.706	0.275	1.322	2.916	1.371
Range	42.5	97	5.601	374	74	74
Minimum	1	1	0.043	1	1	1
Maximum	43.5	98	5.644	375	75	75
Sum	3059.1	2804	530.912	19569	4777.8	4663.6
Count	294	294	294	294	294	294

Fire Assay and Multi-Element Summary Statistics

	Au (ppm)	Al (%)	As (ppm)	Cu (ppm)	Fe (%)	Mn (ppm)	Pb (ppm)	Zn (ppm)
Geometric Mean	0.002	5.666	14.408	16.172	1.532	77.218	25.470	19.703
Mean	0.001	5.839	13.882	17.301	2.515	118.183	26.602	24.409
Standard Error	0.000	0.149	1.131	0.932	0.195	10.862	0.880	1.629
Median	0.001	5.79	11	16	2.72	72	26	19
Mode	0.001	4.52	0	18	0.35	19	26	10
Standard Deviation	0.001	1.439	10.904	8.984	1.879	104.747	8.488	15.712
Sample Variance	0.000	2.071	118.888	80.713	3.531	10971.847	72.047	246.875
Kurtosis	4.713	0.154	-0.261	49.807	-0.830	-0.072	3.707	-0.323
Skewness	1.515	0.491	0.620	6.173	0.307	1.010	1.595	0.787
Range	0.007	7.08	42	84	7.51	375	47	62
Minimum	0	3.02	0	7	0.13	13	13	5
Maximum	0.007	10.1	42	91	7.64	388	60	67
Sum	0.138	543.03	1291	1609	233.85	10991	2474	2270
Count	93	93	93	93	93	93	93	93

Ionic Leach Summary Statistics

	Au (ppb)	As (ppb)	Cu (ppb)	Fe (ppm)	Mn (ppm)	Pb (ppb)	Zn (ppb)
Geometric mean	0.043	31.816	54.361	168.070	0.259	734.368	345.153
Mean	0.022	42.325	100.011	188.003	1.475	1240.891	661.075
Standard Error	0.004	3.703	11.849	9.445	0.243	122.650	74.637
Median	0	30.4	52	182	0.15	988	410
Mode	0	12.4	7	218	0.02	291	10
Standard Deviation	0.035	35.707	114.271	91.084	2.339	1182.792	719.771
Sample Variance	0.001	1274.962	13057.750	8296.249	5.472	1398998	518070.6
Kurtosis	2.542	3.545	3.206	5.577	2.278	2.240	4.998
Skewness	1.775	1.857	1.836	1.683	1.770	1.535	2.051
Range	0.14	174.4	575	546.3	9.61	5462.9	3880
Minimum	0	7.1	1	32.7	0	57.1	10
Maximum	0.14	181.5	576	579	9.61	5520	3890
Sum	2.05	3936.2	9301	17484.3	137.2	115402.9	61480
Count	93	93	93	93	93	93	93

Figure 18: *Summary statistics for Au, Al, As, Cu, Fe, Mn, Pb and Zn analysed by pXRF, fire assay, multi-element analysis and ionic leach (Data from SHG and ALS Global)*

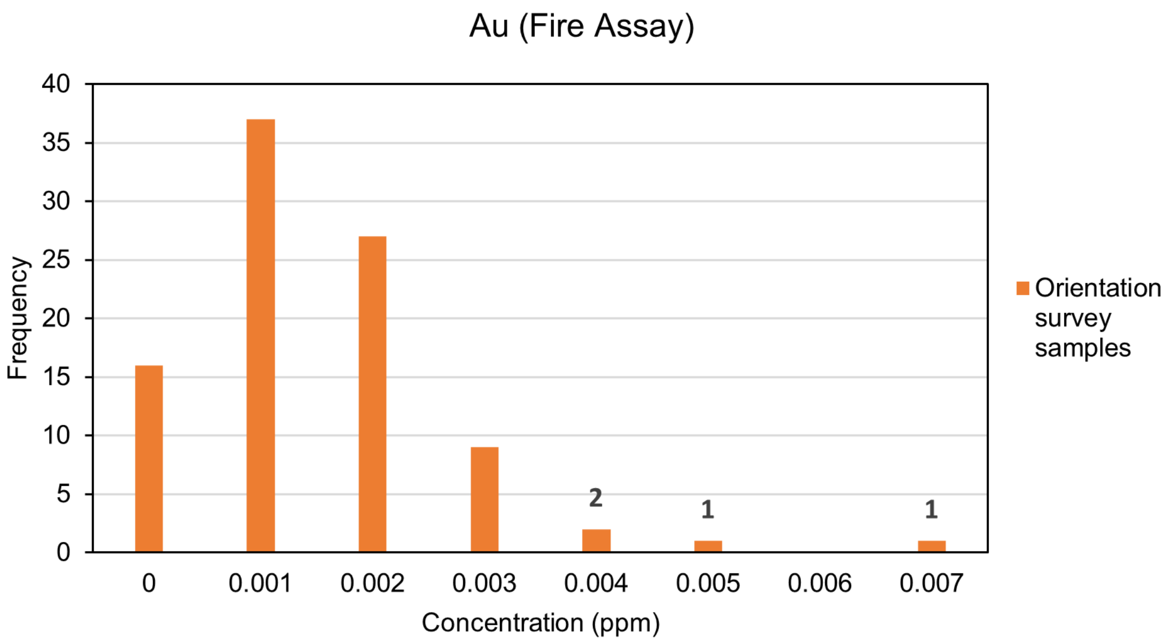

Figure 19: *Histogram for Au analysed by fire assay. The highest value analysed was 0.007ppm, with only 4 samples being 0.004ppm and above*

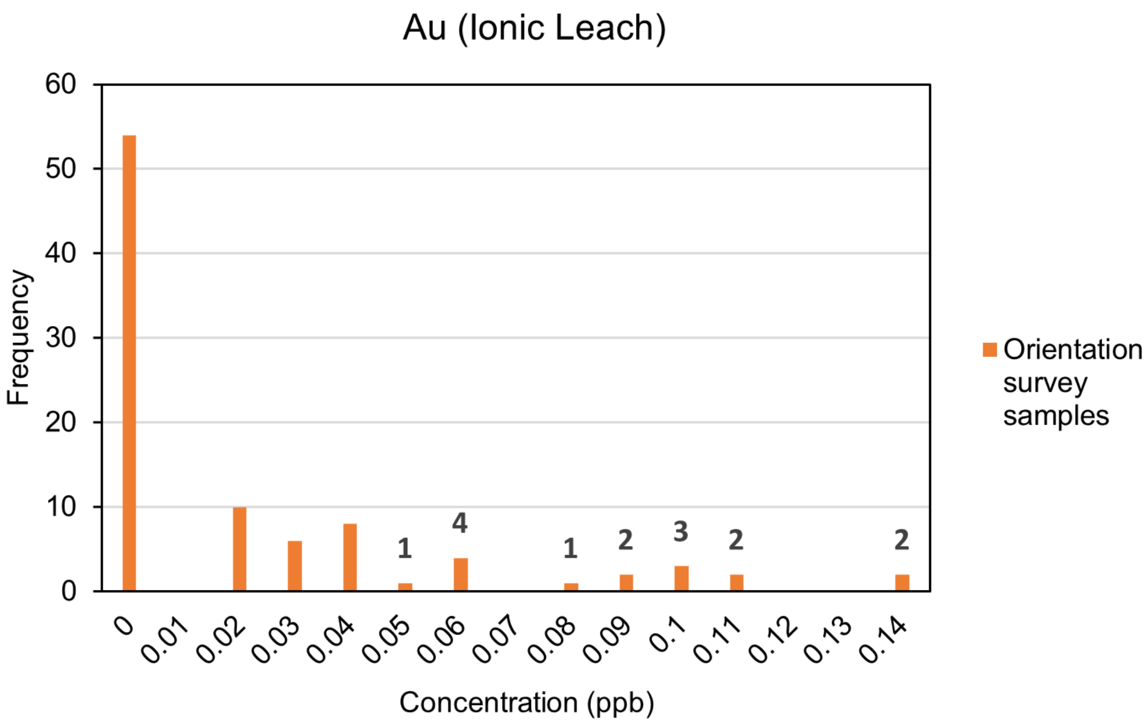

Figure 20: *Histogram for Au analysed by ionic leach. The first class of concentration 0ppb has a high population due to many samples analysed having concentrations below the LOD*

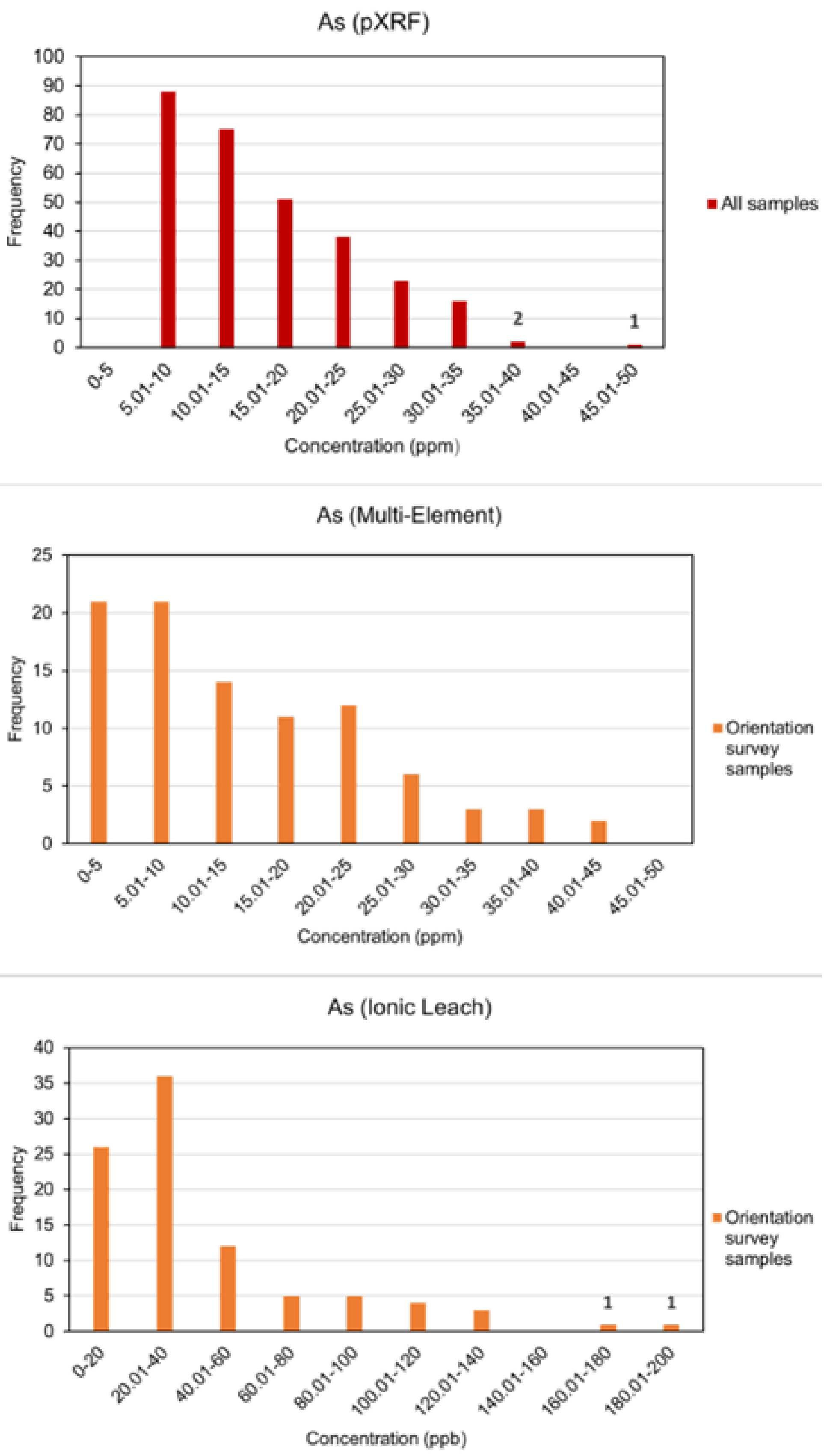

Figure 21: *Histograms for As analysed by pXRF, multi-element analysis and ionic leach*

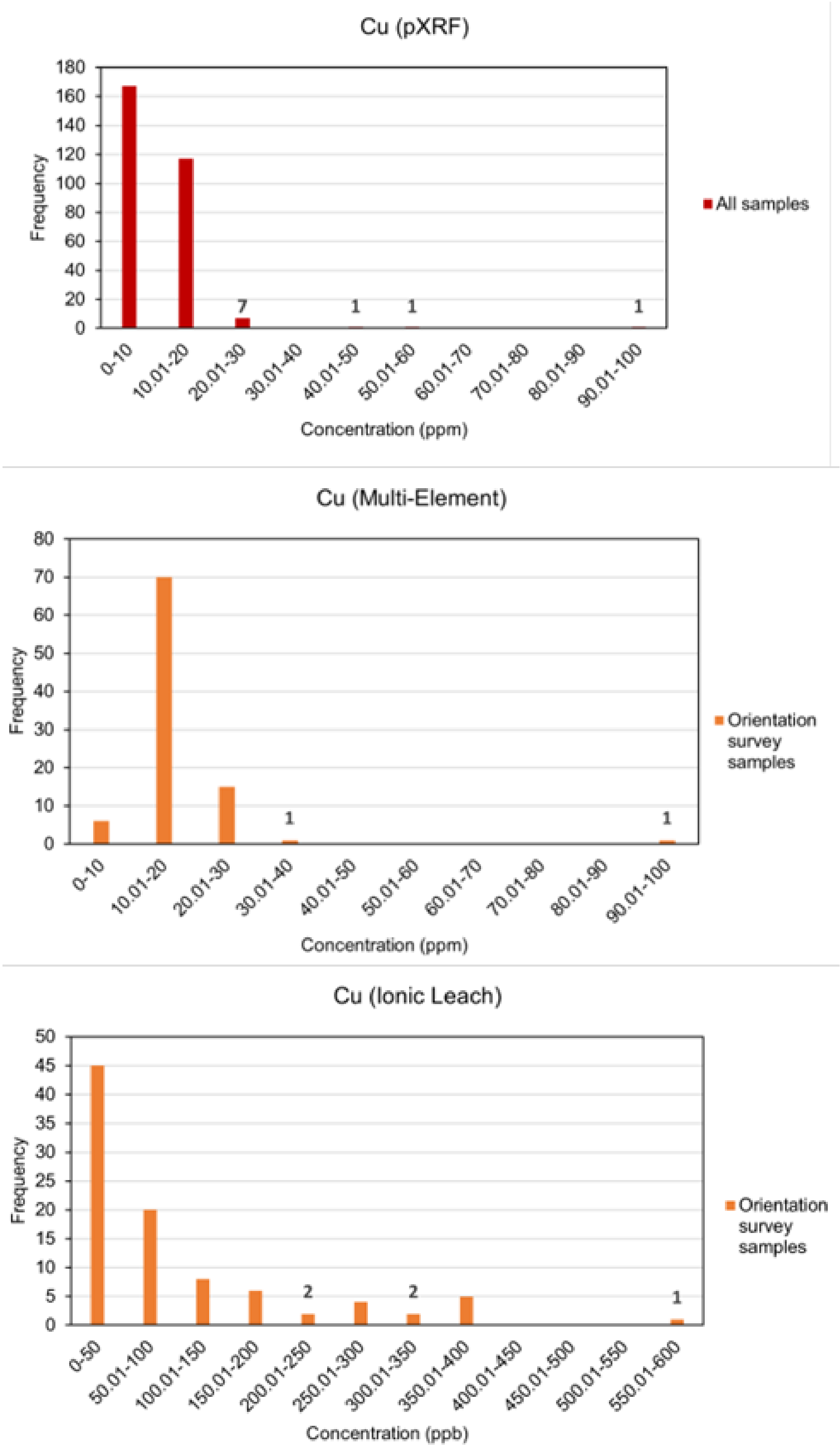

Figure 22: *Histograms for Cu analysed by pXRF, multi-element analysis and ionic leach*

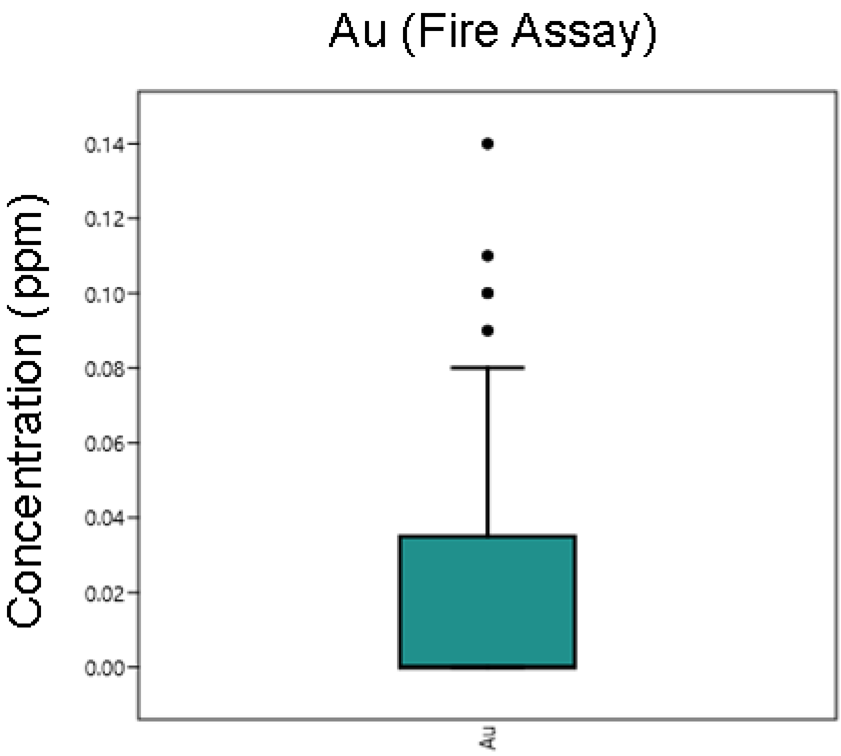

Figure 23: *Box and Whisker plot for Au analysed by fire assay*

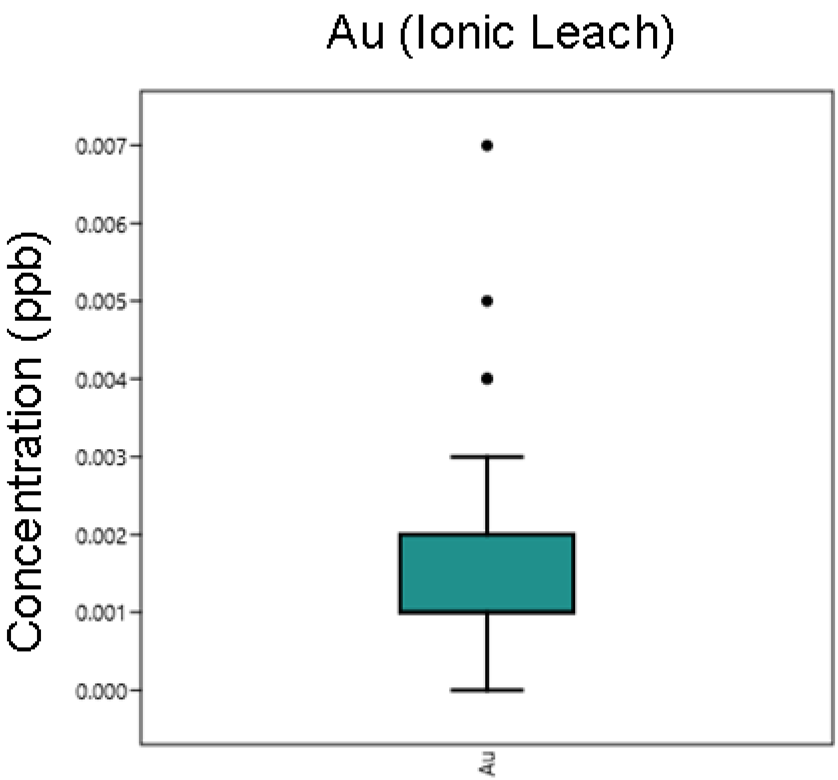

Figure 24: *Box and Whisker plot for Au analysed by ionic leach*

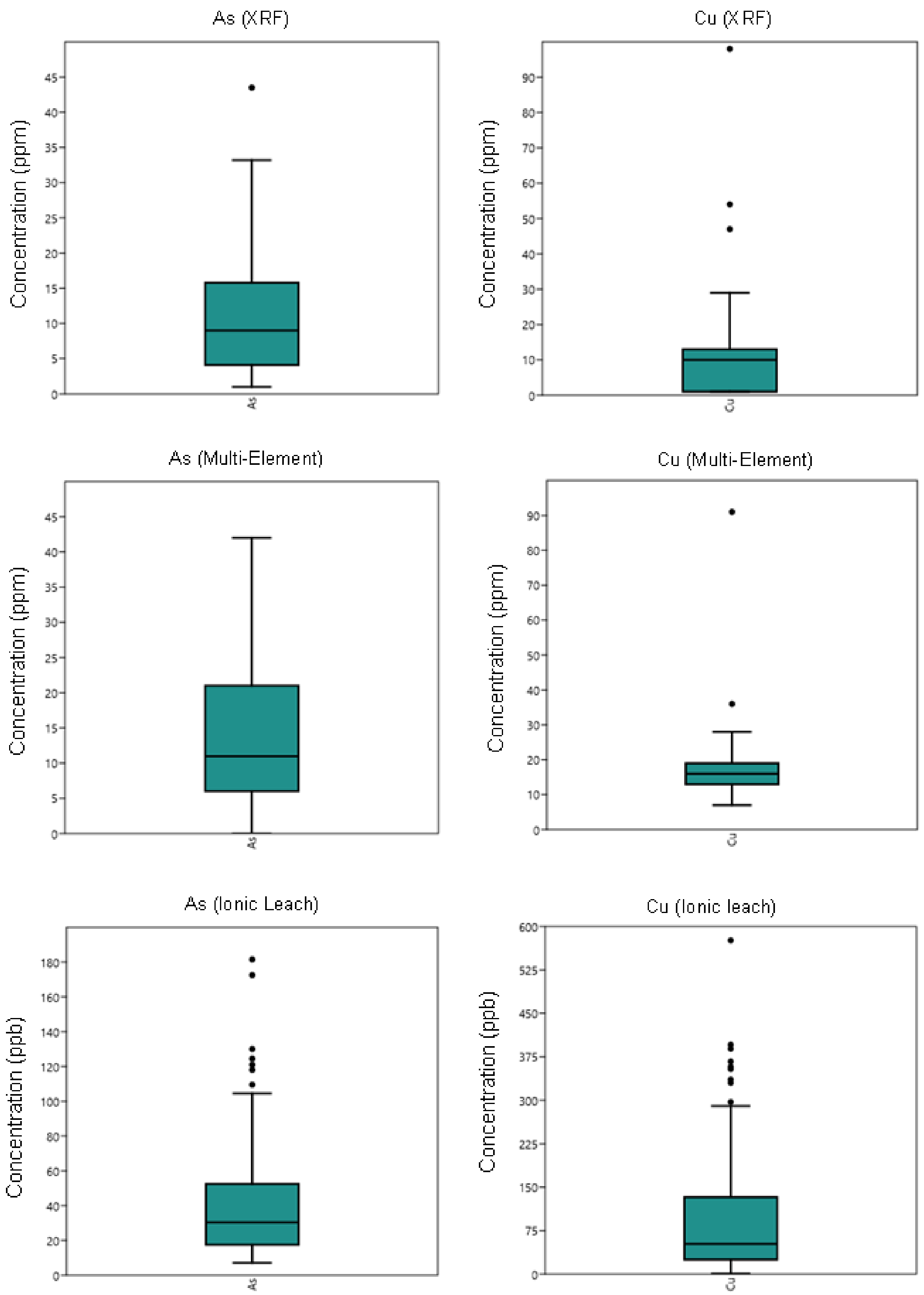

Figure 25: *Box and Whisker plots for As and Cu analysed by pXRF, multi-element analysis and ionic leach*

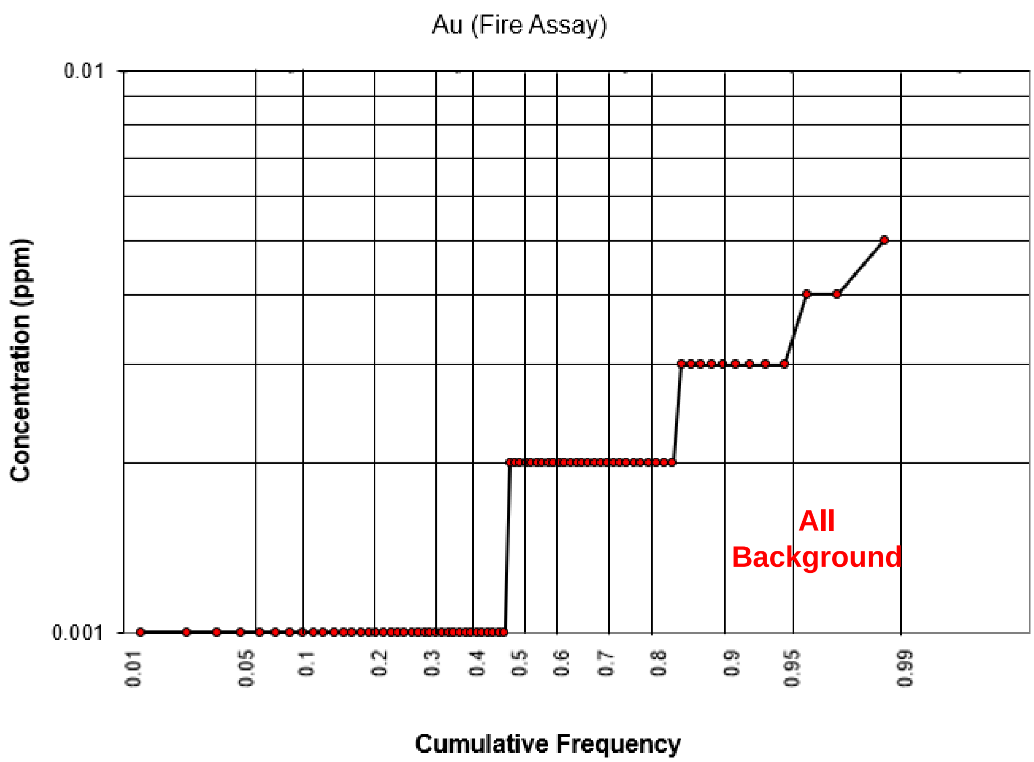

Figure 26: *Log-probability plot for Au analysed by fire assay, with all data points at a background concentration*

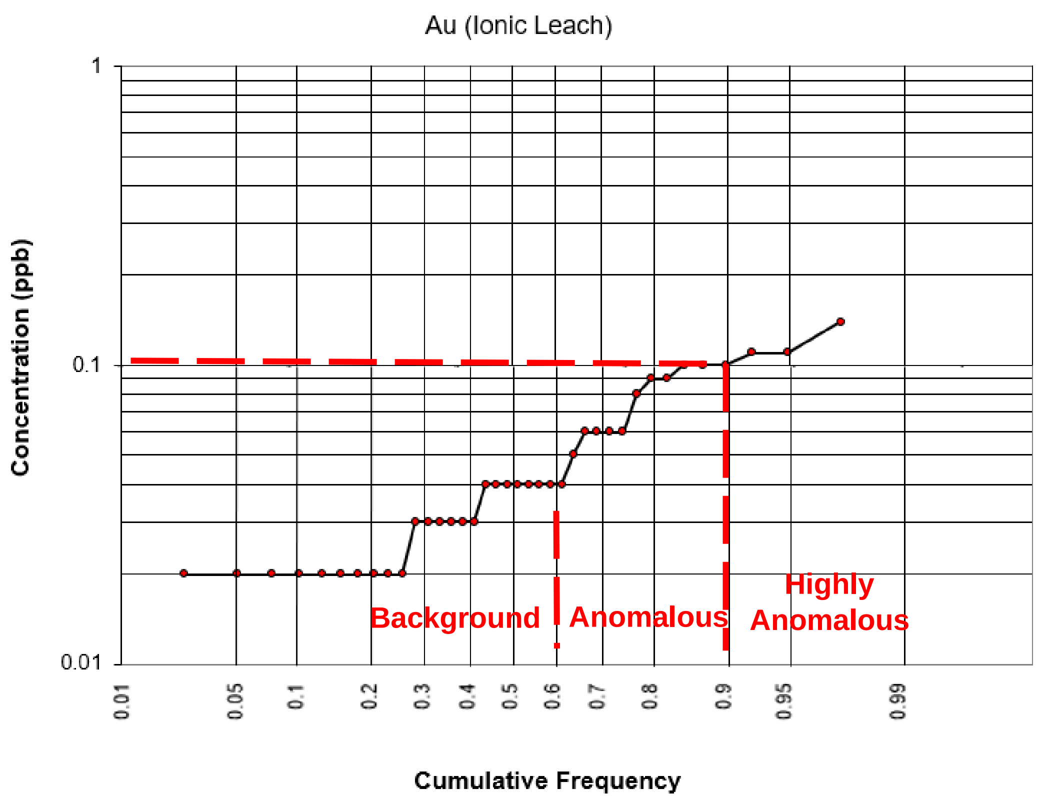

Figure 27: *Log-probability plot for Au analysed by ionic leach. Note only 38 points out of 93 were plotted due to the majority of data points being recorded at 0ppb*

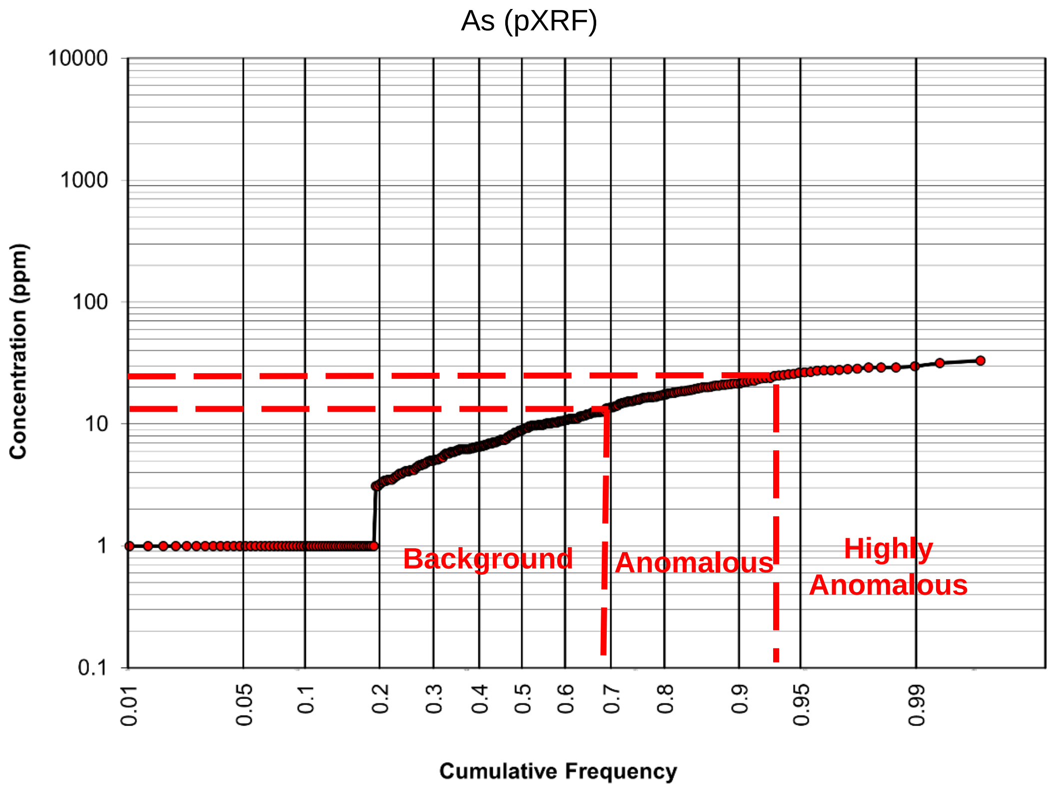

Figure 28: *Log-probability plot for As analysed by pXRF*

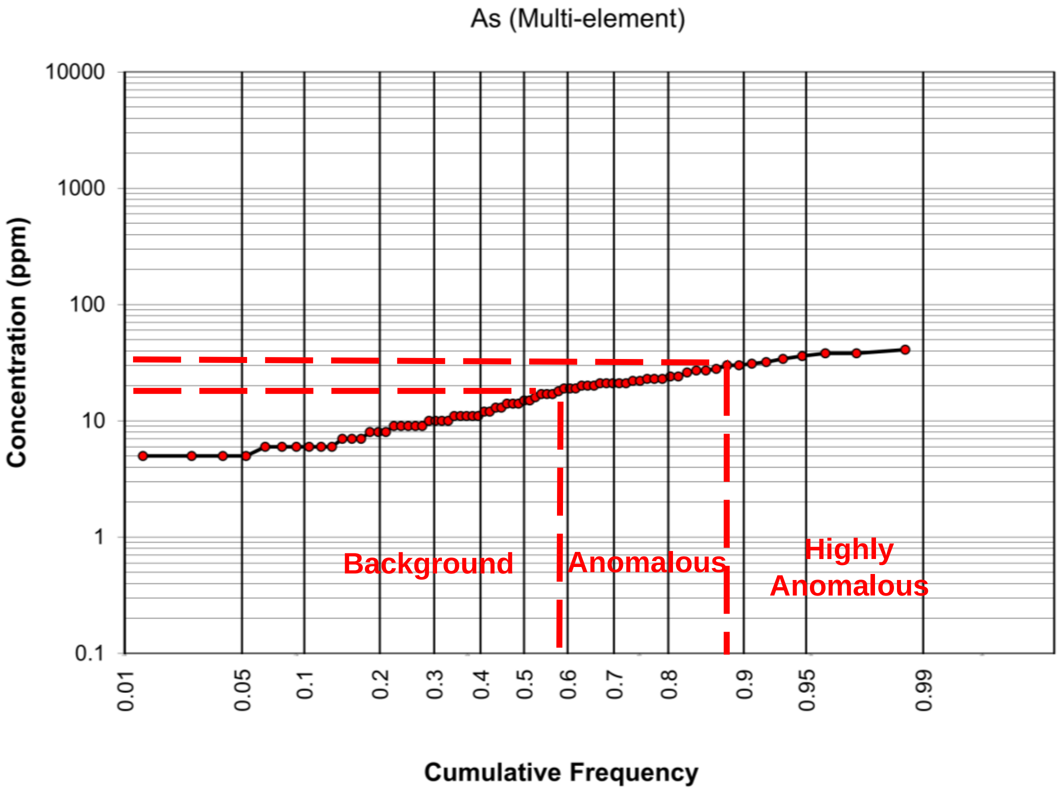

Figure 29: *Log-probability plot for As analysed by multi-element analysis*

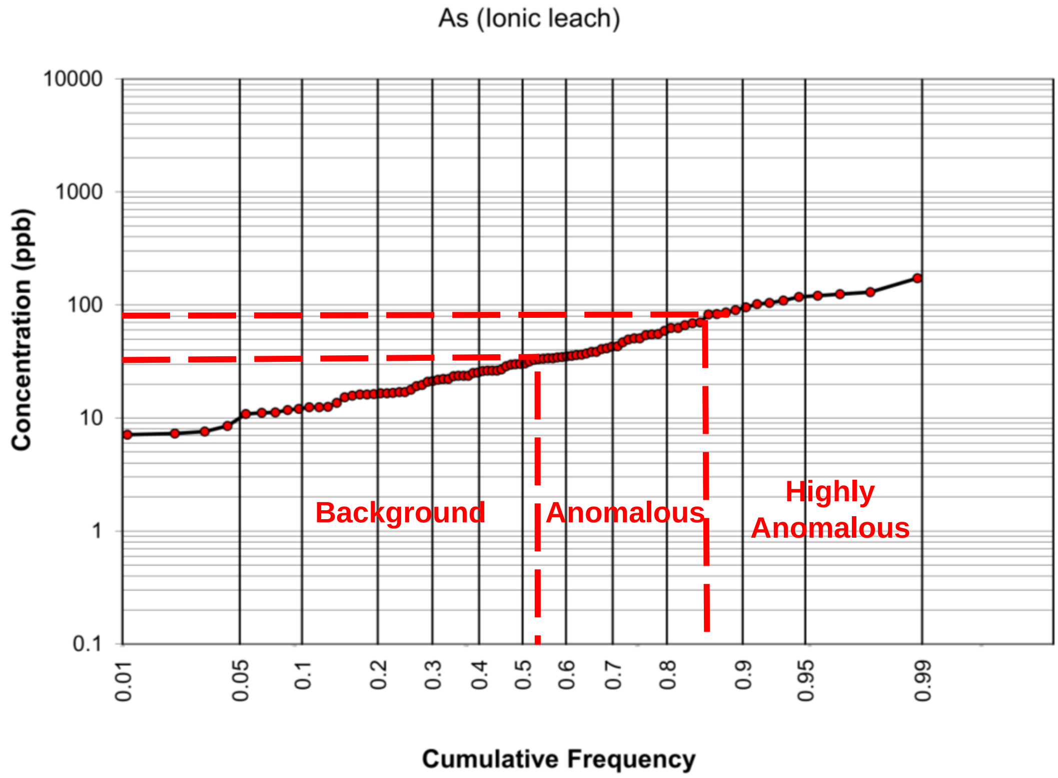

Figure 30: *Log-probability plot for As analysed by ionic leach*

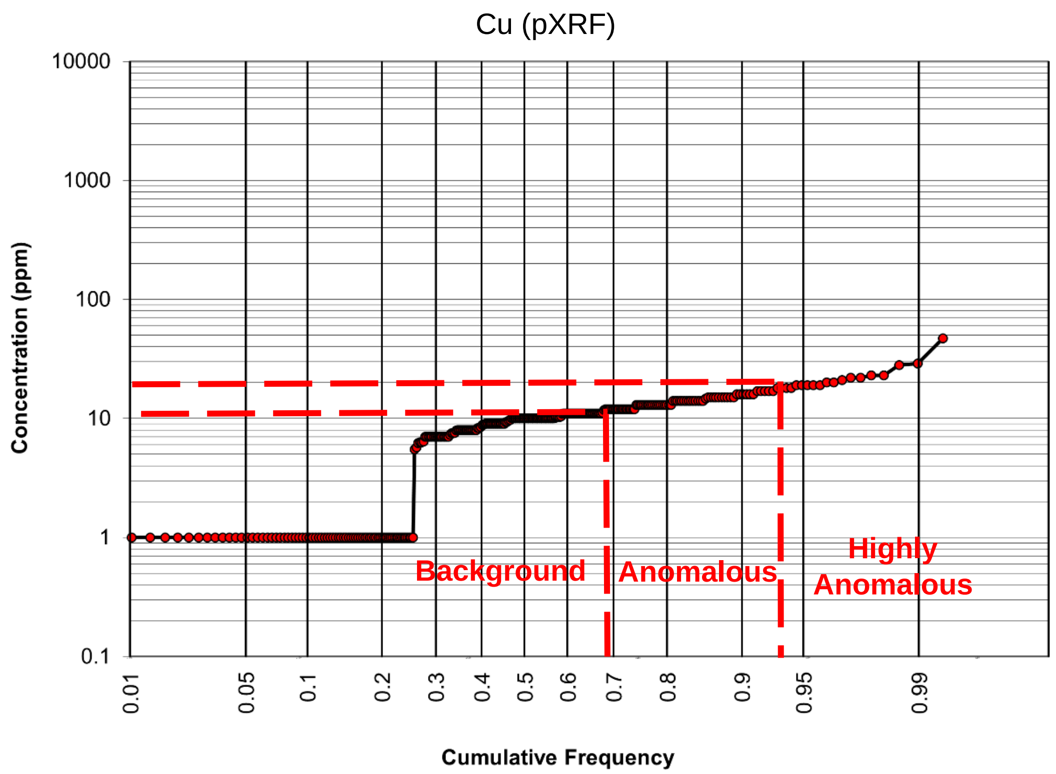

Figure 31: *Log-probability plot for Cu analysed by pXRF*

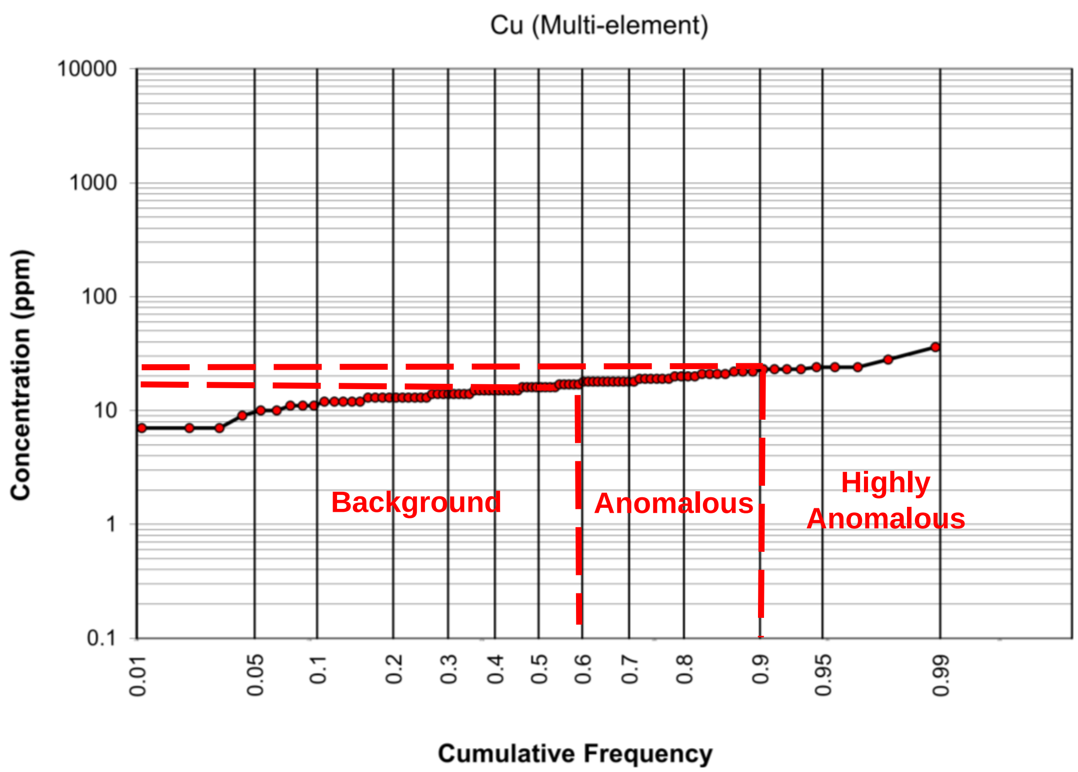

Figure 32: *Log-probability plot for Cu analysed by multi-element analysis*

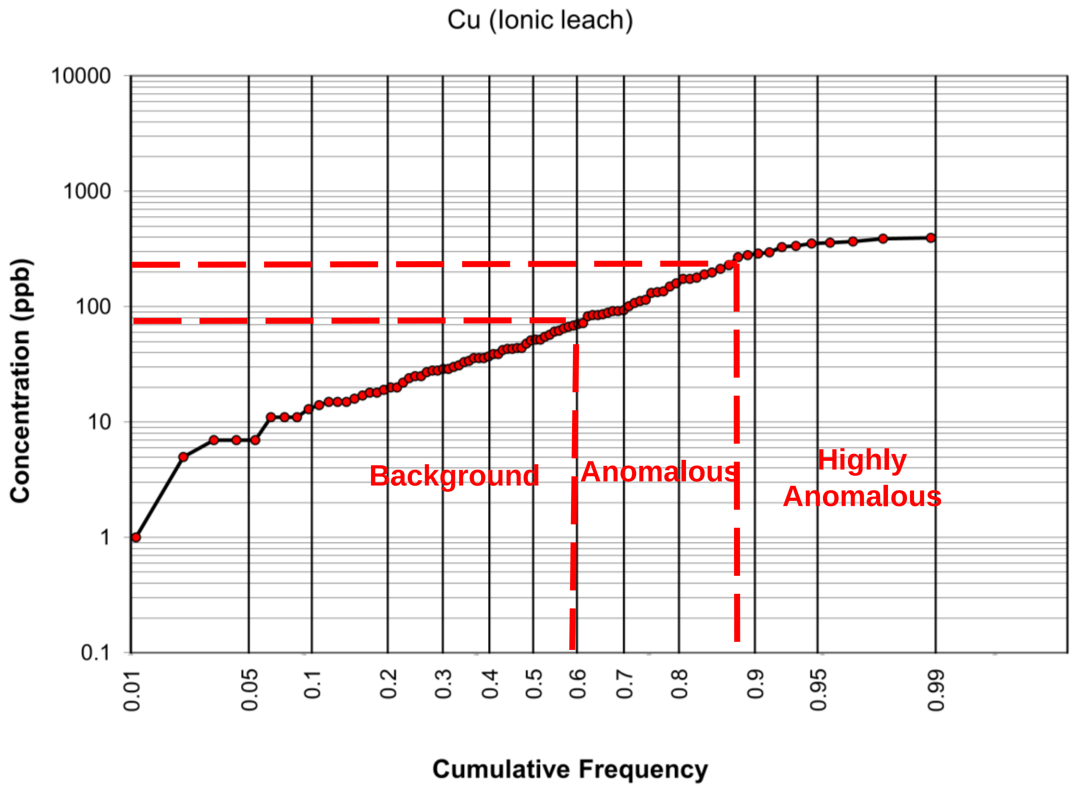

Figure 33: *Log-probability plot for Cu analysed by ionic leach*

5.3 Spatial Analysis: Geochemical Mapping

Each lithology type present within the study area has distinct geochemical signatures, which have been used to refine lithological boundaries and produce an updated geological map (see Figure 34). Elemental ratios have been used to create geochemical heat maps to help establish geochemical anomalies (see Figures 35-38), in addition to Rb, Sr, Fe and S heat maps (Figures 39-42). There is a distinct geochemical boundary between the Nant-y-Coy Formation and the Flinty Rhyolite of the Roch Rhyolite Group. This is characterised by high Ca/Al, Fe/Al, K/Al, Na/Al ratios, along with high Rb and Fe signatures, for the Nant-y-Coy formation. A similar geochemical signature is also present for the Lingula Flags Formation, albeit being slightly less pronounced than the Roch Rhyolite Group. The Flinty Rhyolite is characterised by exceptionally low Na, Ca, K concentrations and high Al, Fe, S and Sr concentrations. This is reflected by the field observations of highly altered sedimentary rocks of the Nant-y-Coy Formation, characterised by intense sericitization and the presence of numerous veins of quartz with pyrite.

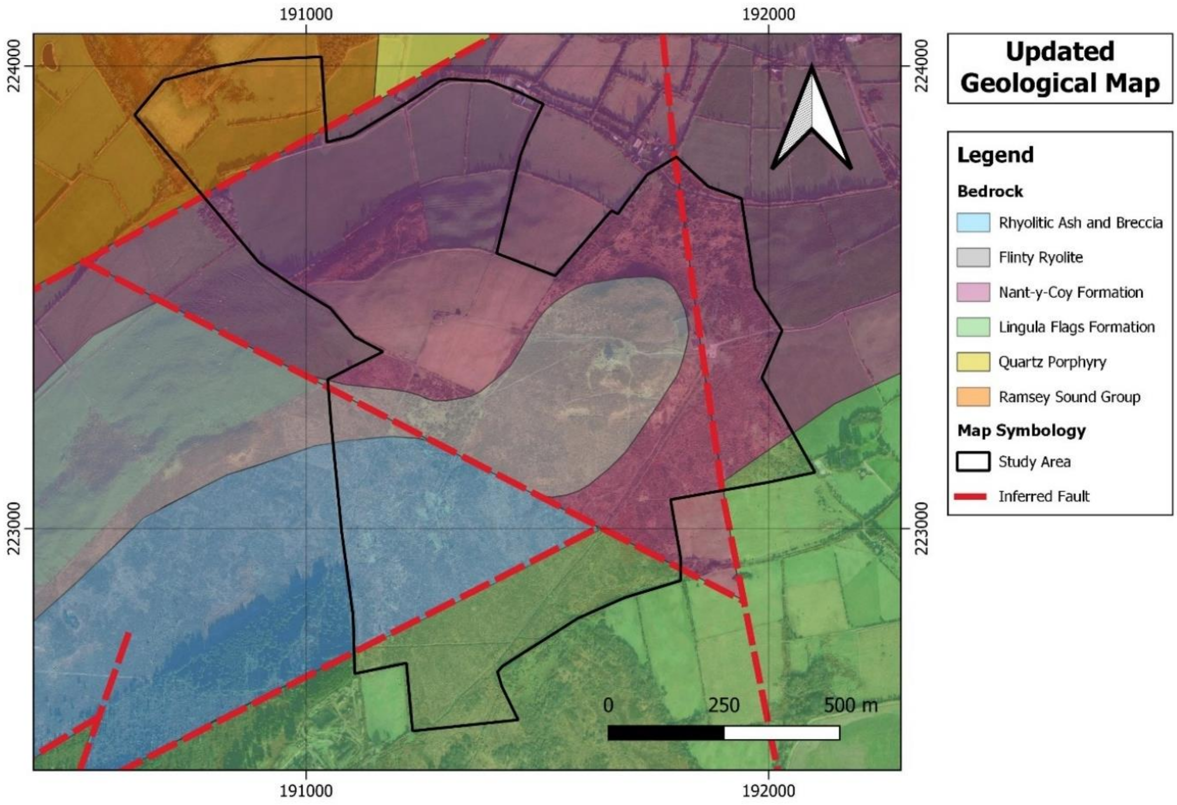

Figure 34: *Updated geological map of the study area, constructed using geochemical data collected from the 2021 field season in combination with wider literature (data from SHG and ALS Global, basemap from Edina Digimap)*

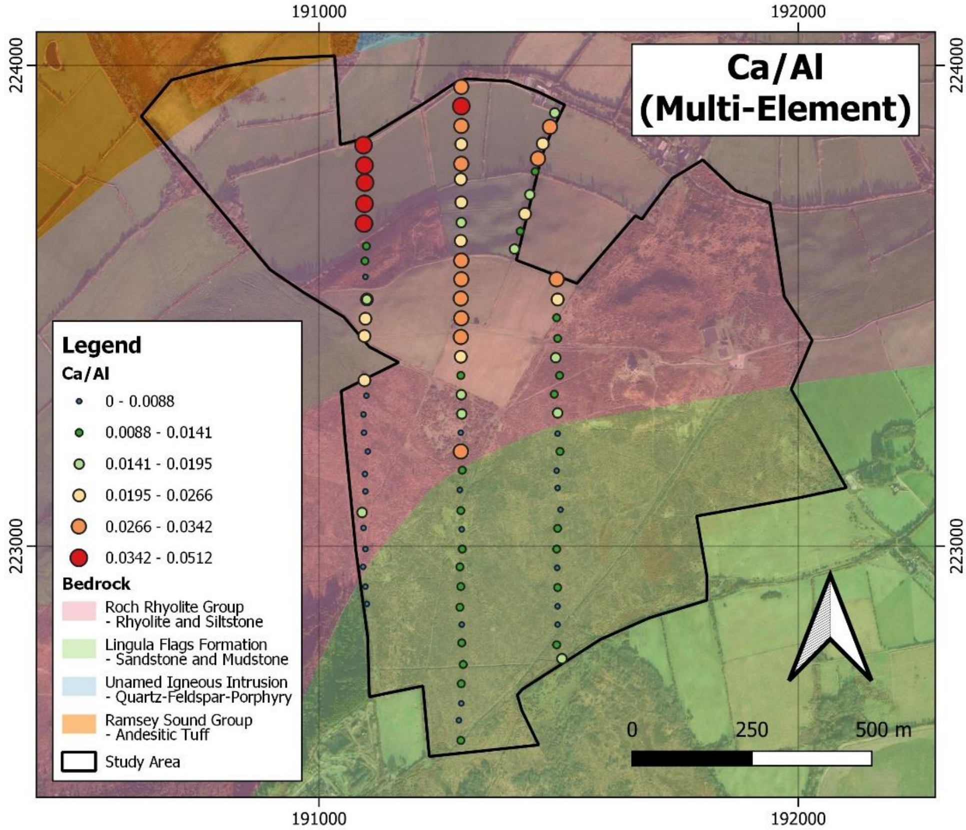

Figure 35: *Ca/Al ratios for soil samples analysed by multi-element analysis within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

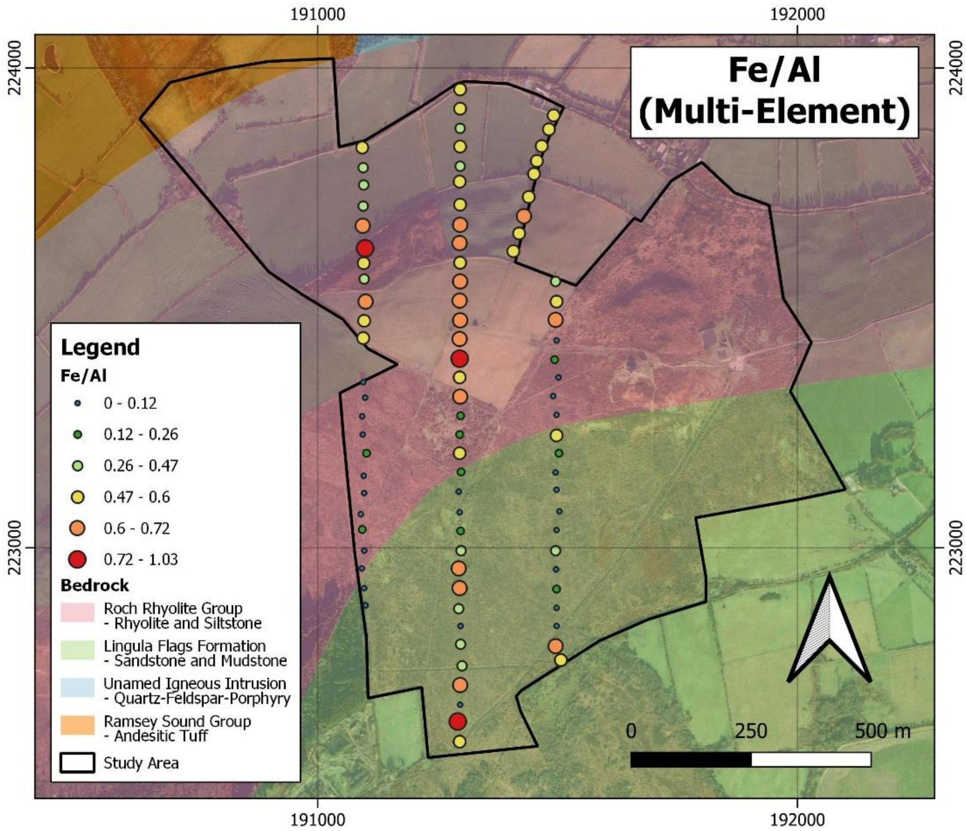

Figure 36: *Fe/Al ratios for soil samples analysed by multi-element analysis within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

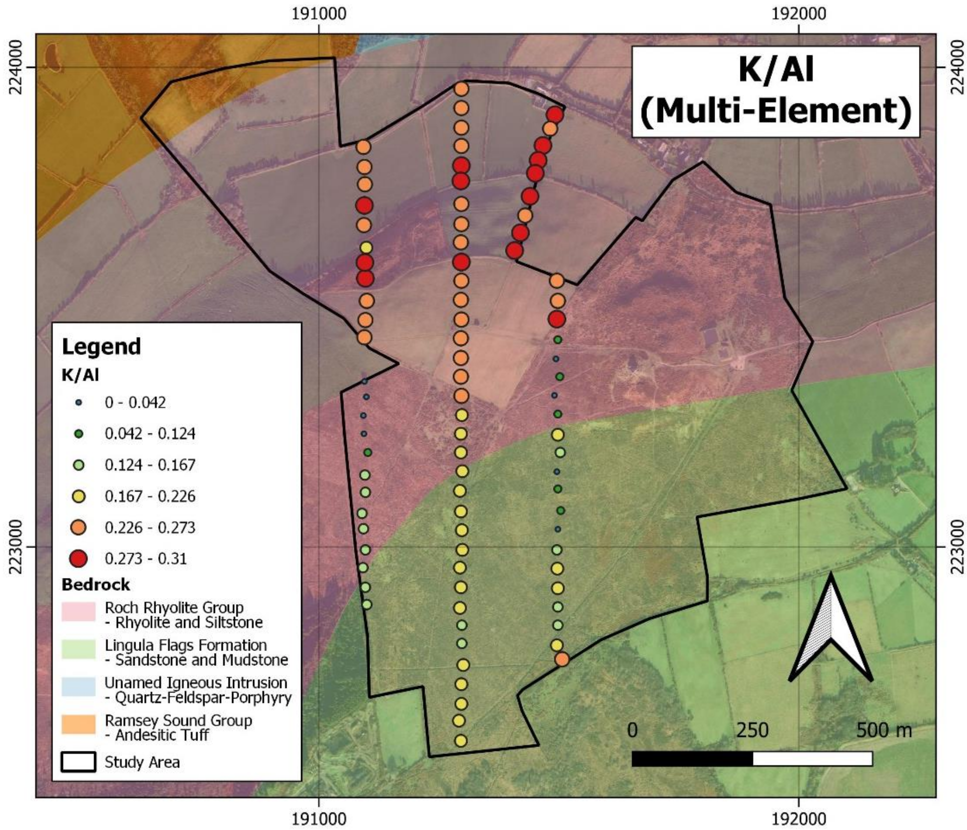

Figure 37: *K/Al ratios for soil samples analysed by multi-element analysis within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

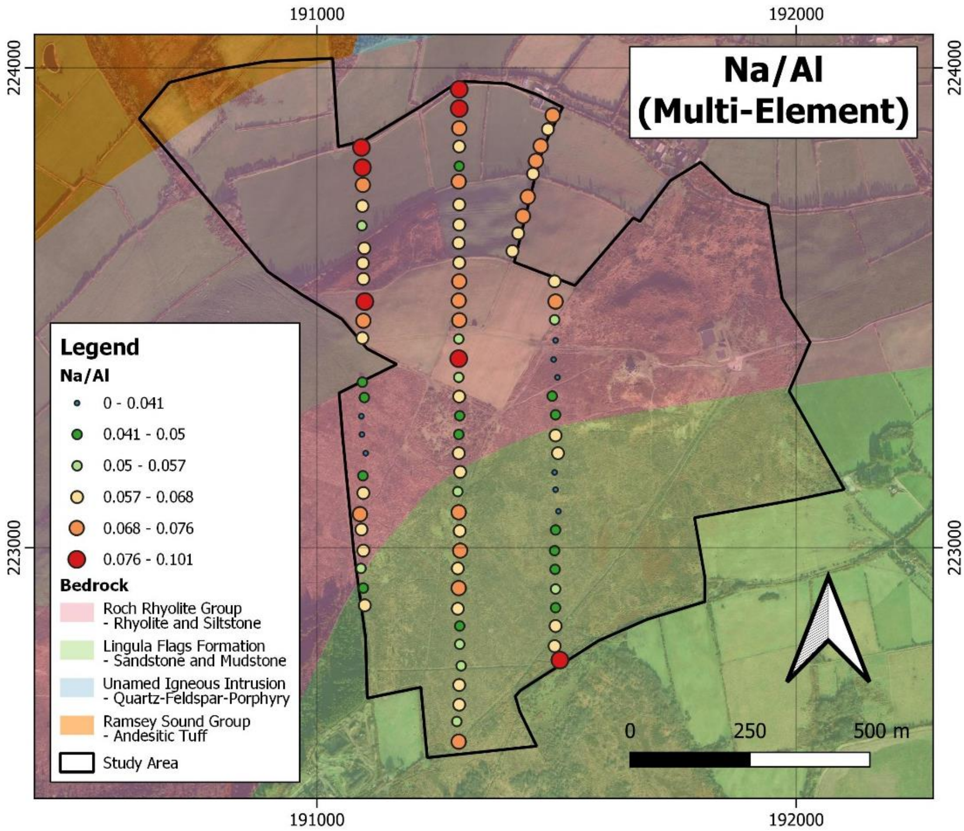

Figure 38: *Na/Al ratios for soil samples analysed by multi-element analysis within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

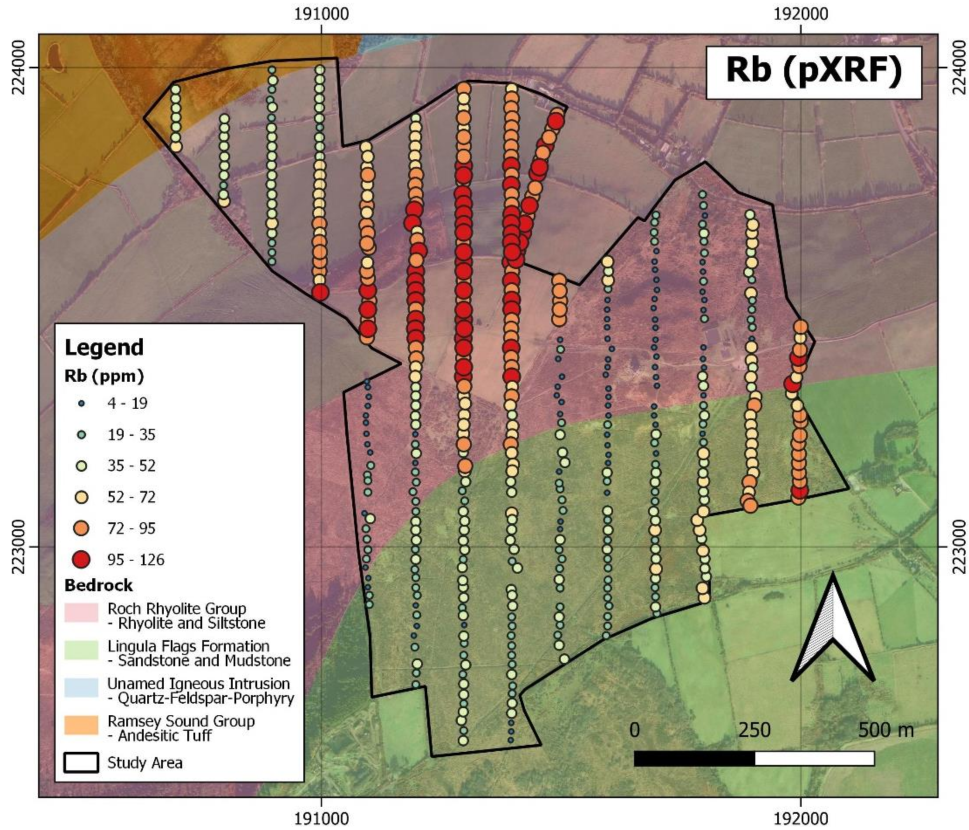

Figure 39: *Rb concentrations for soil samples analysed by pXRF within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

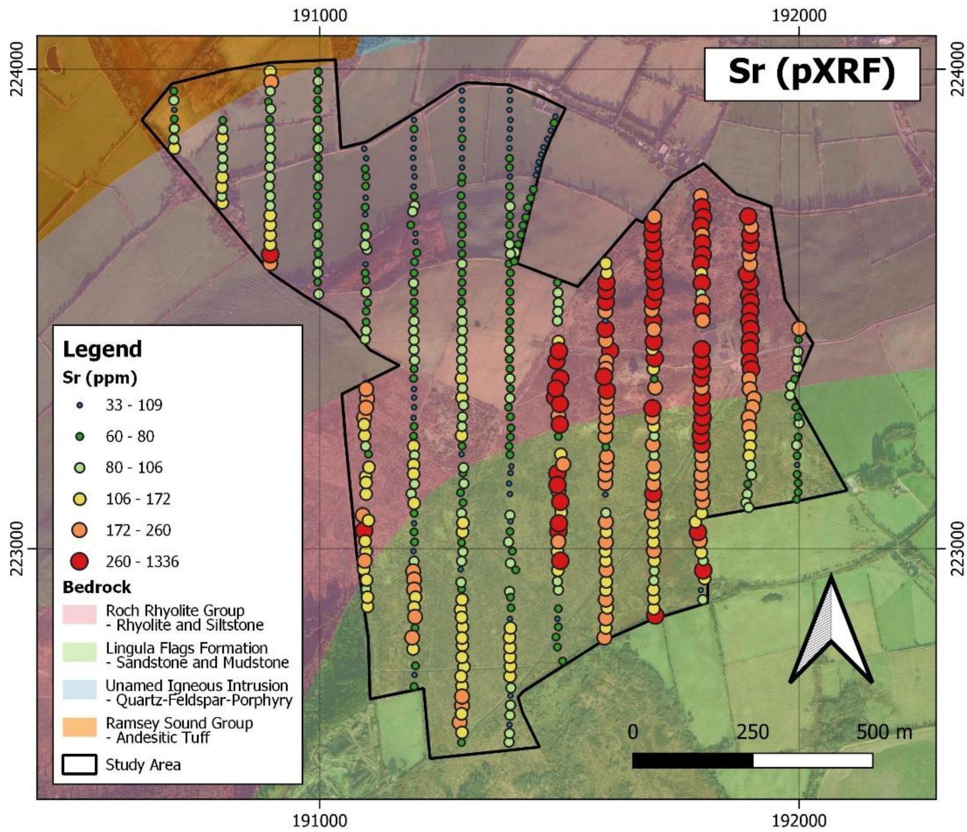

Figure 40: *Sr concentrations for soil samples analysed by pXRF within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

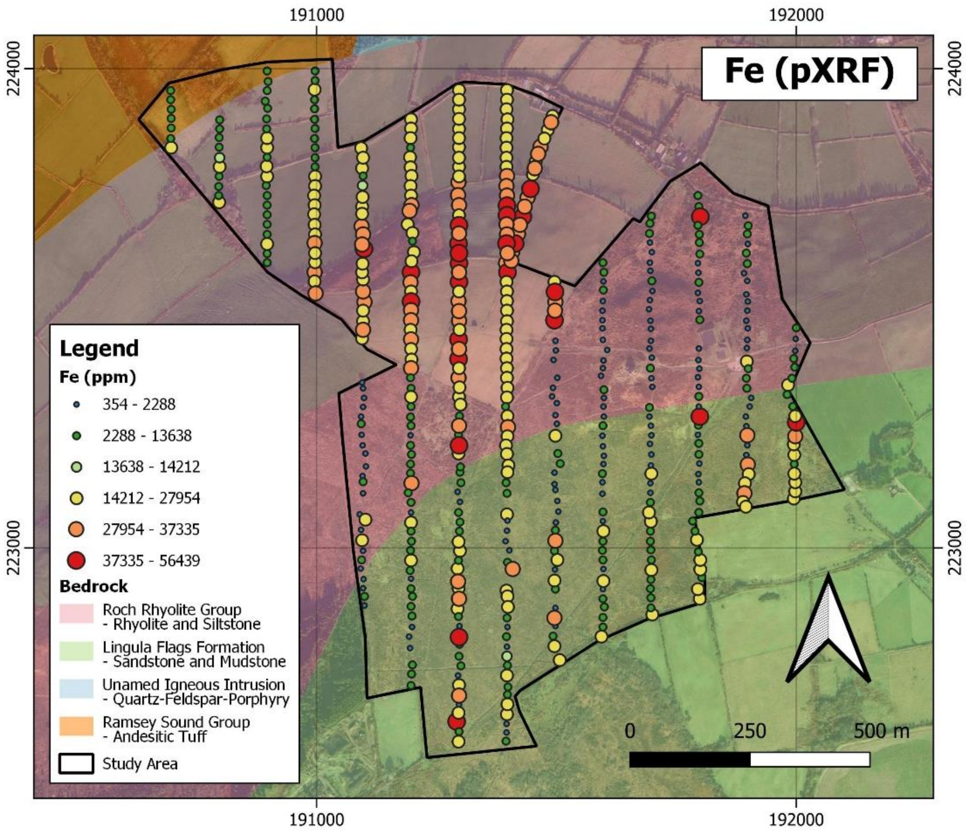

Figure 41: *Fe concentrations for soil samples analysed by pXRF within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

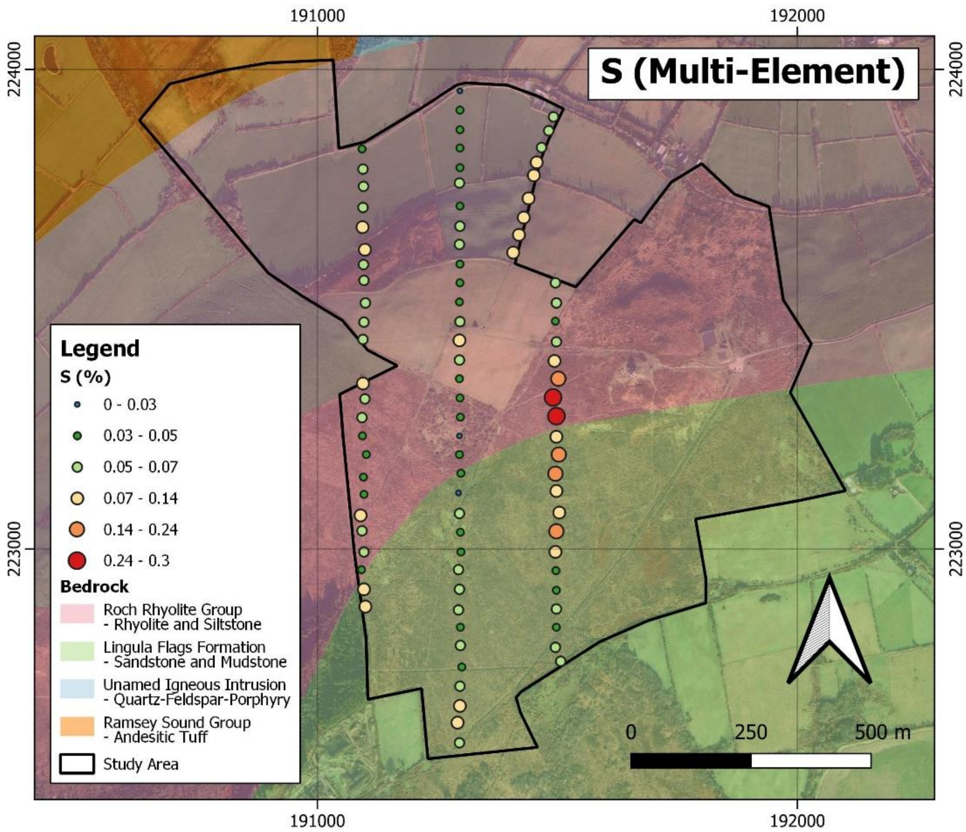

Figure 42: *S concentrations for soil samples analysed by multi-element analysis within the study area (soil data from SHG and ALS Global, 1:50 000 geology layer and basemap from Edina Digimap)*

5.4 Spatial Analysis: Mineral Prospectivity

5.4.1 Spatial Analysis Preamble

The pathfinder elements that have been prioritized include As, Cu, Fe, Mn, Pb and Zn, based upon significant correlations with Au and data from literature. Fire assay and ionic leach data both provided Au results that can be directly compared. Ba has been included to follow-up on potential barite mineralisation identified by the BGS MRP (Brown et al., 1987).

5.4.2 Au Spatial Analysis

Within the study area, Au analysed by fire assay shows a relatively random distribution of concentrations. The highest class of 0.003-0.007ppm has four data points and these do not show a clear spatial pattern (see Figure 43). Also, one duplicate sample located on the western sample line had a concentration of 0.001ppm, when the original had 0.007ppm to further highlight inconsistency. The Au concentrations for ionic leach shows a significant contrast, with 2 peaks above 0.11ppb to the northwest and a more significant cluster of anomalous values to the north, all located within the Nant-y-coy formation (see Figure 44). All other lithologies have anomalously low Au in comparison, with all values below 0.03ppb except for an isolated point of 0.09ppb along the eastern sampling line within the Flinty Rhyolite.

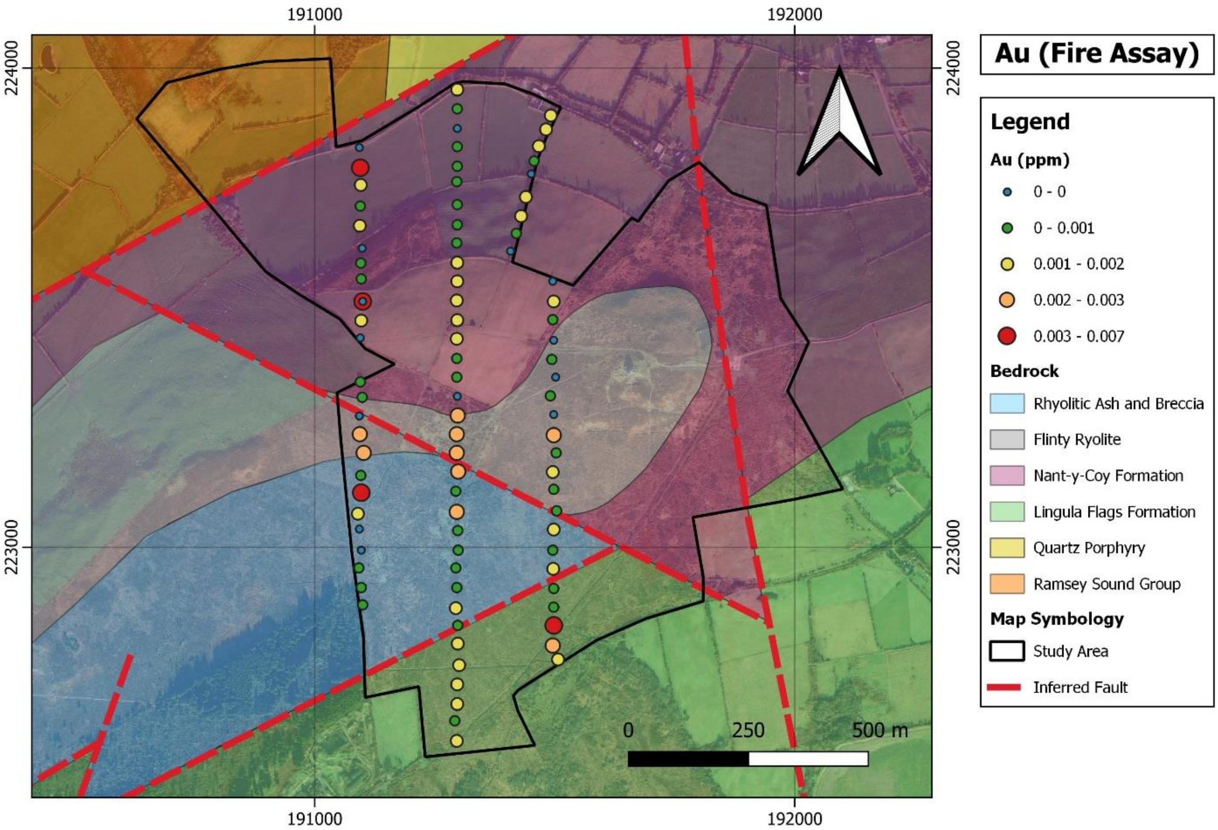

Figure 43: *Au concentrations for soil samples analysed by fire assay, showing a relatively random distribution (data from SHG and ALS Global, basemap from Edina Digimap)*

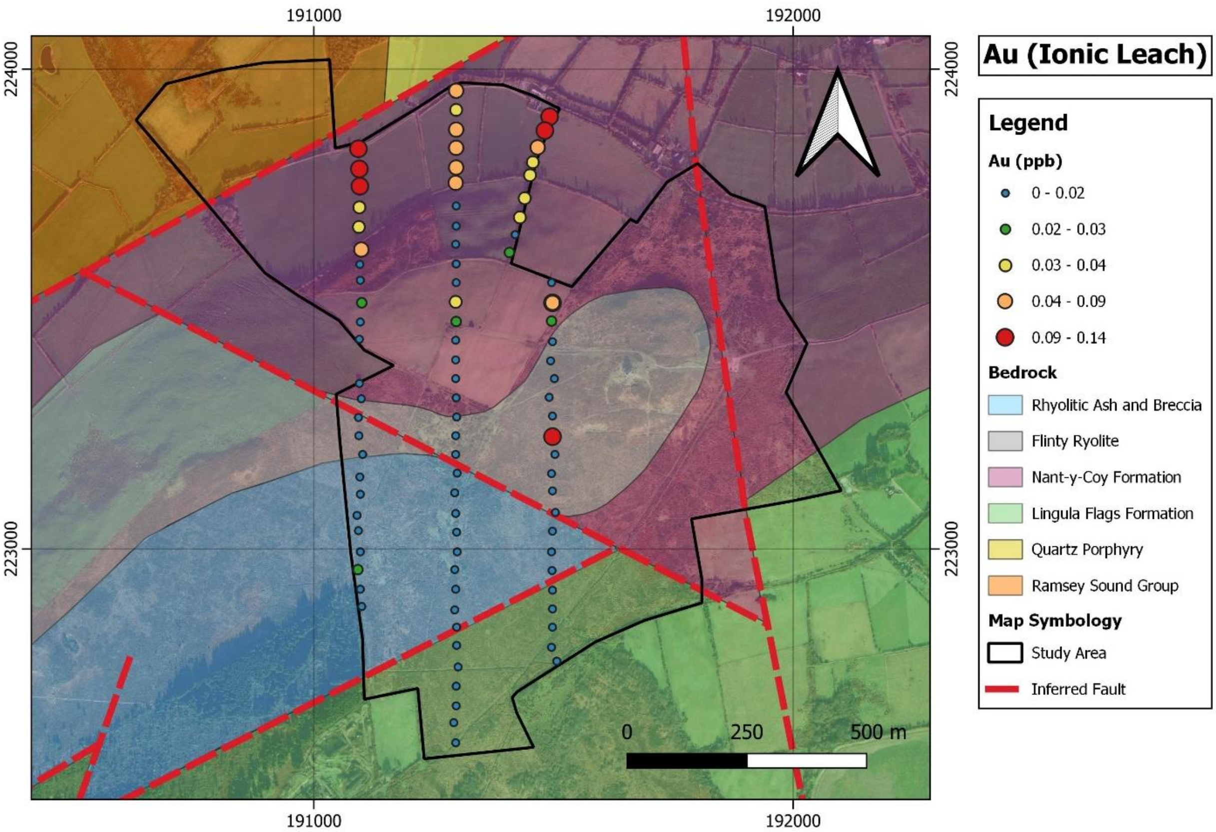

Figure 44: *Au concentrations for soil samples analysed by ionic leach, with an elevated Au anomaly located towards the north of the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

5.4.3 Geochemical Pathfinder Anomalies

There is an As-Cu-Fe-Mn-Zn anomaly to the north of the study area, located in the Nant-y-Coy Formation of the Roch Rhyolite Group, as seen in Figures 45-60. This anomalous zone is approximately 500m wide but is poorly constrained towards the northeast, proximal to the boundary of the study area. The data provided by the pXRF highlights significant enrichments in As, Mn, Zn (see Figures 45, 52 and 58) and less pronounced enrichments of Cu (See Figure 49). In comparison, As-Cu-Fe-Mn-Zn concentrations are anomalously low within the Flinty Rhyolite component, with a significant contrast apparent at the contact with the Nant-y-Coy Formation. When compared with the multi-element data, the trends are largely similar albeit with lower limits of detection provided (see Figures 46, 50, 53, 56 and 58 for multi-element heat maps). Ba data was provided solely by multi-element analysis and shows a moderate enrichment within the Nant-y-Coy Formation (see Figure 48).

There are 4 inferred faults which cross-cut and bound a major proportion of the study area. It is apparent that proximal to these faults are significant anomalies of Cu-Pb across all pXRF, multi-element and ionic leach data (see Figures 49-51 and 55-57). However, the ionic leach data reveals geochemical anomalies that have not been picked up by either pXRF, fire assay or multi-element analysis. As seen in figure 44, Au analysed by ionic leach corresponds with the As-Cu-Fe-Mn-Zn anomaly. Additionally, there are more subtle anomalies of As-Zn that are enriched along the faulted areas that have been primarily identified by ionic leach (see Figures 47 and 60). This is most apparent for the northwest-southeast trending fault that coincides with the boundary between the Nant-y-Coy formation and the Rhyolitic Breccia. There is also minor enrichment in As, Cu and Pb analysed by ionic leach approximately 100m south of the northeast-southwest trending fault that marks the boundary between the Rhyolitic Breccia and the Lingula Flags Formation (see Figures 47, 51 and 57).

There is another significant anomaly for Pb that extends towards the east (see Figure 55). This appears to solely align with Sr enrichment (see Figure 40), although the sample lines for multi-element and ionic leach largely miss this anomaly. Sulphur content also begins to become enriched towards the east but lacks data points to determine significant relationships. It is worth noting that Pb enrichment appears to be inversely proportional to Zn enrichment (see Figure 58-60).

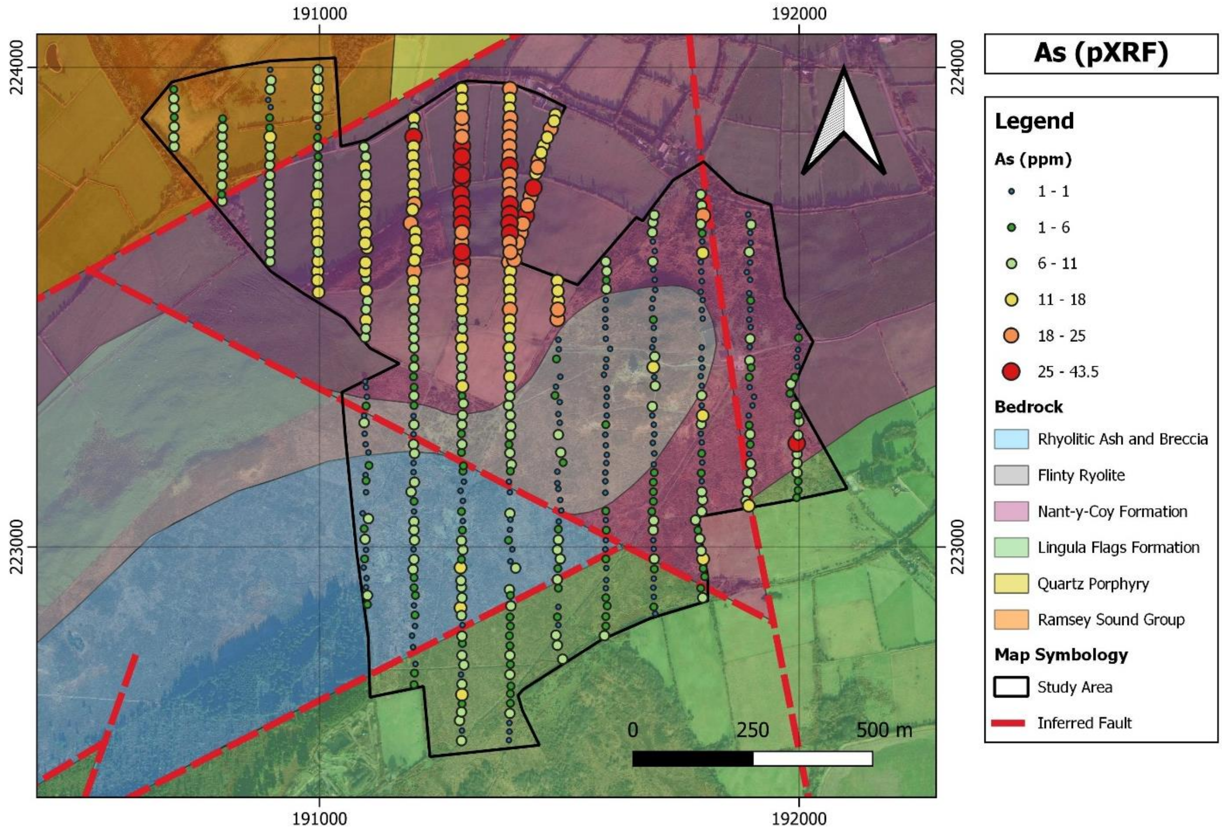

Figure 45: *As concentrations for soil samples analysed by pXRF within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

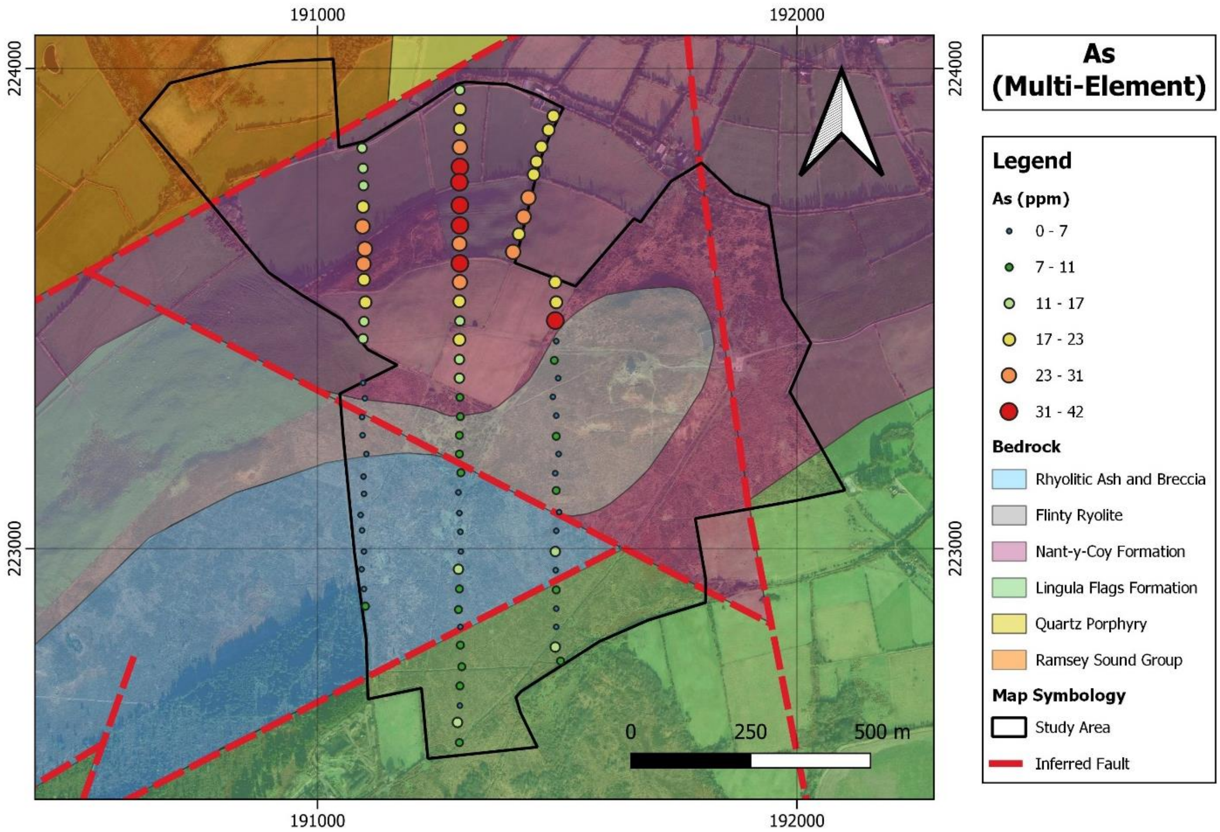

Figure 46: *As concentrations for soil samples analysed by multi-element analysis within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

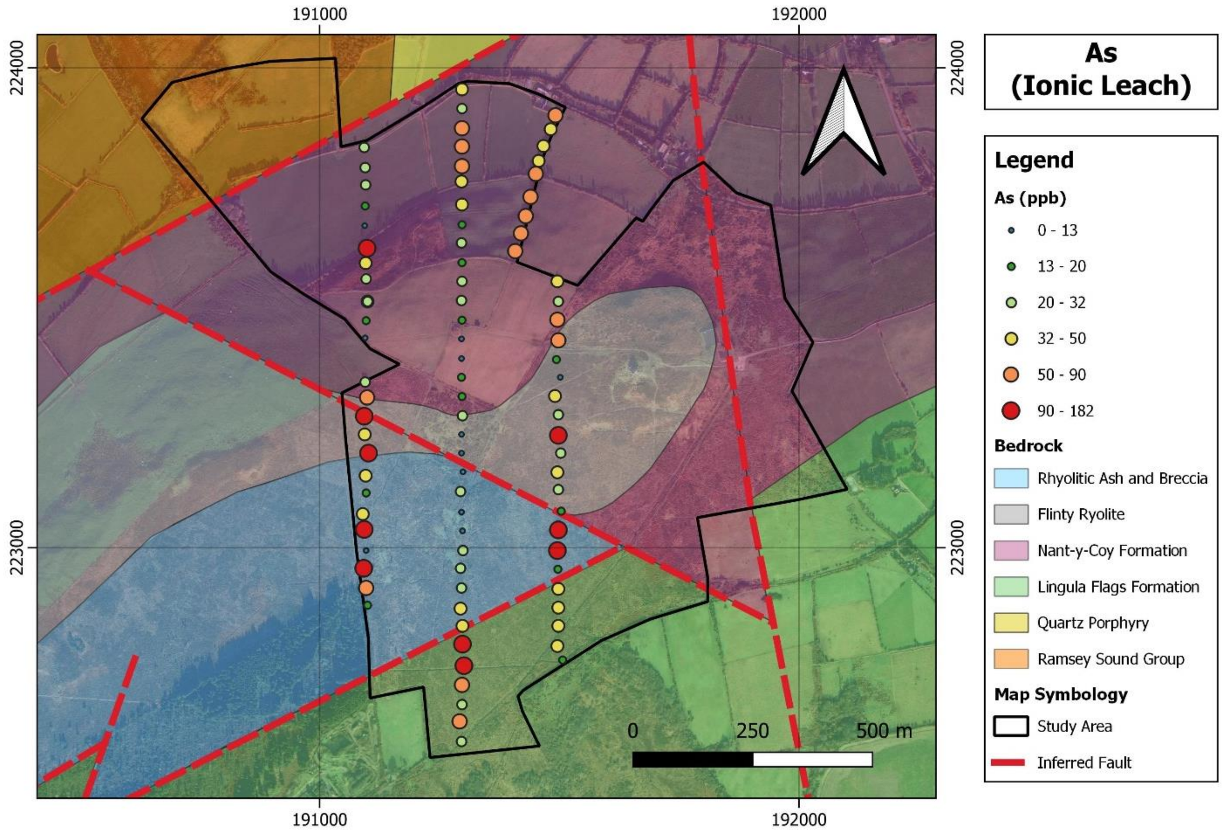

Figure 47: *As concentrations for soil samples analysed by ionic leach within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

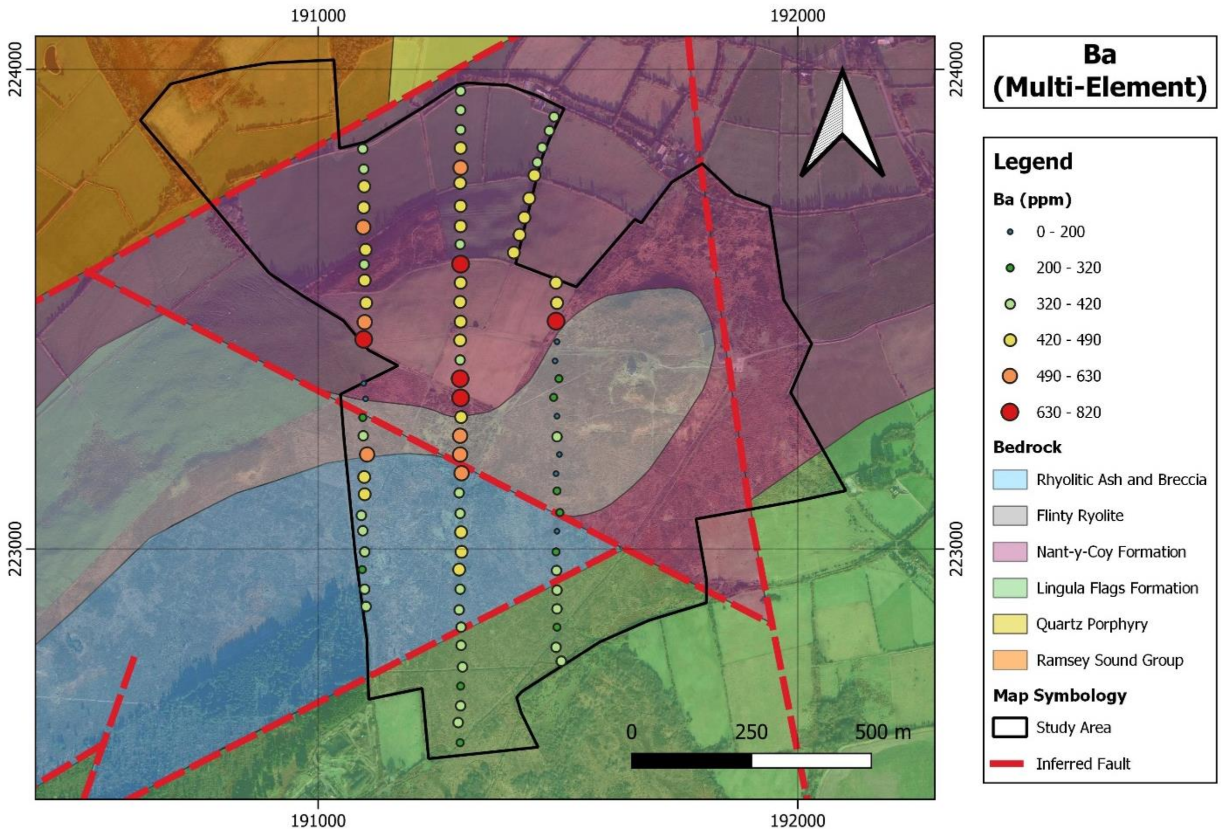

Figure 48: *Ba concentrations for soil samples analysed by multi-element within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

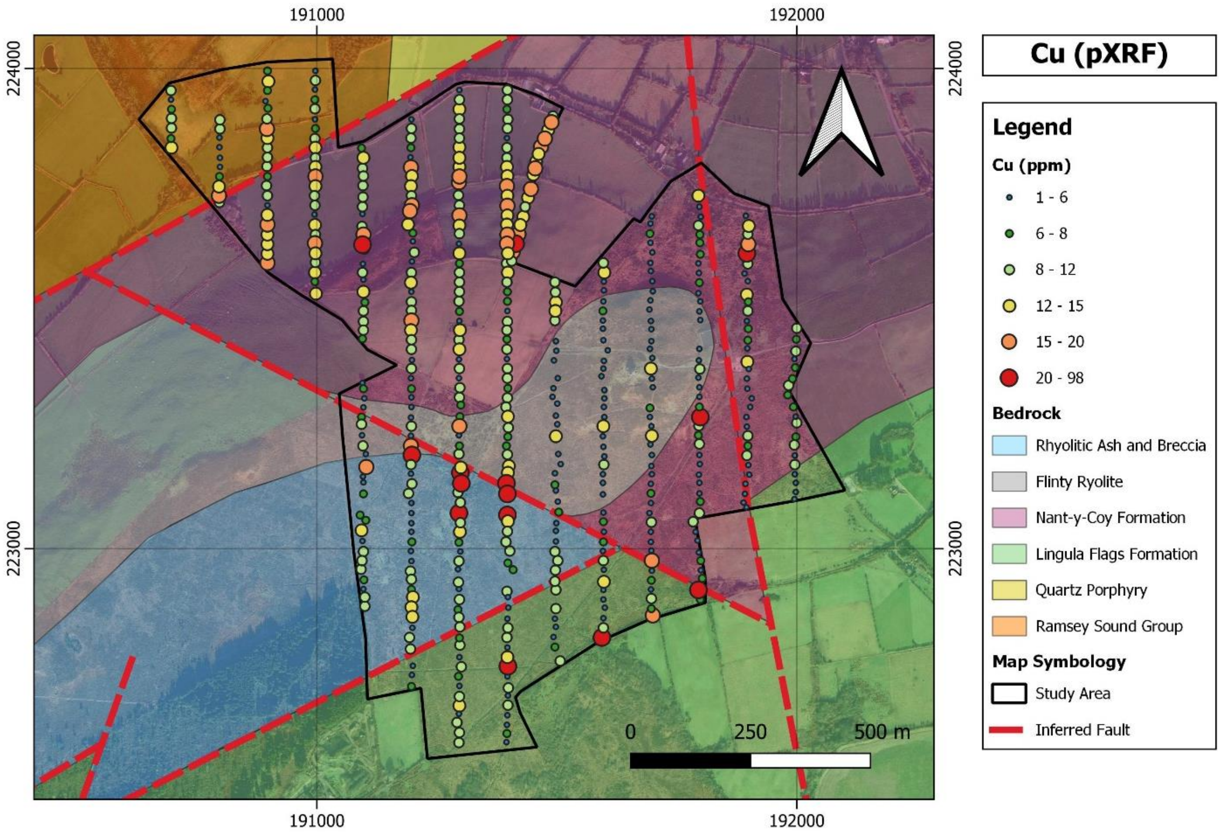

Figure 49: *Cu concentrations for soil samples analysed by pXRF within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

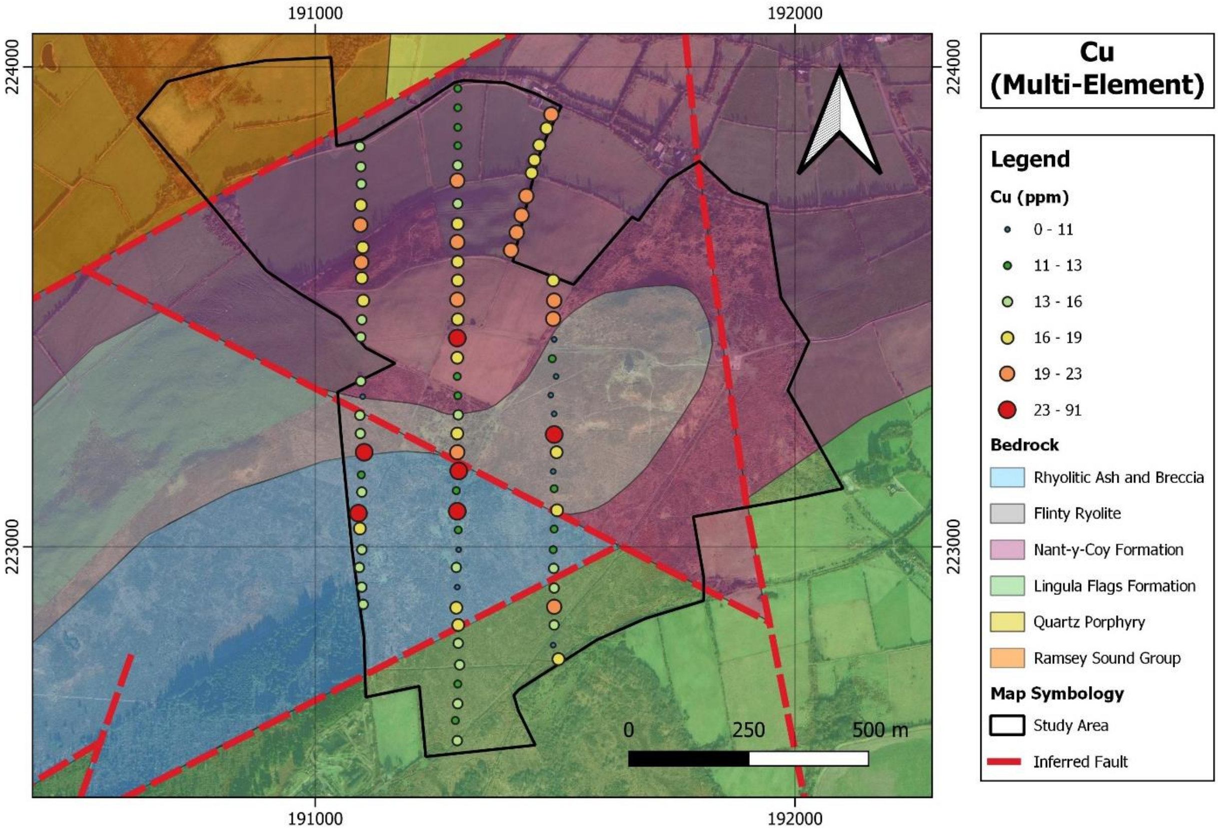

Figure 50: *Cu concentrations for soil samples analysed by multi-element analysis within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

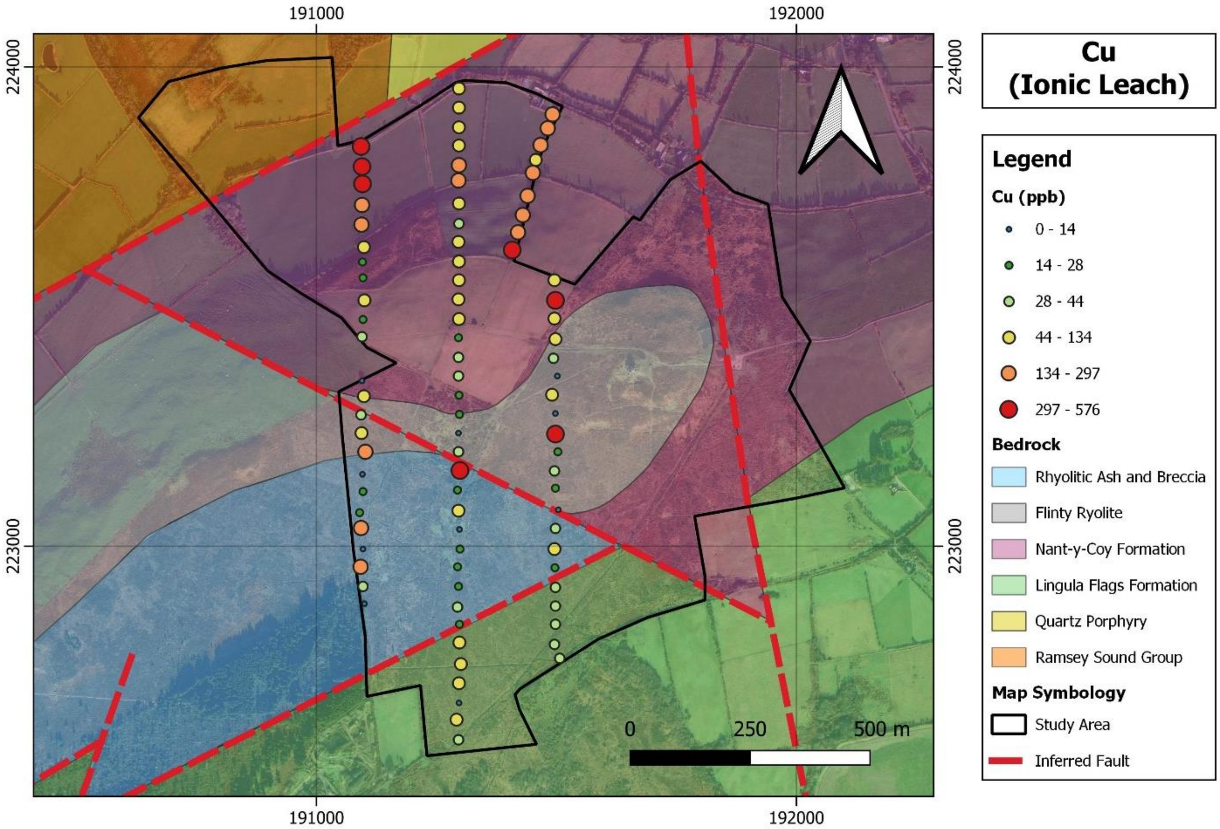

Figure 51: *Cu concentrations for soil samples analysed by ionic leach within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

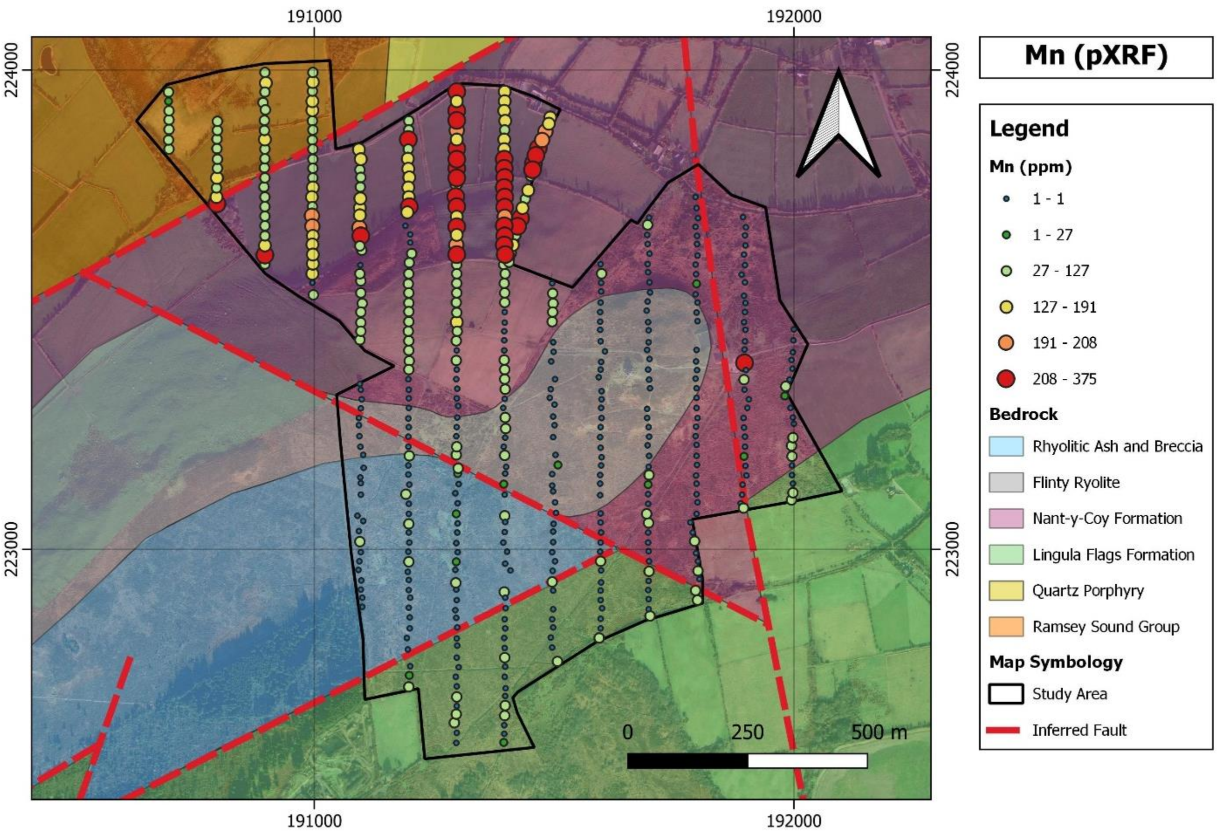

Figure 52: *Mn concentrations for soil samples analysed by pXRF within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

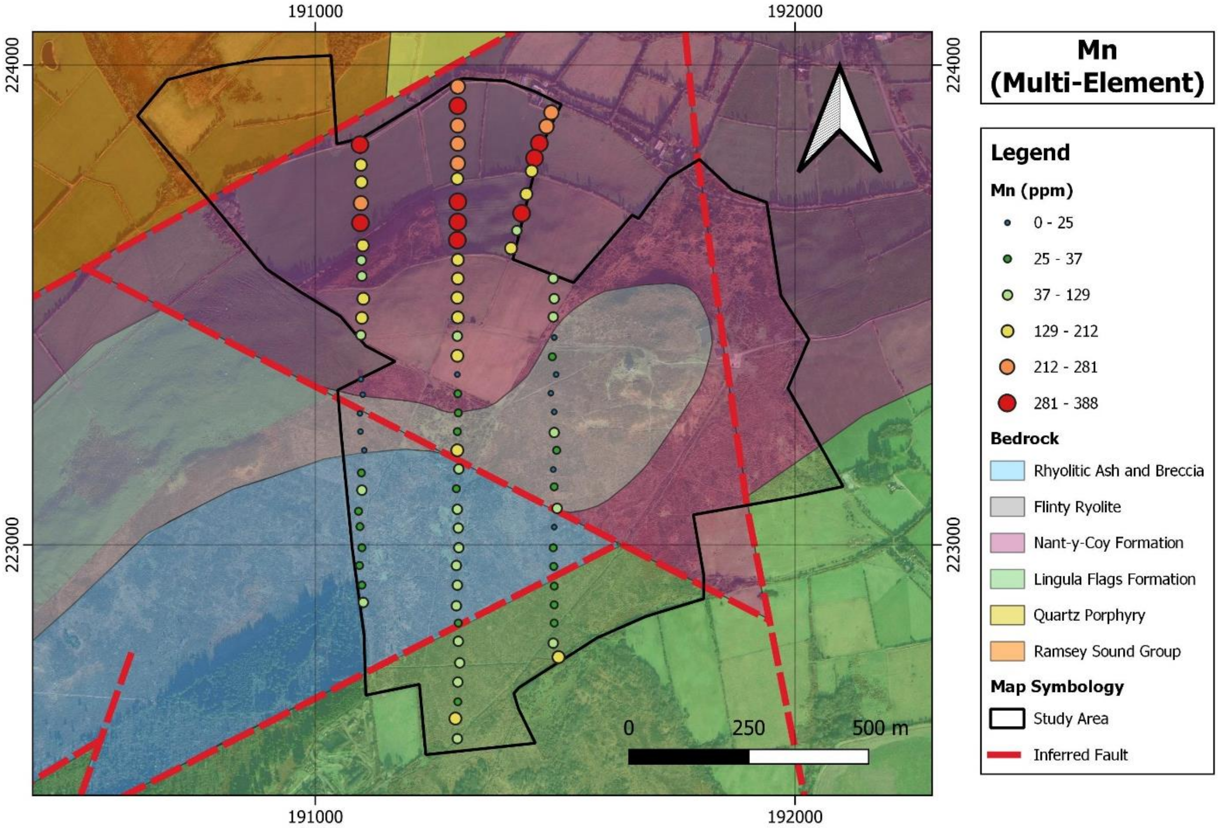

Figure 53: *Mn concentrations for soil samples analysed by multi-element analysis within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

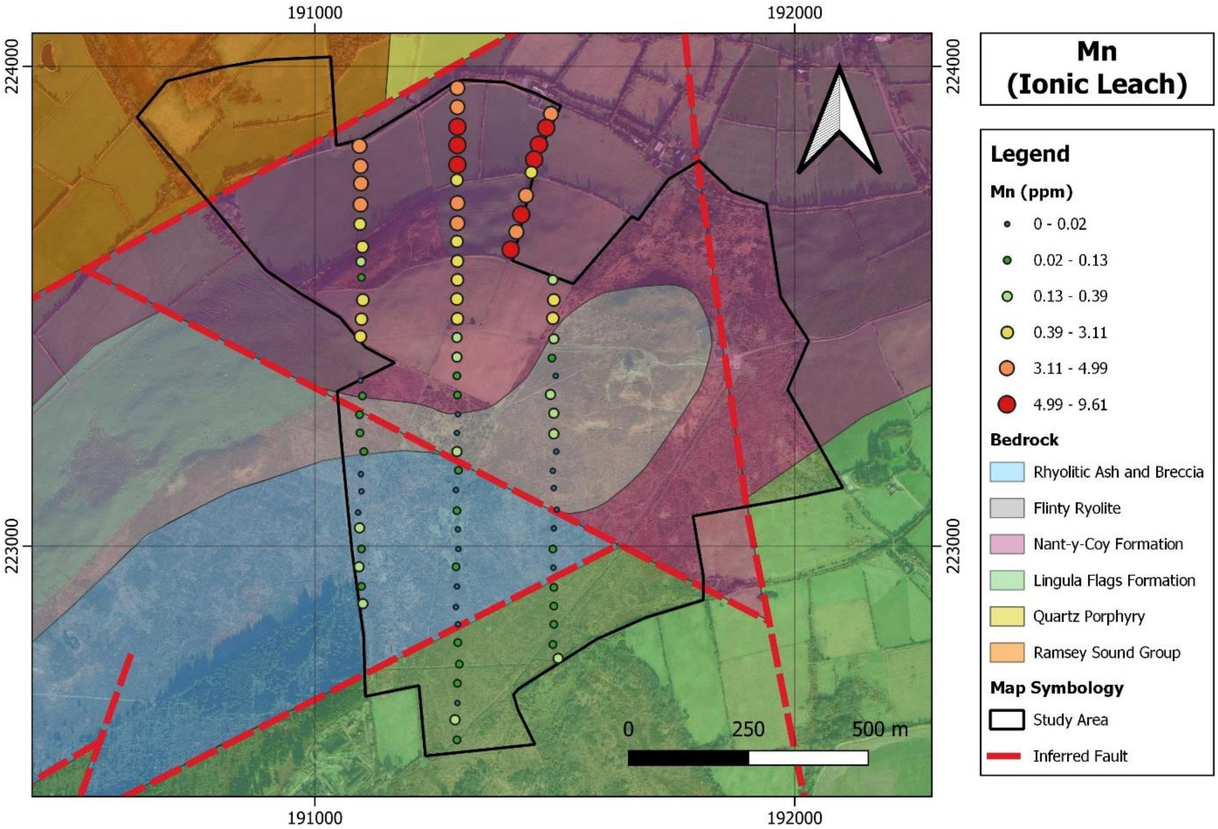

Figure 54: *Mn concentrations for soil samples analysed by ionic leach within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

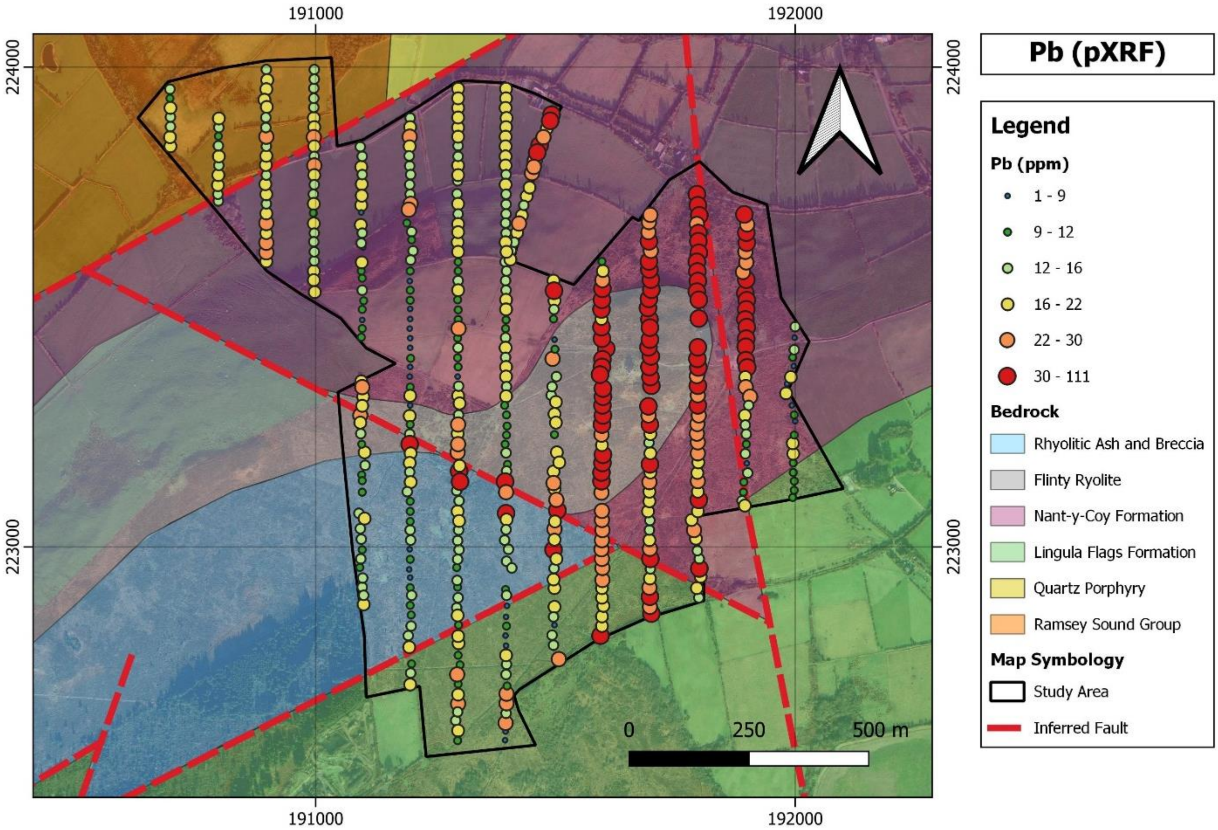

Figure 55: *Pb concentrations for soil samples analysed by pXRF within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

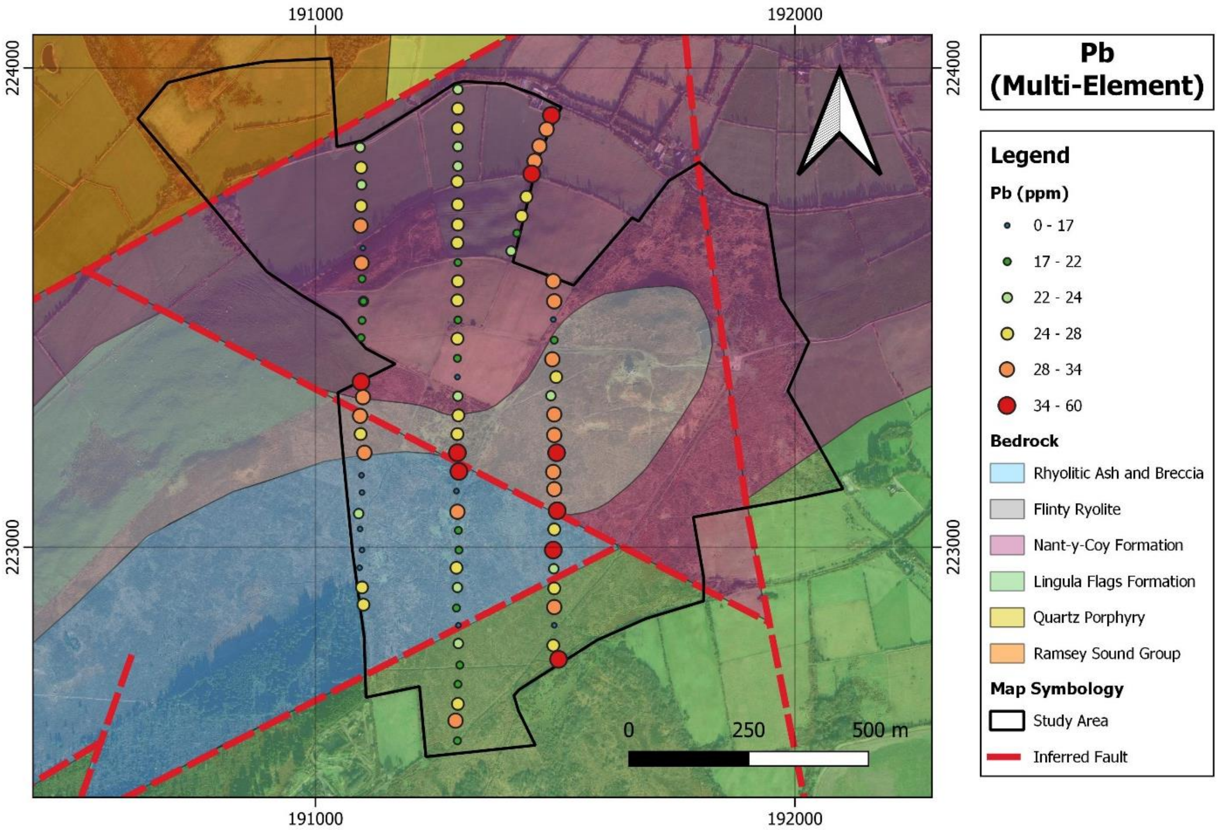

Figure 56: *Pb concentrations for soil samples analysed by multi-element analysis within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

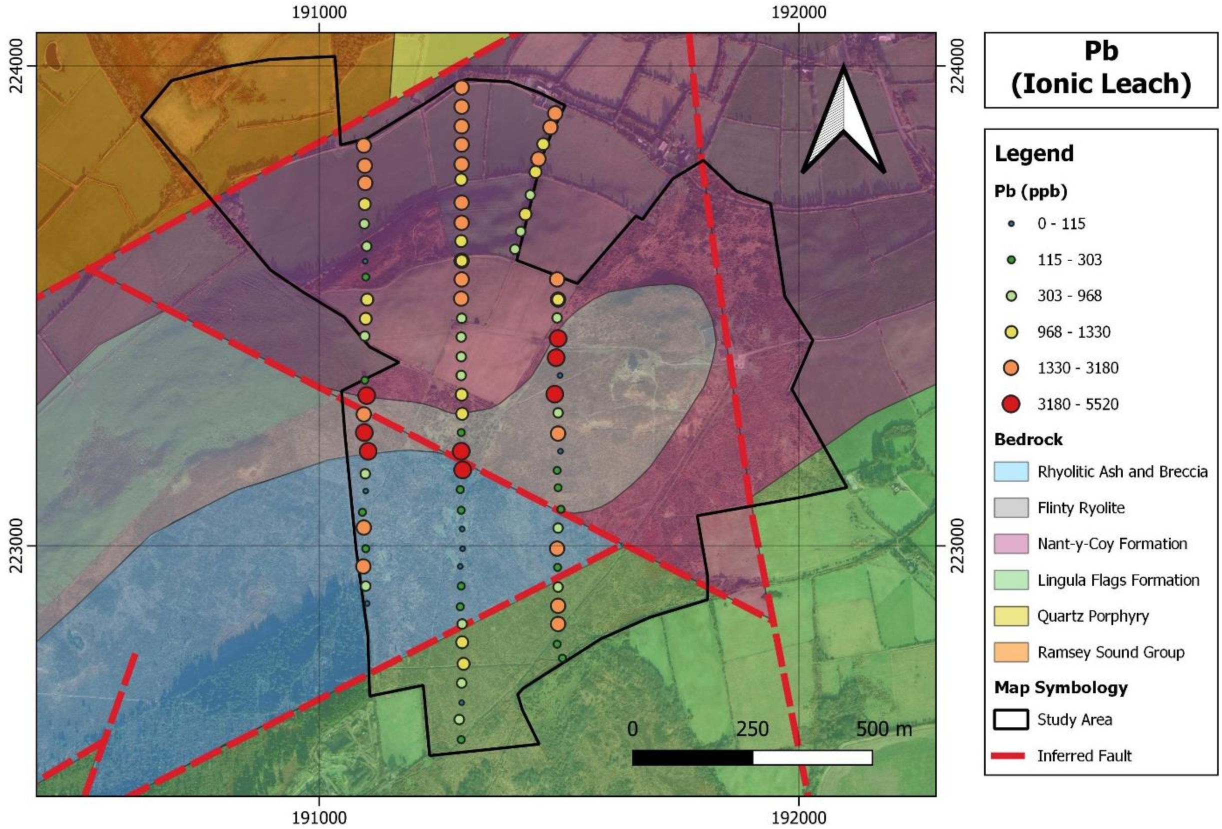

Figure 57: *Pb concentrations for soil samples analysed by ionic leach within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

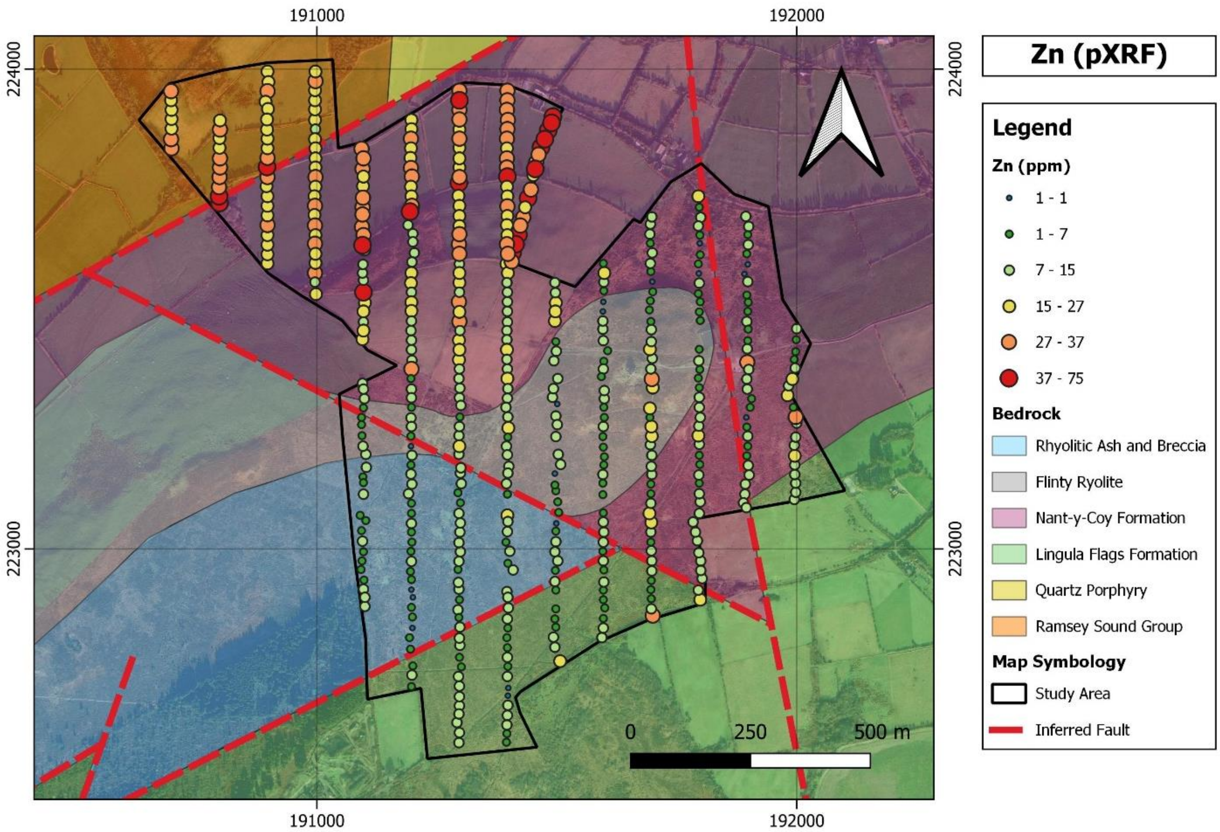

Figure 58: *Zn concentrations for soil samples analysed by pXRF within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

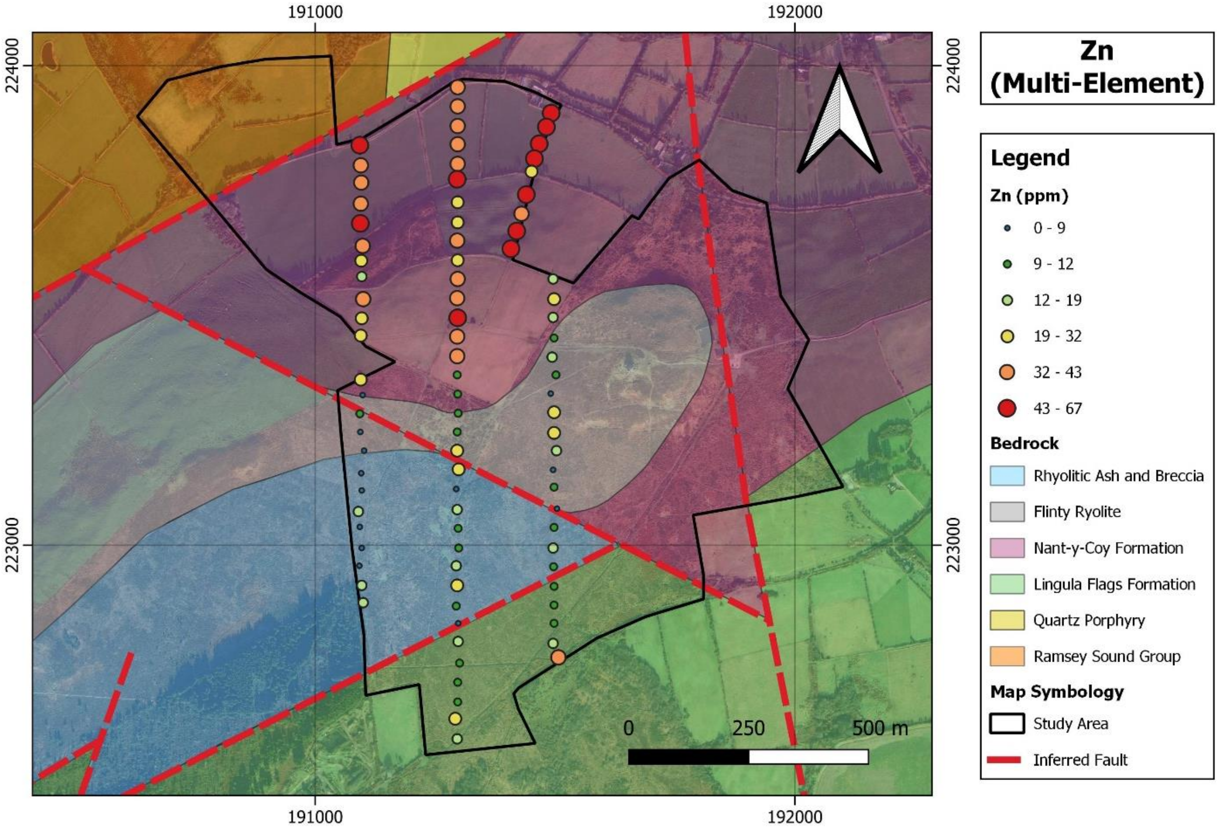

Figure 59: *Zn concentrations for soil samples analysed by multi-element analysis within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

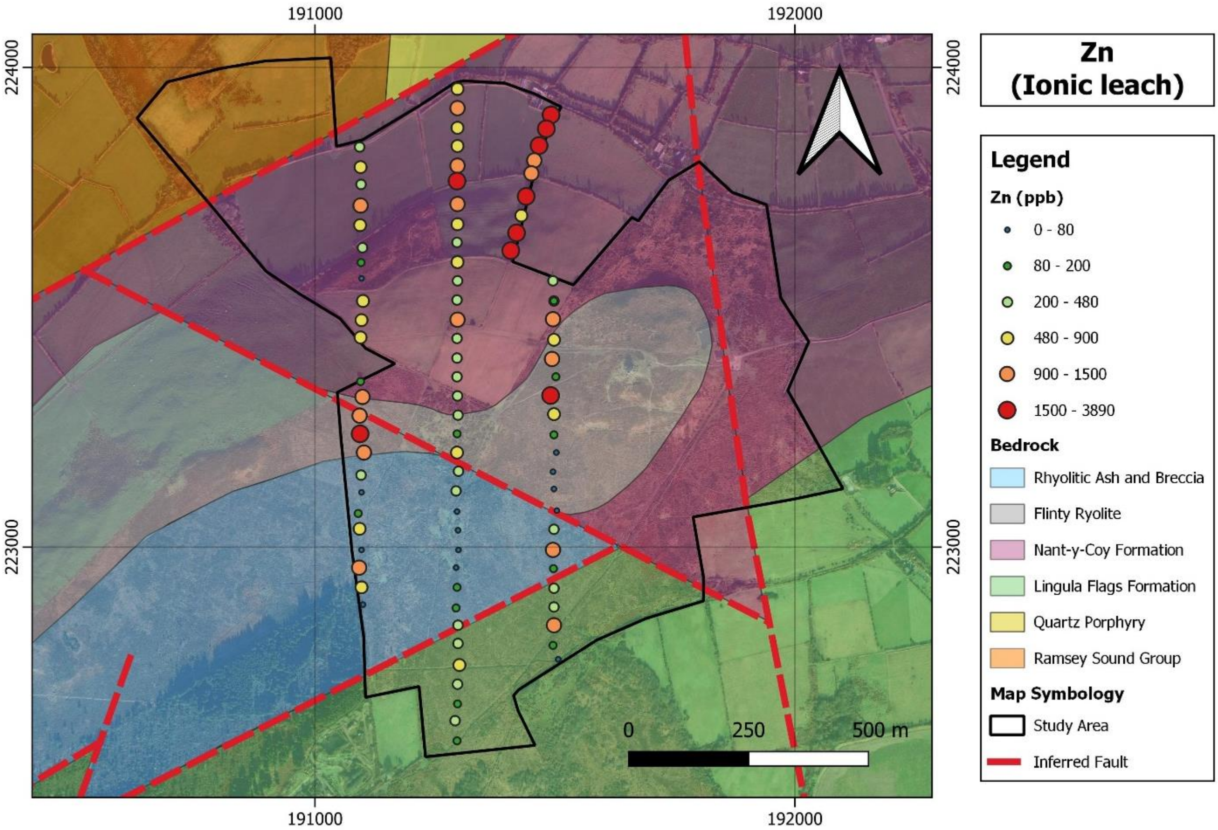

Figure 60: *Zn concentrations for soil samples analysed b by ionic leach within the study area (data from SHG and ALS Global, basemap from Edina Digimap)*

6. Discussion

6.1 Interpretation of Geochemical Anomalies

The main Au-As-Ba-Cu-Fe-Mn-Zn geochemical anomaly lies to the north of the study area (see Figure 63) and is lithologically constrained within the Nant-y-Coy Formation. This anomaly is approximately 500m wide and likely reflects the presence of abundant pyrite and may be an indicator of mineralisation, with the high levels of Cu, Pb and Zn possibly relating to secondary enrichment processes (Brown et al., 1987). An anomalous zone of Ba enrichment is proximal to the contact between the Flinty Rhyolite and the Nant-y-Coy Formation and may possibly represent the surface expression of Ba mineralisation seen at 85-90m depth in BGS borehole 1 approximately 750m west of the study area (see Figure 4).

An inverse distance weighted interpolation (IDW) has been created (see Figure 60) to highlight the extent of the geochemical anomaly, with the boundary outside of the mapping area being poorly constrained. Correlation with other datasets is critical to understand the nature of the anomalies, such as past BGS geophysical surveys. The enriched zone to the north corresponds with a high radiometric anomaly (see Figure 61) and a high chargeability anomaly (see Figure 62). The radiometric high corresponds with high K and Rb values within the soil of the Nant-y-Coy Formation. The Ba, K and Rb values are very low within the Flinty Rhyolite, reflecting extreme alteration and silicification of the rhyolites. The chargeability high within the Nant-y-Coy formation likely corresponds to abundant disseminated pyrite seen in float samples and could reflect a moderately-sized pyrite-bearing body at depth.

Analysis by pXRF has identified an approximately 250m wide zone of Pb enrichment towards the eastern part of the study area (see Figure 64). This Pb anomaly also aligns with a chargeability high but a radiometric low in contrast to the Au-As-Ba-Cu-Fe-Mn-Zn geochemical anomaly. This enriched Pb zone may represent sulphide zoning within a deposit and may correlate with other pathfinder elements which have not been analysed through multi-element analysis and ionic leach. There are local highs of Cu-Pb along faults which cross-cut the study area, which may have been caused by hydrothermal fluids using the faults as fluid conduits, resulting in metal enrichment of the surrounding soil.

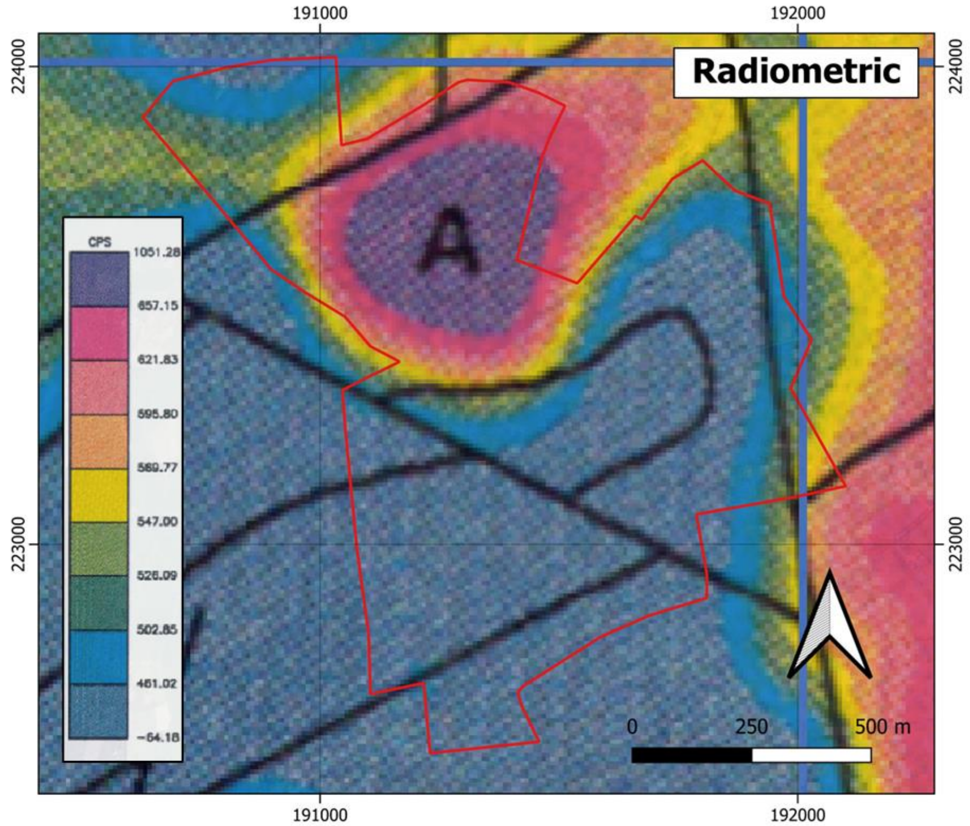

Figure 61: *Equal-area total count radiometric map of Plumstone Mountain (modified from Colman et al., 1995)*

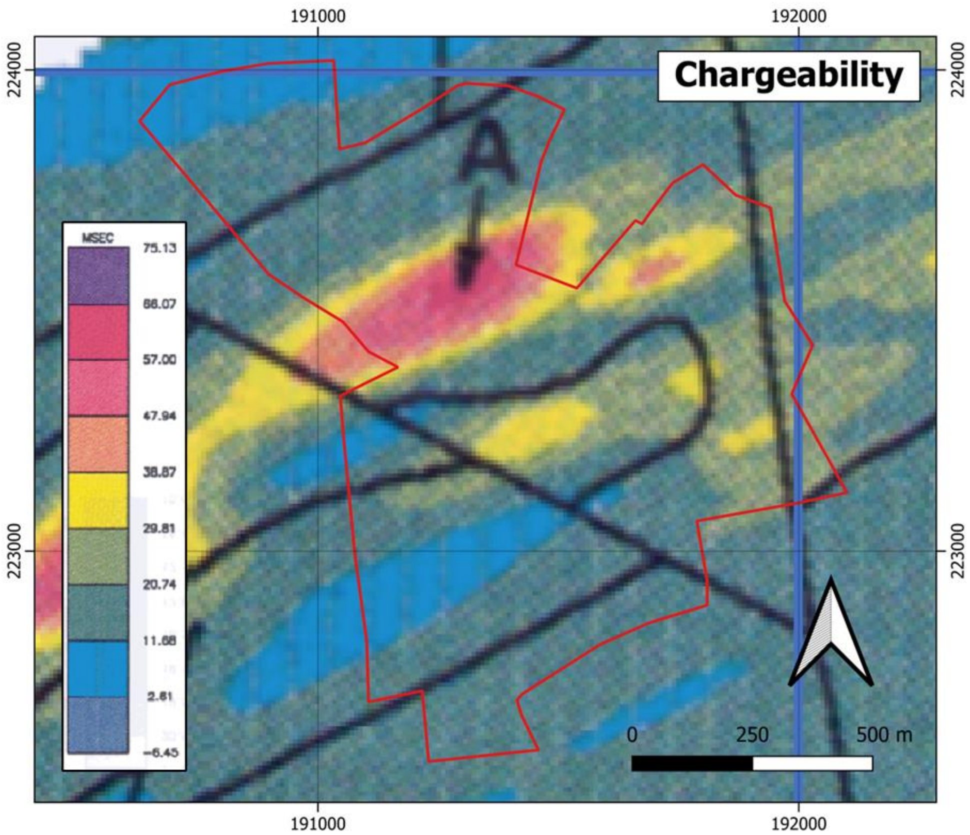

Figure 62: *Equal-area chargeability map of Plumstone Mountain (modified from Colman et al., 1995)*

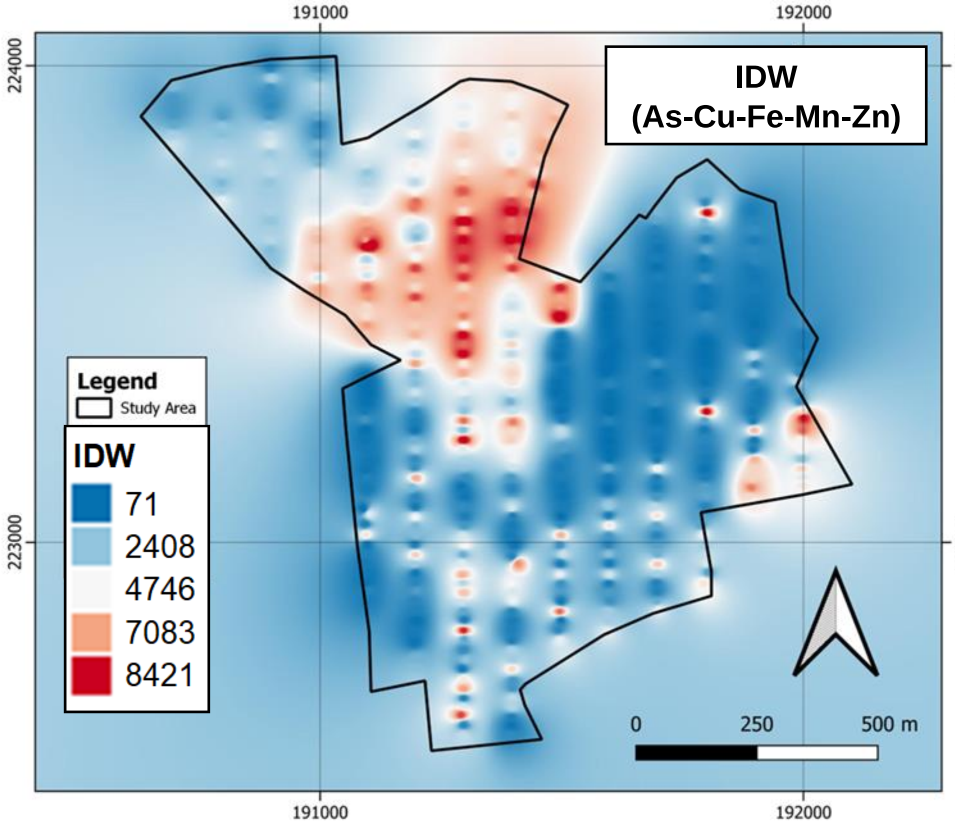

Figure 63: *Inverse distance weighted interpolation of selected pathfinder elements (As-Cu-Fe-Mn-Zn), highlighting the extent of the northern geochemical anomaly*

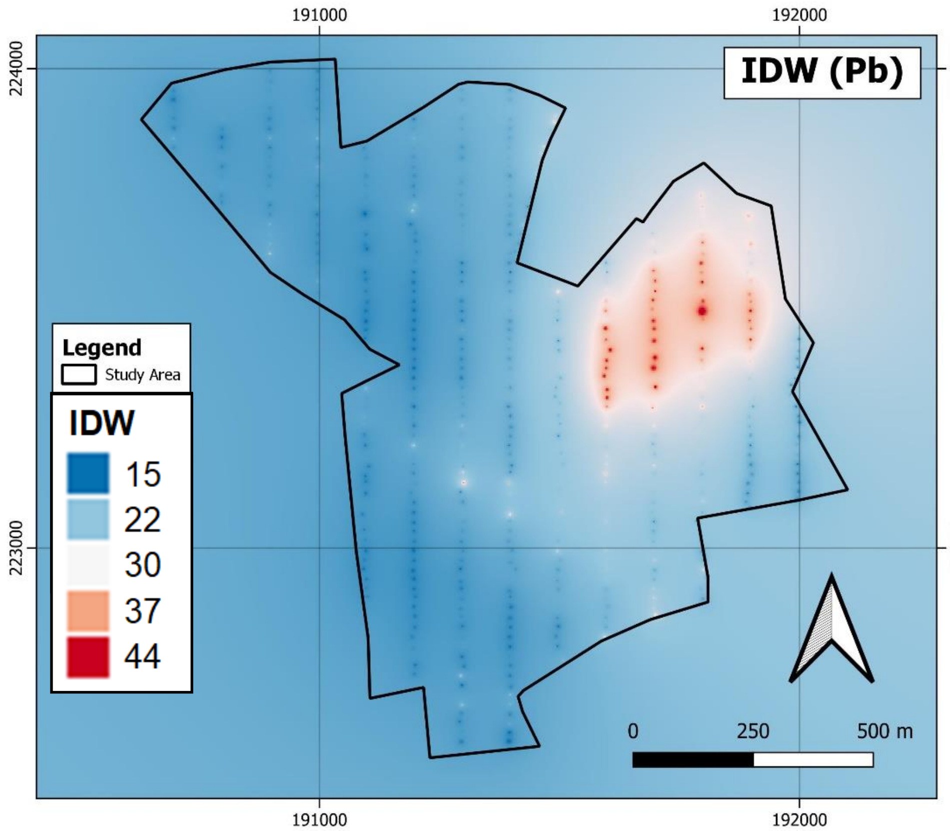

Figure 64: *Inverse distance weighted interpolation map of Pb, highlighting the offset of the Pb anomaly from the larger As-Cu-Fe-Mn-Zn geochemical anomaly to the north*

6.2 Deposit Interpretation

The geochemical signatures analysed at Plumstone Mountain correspond with VMS mineralisation, and in particular the bimodal-felsic VMS model as these deposits are major sources of Zn, Cu, Pb, Ag and Au, and can contain significant amounts of Mn, Te, and Hg (Lydon 1984). They typically occurs as lenses of polymetallic massive sulphide that form proximal to the seafloor in submarine volcanic environments. All VMS deposits are formed in extensional tectonic settings which includes both seafloor spreading and arc environments (Galley et al., 2007). The Nant-y-coy Formation may represent a sedimentary package that has been deposited within a back-arc basin and the dark, fine-grained and pyrite-rich mudstones suggest a deep water environment (see Figure 65).

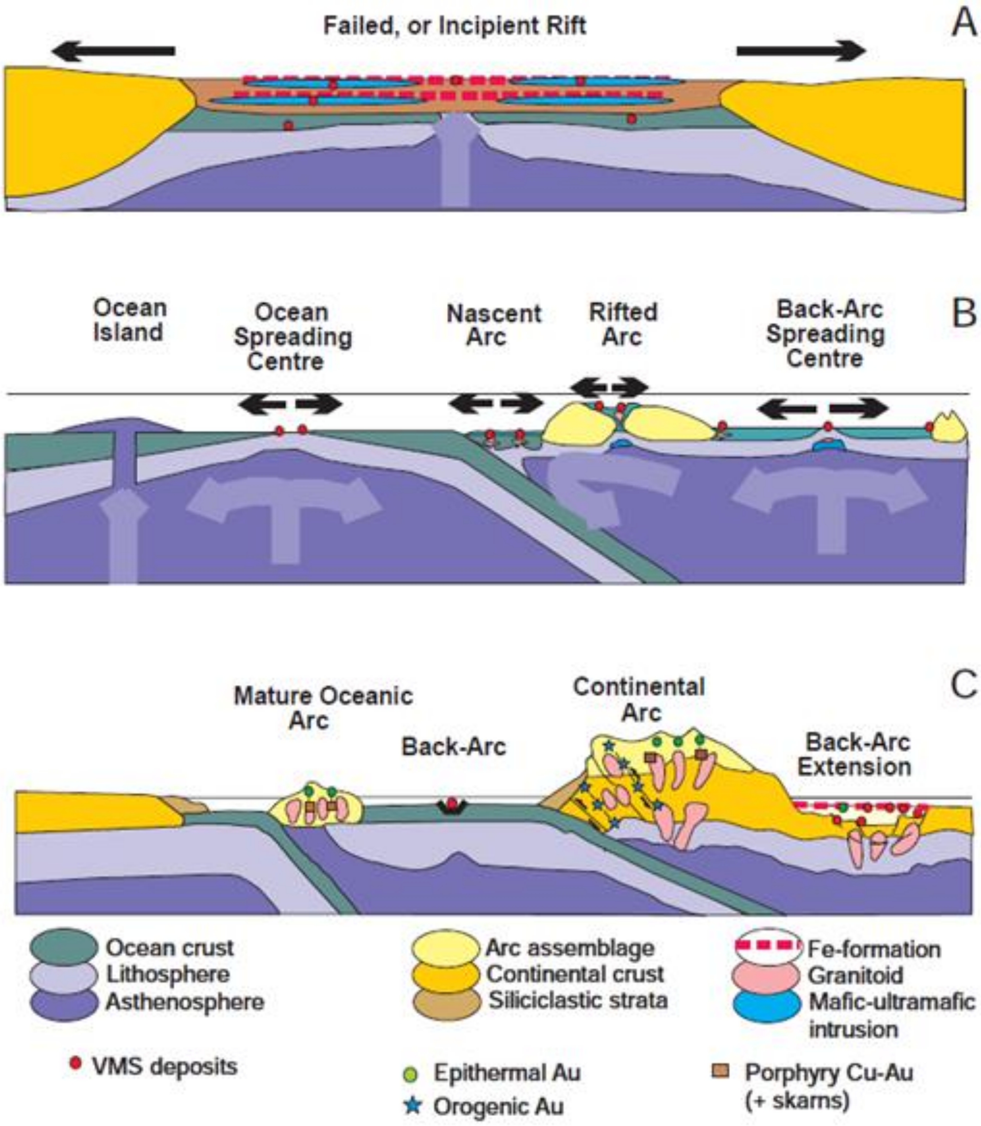

Figure 65: *Diagrams A-C show the principal tectonic environments in which VMS deposits form. Diagram B shows a seafloor spreading extensional regime which corresponds to the study area, further supporting the bimodal-felsic VMS type. Modified from Groves et al., 1998 (Galley et al., 2007)*

VMS deposits are classified according to base metal content, Au content and host-rock lithologies (Franklin et al., 2005). The signatures of the anomaly at Plumstone Mountain indicate that it would fall into the Zn-Pb-Cu group, with characteristically felsic and volcaniclastic host rocks, in addition to intense silicification and hydrothermal alteration characterised by loss of alkalis, with high Al and very low Na, K, Ca and Rb (Colman et al., 1995). The Bimodal-Felsic VMS type (see Figure 66) can be defined as having above 50% felsic volcanic rocks and above 15% siliciclastic rocks in the host stratigraphic succession (Barrie and Hannington, 1999). These deposits are abundant during the Phanerozoic and are found in more compositionally mature volcanic arcs (Lydon, 1984). The felsic host rocks are typically high-silica rhyolite, which are consistent with the study area.

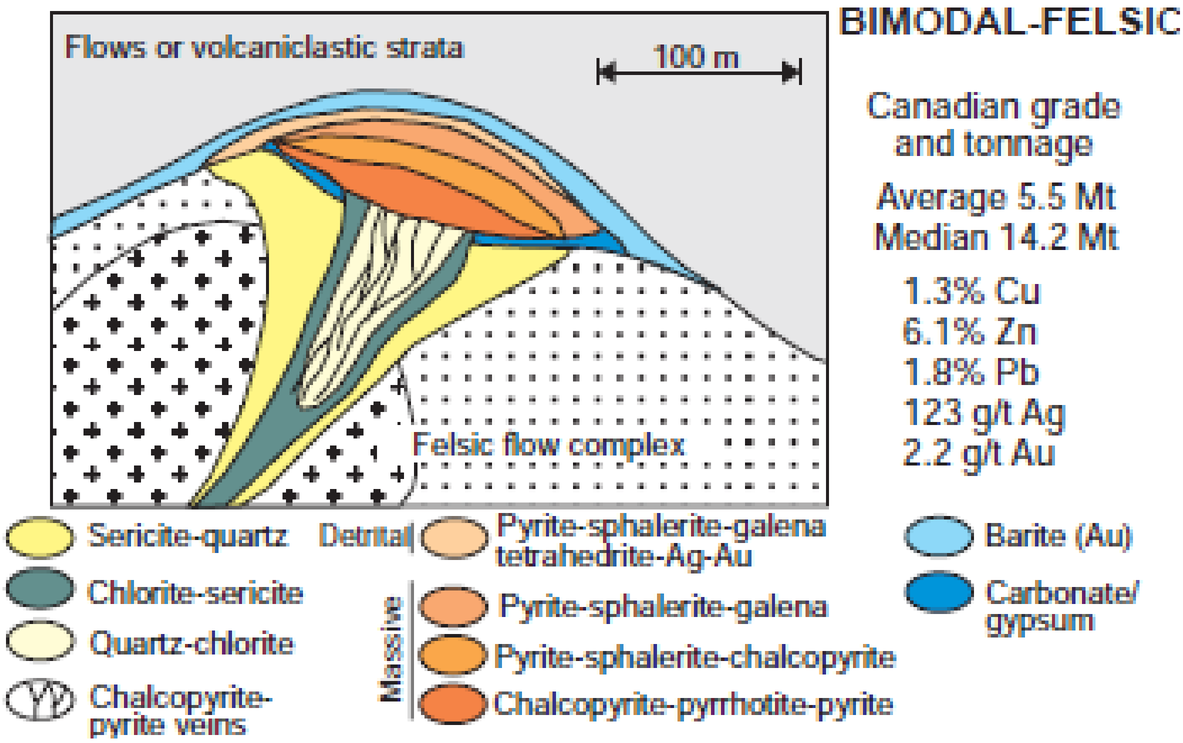

Figure 66: *Proposed mineral deposit model based on the VMS lithological classifications from Barrie and Hannington (1999) and further modified by Franklin et al. (2005) (Galley et al., 2007)*

Within VMS deposits, Au-rich massive sulphides are commonly associated with barite-rich assemblages (Eckstrand et al., 1995). There is enriched Ba at the study area, up to 820ppm analysed in soil samples, which continues across strike of the Roch Rhyolite Group. This could indicate the presence of a distal barite cap, which may then be followed by Pb/Zn and then Cu/Pb/Zn and Cu/Au zone towards the centre of hydrothermal activity (see Figure 67). The hydrothermal alteration, quartz veining and pyrite mineralisation located at Plumstone mountain could further support that it may located on the edge of VMS system (Cooper et al., 2000).

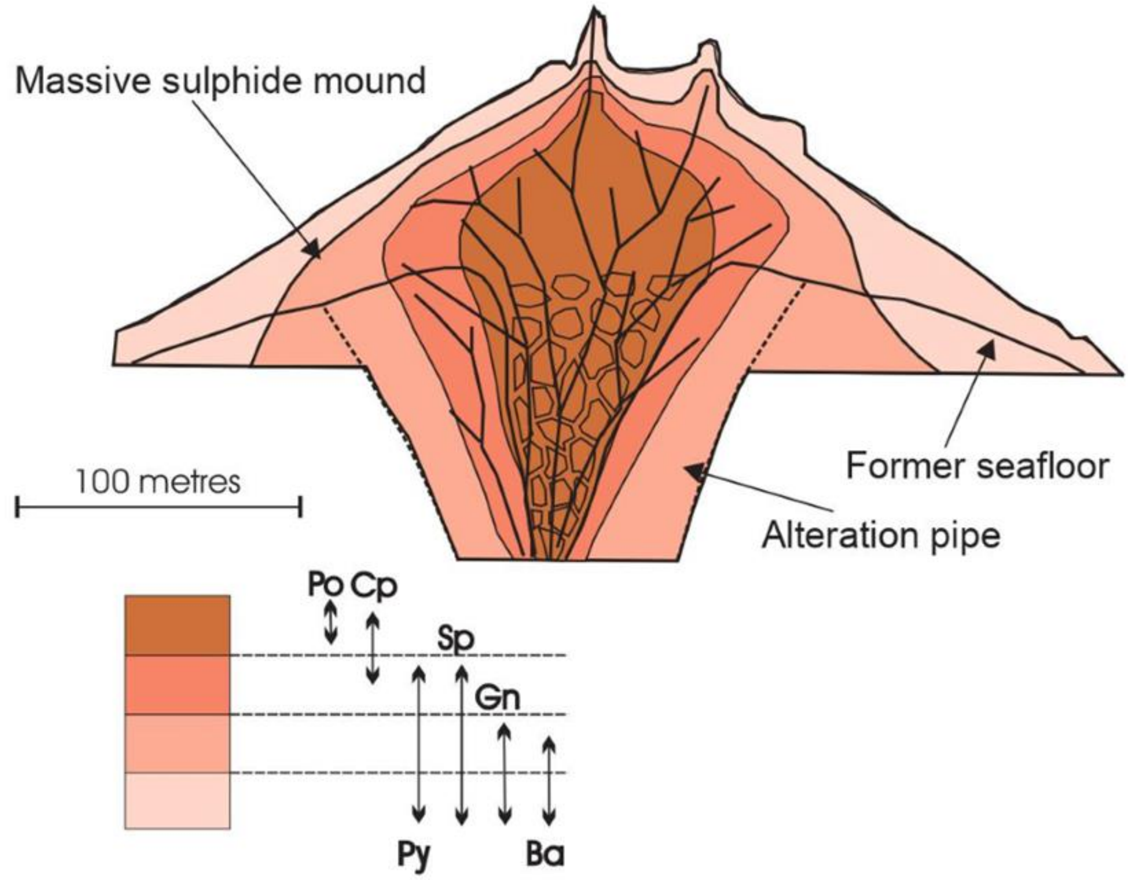

Figure 67: *Typical mineral zonation within VMS deposits, controlled by hydrothermal fluid temperature gradients (Lydon, 1984)*

6.3 Comparisons to Other Deposits

The majority of VMS mining districts have clusters of deposits which have formed within a rift or caldera, attributing to a common heat source. Two classic examples of Bimdoal-Felsic VMS systems are the Miocene deposits of the Hokuroku district, Japan (Kitazono and Ueno, 2008) and the Rosebery deposits of the Cambrian Mt. Read district, Tasmania (Naschwitz, 1985). Across the 5 deposit models proposed by Barrie and Hannington (1999), the Bimodal-Felsic type is the second-most numerous and on average contains the most Zn content (Galley et al., 2007).

The geology of Plumstone Mountain shares similar attributes to established VMS areas such as Parys Mountain (Anglesey), Avoca (Ireland) and the Bucans VMS district (Labrador). All of these deposits have Ordovician aged host rocks, felsic-dominated submarine volcanic rocks and pyritic black shales present (Colman et al., 1995). Additionally, despite no chloritisation being observed, a strong loss of alkalis and intense silicification is a common factor across all discussed deposits and the study area (See Table 8).

Comparison of Plumstone Mountain to established VMS Areas				
Established VMS areas	**Plumstone Mountain, Pembrokeshire**	**Parys Mountain, Anglesey**	**Avoca, Ireland**	**Buchans, Labrador**
Geology				
Archean to Tertiary	Ordovician	Ordovician	Ordovician	Ordovician
Island arc / Greenstone	Back Arc	Back Arc	Continental Margin Arc	Island Arc
Bimodal basalt – Rhyolite submarine volcanics	Felsic – dominated submarine volcanic rocks	Felsic – dominated submarine volcanic rocks	Felsic – dominated submarine volcanic rocks	Mafic – Felsic dominated submarine volcanic rocks
Pyritic black shales present	Present (Nant-y-Coy Formation)	Present	Present	Present
Clusters of deposits	No known deposits	Several deposits	Several deposits	Several deposits
Ore Minerals				
Pyrite (common)	Abundantly disseminated (Roch Rhyolite Group)	Massive and disseminated	Massive and disseminated	Common
Chalcopyrite (common)	Not observed (sparse in Treffgarne)	Common	Common	Common
Galena (common)	Not observed	Common	Common	Common
Sphalerite (common)	Not observed	Common	Common	Common
Baryte (common)	Sporadic	Little reported	Little reported	Common
Hydrothermal Alteration				
Strong – loss of alkalis	Strong – loss of alkalis	Strong – loss of alkalis	Strong – loss of alkalis	Strong – loss of alkalis
Chloritisation (common)	Not observed	Intense Chloritisation	Intense Chloritisation	Intense Chloritisation
Silicification (common)	Intense silicification	Intense silicification	Intense silicification	Intense silicification

Table 8: *Comparison between Plumstone Mountain and established VMS areas (modified from Colman et al., 1995)*

6.4 Limitations of the Proposed Deposit Model

The extreme alteration and silicification of the Roch Rhyolite Group was caused through a high fluid to surround rock ratio which is potentially favourable to epithermal gold mineralisation rather than VMS mineralisation. Additionally, despite abundant pyrite and sparse chalcopyrite, galena and sphalerite has not been observed within the study area compared to established VMS deposits (Colman et al., 1995). Also, the Pb trends are inversely proportional to the Zn trends seen in the study area, which does not support typical VMS mineralisation.

6.5 Evaluation of Geochemical Analysis Techniques

The pXRF and multi-element analytical methods are both versatile and have the benefits of being able to analyse a wide range of elements with good precision. However, one of the key benefits of pXRF is that it has a rapid response rate, allowing for multiple analyses to be made in a short space of time relative to other analytical methods. In comparison, the sample size of the commercial lab techniques were limited due to budgetary constraints, limiting the ability to make full comparisons with the pXRF dataset. Therefore, unlike the commercial lab techniques, results from pXRF can be used to guide ongoing exploration during the projects duration without significant waiting time.

The results obtained via multi-element analysis had a good correlation to the pXRF dataset, and when also considering the increased cost per sample analysis, limits the effectiveness of the multi-element analysis technique. When considering Au concentrations received from the lab, the fire assay revealed a lack of significant anomalies within the study area. However in comparison, the ionic leach dataset revealed a small Au anomaly that corresponds to other base-metals anomalies to the north of the study area. Therefore, it can be concluded that the ionic leach datasets provides different geochemical signatures to the other geochemical analyses and may reveal additional information if used for future exploration.

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7. Conclusions

This project was aimed to determine the gold prospectivity at Plumstone Mountain, evaluate the different geochemical techniques used (pXRF, fire assay, multi-element analysis and ionic leach) and determine if it was possible to further refine the previously mapped geology using geochemical data.

Regarding prospectivity, it can be concluded that there are geochemical anomalies suggesting potential indications for base-metal and precious-metal enrichment. The northern Au-As-Ba-Cu-Fe-Mn-Zn anomaly has been identified to align with a Bimodal-Felsic VMS signature. This spatial anomaly also corresponds with the continuation of the Nant-y-Coy Roch Rhyolite Group, where Au has previously been found associated with pyrite in quartz veins. However, fire assay results have revealed insignificant Au concentrations at typical background levels, and therefore indicates that gold mineralisation may be insubstantial if present.

A detailed elemental suite of data was produced using a combination of pXRF, fire assay, multi-element analysis and ionic leach techniques. Despite lower detection limits, multi-element analysis provided a dataset significantly similar to the pXRF dataset for the purpose of this study. Therefore, pXRF analysis is deemed to be the most effective method to use for this early stage exploration programme due to the cost-effectiveness per sample and rapid response time.

The geochemical data gathered has been used to increase the resolution of the current BGS geological map. Most notably, the geological boundary of the most prospective unit for exploration, the Nant-y-Coy Formation, was able to be adjusted through using a combination of mapped element ratios along with Rb and Sr heat maps. Further exploration can benefit from using this updated map, especially when continuing to assess the prospectivity of the Roch Rhyolite Group in Pembrokeshire.

8. Exploration Recommendations

The author's recommendation is to not pursue further exploration work within the Plumstone Mountain area. The fire assay results were all within a background range, with the highest recorded being 0.007ppm. When making social considerations, Plumstone Mountain contains a site of special scientific interest (SSSI) and this will result in planning restrictions if deciding to advance the project to further stages, such as drilling. There is also a concern for contamination in the study area due to the land being in consistent use by farmers and visitors, which may have directly influenced data collected via enrichments in As and Pb.

However, the ionic leach data has identified an anomalous high for Au corresponding with base-metal enrichment. If further work was to take place, the soil geochemical anomaly to the north should be followed up towards the north-east to further understand its lateral extent via a combination of pXRF and ionic leach sampling. Furthermore, the pXRF is a cost-effective method of analysing a high proportion of samples and can be used during future SHG exploration programmes expanding from this study to guide sampling on-site.

There would also be a benefit to greater understand the nature of the faults in the area, in addition to surveying for ore minerals such as galena and sphalerite. Further work is recommended along strike of the Roch Rhyolite Group to the West of Plumstone Mountain to evaluate the extent of baryte and pyrite mineralisation. Also, it was clear that 3 beam analysis for the pXRF would have been extremely beneficial so that other key elements such as Si and S could have been identified. For example, Si would have been useful to plot elemental ratios for geochemical mapping. If further exploration did take place, it would be critical to consider this in order to provide a more complete suite of elements.

9. Acknowledgements

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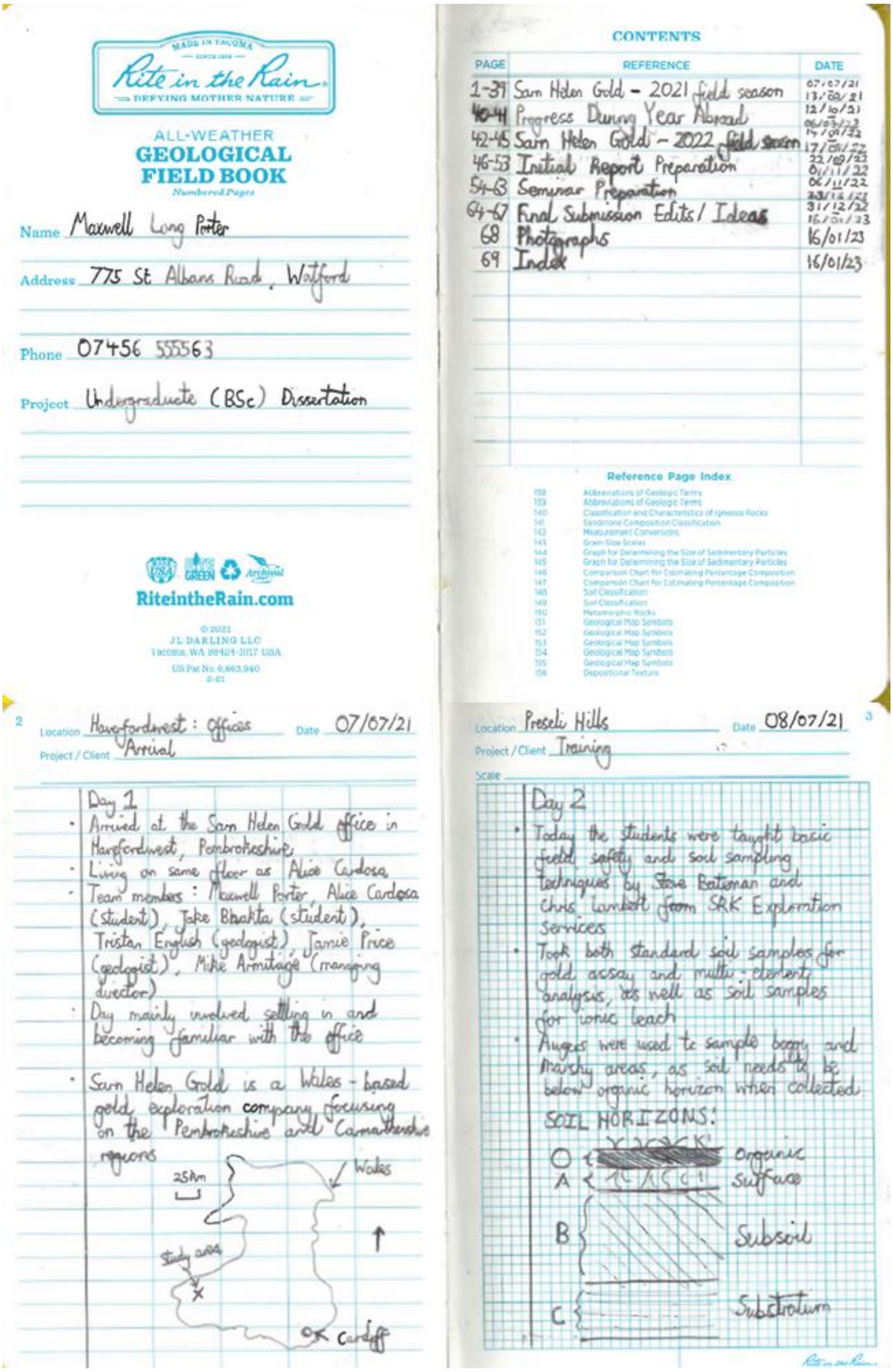
11. Appendices

Appendix 1: Project Notebook (69 pages total)



MADE IN TACOMA
Rite in the Rain
DEFYING MOTHER NATURE
ALL-WEATHER
GEOLOGICAL
FIELD BOOK
Numbered Pages

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Project Undergraduate (BSc) Dissertation

RiteintheRain.com

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2
Location Haverfordwest: Offices Date 07/07/21
Project / Client Arrival

Day 1
- Arrived at the Sarn Helen Gold office in Haverfordwest, Pembrokeshire
- Living on same floor as Alice Cardosa
- Team members: Maxwell Porter, Alice Cardosa (student), Jake Bhakta (student), Tristan English (geologist), Jamie Price (geologist), Mike Armitage (managing director)
- Day mainly involved settling in and becoming familiar with the office
- Sarn Helen Gold is a Wales-based gold exploration company focusing on the Pembrokeshire and Camarthenshire regions

3
Location Preseli Hills Date 08/07/21
Project / Client Training
Scale

Day 2
- Today the students were taught basic field safety and soil sampling techniques by Steve Bateman and Chris Lambert from SRK Exploration Services
- Took both standard soil samples for gold assay and multi-element analysis, as well as soil samples for ionic leach
- Augers were used to sample boggy and marshy areas, as soil needs to be below organic horizon when collected

SOIL HORIZONS:

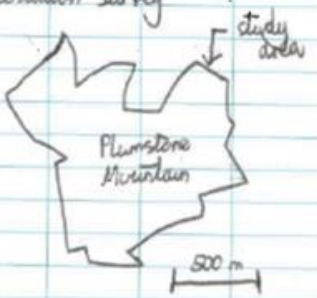
4

Location Plumstone Mountain Date 09/07/21
Project / Client Soil sampling

Day 3
- First day of soil sampling at Plumstone Mountain

Weather: Sunny with clouds
Team members: Alice Cardosa, Jamie Price
Mood: Excited
Hours: 9

- Plumstone Mountain has high density of bushes
- Jamie taught us effective sampling, such as removing loose pebbles / rock fragments with trowel
- Start of orientation survey



22 Soil Samples Taken

Location Plumstone Mountain Date 10/07/21 5
Project / Client Soil Sampling
Scale

Day 4
Weather: Sunny
Team members: Alice Cardosa
Mood: Happy
Hours: 9

- Rock type sampled is a massive shale
  ↳ Need to check official name of rock unit mapped by BGS
- We are using charts to record soil / rock information and switching shovelling / note taking duties daily

Photos
↳ Colour chart
↳ Plumstone mountain outcrop

11 Soil Samples Taken

6

Location Plumstone Mountain Date 11/07/21
Project / Client Soil Sampling

Day 5
Weather: Sunny
Team members: Alice Cardosa, Jamie Price
Mood: Happy
Hours: 9

- Note-taking today, recording information such as texture, colour, moisture, depth
- Organic content seems to vary

48 Soil Samples Taken

Soil Horizons:

Location Haverfordwest Date 12/07/21 7
Project / Client Day off
Scale

Day 6
- Day off

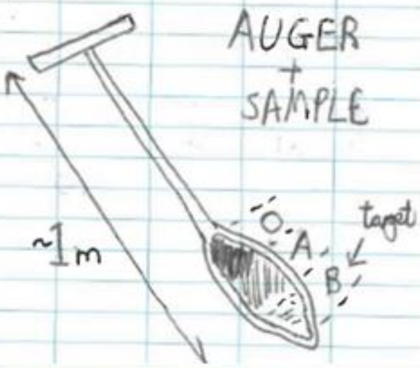
Q Which papers by the BGS provided the exploration information for the project?
↳ Cooper, 2000
↳ Norton, 2000

8 Location: Plumstone Mountain Date: 13/07/21
Project / Client: Soil Sampling

Day 7
Weather: Cloudy
Team members: Alice Cardosa
Mood: Happy, energised
Hours: 8

- Some sample points were difficult to gather sufficient amounts of soil due to higher quantities of rock/rubble fragments
- Organic horizon is relatively small compared to previous days

AUGER + SAMPLE



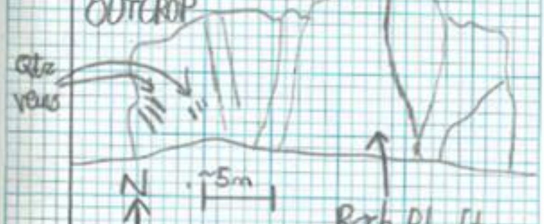
4 Soil Samples Taken

Location: Plumstone Mountain Date: 14/07/21 9
Project / Client: Soil Sampling

Day 8
Weather: Cloudy
Team members: Alice Cardosa
Mood: Happy
Hours: 8

- Plumstone ~~meadow~~ mountain outcrop is a grey, weathered Rhyolite with ~~occasional~~ qtz-veins

PLUMSTONE MOUNTAIN OUTCROP



2 Soil Samples Taken - Flinty Rhyolite

10 Location: Plumstone Mountain Date: 15/07/21
Project / Client: Soil Sampling

Day 9
Weather: Cloudy, some rain
Team members: Alice Cardosa, Tristan English
Mood: Happy
Hours: 8

- Last day for now at Plumstone Mountain
- 2 lithologies seen at Plumstone mountain: Shale and Rhyolite
  - ↳ Check BGS Geological maps
  - ↳ hand specimens have been collected

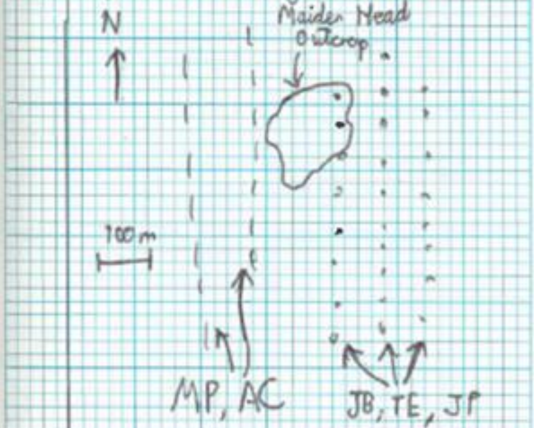
Photos:
- Equipment
- Soil sample → need to annotate

33 Soil Samples Taken

Location: Maiden Castle Date: 16/07/21 11
Project / Client: Soil Sampling

Day 10
Weather: Sunny
Team members: Alice Cardosa, Jamie Price
Mood: Excited
Hours: 9

- Exploring new area today
- Augers are very effective due to deeper organic horizon
- Higher densities of bushes and trees

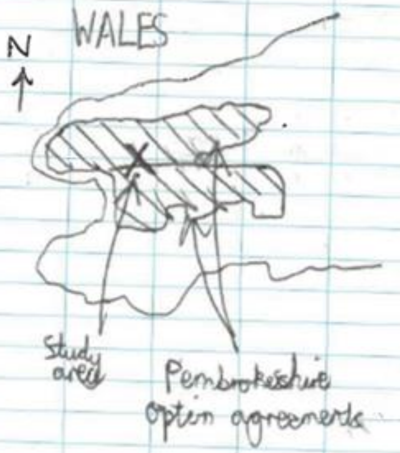


12 Location: Haverfordwest Date: 17/07/21
Project / Client: Day off

Day 11
- Day off

Q Ask for QGIS lesson from Jamie

Q Crown option agreements figure?



Location: Preseli Hills (West) Date: 18/07/21 13
Project / Client: Soil Sampling
Scale

Day 12
Weather: Sunny
Team members: Alice Cardosa, Jamie Price
Mood: Happy
Hours: 8

- Start of soil sampling lines in Preseli Hills
- Occasional wildlife such as sheep, need to be considerate
- Tourists in area on some walking paths
- Auger is very useful in some areas where soil conditions are more marshy

14 Location: Preseli Hills (West) Date: 19/07/21
Project / Client: Soil Sampling

Day 13
Weather: Sunny cloudy
Team members: Alice Cardosa
Mood: Happy
Hours: 8

- Continuation of soil sampling lines from yesterday
- Deep organic content present in majority of project area

Location: Preseli Hills (West) Date: 20/07/21 15
Project / Client: Soil Sampling
Scale

Day 14
Weather: Sunny, cloudy
Team members: Alice Cardosa
Mood: Happy, more tired than usual
Hours: 8

- Continuation of soil sampling lines from the 18th/19th July
- Also deep organic content present - need auger

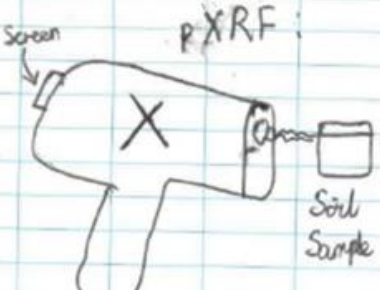
16

Location: Maiden Castle Date: 21/07/21
Project / Client: Soil sampling / Float sampling

Day 15
Weather: Sunny
Team members: Alice Cardosa, Jamie Price, Tristan English, Jake Bhakta
Mood: Happy, excited
Hours: 9

- Following up promising As anomalies for 'float' samples taken previously
- Doing more float sampling
- Using geological hammer
- Float samples approximately a 'fist' in size

pXRF:



17

Location: ~~Clarbes~~ Clarbeston Road Date: 22/07/21
Project / Client: Training - gold panning
Scale

Day 16
Weather: Sunny
Team members: Alice Cardosa, Jamie ~~Mood~~ Price, Tristan English, Jake ~~Hours~~ Bhakta, Steve Bateman, Nicholas O'Reilly, Roger Murphy
Mood: Very excited!
Hours: 9

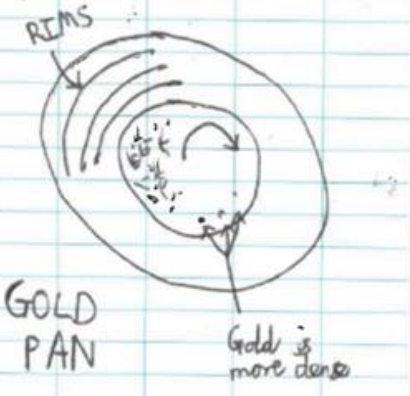
- Taught by Steve and Nick from SRK Exploration Services on the fundamentals of gold panning
- Visited by Roger Murphy
- Took samples from active streams
- Looked for trap sites

18

Location: Clarbeston Road Date: 23/07/21
Project / Client: Gold panning

Day 17
Weather: Cloudy, colder
Team members: AC, TE, JP, JB
Mood: Happy
Hours: 7

- Continuation of gold panning
- Still learning
- Few gold grains found
- More silvery grains are pyrite
- Sampled 3 locations



19

Location: Haverfordwest Date: 24/07/21
Project / Client: Day off
Scale

Day 18
- Day off

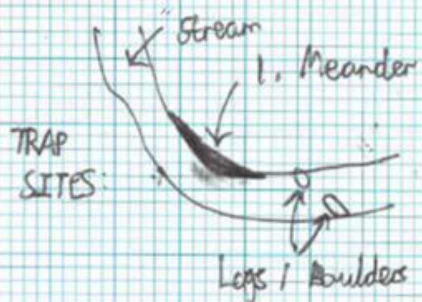
20 Location: Haverfordwest Date: 25/07/21
Project / Client: Day off

Day 19
- Day off

Location: Clarbeston Road Date: 26/07/21 21
Project / Client: Gold panning

Day 20
Weather: Sunny
Team members: AC, JB, JP, TE, AM, MA
Mood: Happy, recharged
Hours: 7

- Visited today by Alex Mikhadev and Mike Armitage
- Alex explained that denser gold grains will sink up to a few metres, so more shoveling is required
- Also checked land ownership for Plumstone Mountain with Mike



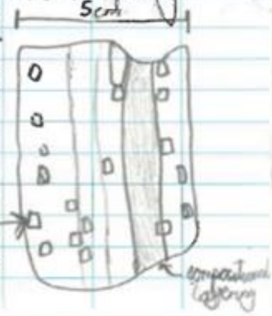
22 Location: Plumstone Mountain Date: 27/07/21
Project / Client: Soil and float sampling

Day 21
Weather: Cloudy
Team members: JB, AC, TE, JP
Mood: Happy
Hours: 8

- Rock chip samples taken with geologic pick
- Continuation of orientation survey
- Looking for sulphidation in rock chips
- Pyrite present
- Some layering seen in sediments
- Shale at site 20
- Ionic leach = 40m spacing
- Standard soils = 20m spacing

Hand Sample 1
- Nant-y-Cwy formation

28 Soil Samples Taken



Location: Preseli Hills (West) Date: 28/07/21 23
Project / Client: Soil Sampling

Day 22
Weather: Sunny
Team members: AC, JB, JP, TE
Mood: Happy
Hours: 8

- Final day sampling soil sample lines in Preseli Hills West
- Majority of outcrop is concealed under regolith

24 Location: Preseli Hills ~~(West)~~ (East) Date: 29/07/21
Project / Client: Soil Sampling

Day 23
Weather: Sunny
Team members: JB, TE, JP
Mood: Happy, tired - day off tomorrow
Hours: 8

- Investigating Au potential in Preseli Hills East.
- Particularly steep elevation in some locations
- Large Hills and bogs form the terrain

Location: Haverfordwest Date: 30/07/21 25
Project / Client: Data processing
Scale

Day 24
- Stayed at base today to process data and revise potential dissertation topics
- As discussed with Mike, I would like to pursue soil sample results at Plumstone Mountain
- Will have pXRF, fire assay, multi-element and ionic leach data

Rite in the Rain

26 Location: Haverfordwest Date: 31/07/21
Project / Client: Day off

Day 25
- Day off

Location: Clarbeston Road Date: 01/08/21 27
Project / Client: Gold panning
Scale

Day 26
Weather: Rain, clouds
Team members: TE, JP, AC, JB
Mood: Happy
Hours: 8
- Back to gold panning at Clarbeston Road
- Lots of trap sites created by meandering parts of stream

Rite in the Rain

28 Location Clarbeston Road Date 02/08/21
Project / Client Gold panning

Day 27
Weather : Some rain clouds
Team members : TE, JP, AC, JB
Mood : Happy
Hours : 8

- Continuation of gold panning
- Once sufficient panning is done, sediment is transferred to panned concentrate bag for further analysis

Location Preseli Hills (East) Date 03/08/21 29
Project / Client Soil Sampling
Scale

Day 28
Weather Cloudy
Team members : JB, AC, JP, TE.
Mood : Happy
Hours : 8

- Since weather improved, continuing soil sampling at Preseli Hills East
- SHG may pursue geophysical surveys in the area

Rite in the Rain

30 Location Preseli Hills (East) Date 04/08/21
Project / Client Soil Sampling

Day 29
Weather : Sunny
Team members : JB
Mood : Happy
Hours : 8

- Soil sampling today with Jake
- Preseli Hills is much steeper than Plumstone Mountain
- Lack of outcrop exposure

Location Clarbeston Road Date 05/08/21 31
Project / Client Gold panning
Scale

Day 30
Weather : Rain
Team members : JB, AC, TE, JP
Mood : Happy
Hours : 6

- Resuming gold panning at Clarbeston Road
- Received a QGIS tutorial from Jamie Price in the evening
  ↳ Shapefile basics
- Symbols:

  Use size to distinguish symbology for soil concentrations

Rite in the Rain

32 Location Clarbeston Road Date 06/08/21
Project / Client Gold panning

Day 31
Weather : Sunny
Team members : TE, JP, JB, AG
Mood : Happy
Hours : 6

- Last day in the field with Jamie Price
  ↳ great mentor, has taught me GIS and soil sampling fundamentals

Location Haverfordwest Date 07/08/21 33
Project / Client Day off
Scale

Day 32
~~Weather~~
~~Team members~~
~~Mood~~
~~Hours:~~

- Day off

34 Location Preseli Hills (East) Date 08/08/21
Project / Client Soil Sampling

Day 33
Weather Sunny
Team members : AC, TE, JB
Mood : Happy
Hours : 8

- Resuming soil sampling at Preseli Hills East
- Think I'll need to revisit Plumstone Mountain for some final photos

Location Preseli Hills (East) Date 09/08/21 35
Project / Client Soil Sampling
Scale

Day 34
Weather : Sunny
Team members : AC, TE, JB
Mood : Happy
Hours : 8

- Particularly more bog in this soil sample ~~the~~ today
- Approximately 20 - 30 samples collected per day in the Preseli Hills

36 Location Preseli Hills East Date 10/08/21
Project / Client Soil Sampling

Day 35
Weather: Sunny / cloudy
Team members: TE, AC, JB
Mood: Happy
Hours: 8

- Last day of soil Sampling at Preseli Hills East, will resume with 2nd group of students

Location Clarbeston Road Date 11/08/21 37
Project / Client Gold panning
Scale

Day 36
Weather: Some rain, cloudy
Team members: TE, AC, JB
Mood: Happy
Hours: 8

- Exploring one of the last stream sites of the field program for group 2
- Abundant trap sites
- 4 gold grains found today

38 Location Clarbeston Road Date 12/08/21
Project / Client Gold panning

Day 37
Weather: Some rain, cloudy
Team members: TE, JB, AC
Mood: Happy
Hours: 8

- Last day of gold panning
- Need to learn how to distinguish pyrite from Au
  ↳ Pyrite can appear more silvery and cubic, less dense

Location Plumstone Mountain Date 13/08/21 39
Project / Client Data collection
Scale

Day 38
Weather: Sunny, windy
Team members: JB
Mood: Happy
Hours: 6

- Final day in the field
- Collecting float samples at Plumstone Mountain, along with photos of soil sampling process
- Investigated main outcrop, took photos + notes
- Decided that Plumstone Mountain will be study area, now waiting on data from ALS
- Will work on geology, introduction and methodology.

40 Location: Vancouver, Canada Date: 12/10/21
Project / Client: Data analysis

- Received a onedrive link from Tristan English to data for project on Plumstone Mountain
- Entered data onto QGIS to see and make initial observations on trends

whole area for pXRF

vs

↳ 3 central lines analysed via ALS commercial lab techniques

Location: Vancouver, Canada Date: 06/04/22 41
Project / Client: ALS tour

- Visiting ALS lab as part of geochemistry module
- Made detailed notes on ~~gold fire~~ fire assay process, useful for project
- Batch fire assay using crucibles
  ↳ lead oxide ~~bead~~ mixed in
  ↳ bead used and digested in nitric acid

of fusion bed

Crucible cups x 30 for fire assay

42 Location: Haverfordwest / Clarbeston Road Date: 14/09/22
Project / Client: Data analysis / project refresher

Revisiting study area

- Have spent the 2021/22 academic year in Canada
- Resuming work on project and have travelled to the Sarn Helen Gold offices as a refresher on collected / new data
- Also completed a few hours of gold panning with new students.
- Revised study area with Tristan English

Statistics
↳ correlation coefficient

	Au	As	Cu
Au	X	~	~
As	~	X	~
Cu	~	~	X

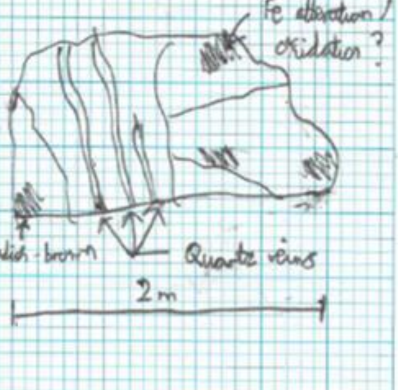
useful to determine relationship between Au and other elements

Location: Plumstone Mountain Date: 15/09/22 43
Project / Client: Data collection / analysis

Weather: Sunny, windy
Team members: TE, AF
Mood: Happy
Hours: 4

- Revisited Plumstone Mountain to take pictures and analyse float samples

Photo: Outcrop, Flinty Rhyolite



44 Location Haverfordwest Date 16/09/22
Project / Client Data analysis

- Reviewing results for Plumstone mountain and discussing anomalies with team
- Organised format for dissertation

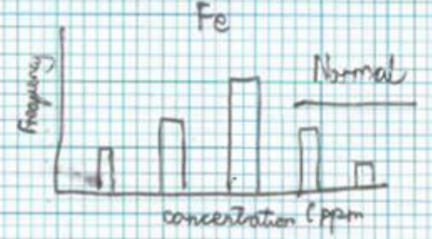
1. Intro
2. Geological Setting
3. Methodology
4. Results
5. Data analysis
6. Discussion
7. Conclusions

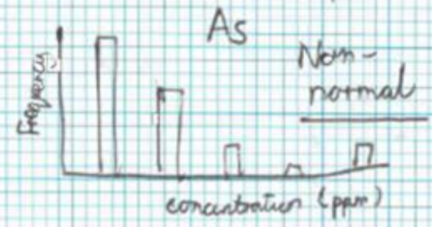
Q Look into VMS literature

Location Haverfordwest Date 17/09/22 45
Project / Client Data analysis
Scale

- Working on transferring datasets to QGIS
- Analysing key areas and working on map showing As concentrations

Statistics
↳ Watch Iain histogram video





46 Location Cardiff University Date 22/09/22
Project / Client Literature review - ALS reports

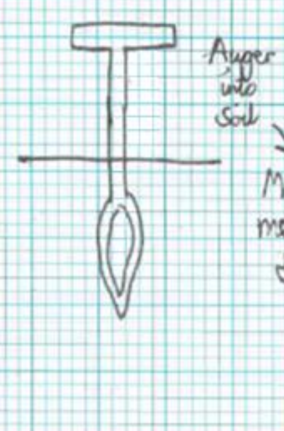
- Completing a review of ALS methodology reports for analytical techniques
- Fire assay, multi element and ionic leach;

sample lines, only a selection of samples could be sent off for review

- pXRF had no waiting time for results + cost - effective + can be used to guide ongoing exploration

Location Cardiff University Date 02/10/22 47
Project / Client Initial report
Scale

- Main focus is initial report which is due on October 14th
- Finalising methodology
↳ Soil Sampling, can leave out gold panning & keep short explanation

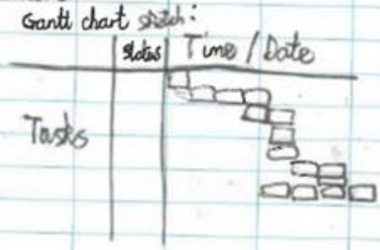


Auger into Soil → Make methodology figure?

48 Location Cardiff University Date 09/10/22
Project / Client Initial Report / Data Analysis

- Annotating project photos and compiling overview maps of study location
- Reviewing mineral report 137
  ↳ Plumstone Mountain has had prior exploration; soil sampling and geophysical surveys
- Need to include detailed Gantt chart

Gantt chart sketch:

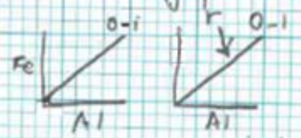


Location Cardiff University Date 11/10/22 49
Project / Client Meeting with Iain
Scale

- Meeting with Iain to discuss initial report progress and data analysis

Notes

- Consistency and symbology is critical: 5-8 categories
- No white/red colours for maps
- Can use Al to gauge clay content
  ↳ create ratios
  ↳ Sandy soil has a low ratio
  ↳ can use to determine systematic differences
- K content is higher for the rhyolite, can use info to map unit
- Make correlation matrices!
- Make X-Y graphs:



- $r > 0.55$ for significant correlation
- Clear plan is critical

50 Location Cardiff University Date 13/10/22
Project / Client Meeting with Tristan / Data analysis / Initial report hand-in

- Meeting with Tristan to discuss initial report → Add Timeline!
- Should look at Mineral Report 137 and 86 conclusions for VMS links
- What is the correlation between fire assay gold and Ionic leach gold

12/10/22 Placement dissertation meeting with James feedback:

- Review and determine importance of geophysics with results.

Location Cardiff University Date 20/10/22 51
Project / Client Geochemical maps / statistics
Scale

Weekly Review

- Expanded list of pathfinder elements to As, Cu, Pb, Zn, Mn, Fe
  ↳ determined through correlation matrix relationships
- Could the gold be due to an epithermal / porphyry source?

52 Location Cardiff University Date 27/10/22
Project / Client Statistics

Weekly Review

- Made a series of log-probability graphs and histograms to ~~establish further relationships between elements~~ suitable grouping and classes used in QGIS to display elements
- Need to look into limit of detection control on results
- Make correlation coefficients for multi-element and ionic leach

Location Cardiff University Date 01/11/22 53
Project / Client Initial Report Review
Scale

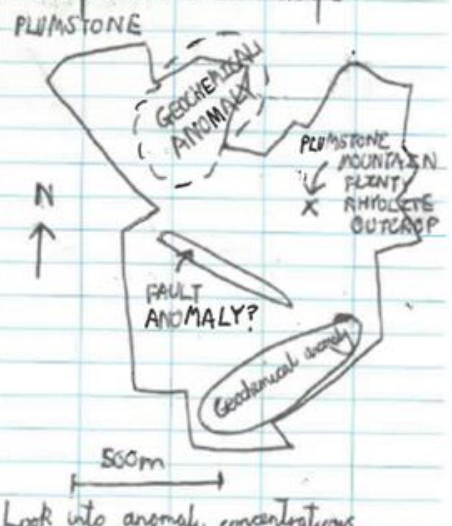
Initial Report Review

- Overall quite positive
- AIMS / OBJECTIVES / GOALS table good
- Main Critique: We are being employed to THINK, not only
  ↳ Modify student responsibilities to include this!

54 Location Cardiff University Date 06/11/22
Project / Client Mapping with geochemistry - gold prospectivity

Weekly Review

- MRP 86 - very useful for mapping
- Elements to focus on include Al, Na, Ca, K, Ba, Sr, Fe, S
- Northern geochemical anomaly seems to be present in the maps



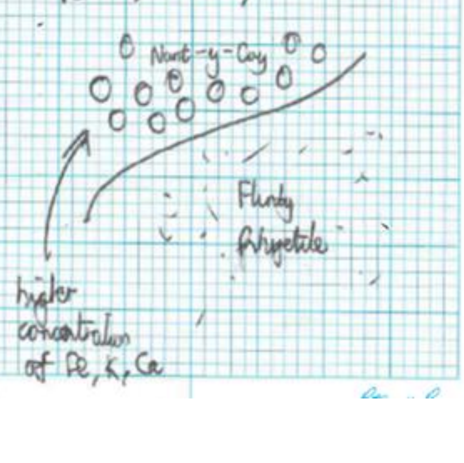
- Look into anomaly concentrations

Location Cardiff University Date 13/11/22 55
Project / Client Mapping with geochemistry - ratios

Weekly Review

- Use elemental ratios
- Ca/Al, K/Al, Fe/Al, Na/Al
- Also use Rb, Sr, Fe, S
- Different signatures for different lithologies

Fe/Al; K/Al, Ca/Al



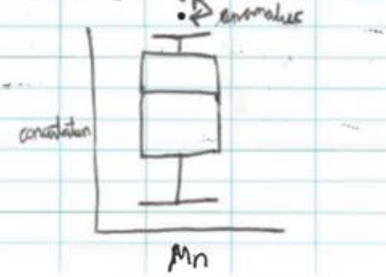
56 Location Cardiff University Date 20/11/22
Project / Client Geochemical mapping

Weekly review

- Working on adjusting boundary of Nant-y-Coy Formation

Previously → Now

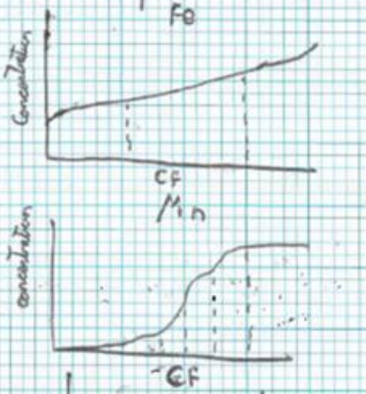
Statistics:
↳ Box plots → used to determine anomalies



Location Cardiff University Date 27/11/22 57
Project / Client Statistics
Scale

Weekly Review

- Make more figures for log-probability graphs, histograms, and box plots



↳ Need to ~~find the~~ determine full suite of elements that have a normal vs non-normal distribution

58 Location Cardiff University Date 30/11/22
Project / Client Meeting with Tristan

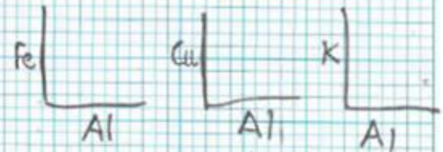
Q Significance of faults?
Q Ask for land Registry claims
Q Ask for reasons for inconsistences in data points
↳ Solved: Duplicate Samples!
Q Review log probabilities

Main points:

- Create log probability for Au five assay
- Missed many key elements by doing 2D beam analyses
- Anomalies I've mapped / analysed are consistent with BGS

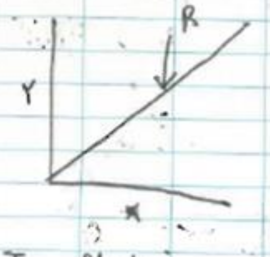
Location Cardiff University Date 05/12/22 59
Project / Client Meeting with Iain
Scale

- Look into VMS types and models from the Galley 2007 paper
- As - Cu - Fe - Mn - Pb - Zn geochemical anomaly correlates with high magnetic, chargeability and radiometric Signature



60 Location: Cardiff University Date: 12/12/22
Project / Client: Meeting with Tom / Wolf

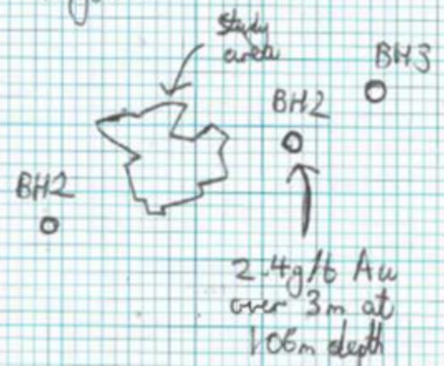
- Wolfgang Maier
  - ↳ Statistical analysis
    - ↳ Standard deviation
    - ↳ X-Y plots
      - ↳ IoGas



- Tom Blenkinsop
  - ↳ Geochemistry is consistent with geophysics
  - ↳ Check epithermal link
    - ↳ Te and Hg

Location: Cardiff University Date: 14/12/22 61
Project / Client: Finalising Seminar presentation + Meeting with Tristan

- check prior exploration by the BGS
  - ↳ notably drillholes 1, 2 and 3 in Nant-y-Coy Formation and Flinty Rhyolite



62 Location: Cardiff University Date: 15/12/22
Project / Client: Project Seminar feedback

Deposit interpretation
↳ Geochemical signatures at Plumstone Mountain correspond with VMS mineralisation

1. Iain
   - ↳ Check if Pb anomaly correlates with other element enrichment
   - ↳ Why no Galena or Sphalerite?
2. Wolf
   - ↳ Other VMS mineralisation in / near Wales?
3. Tom
   - ↳ Why Ionic lead?
     - ↳ Need to justify

Location: Home Date: 23/12/22 63
Project / Client: Detailed Seminar feedback

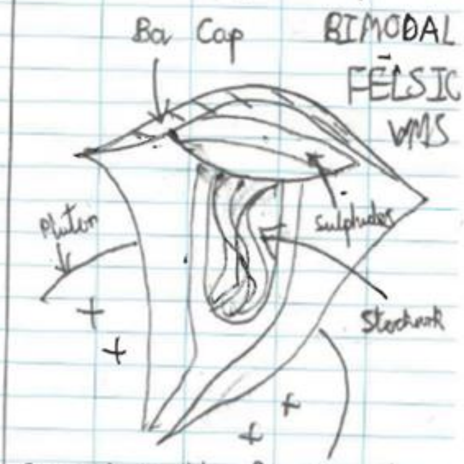
Seminar feedback - Main Points:

1. Need to include big picture
2. Need to address overinterpretation
3. Further thought on fault associations
4. Significance of ionic lead data? Why continue?

64 Location Home Date 31/12/22
Project / Client Final draft editing

Weekly Review

- Data points to bimodal felsic VMS model
- Cu, Zn, Pb, Ag, Au, Ba
  not present

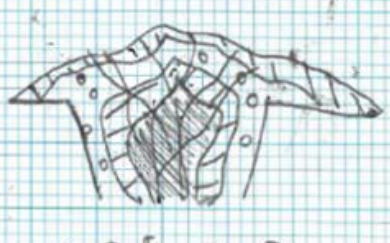


- Cross-check with Barrie and Hannington 1999

Location Home Date 07/12/23 65
Project / Client Final draft editing
Scale

Weekly Review

- Check sulphide zoning in Galley et al., 2007 and Lydon, 1984.



\\\ = Sp, Py, Ba
oo = Sp, Gn
// = Cp, Sp, Gn
WW = Po, Cp, Sp

66 Location Cardiff University Date 10/01/23
Project / Client Meeting with Iain

Q Journal in dis in appendix
Q Critique of geological map
Q Is a lit review section required
Q. Should I put new geological layer ~~over~~ map over maps
Q Review data analysis section

Bimodal is significant
Irish - VMS
Why is Pb zoned
Avoca Silver Mines - look in to for deposit link
Critique for not analysing Ca, Al, Mg, S
↳ Talk about Kuroko
↳ Why is Ag lost
↳ check Buchans
↳ Au within pyrite, Asp
↳ Separation between
↳ Look into Kuroko + Avoca + Silver Mines
↳ Fire assay is rarely wrong
↳ don't have many sample lines
↳ Gold replacement localised
↳ nugget effect
↳ Walk A way.

Location Home Date 16/01/23 67
Project / Client Final draft edits
Scale

Final checklist
1. Check feedback from initial report and interim seminar
2. Talk with Tristan to check discussion and conclusion
3. Format Statistics figures
4. Scan journal
5. Add mineral zonation and tectonic setting figures to discussion
6. Check Silver mines and Avoca
7. Tweak exploration reccomendations

READY FOR SUBMISSION

68

Location: Home Date: 16/01/23

Project / Client: List of photographs

Photographs:

1. Photo of soil sampling equipment
2. Photo of soil extracted from Auger
3. Tristan English extracting gold grains from panned concentrate
4. Auger being used in the Field
5. Collected soil sample with labelled horizons
6. Rock chip sample of Nant-y-Coy Formation
7. pXRF in use by Jamie Price

Location: Home Date: 16/01/23 69

Project / Client: Index

Scale

Appendix 2: Laboratory method descriptions (Fire Assay, Multi-Element Analysis and Ionic Leach)

ALS Geochemistry

September 2014
REVISION 2.0
Geochemical Procedure

Au-ICP21/Au-ICP22 – Fire Assay Fusion – ICP-AES Finish

Sample Decomposition:

Fire Assay Fusion (FA-FUSPG1 & FA-FUSPG2)

Analytical Method:

Inductively Couple Plasma – Atomic Emission Spectrometry

A prepared sample is fused with a mixture of lead oxide, sodium carbonate, borax, silica and other reagents as required, inquarted with 6 mg of gold-free silver and then cupelled to yield a precious metal bead.

The bead is digested in 0.5 mL dilute nitric acid in the microwave oven. 0.5 mL concentrated hydrochloric acid is then added and the bead is further digested in the microwave at a lower power setting. The digested solution is cooled, diluted to a total volume of 4 mL with de-mineralized water, and analyzed by inductively coupled plasma atomic emission spectrometry against matrix-matched standards.

Method Code	Element	Symbol	Units	Sample Weight (g)	Lower Limit	Upper Limit	Default Overlimit Method
Au-ICP21	Gold	Au	ppm	30	0.001	10	Au-GRA21
Au-ICP22	Gold	Au	ppm	50	0.001	10	Au-GRA22

Geochemical Procedure

ME-MS22, ME-MS23
pH Controlled Ionic Leach With ICP-MS Finish

Sample Decomposition:

Ionic leach (SEL-ION)

Analytical Method:

Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)

Ionic Leach is a static sodium cyanide leach using chelating agents ammonium chloride, citric acid and EDTA with the leachant buffered at pH 8.5.

Note: Method code ME-MS23 reports all analytes in the table. To pick select analytes use method code ME-MS22.

Element	Symbol	Units	Lower Limit	Upper Limit
Silver	Ag	ppb	0.1	1000000
Arsenic	As	ppb	2	1000000
Gold	Au	ppb	0.02	1000000
Barium	Ba	ppb	10	1000000
Beryllium	Be	ppb	0.2	1000000
Bismuth	Bi	ppb	3	1000000
Bromine	Br	ppm	0.05	20000
Calcium	Ca	ppm	0.2	1000
Cadmium	Cd	ppb	1	1000000
Cerium	Ce	ppb	0.1	1000000
Cobalt	Co	ppb	0.3	1000000
Chromium	Cr	ppb	1	1000000
Cesium	Cs	ppb	0.1	1000000

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March 26, 2013

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Geochemical Procedure

Element	Symbol	Units	Lower Limit	Upper Limit
Copper	Cu	ppb	1	1000000
Dysprosium	Dy	ppb	0.1	1000000
Erbium	Er	ppb	0.1	1000000
Europium	Eu	ppb	0.1	1000000
Iron	Fe	ppm	0.1	1000000
Gallium	Ga	ppb	0.5	1000000
Gadolinium	Gd	ppb	0.1	1000000
Germanium	Ge	ppb	0.1	1000000
Hafnium	Hf	ppb	0.5	1000000
Mercury	Hg	ppb	0.1	1000000
Holmium	Ho	ppb	0.1	1000000
Iodine	I	ppm	0.01	50000
Indium	In	ppb	0.1	1000000
Lanthanum	La	ppb	0.1	1000000
Lithium	Li	ppb	0.2	1000000
Lutetium	Lu	ppb	0.1	1000000
Magnesium	Mg	ppm	0.01	1000
Manganese	Mn	ppm	0.01	1000
Molybdenum	Mo	ppb	0.5	1000000
Niobium	Nb	ppb	0.1	1000000
Neodymium	Nd	ppb	0.1	1000000
Nickel	Ni	ppb	1	1000000
Lead	Pb	ppb	1	1000000
Lead 206†	Pb 206	ppb	1	1000000
Lead 207†	Pb 207	ppb	1	1000000
Lead 208‡	Pb 208	ppb	1	1000000
Palladium	Pd	ppb	0.1	1000000

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March 26, 2013

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Geochemical Procedure

Element	Symbol	Units	Lower Limit	Upper Limit
Praseodymium	Pr	ppb	0.1	1000000
Rubidium	Rb	ppb	0.1	1000000
Rhenium	Re	ppb	0.1	1000000
Antimony	Sb	ppb	0.5	1000000
Scandium	Sc	Ppb	1	1000000
Selenium	Se	ppb	2	1000000
Samarium	Sm	ppb	0.1	1000000
Tin	Sn	ppb	0.2	1000000
Strontium	Sr	ppb	1	1000000
Tantalum	Ta	ppb	1	1000000
Terbium	Tb	ppb	0.1	1000000
Tellurium	Te	ppb	1	1000000
Thorium	Th	ppb	0.02	1000000
Titanium	Ti	ppb	5	1000000
Thallium	Tl	ppb	0.5	1000000
Thulium	Tm	ppb	0.1	1000000
Uranium	U	ppb	0.1	1000000
Tungsten	W	ppb	1	1000000
Yttrium	Y	ppb	0.1	1000000
Ytterbium	Yb	ppb	0.1	1000000
Zinc	Zn	ppb	10	1000000
Zirconium	Zr	ppb	0.1	1000000
pH*	Unity	pH	0.1	14

*pH is reported off method code pH-MS22 or pH-MS23.

†Available in ME-MS22 upon request

‡Not available in ME-MS22

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March 26, 2013

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ME-ICP61 – Trace Level Methods Using Conventional ICP-AES Analysis

Sample Decomposition:

HNO3-HClO4-HF-HCl digestion, HCl Leach (GEO 4ACID)

Analytical Method:

Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP - AES)

A prepared sample (0.25 g) is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by inductively coupled plasma-atomic emission spectrometry. Results are corrected for spectral interelement interferences.

NOTE: Four acid digestions are able to dissolve most minerals; however, although the term "near-total" is used, depending on the sample matrix, not all elements are quantitatively extracted.

List of Reportable Analytes:

Analyte	Symbol	Units	Lower Limit	Upper Limit	Default Overlimit Method
Silver	Ag	ppm	0.5	100	Ag-OG62
Aluminum	Al	%	0.01	50	
Arsenic	As	ppm	5	10000	
Barium	Ba	ppm	10	10000	
Beryllium	Be	ppm	0.5	1000	
Bismuth	Bi	ppm	2	10000	
Calcium	Ca	%	0.01	50	
Cadmium	Cd	ppm	0.5	1000	
Cobalt	Co	ppm	1	10000	Co-OG62
Chromium	Cr	ppm	1	10000	
Copper	Cu	ppm	1	10000	Cu-OG62
Iron	Fe	%	0.01	50	
Gallium	Ga	ppm	10	10000	
Potassium	K	%	0.01	10	
Lanthanum	La	ppm	10	10000	
Magnesium	Mg	%	0.01	50	
Manganese	Mn	ppm	5	100000	
Molybdenum	Mo	ppm	1	10000	Mo-OG62
Sodium	Na	%	0.01	10	
Nickel	Ni	ppm	1	10000	Ni-OG62
Phosphorus	P	ppm	10	10000	
Lead	Pb	ppm	2	10000	Pb-OG62
Sulphur	S	%	0.01	10	
Antimony	Sb	ppm	5	10000	
Scandium	Sc	ppm	1	10000	
Strontium	Sr	ppm	1	10000	
Thorium	Th	ppm	20	10000	
Titanium	Ti	%	0.01	10	
Thallium	Tl	ppm	10	10000	
Uranium	U	ppm	10	10000	
Vanadium	V	ppm	1	10000	

Analyte	Symbol	Units	Lower Limit	Upper Limit	Default Overlimit Method
Tungsten	W	ppm	10	10000	
Zinc	Zn	ppm	2	10000	Zn-OG62

Elements Listed below are available upon request:

Analyte	Symbol	Units	Lower Limit	Upper Limit	Default Overlimit Method
Lithium	Li	ppm	10	10000	
Niobium	Nb	ppm	5	2000	
Rubidium	Rb	ppm	10	10000	
Selenium	Se	ppm	10	1000	
Tin	Sn	ppm	10	10000	
Tantalum	Ta	ppm	10	10000	
Tellurium	Te	ppm	10	10000	
Yttrium	Y	ppm	10	10000	
Zirconium	Zr	ppm	5	500	

Appendix 3: Raw pXRF Data

SAMPLE_ID	X_BNG	Y_BNG	Z	Sampler	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Se	Rb	Sr	Y	Zr	Mo	Ag	Cd	Sn	Sb	W	Hg	Pb	Bi	Th	U
S10709A001	191296	222596	123.4119	MP AC	1	1	1	16133	1	1	9	9.8	7.8	1	35.7	71	12.3	335	1	1	1	1	1	1	1	11.9	1	32	1
S10709A002	191292	222638	122.7746	MP AC	1	1	75	38968	1	1	10	12.4	10.3	2.3	45.5	191	7.8	259	1	1	1	1	1	1	1	12.8	1	35	1
S10709A003	191297	222673	122.5846	MP AC	205	1	1	2255	1	1	13	9.2	4.1	1	32.6	198	11.3	349	1	1	1	1	1	1	1	27.5	1	1	7.4
S10709A004	191297	222714	124.6135	MP AC	151	1	1	23828	1	1	1	8	8.3	1.8	39.3	129	11.4	354	1	1	1	1	1	1	1	10.8	1	1	1
S10709A005	191301	222754	122.3633	MP AC	160	1	1	11019	1	1	9	7	8.9	2	39.4	145	16.7	442	1	1	1	1	1	1	1	11.5	1	33	1
S10709A006	191298	222799	129.889	MP AC	1	1	1	7060	1	1	8.5	9.3	3.5	1	21.1	109	10	275	1	1	1	1	1	1	1	20	20	1	1
S10709A007	191298	222837	128.756	MP AC	1	1	1	2093	1	1	9.6	8	1	1	16.1	122	14.7	342	1	1	1	1	1	1	1	11.3	1	34	1
S10709A008	191294	222873	132.1528	MP AC	1	1	1	16943	1	1	8	7.2	11.2	2.2	29.8	127	9.9	288	1	1	1	1	1	1	1	15.4	1	1	1
S10709A009	191296	222916	131.8886	MP AC	119	1	1	14595	1	1	1	11.1	6.4	1	43.9	68.2	11.3	334	1	1	1	1	1	1	1	11.1	1	1	1
S10709A010	191294	222957	135.8955	MP AC	124	1	1	19337	1	1	1	5.4	11.5	1	41.4	58.8	10.4	292	1	1	1	1	1	1	1	10.8	1	1	1
S10709A011	191299	222994	137.8274	MP AC	1	1	1	22115	1	1	1	10.8	6.3	1	40.2	105	13.8	392	1	1	1	1	1	1	1	14.9	1	33	1
S10709A012	191298	223035	140.7992	MP AC	124	1	1	5332	1	1	13	8	5.3	1	41.4	144	16.4	422	1	1	1	1	1	1	1	15.9	1	1	1
S10709A013	191296	223074	141.62	MP AC	146	1	26	3950	1	1	28	11.3	4.1	1.8	42.9	94	15.7	350	1	1	1	1	1	1	1	21	1	1	1
S10709A014	191294	223117	144.8649	MP AC	1	1	1	1203	1	1	11	5.1	1	1	27.9	69.6	16.9	379	1	1	1	1	1	1	1	12.2	1	30	1
S10709A015	191299	223158	147.5938	MP AC	175	48	27	10959	1	1	54	13.5	5.7	1	63	75.2	20.4	313	1	1	1	1	1	1	1	35.7	1	1	1
S10709A016	191296	223197	150.2641	MP AC	131	1	70	18840	1	1	12	13.7	4.6	1	50.4	55.1	10	219	1	1	1	1	1	1	1	22.2	20	1	1
S10709A017	191296	223236	155.2015	MP AC	211	1	1	9967	1	1	1	10.5	6	1.8	60.3	130	20	328	1	1	1	1	1	1	1	18.9	1	33	1
S10709A018	191298	223275	157.7513	MP AC	186	1	1	10957	1	1	7	6.7	7.4	1	58.2	84	15.5	257	1	1	1	1	1	1	1	15.6	1	1	1
S10709A019	191297	223315	160.9162	MP AC	274	1	1	20558	1	1	10	9.6	5.9	1	71	154	17.3	267	1	1	1	1	1	1	1	18.1	1	34	1
S10709A020	191296	223355	163.023	MP AC	311	1	1	31404	1	1	1	7.3	7.4	1	95.5	113	19.1	195	1	1	1	1	1	1	1	7.7	1	34	1
S10709A021	191296	223394	164.903	MP AC	223	1	115	44408	1	40	1	27	11	1	92.7	88	17	261	1	1	1	1	1	1	1	10.4	1	1	1
S10709A022	191296	223435	168.5219	MP AC	1	1	66	44170	1	23	10	19.8	11.8	1	100.1	88	14.1	153	1	1	1	1	1	1	1	10	1	1	1
S10709B001	191100	222880	145.8519	JB TE	1	42	1	2237	1	1	9.7	9	5	1	28.6	161	12.2	336	1	1	1	1	1	1	1	18.3	36	1	1
S10709B002	191097	222916	148.0687	JB TE	1	1	1	916	1	1	1	8.1	1	1	15.8	103.6	8.7	210	1	1	1	1	1	1	1	14.6	34	1	1
S10709B003	191092	222957	148.3373	JB TE	1	1	1	1791	1	1	8.3	4.7	1	1	17.3	172	17.1	454	1	1	1	1	1	1	1	11	35	1	1
S10709B004	191097	222994	149.9072	JB TE	134	31	1	1148	1	1	10.1	3.5	1	1	24.4	152	17	418	1	1	1	1	1	1	1	10.2	33	1	1
S10709B005	191093	223038	151.4471	JB TE	140	1	1	2152	1	1	15	7	4.8	1	22.6	399	16.3	393	1	1	1	1	1	1	1	14.2	1	32	1
S10709B006	191090	223070	151.1377	JB TE	120	1	1	650	1	1	7.5	5.5	1	1	8	209	13.4	309	1	1	1	1	1	1	1	13	27	33	1
S10709B007	191097	223114	154.3738	JB TE	200	1	1	1690	1	1	7	8.3	1	1	21.7	131	16.8	372	1	1	1	1	1	1	1	10.6	27	1	1
S10709B008	191096	223150	156.5469	JB TE	109	1	1	941	1	1	1	5	1	1	23.1	112	16.1	365	1	1	1	1	1	1	1	11.3	21	1	1
S10709B009	191102	223197	159.4296	JB TE	1	1	1	1764	1	1	1	12.6	1	1	7.6	62	5.9	133	1	1	1	1	1	1	1	18.9	1	1	1
S10709B010	191094	223236	157.2936	JB TE	1	1	1	716	1	1	1	7	1	1	6.9	147	8.8	253	1	1	1	1	1	1	1	13	1	1	1
S10709B011	191093	223274	160.3079	JB TE	142	1	1	1617	1	1	6.3	3.9	1	1	4.9	199	12.2	234	1	1	1	1	1	1	1	22.5	28	1	1
S10709B012	191099	223313	161.612	JB TE	1	1	1	431	1	1	1	8.5	1	1	4.3	194	6.8	204	1	1	1	1	1	1	1	18.4	1	1	1
S10709B013	191095	223345	160.2079	JB TE	1	1	1	620	1	1	1	7.8	1	1	6.7	57.7	7.5	155	1	1	1	1	1	1	1	17.5	28	1	1
S10709B014	191095	223437	162.0586	JB TE	293	51	64	27443	1	1	8	18	9.8	1	90.8	85	16.8	219	1	1	1	1	1	1	1	11	1	38	1
S10709B015	191097	223473	160.2786	JB TE	146	1	77	24738	1	1	9	13.6	11.6	1	81.5	70.3	17.4	249	1	1	1	1	1	1	1	6	1	31	1
S10709B016	191100	223513	159.0374	JB TE	191	68	107	33103	1	1	7	23.5	11	1	80.3	69	16.7	253	1	1	1	1	1	1	1	11.7	1	1	1
S10709B017	191099	223624	136.8428	JB TE	257	66	101	56439	1	42	12	24	15.8	2.5	91.3	83	17.3	300	1	1	1	1	1	1	1	7.5	23	36	1
S10709B018	191094	223671	130.7078	JB TE	286	60	208	31110	1	1	11	33	17.5	1	82.7	78	21.7	399	1	1	1	1	1	1	1	18.8	1	1	1
S10709B019	191095	223712	125.7835	JB TE	181	53	150	18221	1	21	10	28	12.6	1	78	67.7	25.8	465	1	1	1	1	1	1	1	18	1	34	1
S10709B020	191096	223756	123.6335	JB TE	205	43	98	14003	1	17	12	24.9	12.5	1	65.2	72.7	25.6	512	1	1	1	1	1	1	1	17.4	1	29	1
S10709B021	191095	223792	122.6192	JB TE	263	92	123	17468	1	26	10	27.6	12.4	1	66.2	79.5	23.6	456	1	1	1	1	1	1	1	18.4	1	1	1
S10709B022	191093	223834	117.808	JB TE	164	56	178	21303	1	23	7	32.2	9.2	1	62.1	56.9	17.9	382	1	1	1	1	1	1	1	14.8	1	26	1
S10709B023	191491	223316	160.8071	JB TE	127	1	1	468	1	1	1	8.4	3.9	1	11.9	537	15.4	325	1	1	1	1	1	1	1	13.8	1	36	1
S10710A001	191297	223474	165.3955	MP AC	272	57	143	34790	1	1	1	33	10.8	2.4	104.6	93	18.9	216	1	1	1	1	1	1	1	9.8	1	30	1
S10710A002	191296	223515	165.7944	MP AC	1	1	123	31422	1	40	10	29	15.3	1	79.6	64	15.5	277	1	1	1	1	1	1	1	10.3	1	45	1
S10710A003	191297	223555	163.7292	MP AC	152	1	112	40492	1	19	12	21.7	20.5	1	94.3	70	18	273	1	1	1	1	1	1	1	14.3	1	38	1
S10710A004	191297	223594	161.9001	MP AC	316	61	90	41367	1	24	8	12.8	27.3	1	126.1	102	21.2	183	1	1	1	1	1	1	1	10.8	22	37	1
S10710A005	191507	222766	118.6726	MP AC	118	50	96	17734	1	1	9	22.5	7.5	1	45.2	79.9	15.5	426	1	1	1	1	1	1	1	22.7	1	1	1
S10710A006	191496	222795	123.6772	MP AC	1	1	1	20287	1	1	8	8.5	8.1	1	44.2	62.5	12.2	338	1	1	1	1	1	1	1	12.4	1	1	1
S10710A007	191498	222837	123.367	MP AC	1	31	1	1340	1	1	5.7	5.5	1	1	22.6	71	14.4	395	1	1	1	1	1	1	1	8.9	33	24	1
S10710A008	191498	222875	125.087	MP AC	1	1	1	1562	1	1	11.8	5.1	1	1	25.3	71.9	17.8	283	1	1	1	1	1	1	1	20	27	1	1
S10710A009	191498	222914	127.4228	MP AC	126	1	1	4584	1	1	9	5	3.4	1	32.3	100	15	255	1	1	1	1	1	1	1	16.2	31	1	1
S10710A010	191497	222955	128.1036	MP AC	1	1	1	1881	1	1	9.4	6.1	3.2	1	28.8	119	13.8	274	1	1	1	1	1	1	1	14.5	19	1	1
S10710A011	191496	222994	129.8925	MP AC	118	1	1	4703	1	1	8.8	7.7	6.6	1	24.5	169	10.9	260	1	1	1	1	1	1	1	33.7	34	1	1
S10710B001	191496	223555	160.1823	JB TE	315	1	1	19247	1	1	11	12	11.6	1	75	79	16.9	234	1	1	1	1	1	1	1	21.9	1	31	1
S10710B002	191498	223513	163.8274	JB TE	299	1	80	31956	1	1	15	22	16.5	1	80.7	89	14.7	254	1	1	1	1	1	1	1	18.6	1	48	1
S10710B003	191496	223475	164.4016	JB TE	219	1	55	46432	1	1	10	15.8	18.6	1	86.1	87	11.8	199	1	1	1	1	1	1	1	9.3	1	33	1
S10710B004	191498	223432	163.7826	JB TE	1	1	1	1112	1	1	1	6	1	1	16.6	145	17.6	250	1	1	1	1	1	1	1	8.3	1	1	1
S10710B005	191494	223392	163.9279	JB TE	1	1	1	732	1	1	1	10.6	5.1	1	10.5	458	12.3	239	1	1	1	1	1	1	1	23	1	1	1
S10710B006	191502	223355	159.6202	JB TE	1	1	1	1159	1	1	1	14.6	1	1	13.3	320	14.4	197	1	1	1	1	1	1	1	12.4	1	1	1
S10710B007	191498	223277	152.7593	JB TE	1	1	1	725	1	1	1	12.8	1	1	10.5	183	10	219	1	1	1	1	1	1	1	16.6	37	1	1
S10710B008	191498	223234	147.8376	JB TE	1	1	1	15912	1	1	13	10.5	8.1	1	50.5	75.6	11.3	170	1	1	1	1	1	1	1	11.4	1	1	1
S10710B009	191503	223197	143.4037	JB TE	1	1	1	6090	1	1	1	7.5	9.9	1	49.9	146	15	246	1	1	1	1	1	1	1	19.3	1	1	1
S10710B010	191496	223157	141.2519	JB TE	1	1	1	1844	1	1	1	1	1	1	17	326	15	319	1	1	1	1	1	1	1	21.6	1	1	1
S10710B011	191498	223121	137.584	JB TE	94	36	1	1316	1	1	1	3.8	1	1	25.7	220	12.9	278	1	1	1	1	1	1	1	21.1	20	1	1
S10710B012	191504	223076	134.4812	JB TE	132	1	1	2074	1	1	7.5	6	1	1	24.9	164	18.4	358	1	1	1	1	1	1	1	30.2	25	1	1
S10710B013	191498	223037	133.3043	JB TE	1	1	1	3910	1	1	1	5.9	4.2	1	15.1	296	14.1	275	1	1	1	1	1	1	1	23.1	1	1	1
S10710B034	191097	223814	122.6187	JB TE	187	1	170	18819	1	1	13	28	10.6	1	58	59	17.7	400	1	1	1	1	1	1	1	16	1	1	1
S10710B035	191097	223776	123.1922	JB TE	230	55	81	11345	1	1	9	27	10.5	1	73.8	65	25.1	432	1	1	1	1	1	1	1	14.5	1	31	1
S10710B036	191096	223732	123.4063	JB TE	206	1	144	17322	1	1	12	28.4	12.6	1	69.3	58	22	442	1	1	1	1	1	1	1	17.7	1	29	1
S10710B037	191095	223697	127.2934	JB TE	1	1	159	22132	1	1	1	28	18	1	69	60	16	352	1	1	1	1	1	1	1	1	1	1	1
S10710B038	191097	223654	130.8625	JB TE	257	1	232	34152	1	22	19	37	16.6	1	80.2	88	18.4	361	1	1	1	1	1	1	1	12.9	1	1	1
S10711A001	191197	223894	117.9166	MP AC	1	1	114	16611	1	37	1	25	13.9	1	52.2	48	18.2	367	1	1	1	1	1	1	1	13	1	1	1
S10711A002	191197	223875	116.5315	MP AC	180	1	127	17344	1	1	10	25	7.1	1	57.3	62	17.3	396	1	1	1	1	1	1	1	17.8	1	1	1
S10711A003	191196	223855	118.0494	MP AC	264	1	233	22035	1	21	11	28	29	1	62.7	58	16.5	357	1	1	1	1	1	1	1	23	1	1	1
S10711A004	191196	223835	119.0175	MP AC	183	66	115	12409	1	1	7	23.1	11.7	1	63.8	52.7	21.3	435	1	1	1	1	1	1	1	19.2	1	1	1
S10711A005	191195	223815	119.8256	MP AC	1	1	160	18023	1	29	1	27	15.5	1	59.8	51.1	21.1	434	1	1	1	1	1	1	1	16	1	1	1
S10711A006	191196	223794	121.5867	MP AC	172	50	191	22766	1	1	16	29	17.9	1	62.5	56.1	19.7	447	1	1	1	1	1	1	1	16	1	32	1
S10711A007	191198	223776	122.9727	MP AC	1	1	144	21163	1	30	13	33	18	1	73	52	20.3	402	1	1	1	1	1	1	1	14	1	1	1
S10711A008	191196	223755	124.0118	MP AC	1	68	155	15320	1	1	13	25	16.3	1	77.7	47.3	16.4	318	1	1	1	1	1	1	1	13	1	1	1
S10711A009	191197	223735	125.2559	MP AC	255	55	156	21325	1	1	10	24.3	16.7	1	83.6	63.4	23.3	323	1	1	1	1	1	1	1	14.3	1	40	1
S10711A010	191198	223715	128.267	MP AC	1	73	240	35984	1	30	19	32	21	1	79	83	22	408	1	1	1	1	1	1	1	26	1	82	1
S10711A011	191197	223575	159.0175	MP AC	208	1	87	39116	1	1	12	22	21.3	1	101.9	74	17	188	1	1	1	1	1	1	1	11.3	1	56	1
S10711A012	191196	223554	161.2887	MP AC	230	1	88	29871	1	1	13	23	16.9	1	99.2	81	20.1	193	1	1	1	1	1	1	1	8.5	1	59	1
S10711A013	191197	223535	162.0047	MP AC	169	1	51	25549	1	1	1	12.6	9.7	1	96	72	18.5	205	1	1	1	1	1	1	1	11.8	1	1	1
S10711A014	191197	223514	163.4828	MP AC	1	56	102	39163	1	24	10	18	12.4	1	97.6	76	15.2	215	1	1	1	1	1	1	1	9.7	1	32	1
S10711A015	191197	223496	163.9478	MP AC	267	1	71	28999	1	1	11	17	9.3	1	87	80	17.2	189	1	1	1	1	1	1	1	7	1	1	1
S10711A016	191197	223475	164.487	MP AC	1	1	54	29694	1	1	20	15	11	1	97	94	17.4	176	1	1	1	1	1	1	1	8	1	52	1
S10711A017	191196	223455	163.962	MP AC	278	1	56	26587	1	1	13	12.1	9.7	1	112	104	18.4	167	1	1	1	1	1	1	1	7.6	1	31	1
S10711A018	191197	223435	164.1941	MP AC	260	1	60	30278	1	1	11	12.6	9.7	1	106	104	13.5	163	1	1	1	1	1	1	1	8	1	50	1
S10711A019	191197	223415	160.5391	MP AC	218	81	43	21844	1	1	10	11.7	8.9	1	94.3	92	19.3	179	1	1	1	1	1	1	1	6.6	1	52	1
S10711A020	191198	223393	160.1233	MP AC	300	1	37	15822	1	1	1	14.4	4.7	1	93.6	85	19.6	203	1	1	1	1	1	1	1	11	1	35	1
S10711A021	191197	223375	158.1374	MP AC	1	69	81	32582	1	32	12	28	7.4	1	64.2	69	14.7	260	1	1	1	1	1	1	1	5.7	1	1	1
S10711A022	191196	223355	157.6434	MP AC	206	1	1	9783	1	1	1	5.2	4	1	64.3	67	14	192	1	1	1	1	1	1	1	7.7	1	50	1
S10711A023	191197	223333	156.2575	MP AC	1	1	1	10040	1	1	8	10.7	5.1	1	40.7	50.4	11.3	185	1	1	1	1	1	1	1	11.2	1	1	1
S10711A024	191197	223315	158.2057	MP AC	1	1	1	17309	1	1	1	7.5	7.1	1	44.9	53.9	9.8	161	1	1	1	1	1	1	1	18.1	1	1	1
S10711A025	191197	223295	157.7176	MP AC	158	1	1	10708	1	1	1	6.9	5	1	51.3	59	8.4	172	1	1	1	1	1	1	1	8	1	32	1

S10711A026	191196	223273	155.9517	MP AC	1	1	1	3187	1	1	1	10.8	1	1	37.2	58	11.2	233	1	1	1	1	1	1	1	17	1	1	1
S10711A027	191197	223255	155.8558	MP AC	130	1	1	2323	1	1	9	8	6.1	1	36.7	67	11	271	1	1	1	1	1	1	1	10.6	1	1	1
S10711A028	191196	223235	155.2258	MP AC	1	1	1	1141	1	1	1	7	1	1	16	66	11.5	244	1	1	1	1	1	1	1	15	1	53	1
S10711A029	191196	223214	152.4709	MP AC	1	1	1	8614	1	1	16	1	10	1	25.9	146	9.5	263	1	1	1	1	1	1	1	32	1	1	1
S10711A030	191198	223195	152.229	MP AC	1	1	56	13367	1	1	22	15	6.1	1	37	102	13.1	315	1	1	1	1	1	1	1	19	1	1	1
S10711A031	191196	223175	152.883	MP AC	1	1	1	4038	1	1	10	6.3	1	1	16	117	9.8	221	1	1	1	1	1	1	1	16.1	1	31	1
S10711A032	191196	223156	150.5191	MP AC	1	1	1	4218	1	1	1	7.2	1	1	26	116	18.9	387	1	1	1	1	1	1	1	14.4	1	1	1
S10711A033	191198	223135	149.2743	MP AC	1	1	1	30969	1	1	12	9.8	8.6	1	33.8	106	12.8	294	1	1	1	1	1	1	1	17	1	1	1
S10711A034	191191	223115	148.8012	MP AC	220	1	35	9464	1	1	11	10.5	6.5	2.3	22.1	83	12.5	263	1	1	1	1	1	1	1	15.1	1	1	1
S10711A035	191197	223095	147.1433	MP AC	1	1	1	3322	1	1	1	7	5.9	1	30.7	121	11.4	272	1	1	1	1	1	1	1	11.7	1	1	1
S10711A036	191197	223074	145.2635	MP AC	1	1	1	1499	1	1	1	4.7	1	1	22	65.1	11.4	302	1	1	1	1	1	1	1	9.9	1	1	1
S10711A037	191197	223053	146.7257	MP AC	1	1	41	21460	1	1	1	9.6	7.9	1	43.1	47.9	12.1	313	1	1	1	1	1	1	1	10.5	21	1	1
S10711A038	191197	223035	144.7756	MP AC	202	1	1	9380	1	1	1	6.2	6.8	1	47.8	79	12.4	338	1	1	1	1	1	1	1	12.1	1	1	1
S10711A039	191198	223014	144.1978	MP AC	153	1	1	10238	1	1	7	4.9	6.2	1	42.1	77	12.6	362	1	1	1	1	1	1	1	12.4	1	1	1
S10711A040	191196	222995	143.8346	MP AC	117	1	1	2373	1	1	1	5.5	1	1	34	57.1	13.3	358	1	1	1	1	1	1	1	7	1	1	1
S10711A041	191197	222974	144.4439	MP AC	143	1	42	27021	1	1	1	11.2	6.2	1	39.6	96	10.7	314	1	1	1	1	1	1	1	11.9	1	30	1
S10711A042	191195	222953	142.2229	MP AC	258	1	1	12108	1	27	12	7	6.2	1	28.7	191	14.1	320	1	1	1	1	1	1	1	8	1	1	1
S10711A043	191197	222936	140.472	MP AC	161	1	1	1422	1	1	11	5.2	3.5	1	25.2	203	19.5	507	1	1	1	1	1	1	1	9	1	39	1
S10711A044	191197	222915	140.9181	MP AC	1	1	1	3221	1	1	7	1	3.8	1	20.8	188	11.5	278	1	1	1	1	1	1	1	10.8	1	1	1
S10711A045	191200	222899	139.5702	MP AC	180	1	1	6239	1	1	15	1	4.9	1	28.6	135	12.3	355	1	1	1	1	1	1	1	12.8	1	1	1
S10711A046	191197	222878	137.9102	MP AC	1	1	1	3171	1	1	14	7	1	1	18.1	145	12.6	273	1	1	1	1	1	1	1	12	1	1	1
S10711A047	191199	222858	136.9083	MP AC	198	1	1	2623	1	1	15	5.3	5	1	32.1	194	15.1	341	1	1	1	1	1	1	1	11.7	1	1	1
S10711A048	191199	222835	137.4204	MP AC	1	1	1	858	1	1	1	1	1	1	13.3	78	8.9	234	1	1	1	1	1	1	1	12.2	1	1	1
S10711B009	191194	223703	131.8311	JB TE	294	70	142	35049	1	39	19	52	17.5	2.1	102.1	86	28	476	1	1	1	1	1	1	1	29	1	47	1
S10711B010	191095	223633	131.2298	JB TE	200	1	115	31686	1	39	21	43	12.5	1	89.7	100	24.7	437	1	1	1	1	1	1	1	14.4	1	62	1
S10711B013	191097	223535	152.4966	JB TE	305	74	106	35685	1	20	13	75	16.1	1	100.1	99	20	254	1	1	1	1	1	1	1	13	1	1	1
S10711B014	191097	223560	146.6891	JB TE	127	1	37	17460	1	1	1	10.4	10.1	1	78.9	60.5	17.3	212	1	1	1	1	1	1	1	11.2	40	22	1
S10711B015	191095	223575	144.323	JB TE	160	1	41	23960	1	1	9	11.6	12	1	86.4	74.2	17.4	213	1	1	1	1	1	1	1	10.2	1	1	1
S10711B016	191096	223593	140.088	JB TE	1	1	1	14292	1	1	1	14.8	12.5	1	59.5	41.4	13.5	177	1	1	1	1	1	1	1	18.7	1	1	1
S10711B017	191190	223675	137.2039	JB TE	251	69	1	20059	1	15	13	12.4	22.1	1	112.1	75.6	24.5	250	1	1	1	1	1	1	1	9.1	22	44	1
S10711B018	191200	223657	141.3673	JB TE	1	1	1	14621	1	1	8	12.2	16.6	1	67.7	47.9	12	182	1	1	1	1	1	1	1	13.8	1	1	1
S10711B019	191200	223640	143.2354	JB TE	130	1	1	10031	1	1	1	7.8	13.6	1	84.6	48.7	17.2	204	1	1	1	1	1	1	1	11.3	1	37	1
S10711B020	191203	223617	149.8625	JB TE	262	47	48	26523	1	17	9	14.2	14.2	1	106.1	66.9	19.1	231	1	1	1	1	1	1	1	13.1	1	35	1
S10711B021	191198	223598	153.5305	JB TE	189	1	59	21115	1	1	1	14.4	14	1	91	67.9	15.9	189	1	1	1	1	1	1	1	15.6	20	32	1
S10711B022	191097	223495	156.6112	JB TE	255	62	52	25365	1	1	10	17.1	10.3	1	97.7	77	20.2	252	1	1	1	1	1	1	1	9.1	1	30	1
S10711B023	191097	223455	159.5355	JB TE	198	70	116	32863	1	26	9	21.1	10.1	1	104.6	86	21.6	246	1	1	1	1	1	1	1	10.8	1	38	1
S10711B024	191097	223333	161.546	JB TE	197	34	1	524	1	1	7.9	9.7	1	1	7.1	174	16.9	321	1	1	1	1	1	1	1	27	28	1	1
S10711B025	191097	223294	160.4771	JB TE	1	1	1	677	1	1	1	5	3.4	1	5.8	200	10.7	266	1	1	1	1	1	1	1	18.2	1	1	1
S10711B026	191093	223259	159.8182	JB TE	1	1	1	5077	1	1	10.3	5.6	9.8	1	11.3	166	8.6	248	1	1	1	1	1	1	1	21	19	1	1
S10711B027	191096	223214	160.0734	JB TE	199	1	1	1210	1	1	11	7.1	1	1	15.5	91	14	344	1	1	1	1	1	1	1	10.8	1	1	1
S10711B028	191103	223170	157.6686	JB TE	232	1	1	1417	1	1	17	8.6	4.2	1	22.7	125	13.8	367	1	1	1	1	1	1	1	12.6	1	28	1
S10711B029	191097	223138	156.2117	JB TE	193	1	1	2745	1	1	1	6.3	4.1	1	22.8	128	13.5	295	1	1	1	1	1	1	1	11.8	1	22	1
S10711B030	191102	223059	153.0221	JB TE	142	1	1	19138	1	1	6.3	5.8	10.1	1.6	38.3	116	8.8	258	1	1	1	1	1	1	1	18.2	24	1	1
S10711B031	191095	223016	149.5051	JB TE	129	1	52	24328	1	1	1	13.7	6.3	3.8	34.1	151	11.6	311	1	1	1	1	1	1	1	15.4	1	1	1
S10711B032	191094	222975		JB TE	115	1	1	2724	1	1	11.2	6.4	5.6	1	22.2	173	16.5	357	1	1	1	1	1	1	1	13.6	25	36	1
S10711B033	191098	222935		JB TE	168	1	1	1521	1	1	6.4	6.5	1	1	16.3	135	19.8	359	1	1	1	1	1	1	1	13.5	26	30	1
S10711B034	191100	222899	145.6187	JB TE	1	1	1	3113	1	1	10.9	7.1	9.8	1	29.1	163	13.8	333	1	1	1	1	1	1	1	14.6	18	29	1
S10711B035	191197	222713	131.2339	JB TE	133	1	28	12094	1	22	7	6.7	5.3	1	22	75.9	7.4	302	1	1	1	1	1	1	1	19.5	24	37	1
S10711B036	191198	222737	133.2239	JB TE	1	1	21	10244	1	1	5.5	10.9	3.1	1	30.5	49	10.5	292	1	1	1	1	1	1	1	13.6	27	1	1
S10711B037	191200	222756	133.2157	JB TE	1	1	1	8825	1	1	1	4	1	1	35.8	70.5	13.6	368	1	1	1	1	1	1	1	11.3	20	1	1
S10711B038	191195	222791	135.4415	JB TE	1	1	1	1251	1	1	10	4.5	1	1	26	141	13.7	361	1	1	1	1	1	1	1	16.2	1	1	1
S10711B039	191193	222815	137.5814	JB TE	1	1	1	1926	1	1	9	5.5	1	1	13.2	260	10.4	317	1	1	1	1	1	1	1	13.8	1	39	1
S10713A028	191395	222597	117.1534	MP AC	1	1	18	3780	1	1	1	6.4	1	1	13.6	91.6	5	138	1	1	1	1	1	1	1	5.2	37	1	1
S10713A029	191396	222615	118.0614	MP AC	1	1	1	1240	1	1	6.2	5.8	1	1	16	82	9.3	202	1	1	1	1	1	1	1	7.7	38	1	1
S10713A030	191396	222633	119.2593	MP AC	1	1	1	2288	1	1	1	8.3	1	1	19	58.2	4.9	165	1	1	1	1	1	1	1	22.1	1	1	1
S10713A031	191397	222653	119.4902	MP AC	163	1	60	14298	1	1	1	10.4	6.9	1	41.3	83.4	9.9	329	1	1	1	1	1	1	1	13.2	26	1	1
S10713A032	191398	222674	121.8203	MP AC	1	1	77	15595	1	1	10	10.7	5.7	1	37.6	91	11.8	286	1	1	1	1	1	1	1	23.1	1	1	1
S10713B001	191395	223594	158.8708	JB TE	212	59	93	28390	1	1	10	16.5	19.7	1	98.3	68.6	17.4	205	1	1	1	1	1	1	1	12.8	21	30	1
S10713B002	191398	223575	159.5506	JB TE	184	1	60	39729	1	1	15	18.2	15.8	1	90.4	64.6	16.4	176	1	1	1	1	1	1	1	12.1	1	1	1
S10713B003	191396	223555	160.6018	JB TE	325	1	44	24500	1	1	12	14.9	15.3	1	105.1	71.9	22.1	221	1	1	1	1	1	1	1	13.1	1	50	1
S10713B004	191397	223535	161.5808	JB TE	215	39	56	21821	1	1	8	13.9	17.1	1	89.4	65.7	20.5	225	1	1	1	1	1	1	1	14.3	26	28	1
S10713B005	191397	223515	162.7139	JB TE	230	1	36	19772	1	1	7	13.3	17.2	1	98.9	70.5	19.6	229	1	1	1	1	1	1	1	20.7	1	45	1
S10713B006	191397	223495	164.26	JB TE	283	1	1	16988	1	1	1	14.3	18.6	1	97	75.8	25.3	221	1	1	1	1	1	1	1	17.8	27	1	1
S10713B007	191397	223473	162.1592	JB TE	217	48	1	22508	1	1	12	10.2	13.7	1	84.8	75	17.5	209	1	1	1	1	1	1	1	11.1	22	1	1
S10713B008	191396	223455	161.9631	JB TE	294	1	1	20249	1	1	9	11.3	13.4	1	88.4	76.6	20.3	216	1	1	1	1	1	1	1	12	31	32	1
S10713B009	191396	223436	159.8722	JB TE	178	48	1	15708	1	1	7	12.9	10.7	1	85.2	74.6	17.7	236	1	1	1	1	1	1	1	15.5	27	37	1
S10713B010	191396	223415	159.5772	JB TE	237	47	1	26187	1	19	10	15.6	11.1	1	97.8	85	19.1	213	1	1	1	1	1	1	1	16.4	1	28	1
S10713B011	191396	223395	158.2283	JB TE	161	39	31	15409	1	1	1	13.1	9.6	1	83.9	76.4	22.7	217	1	1	1	1	1	1	1	12.6	26	24	1
S10713B012	191397	223375	157.0054	JB TE	202	59	31	23970	1	1	11	10.5	6.5	2.5	82.8	80	19.6	214	1	1	1	1	1	1	1	16.9	1	1	1
S10713B013	191397	223355	156.3685	JB TE	177	48	34	26007	1	1	11	15.4	14.8	1	95.3	82	19.2	222	1	1	1	1	1	1	1	19.8	1	32	1
S10713B014	191398	223334	156.5265	JB TE	244	1	28	24055	1	1	8	10.9	7.2	1.8	53.1	77.1	14.8	223	1	1	1	1	1	1	1	14.6	24	1	1
S10713B015	191397	223314	155.4716	JB TE	270	41	1	17866	1	1	11	12.6	10.6	1	87.5	84	20.7	233	1	1	1	1	1	1	1	20.7	1	32	1
S10713B016	191394	223295	153.3687	JB TE	116	1	1	8696	1	1	10	11	6.5	1	64.6	60.3	18.4	259	1	1	1	1	1	1	1	9.7	1	29	1
S10713B017	191398	223275	12.52175	JB TE	1	1	32	16550	1	1	15	10	6.2	1	45.7	66.4	14.2	238	1	1	1	1	1	1	1	11	1	1	1
S10713B018	191399	223252	150.886	JB TE	147	52	34	35026	1	1	12	15.6	8.8	2.5	60.4	62	12.8	194	1	1	1	1	1	1	1	9.8	21	1	1
S10713B019	191398	223233	148.091	JB TE	179	54	1	25077	1	1	7	5.7	9.6	1	68.4	70.2	16.4	263	1	1	1	1	1	1	1	11.2	20	26	1
S10713B020	191395	223214	147.328	JB TE	176	47	1	26753	1	1	7	10.1	3.9	2.3	78.3	66.1	13.1	242	1	1	1	1	1	1	1	11.2	21	1	1
S10713B025	191397	223196	148.9131	JB TE	212	46	30	21226	1	1	11	13.1	6.4	1	66	66	17.2	272	1	1	1	1	1	1	1	13.8	36	24	1
S10713B026	191400	223172	150.0211	JB TE	109	45	1	21132	1	1	13	7.9	6.7	1	59.2	59.2	14.5	246	1	1	16	1	1	1	1	9.6	22	1	1
S10713B027	191398	223158	144.4273	JB TE	153	1	1	17420	1	1	14	9.4	5.1	1	62.1	54.3	11.8	239	1	1	1	1	1	1	1	13.8	34	1	1
S10713B028	191395	223136	140.8104	JB TE	157	1	21	5551	1	1	29	8.3	1	1	43.2	45.5	16.6	206	1	1	1	1	1	1	1	39.5	23	1	1
S10713B029	191397	223114	139.9255	JB TE	1	32	1	3163	1	1	22	5.6	1	1	42.3	56.5	18.4	286	1	1	1	1	1	1	1	27.6	21	26	1
S10713B030	191397	223070	146.5566	JB TE	303	1	40	18234	143	18	47	22.9	6.9	3.3	66.2	83.6	19.3	263	1	1	1	1	1	1	1	48	1	36	1
S10713B031	191398	223057	144.8557	JB TE	129	33	1	1909	1	1	14.7	7.6	1	1	40.7	57.6	18.1	333	1	1	1	1	1	1	1	16.4	21	23	1
S10713B032	191397	223036	145.5257	JB TE	122	1	1	1897	1	1	10.3	7.2	1	1	40.4	66.9	12.4	271	1	1	1	1	1	1	1	16	1	1	1
S10713B033	191394	223014	141.4988	JB TE	226	1	1	1903	1	1	10.3	5.1	3.3	1	41	91.2	17.4	352	1	1	1	1	1	1	1	14.9	1	34	1
S10713B034	191402	222995	136.804	JB TE	211	1	1	1223	1	1	10	7.8	1	1	35.9	79.9	16.6	290	1	1	1	1	1	1	1	13.3	1	1	1
S10714A029	191398	222694	127.2231	MP AC	1	1	1	5096	0	1	1	1	5.9	1	24.3	54.1	8.2	233	1	1	1	1	1	1	1	24.3	1	1	1
S10714A030	191399	222710	126.8361	MP AC	116	1	1	5285	1	1	9.3	1	3.1	1	34	87.3	14	387	1	1	1	1	1	1	1	11.9	20	1	1
S10715B006	191398	222970	128.966	JB TE	135	1	1	2594	1	1	8	6.3	1	1	32.6	91	12.7	282	1	1	1	1	1	1	1	15.1	1	1	1
S10715B007	191409	222956	129.1803	JB TE	252	1	1	34064	1	1	7	9.5	10.5	1	48.6	75	9.6	254	1	1	1	1	1	1	1	15.7	1	1	1
S10715B008	191396	222911	126.5812	JB TE	1	1	63	21747	1	1	10	13.5	6.9	1	46.3	104	9.3	322	1	1	1	1	1	1	1	11.7	1	1	1
S10715B009	191398	222899	123.9183	JB TE	1	1	1	18350	1	1	1	9.9	5.7	1	37.2	70	8.6	242	1	1	1	1	1	1	1	14	1	1	1
S10715B010	191399	222877	124.1374	JB TE	1	1	1	20750	1	26	1	8.1	6.2	1	42.2	61	15.4	318	1	1	1	1	1	1	1	8.1	1	1	1
S10715B011	191493	222816	125.4511	JB TE	1	1	1	3452	1	1	1	8.7	6.2	1	27.3	63.9	11.1	324	1	1	1	1	1	1	1	12.7	1	1	1
S10715B012	191496	222854	127.855	JB TE	200	1	1	36532	1	1	1	6.5	4.2	3	45	58.1	9.9	282	1	1	1	1	1	1	1	15.5	22	1	1
S10715B013	191496	222932	131.1557	JB TE	156	1	29	20393	1	1	11	10.1	6.2	1.9	47.3	93	15.9	284	1	1	1	1	1	1	1	17.2	25	1	1
S10715B014	191502	222975	134.2806	JB TE	257	1	1	16972	1	1	10	7.1	9.7	3	32.9	302	15.1	317	5.1	1	1	1	1	1	1	17.2	26	1	1
S10715B015	191498	223015	132.1404	JB TE	1	1	1	30317	1	1	1	9.4	9.3	2.6	36.7	204	9.8	236	1	1	1	1	1	1	1	20	1	1	1
S10715B016	191499	223053	135.2933	JB TE	149	1	1	544	1	1	1	1	1	1	7.9	730	10.5	246	1	1	1	1	1	1	1	22	1	1	11

S10715B017	191502	223098	136.2182	JB TE	230	42	1	1252	1	1	1	5.7	1	1	28.1	395	18.5	362	1	1	1	1	1	1	1	24.5	1	38	1
S10715B018	191496	223133	137.3369	JB TE	127	49	1	2283	1	1	7.3	4.6	1	1	22.3	264	17.1	283	1	1	1	1	1	1	1	22.9	1	1	1
S10715B019	191508	223176	140.8219	JB TE	158	1	26	2666	1	1	1	8.1	5.2	1	43.7	202	21.8	460	1	1	1	1	1	1	1	18.5	21	1	1
S10715B020	191501	223259	150.9595	JB TE	1	37	1	1869	1	1	1	7.9	1	1	23.8	292	22.8	361	1	1	1	1	1	1	1	18.1	1	36	1
S10715B021	191501	223302	158.3704	JB TE	1	1	1	992	1	1	1	1	1	1	17.7	285	18	313	1	1	1	1	1	1	1	16.6	1	1	1
S10715B022	191493	223334	157.8051	JB TE	120	1	1	650	1	1	1	7.4	1	1	16.4	552	20	362	1	1	1	1	1	1	1	15.9	1	50	7
S10715B023	191499	223412	159.5929	JB TE	162	1	1	1131	1	1	1	11.8	1	1	19.7	292	23.9	336	1	1	1	1	1	1	1	11.8	1	1	1
S10715A005	191397	222734	119.8929	MP AC	132	1	1	25634	1	1	1	8.7	7.4	1.9	41.8	150	10.4	287	1	1	1	1	1	1	1	12.6	1	29	1
S10715A006	191398	222755	121.7569	MP AC	138	1	1	12482	1	1	23	4.5	4.4	1	24.5	155	14.6	443	1	1	1	1	1	1	1	12.7	1	34	1
S10715A007	191397	222774	120.4208	MP AC	1	1	34	14212	1	1	13	9.9	10.3	1	33	120	11.8	313	1	1	1	1	1	1	1	16.6	23	1	1
S10715A008	191397	222794	120.2937	MP AC	1	1	1	2103	1	1	1	5.1	3.6	1	19.3	112	12.1	324	1	1	1	1	1	1	1	8.3	1	1	1
S10715A009	191396	222815	120.0187	MP AC	1	1	1	2441	1	1	11	5.6	3.5	1	26.9	143	14.5	415	1	1	1	1	1	1	1	8.8	1	26	1
S10715A010	191398	222835	121.7635	MP AC	174	1	1	2061	1	1	8.3	4.2	3.7	1	27.2	127	14.8	416	1	1	15	1	1	1	1	10.2	23	1	1
S10715A011	191397	222854	122.4085	MP AC	1	1	1	2972	1	1	1	7.3	4.5	1	22.9	57.4	9.1	291	1	1	1	1	1	1	1	8.9	31	1	1
S10715A012	191297	222617	125.1098	MP AC	151	1	1	3072	1	1	11	7.6	1	1	33	125	15.7	400	1	1	1	1	1	1	1	17.8	1	1	1
S10715A013	191296	222656	125.6466	MP AC	133	1	29	18641	1	1	1	7.8	6.7	2	43.6	117	10.4	372	1	1	1	1	1	1	1	14.5	28	1	1
S10715A014	191297	222692	129.2345	MP AC	145	1	43	32629	1	1	11	12.4	12.8	3.4	46.3	256	10.5	345	1	1	1	1	1	1	1	19.6	1	1	1
S10715A015	191295	222734	132.5095	MP AC	116	1	1	1571	1	1	7	9.4	1	1	23	144	17.8	426	1	1	1	1	1	1	1	28	20	28	1
S10715A016	191297	222774	131.9732	MP AC	197	1	1	3983	1	1	1	6.9	8.5	1	33.8	151	14.5	352	1	1	1	1	1	1	1	10.9	26	33	1
S10715A017	191297	222814	129.6521	MP AC	326	1	1	41400	1	21	8	9.6	9.1	1	36.7	160	11	303	1	1	1	1	1	1	1	17.8	1	1	1
S10715A018	191296	222857	130.6899	MP AC	124	1	1	7534	1	1	12	6.5	6.6	1.8	40.1	150	12	319	1	1	1	1	1	1	1	16.6	26	1	1
S10715A019	191297	222894	132.8677	MP AC	164	1	1	28447	1	1	10	5.9	7.1	1	40.2	116	9.3	349	1	1	1	1	1	1	1	15.4	1	1	1
S10715A020	191295	222930	134.3045	MP AC	165	1	69	30754	1	1	10	13.4	9.8	2.6	46.7	88	15.2	331	1	1	1	1	1	1	1	13.3	1	36	1
S10715A021	191296	222974	134.8015	MP AC	1	1	23	8013	1	1	8.9	9	4.7	1	28.1	86.6	12.4	401	1	1	1	1	1	1	1	14.4	1	29	1
S10715A022	191296	223013	134.3264	MP AC	166	1	1	18397	1	1	7	7.6	8.5	1.9	46.7	69.6	13.5	371	1	1	1	1	1	1	1	13.9	25	1	1
S10715A023	191299	223054	139.2481	MP AC	147	1	1	2311	1	1	10.4	7.4	1	1	37.6	118	16.8	402	1	1	1	1	1	1	1	17.6	31	1	1
S10715A024	191299	223096	143.666	MP AC	142	1	1	1452	1	1	12	4.2	1	1	22.3	79.8	15.7	373	1	1	1	1	1	1	1	12.8	24	25	1
S10715A025	191301	223136	145.739	MP AC	258	50	1	4002	1	1	98	8.4	1	2	40.3	80.1	25	333	1	1	1	1	1	1	1	75	19	38	1
S10715A026	191300	223169	151.5138	MP AC	200	57	33	13556	1	1	13	10.7	4.6	2.1	74.6	90	13.9	307	1	1	1	1	1	1	1	17.8	24	1	1
S10715A027	191297	223214	151.3195	MP AC	283	1	71	46639	1	28	8	16.9	10.1	3.8	75	80	15.9	291	1	1	1	1	1	1	1	23.6	1	29	1
S10715A028	191297	223255	153.6554	MP AC	179	70	1	36151	1	1	17	10	10.8	6.1	58.5	81	31.6	226	1	1	1	1	1	1	1	26.9	1	32	1
S10715A029	191300	223299	156.5673	MP AC	228	1	1	15124	1	1	7.6	9.1	7.3	1	55.6	85.5	14.2	219	1	1	1	1	1	1	1	17.5	24	1	1
S10715A030	191298	223335	159.4909	MP AC	235	45	1	18834	1	1	12	11.5	11.1	1	86.8	95	19.3	221	1	1	1	1	1	1	1	15.5	22	43	1
S10715A031	191297	223375	162.2982	MP AC	258	58	1	23714	1	1	10	11.4	10.3	1	99.6	96	21.1	199	1	1	1	1	34	1	1	11.6	1	38	1
S10715A032	191297	223415	166.5628	MP AC	156	1	1	35862	1	19	14	24.4	12.4	1	97.5	88	13.8	158	1	1	1	1	1	1	1	14.3	1	28	1
S10715A033	191298	223455	169.4186	MP AC	178	1	28	21149	1	1	14	12.3	11	1	96.7	94	19.5	175	1	1	1	1	1	1	1	22.3	1	1	1
S10715A034	191297	223494	171.1432	MP AC	225	1	86	29017	1	19	8	18.2	12	1	105	89	20.3	208	1	1	1	1	1	1	1	11.4	1	49	1
S10715A035	191297	223535	169.1313	MP AC	235	52	86	25751	1	1	11	14.6	16.7	1	101.7	69.4	22.4	236	1	1	1	1	1	1	1	20	21	31	1
S10715A036	191297	223575	166.7723	MP AC	258	52	110	32801	1	17	11	21.2	22.7	1	109.2	72.9	20	199	1	1	1	1	1	1	1	11.7	1	36	1
S10715A037	191497	223534	159.4245	MP AC	366	1	43	41370	1	19	12	14.1	15.7	1	92.4	102	17	267	1	1	1	1	1	1	1	49	25	33	1
S10715A038	191497	223495	161.5834	MP AC	218	1	49	33052	1	21	13	15.3	22.6	1	85.7	95	17.7	267	1	1	1	1	1	1	1	15.9	1	1	1
S10727A001	191296	223635	153.164	MP AC	320	87	194	43102	1	35	1	32	20	1	89	72	13.6	254	1	1	1	1	1	1	1	19	1	58	1
S10727A002	191297	223955	116.1632	MP AC	182	1	223	24033	1	20	1	34	13.7	1	75.7	53.6	18.7	399	1	1	1	1	1	1	1	18.9	1	32	1
S10727A003	191297	223915	112.0367	MP AC	186	55	215	19796	1	1	13	29.8	15.1	1	68.7	54.6	19.7	472	1	1	1	1	1	1	1	21.8	1	32	1
S10727A004	191297	223874	115.232	MP AC	1	63	196	18470	1	1	11	27	20.7	1	71.1	54	21.4	442	1	1	1	1	1	1	1	18.4	1	43	1
S10727A005	191297	223836	118.4691	MP AC	364	1	209	27397	1	27	13	23	26.4	1	82.4	60	20	449	1	1	1	1	1	1	1	14	1	41	1
S10727A006	191297	223795	121.9243	MP AC	265	59	215	21314	1	23	14	26.4	33.2	1	106.6	55.3	27.9	402	1	1	1	1	1	1	1	20.1	1	42	1
S10727A007	191296	223763	124.4085	MP AC	257	1	144	30657	1	25	18	41	27.7	1	93.2	66	20.4	474	1	1	1	1	1	1	1	16	1	52	1
S10727A008	191297	223775	123.1944	MP AC	321	89	249	23734	1	28	18	31	43.5	1	113.8	60.4	26.3	377	1	1	1	1	1	1	1	19	1	38	1
S10727A009	191297	223814	120.3414	MP AC	296	64	216	25093	1	22	14	27	29	1	85.3	56	23.3	419	1	1	1	1	1	1	1	13.7	1	45	1
S10727A010	191297	223855	117.6092	MP AC	221	1	170	25921	1	1	10	30	23.8	1	78.3	80	21.9	448	1	1	1	1	1	1	1	20	1	30	1
S10727A011	191297	223895	116.33	MP AC	291	1	274	21871	1	22	10	33	21.4	1	74.7	55.6	21.4	491	1	1	1	1	1	1	1	17.5	1	40	1
S10727A012	191297	223935	115.8299	MP AC	1	59	185	22363	1	30	10	40	14.9	1	67.5	48	19.3	415	1	1	1	1	1	1	1	18	1	46	1
S10727A013	191397	223955	117.3132	MP AC	159	1	168	25804	1	20	9	31	19	1	70.3	53.3	18.9	416	1	1	1	1	1	1	1	16.1	1	33	1
S10727A014	191397	223935	117.5333	MP AC	170	1	159	21925	1	1	11	27.3	14.7	1	74.9	57.7	20	398	1	1	1	1	1	1	1	18.4	1	41	1
S10727A015	191396	223915	117.6923	MP AC	293	1	167	21871	1	17	8	28.2	13.5	1	74.2	52.8	20.8	429	1	1	1	1	1	1	1	21.7	1	31	1
S10727A016	191398	223894	116.7495	MP AC	260	50	181	26765	1	29	9	30	20.1	1	76.7	56.8	21.4	450	1	1	1	1	1	1	1	19	1	35	1
S10727A017	191397	223875	118.6475	MP AC	163	49	112	22024	1	16	11	27.3	19.2	1	73.9	52.4	22.6	449	1	1	1	1	1	1	1	16.8	1	32	1
S10727A018	191396	223855	120.4246	MP AC	1	73	148	22864	1	25	1	28	18.3	1	84.7	52	24.2	407	1	1	1	1	1	1	1	16.6	1	1	1
S10727A019	191396	223835	121.7846	MP AC	181	1	165	20707	1	1	12	27	21	1	82.4	56	23	369	1	1	1	1	1	1	1	18	1	37	1
S10727A020	191396	223814	123.3348	MP AC	150	58	237	19232	1	20	12	31	20.6	1	90.8	61	21.2	318	1	1	1	1	1	1	1	19.2	1	50	1
S10727A021	191396	223795	125.1258	MP AC	289	56	282	22595	1	23	14	32	27.5	1	113	69	24.5	342	1	1	1	1	1	1	1	19.3	1	51	1
S10727A022	191397	223776	127.3249	MP AC	250	1	253	31966	1	35	14	50	18.7	1	93.5	58.4	17	297	1	1	1	1	1	1	1	12.5	1	46	1
S10727A023	191295	223736	130.0575	MP AC	293	84	245	37335	1	1	10	22	26.6	1	104.2	73	18.6	317	1	1	1	1	1	1	1	16	1	39	1
S10727A024	191297	223715	135.0745	MP AC	295	48	241	31447	1	25	11	20.1	31.6	1	104.5	71	23.4	311	1	1	1	1	1	1	1	17.5	1	34	1
S10727A025	191297	223694	139.3416	MP AC	261	71	171	24949	1	1	16	19.3	25.6	1	107.2	78	24.1	272	1	1	1	1	1	1	1	15.8	1	42	1
S10727A026	191297	223673	144.1777	MP AC	353	1	229	50748	1	1	13	25	29	1	112	73	19.9	261	1	1	1	1	1	1	1	18	1	41	1
S10727A027	191297	223656	145.1598	MP AC	260	68	188	31781	1	18	11	32	20.2	1	96.7	66.1	21.1	273	1	1	1	1	1	1	1	19.4	1	33	1
S10727A028	191297	223615	154.659	MP AC	319	88	302	37965	1	26	15	37	27.6	1	109.9	79	22.7	241	1	1	1	1	1	1	1	19	1	1	1
S10727B001	191408	223618	157.6607	JB JP TE	238	59	183	35508	1	1	17	45	22.3	1	109.7	87	21.5	194	1	1	1	1	1	1	1	15.3	1	32	1
S10727B002	191492	223901	115.5809	JB JP TE	1	1	143	26145	1	1	10	38	15	1	79.2	49	16.3	323	1	1	1	1	1	1	1	32	1	1	1
S10727B003	191482	223872	117.3779	JB JP TE	328	1	202	27954	1	1	15	43	18.4	1	84.1	53.3	19.6	362	1	1	1	1	1	1	1	20	1	35	1
S10727B004	191467	223837	120.9758	JB JP TE	235	1	299	31515	1	22	18	39	15.4	1	97	59.8	23.5	430	1	1	1	1	1	1	1	34	1	33	1
S10727B005	191457	223806	123.7548	JB JP TE	229	83	330	26958	1	24	14	36	21.6	1	88.9	55.3	21	421	1	1	1	1	1	1	1	27	1	32	1
S10727B006	191451	223779	128.7207	JB JP TE	155	51	81	23862	1	1	14	23.7	16.4	1	95.9	53.4	19.4	299	1	1	1	1	1	1	1	25.8	1	1	1
S10727B007	191440	223731	136.7168	JB JP TE	193	1	123	28401	1	1	14	49	18.9	1	94	68	24.6	303	1	1	1	1	1	1	1	18	1	29	1
S10727B008	191430	223691	145.3588	JB JP TE	306	94	250	38707	1	29	13	30	25.1	1	90.3	70	15.6	264	1	1	1	1	1	1	1	18	1	57	1
S10727B009	191420	223655	149.0227	JB JP TE	214	57	91	36022	1	18	19	55	20.1	1	110.8	69	21.9	240	1	1	1	1	1	1	1	16.6	1	56	1
S10727B010	191406	223599	158.5047	JB JP TE	293	86	80	34869	1	22	10	36	21.1	1	119.3	72	21.1	257	1	1	1	1	1	1	1	16.1	1	53	1
S10727B011	191414	223635	154.4317	JB JP TE	308	56	158	42551	1	25	23	44	23.3	1	114.2	71	21	252	1	1	1	1	1	1	1	14.4	1	43	1
S10727B012	191424	223674	148.7817	JB JP TE	201	1	375	35742	1	29	14	34	25	1	102	64	19.8	251	1	1	1	1	1	1	1	27	1	48	1
S10727B013	191434	223712	142.1037	JB JP TE	241	91	160	33567	1	33	11	18.2	21.4	1	104.4	71	19	263	1	1	1	1	1	1	1	15.2	22	27	1
S10727B014	191446	223749	136.6178	JB JP TE	213	75	184	38601	1	31	17	34	26.8	1	94.1	73	20.1	326	1	1	1	1	1	1	1	21.8	1	1	1
S10727B015	191396	223755	129.46	JB JP TE	347	76	258	28640	1	23	16	21.2	24.8	1	109.3	74	23.2	324	1	1	1	1	1	1	1	18.9	1	36	1
S10727B016	191397	223735	134.262	JB JP TE	208	1	273	29166	1	1	15	23.9	23.6	1	88.9	66.6	20.1	286	1	1	1	1	1	1	1	14.9	1	33	1
S10727B017	191397	223714	138.7363	JB JP TE	211	58	326	38339	1	25	18	34	28.4	1	94.3	85	25.3	388	1	1	1	1	1	1	1	16	1	51	1
S10727B018	191397	223694	141.7272	JB JP TE	223	59	208	46347	1	1	13	16.6	25.8	2.7	100.7	77	19.2	268	1	1	1	1	1	1	1	15	1	57	1
S10727B019	191396	223675	146.4282	JB JP TE	300	515	226	34637	1	18	14	21.4	29.7	1	113.1	73	24	276	1	1	1	1	1	1	1	12.7	1	44	1
S10727B020	191397	223654	147.0154	JB JP TE	213	64	237	35196	1	25	17	20.7	28.1	1	115.1	73	22.1	248	1	1	1	1	1	1	1	12.1	1	40	1
S10727B021	191396	223635	153.2035	JB JP TE	287	75	311	46197	1	46	20	31	19.4	2.1	97	81	22.1	331	1	1	1	1	1	1	1	21	1	57	1
S10727B022	191398	223615	155.2186	JB JP TE	212	83	308	36797	1	33	15	36	23.9	1	123	97	25.4	297	1	1	1	1	1	1	1	17.4	1	59	1
S10727C001	191489	223888	116.5489	JP	258	63	173	30861	1	29	16	43	12.1	1	96.1	66	22.6	390	1	1	1	1	1	1	1	43	1	46	1
S10727C002	191475	223854	119.9479	JP	1	73	197	26294	1	18	16	39	17.9	1	83.4	58.5	22.1	389	1	1	1	1	1	1	1	24.3	1	42	1
S10727C003	191462	223822	122.0948	JP	1	75	290	31722	1	23	14	32	16.6	1	89.5	56.1	23	427	1	1	1	1	1	1	1	31	1	47	1
S10727C004	191455	223792	125.4988	JP	254	1	349	28998	1	25	19	48	19.6	1	102.5	58	19	311	1	1	1	1	1	1	1	26	1	38	1

Appendix 4: Raw Fire Assay and Multi-Element Data

SAMPLE ID	GPS SAMPLE ID	X_BNG	Y_BNG	Z	Sampler	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
DESCRIPTION	NA	NA	NA	NA	NA	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
S10709A001	S10709A001	191296	222596	123.4119	MP AC	0.002	0	4.58	8	300	0.6	4	0.06	0	1	52	14	2.44
S10709A002	S10709A002	191292	222638	122.7746	MP AC	0.001	0	5.83	14	340	0.8	0	0.05	0	2	64	12	6.02
S10709A003	S10709A003	191297	222673	122.5846	MP AC	0.002	0	5.1	6	400	0.6	0	0.04	0	1	47	15	0.4
S10709A004	S10709A004	191297	222714	124.6135	MP AC	0.002	0	4.52	10	310	0.6	0	0.05	0	0	51	13	2.93
S10709A005	S10709A005	191301	222754	122.3633	MP AC	0.002	0	4.99	11	350	0.6	0	0.05	0	1	49	14	2.06
S10709A006	S10709A006	191298	222799	129.889	MP AC	0.002	0	5.35	9	370	0.5	0	0.05	0	1	48	16	1.9
S10709A007	S10709A007	191298	222837	128.756	MP AC	0.001	0	4.52	0	360	0	2	0.03	0	0	41	18	0.37
S10709A008	S10709A008	191294	222873	132.1528	MP AC	0.002	0	4.77	9	420	0.5	0	0.05	0	1	49	18	1.77
S10709A009	S10709A009	191296	222916	131.8886	MP AC	0.001	0	5.22	11	400	0.8	0	0.07	0	2	62	11	3.39
S10709A010	S10709A010	191294	222957	135.8955	MP AC	0.001	0	5.2	14	440	0.7	3	0.05	0	2	57	14	3.46
S10709A011	S10709A011	191299	222994	137.8274	MP AC	0.001	0	4.84	6	440	0.8	0	0.05	0	1	54	11	2.04
S10709A012	S10709A012	191298	223035	140.7992	MP AC	0.001	0	4.62	6	460	0.6	2	0.04	0	0	50	13	0.66
S10709A013	S10709A013	191296	223074	141.62	MP AC	0.003	0	5.78	0	420	0.9	0	0.07	0	2	60	36	0.61
S10709A014	S10709A014	191294	223117	144.8649	MP AC	0.001	0	4.45	5	390	0.6	0	0.03	0	0	43	13	0.2
S10709A015	S10709A015	191299	223158	147.5938	MP AC	0.003	0	7.64	8	600	1.4	4	0.07	0	2	73	91	1.98
S10709A016	S10709A016	191296	223197	150.2641	MP AC	0.003	0	6.53	9	550	1.1	2	0.2	0	2	65	21	3.55
S10709A017	S10709A017	191296	223236	155.2015	MP AC	0.003	0	6.95	9	600	1	0	0.06	0	1	57	19	1.78
S10709A018	S10709A018	191298	223275	157.7513	MP AC	0.003	0	6.41	11	490	1	0	0.1	0	1	56	16	1.69
S10709A019	S10709A019	191297	223315	160.9162	MP AC	0	0	6.97	11	640	1.6	0	0.11	0	0	68	12	4.2
S10709A020	S10709A020	191296	223355	163.023	MP AC	0.001	0	8.87	14	820	2.3	2	0.12	0	0	78	13	5.01
S10709A021	S10709A021	191296	223394	164.903	MP AC	0.001	0	6.39	16	390	1.5	2	0.15	0	4	80	17	5.29
S10709A022	S10709A022	191296	223435	168.5219	MP AC	0.002	0	7.9	18	480	2.2	0	0.27	0	2	81	24	5.29
S10710A001	S10710A001	191297	223474	165.3955	MP AC	0.002	0	7.57	13	460	2	3	0.24	0	3	81	19	4.76
S10710A002	S10710A002	191296	223515	165.7944	MP AC	0.002	0	7.46	23	440	1.8	2	0.21	0	3	87	21	4.71
S10710A003	S10710A003	191297	223555	163.7292	MP AC	0.002	0	7.51	26	440	1.8	4	0.22	0	4	88	18	5.41
S10710A004	S10710A004	191297	223594	161.9001	MP AC	0.002	0	10.1	41	670	2.9	2	0.29	0	1	92	15	5.92
S10710A005	S10710A005	191507	222766	118.6726	MP AC	0.001	0	5.26	6	380	1.1	0	0.1	0	5	65	16	2.78
S10710A004D	S10710A004	191297	223594	161.9001	MP AC	0.002	0	9.96	42	660	2.8	0	0.31	0	1	92	17	5.95
S10710A005D	S10710A005	191507	222766	118.6726	MP AC	0.002	0	5.12	10	370	0.8	2	0.1	0	5	61	18	2.72
S10710A006	S10710A006	191496	222795	123.6772	MP AC	0.003	0	4.91	13	390	0.7	0	0.06	0	1	57	10	3.36
S10710A007	S10710A007	191498	222837	123.367	MP AC	0.004	0	3.39	0	290	0	0	0.03	0	0	40	15	0.24
S10710A008	S10710A008	191498	222875	125.087	MP AC	0.001	0	5.39	0	400	0.7	0	0.03	0	0	52	22	0.31
S10710A009	S10710A009	191498	222914	127.4228	MP AC	0.001	0	5.27	11	330	0.7	3	0.05	0	1	52	16	0.96
S10710A010	S10710A010	191497	222955	128.1036	MP AC	0.002	0	5.65	0	380	0.8	4	0.04	0	0	58	15	0.4
S10710A011	S10710A011	191496	222994	129.8925	MP AC	0.001	0	5.02	17	280	0.7	4	0.05	0	0	56	13	1.62
S10727A001	S10727A001	191296	223635	153.164	MP AC	0.001	0	7.49	31	420	1.9	2	0.18	0.5	2	98	20	4.94
S10727A002	S10727A002	191297	223955	116.1632	MP AC	0.002	0	5.79	17	360	1.2	0	0.16	0	4	77	13	3.35
S10727A003	S10727A003	191297	223915	112.0367	MP AC	0.001	0	5.18	21	350	1.1	0	0.21	0	1	76	13	2.66
S10727A004	S10727A004	191297	223874	115.232	MP AC	0	0	5.66	21	390	1.3	4	0.19	0.5	1	80	12	2.42
S10727A005	S10727A005	191297	223836	118.4691	MP AC	0.001	0	6.49	30	450	1.5	2	0.16	0	2	87	13	3.35
S10727A006	S10727A006	191297	223795	121.9243	MP AC	0.001	0	7.02	38	600	1.7	0	0.21	0.5	1	84	16	2.65
S10727A007	S10727A007	191296	223763	124.4085	MP AC	0.001	0	5.8	32	430	1.6	0	0.13	0	4	80	21	3.4
S10727A024	S10727A024	191297	223715	135.0745	MP AC	0.001	0	7.29	38	470	2	2	0.17	0	1	94	16	4.04
S10727A026	S10727A026	191297	223673	144.1777	MP AC	0.001	0	7.96	36	470	2.1	0	0.15	0.6	2	100	17	5.39
S10710B001	S10710B001	191496	223555	160.1823	JB TE	0	0	7.03	22	490	1.7	0	0.19	0	0	68	18	3.12
S10710B002	S10710B002	191498	223513	163.8274	JB TE	0	0	7.1	21	490	1.9	2	0.16	0	2	77	23	4.09
S10710B002D	S10710B002	191498	223513	163.8274	JB TE	0.002	0	7	20	480	1.8	3	0.16	0	2	75	23	4.04
S10710B003	S10710B003	191496	223475	164.4016	JB TE	0.001	0	8.46	34	660	2.2	0	0.1	0	1	81	23	5.73
S10710B004	S10710B004	191498	223432	163.7826	JB TE	0	0	4.9	0	200	0	4	0.05	0	0	34	7	0.36
S10710B005	S10710B005	191494	223392	163.9279	JB TE	0.001	0	4.77	9	200	0	2	0.08	0	0	32	12	0.69
S10710B006	S10710B006	191502	223355	159.6202	JB TE	0	0	4.98	0	210	0.5	5	0.07	0	0	38	7	0.33
S10710B007	S10710B007	191498	223277	152.7593	JB TE	0	0	3.76	5	200	0	0	0.07	0	0	28	10	0.21
S10710B008	S10710B008	191498	223234	147.8376	JB TE	0.003	0	5.79	10	420	1	0	0.05	0	1	56	28	2.9
S10710B009	S10710B009	191503	223197	143.4037	JB TE	0.001	0	3.37	7	200	0	0	0.04	0	0	41	18	0.52
S10710B010	S10710B010	191496	223157	141.2519	JB TE	0.002	0	4.28	0	200	0	0	0.03	0	0	68	9	0.24
S10710B011	S10710B011	191498	223121	137.584	JB TE	0.001	0	5.21	8	230	0.5	3	0.03	0	0	68	13	0.29
S10710B012	S10710B012	191504	223076	134.4812	JB TE	0.001	1	5.61	0	260	0.6	2	0.03	0	0	66	17	0.35
S10710B013	S10710B013	191498	223037	133.3043	JB TE	0.002	0	3.94	5	200	0	2	0.04	0	0	54	12	0.36
S10727B001	S10727B001	191408	223618	157.6607	JB JP TE	0	0	7.37	24	490	2.1	0	0.12	0	1	91	23	4.05
S10727B002	S10727B002	191492	223901	115.5809	JB JP TE	0.002	0	5.88	19	390	1.4	3	0.1	0	3	73	20	3.23
S10727B003	S10727B003	191482	223872	117.3779	JB JP TE	0.002	0	6.19	20	410	1.4	2	0.21	0.5	2	76	19	3.21
S10727B004	S10727B004	191467	223837	120.9758	JB JP TE	0.002	0	5.8	19	410	1.4	3	0.14	0	3	79	19	3.26
S10727B005	S10727B005	191457	223806	123.7548	JB JP TE	0.001	0	5.9	23	420	1.5	2	0.19	0	2	80	18	3.08
S10727B006	S10727B006	191451	223779	128.7207	JB JP TE	0	0	6.43	21	430	1.7	0	0.08	0	2	71	19	3.34
S10727B007	S10727B007	191440	223731	136.7168	JB JP TE	0.002	0	6.47	27	440	1.8	0	0.12	0	1	80	22	3.56
S10727B008	S10727B008	191430	223691	145.3588	JB JP TE	0.002	0	6.93	30	440	1.9	3	0.15	0	2	94	20	4.66
S10727B009	S10727B009	191420	223655	149.0227	JB JP TE	0.001	0	7.13	23	490	2	0	0.1	0	3	78	21	3.79
S10711B014	S10711B014	191097	223560	146.6891	JB TE	0.001	0	6.78	21	450	1.7	2	0.06	0	2	71	17	3.14
S10711B016	S10711B016	191096	223593	140.088	JB TE	0.001	0	6.01	24	400	1.5	0	0.07	0	1	68	20	2.96
S10709B001	S10709B001	191100	222880	145.8519	JB TE	0.001	0	4.54	10	330	0.5	0	0.04	0	1	47	16	0.35
S10709B002	S10709B002	191097	222916	148.0687	JB TE	0.001	0	4.74	7	340	0	0	0.04	0	0	38	15	0.32
S10709B003	S10709B003	191092	222957	148.3373	JB TE	0.001	0	4.14	0	280	0	0	0.03	0	1	36	14	0.21
S10709B004	S10709B004	191097	222994	149.9072	JB TE	0	0	4.37	5	360	0.5	0	0.03	0	1	39	15	0.22
S10709B005	S10709B005	191093	223038	151.4471	JB TE	0	0	4.19	6	410	0	0	0.03	0	1	35	18	0.51
S10709B006	S10709B006	191090	223070	151.1377	JB TE	0.002	0	3.02	7	370	0	0	0.05	0	1	34	24	0.35
S10709B007	S10709B007	191097	223114	154.3738	JB TE	0.004	0	3.89	6	450	0	2	0.03	0	0	42	15	0.4
S10709B008	S10709B008	191096	223150	156.5469	JB TE	0.001	0	4.07	0	430	0	2	0.02	0	0	37	13	0.18
S10709B009	S10709B009	191102	223197	159.4296	JB TE	0.003	0	4.49	0	510	0	2	0.03	0	1	29	24	0.6
S10709B010	S10709B010	191094	223236	157.2936	JB TE	0.003	0	4.04	0	350	0	3	0.03	0	0	35	14	0.15
S10709B011	S10709B011	191093	223274	160.3079	JB TE	0	0	6.6	0	230	0	0	0.04	0	0	35	15	0.55
S10709B012	S10709B012	191099	223313	161.612	JB TE	0.001	0	4.12	0	180	0	2	0.03	0	0	39	11	0.18
S10709B013	S10709B013	191095	223345	160.2079	JB TE	0.001	0	3.64	0	160	0	2	0.08	0	1	34	14	0.22
S10709B014	S10709B014	191095	223437	162.0586	JB TE	0	0	7.15	12	800	1.9	2	0.19	0	0	79	16	3.66
S10709B015	S10709B015	191097	223473	160.2786	JB TE	0.002	0	6.79	17	580	1.7	0	0.16	0	1	84	14	3.8
S10709B016D	S10709B016	191100	223513	159.0374	JB TE	0.007	0	6.84	19	420	1.7	0	0.14	0	3	81	18	4.64
S10709B016	S10709B016	191100	223513	159.0374	JB TE	0	0	7.12	20	440	1.8	0	0.13	0	3	84	18	4.88
S10709B017	S10709B017	191099	223624	136.8428	JB TE	0	0	8.27	28	430	2	0	0.08	0	3	95	19	7.64
S10709B018	S10709B018	191094	223671	130.7078	JB TE	0.002	0	7.23	27	500	1.7	2	0.37	0	2	95	22	4.47
S10709B019	S10709B019	191095	223712	125.7835	JB TE	0.001	0	6.11	22	440	1.5	2	0.29	0	2	82	18	2.85
S10709B020	S10709B020	191096	223756	123.6335	JB TE	0.002	0	6.19	15	430	1.4	0	0.27	0	3	83	14	2.15
S10709B021	S10709B021	191095	223792	122.6192	JB TE	0.005	0	6.03	15	420	1.4	3	0.24	0	2	82	15	2.44
S10709B022	S10709B022	191093	223834	117.808	JB TE	0	0	5.51	12	370	1.2	2	0.22	0	4	89	15	3.06
S10709B023	S10709B023	191491	223316	160.8071	JB TE	0.001	0	4.13	0	210	0	2	0.05	0	0	32	7	0.13

Ga	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti	Tl	U	V	W	Zn
ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
10	0.88	30	0.13	65	2	0.34	8	340	22	0.07	5	7	114	0	0.44	0	0	79	0	15
20	1.1	30	0.16	147	3	0.31	8	510	29	0.08	6	9	123	0	0.39	0	0	97	0	20
20	1.04	30	0.09	37	3	0.32	3	380	27	0.08	0	8	248	0	0.49	0	0	71	0	11
10	0.88	30	0.09	98	3	0.3	4	350	19	0.06	0	8	175	0	0.46	0	0	77	0	11
10	0.97	30	0.1	45	4	0.28	3	300	18	0.05	0	8	170	0	0.48	0	0	82	0	10
20	0.89	30	0.1	53	2	0.28	5	390	23	0.06	0	8	163	0	0.47	0	0	78	0	13
10	0.62	30	0.04	29	1	0.21	3	330	17	0.05	5	7	199	0	0.52	0	0	67	0	8
10	0.89	30	0.11	59	2	0.32	3	370	22	0.06	0	8	167	0	0.47	0	0	70	0	12
20	1.16	30	0.22	94	2	0.38	9	460	24	0.06	6	8	104	0	0.39	10	0	87	0	23
20	1.11	30	0.14	72	3	0.31	5	510	25	0.06	0	8	102	0	0.41	0	0	87	0	14
20	1.07	30	0.11	59	1	0.34	5	340	21	0.04	0	8	100	0	0.47	0	0	72	0	11
10	0.95	30	0.09	47	2	0.31	4	380	22	0.04	0	8	135	0	0.52	0	0	69	0	10
20	1.16	30	0.16	58	3	0.42	7	660	31	0.06	0	9	122	0	0.47	0	0	70	0	18
10	0.8	30	0.05	30	2	0.23	2	230	15	0.03	0	7	85	0	0.56	0	0	59	0	9
20	1.58	30	0.24	85	4	0.48	10	480	60	0.05	0	14	117	0	0.46	0	0	96	0	24
20	1.37	30	0.23	147	4	0.4	8	460	39	0.05	0	10	104	0	0.42	0	0	86	0	26
20	1.41	40	0.18	34	4	0.34	2	330	27	0.03	0	12	128	0	0.52	0	0	106	0	11
20	1.23	30	0.09	28	6	0.3	3	330	27	0.05	6	11	119	0	0.46	0	0	93	0	12
20	1.68	30	0.13	36	3	0.41	5	360	24	0.05	0	12	128	0	0.44	0	0	91	0	12
20	2.38	40	0.14	25	3	0.5	3	320	17	0.04	5	16	150	0	0.53	0	0	114	0	11
20	1.55	30	0.31	157	2	0.51	14	550	19	0.06	0	10	89	0	0.37	0	0	76	0	42
20	1.84	30	0.16	88	3	0.44	10	850	26	0.09	0	14	119	0	0.43	0	0	95	0	34
20	1.9	30	0.26	202	2	0.54	12	820	20	0.06	0	13	109	0	0.43	0	0	91	0	48
20	1.92	30	0.37	206	2	0.56	15	430	26	0.04	7	12	96	0	0.43	0	0	90	0	42
20	1.87	30	0.3	212	2	0.54	11	490	25	0.05	5	12	91	0	0.39	0	0	94	0	37
30	2.95	40	0.22	131	3	0.67	4	430	17	0.04	6	17	134	20	0.42	0	0	120	0	17
10	1.37	30	0.4	185	1	0.53	18	300	33	0.04	0	8	98	0	0.43	0	0	69	0	43
30	2.86	40	0.23	140	3	0.64	5	510	22	0.05	5	17	129	0	0.42	0	0	122	0	22
10	1.25	30	0.34	160	2	0.5	16	370	50	0.06	0	8	113	0	0.42	0	0	67	0	38
20	1.06	30	0.14	64	2	0.33	6	360	25	0.06	0	8	101	0	0.42	0	0	96	0	15
10	0.54	30	0.04	35	1	0.23	2	260	16	0.05	0	6	94	0	0.46	0	0	46	0	10
10	0.87	30	0.07	32	3	0.26	3	380	32	0.06	0	9	101	0	0.46	0	0	71	0	10
10	0.94	30	0.1	31	3	0.28	6	340	27	0.05	0	9	129	0	0.42	0	0	79	0	11
20	1.01	30	0.08	29	3	0.27	4	300	23	0.05	0	10	183	0	0.51	0	0	79	0	10
20	0.82	30	0.09	30	4	0.24	3	410	54	0.09	0	8	221	0	0.41	0	0	96	0	14
20	1.79	30	0.28	366	2	0.51	10	800	27	0.06	0	12	95	0	0.37	0	0	109	0	43
10	1.48	30	0.34	242	2	0.48	14	570	24	0.03	5	9	70	0	0.4	0	0	80	0	42
10	1.34	30	0.24	318	1	0.44	12	830	26	0.05	0	8	67	0	0.39	0	0	91	0	39
20	1.45	30	0.22	241	2	0.42	10	710	28	0.05	5	9	68	0	0.42	0	0	89	0	33
20	1.75	30	0.28	263	2	0.43	11	670	23	0.05	5	10	75	0	0.42	0	0	97	0	35
20	2.11	40	0.21	281	2	0.31	11	820	24	0.05	0	12	65	0	0.43	0	0	104	0	33
20	1.8	30	0.26	197	2	0.44	15	870	25	0.06	0	9	71	0	0.37	0	0	82	0	52
20	1.96	40	0.19	321	2	0.45	6	750	25	0.05	0	13	90	0	0.41	0	0	119	0	27
20	2.01	40	0.21	329	2	0.46	6	980	26	0.07	5	13	94	0	0.38	0	0	123	0	32
20	1.9	40	0.17	42	2	0.41	3	500	34	0.06	0	12	105	0	0.36	0	0	100	0	19
20	1.92	30	0.26	105	3	0.5	10	550	31	0.06	0	11	113	0	0.34	0	0	89	0	30
20	1.89	30	0.26	102	2	0.5	10	520	29	0.06	0	11	112	0	0.35	0	0	89	0	29
20	2.36	40	0.17	54	3	0.46	6	370	17	0.05	0	14	132	0	0.34	0	0	106	0	19
10	0.61	20	0.04	19	1	0.16	2	400	21	0.07	0	8	232	0	0.47	0	0	80	0	10
10	0.45	20	0.05	35	1	0.13	4	670	32	0.11	0	8	446	0	0.47	0	0	78	0	16
10	0.5	30	0.04	19	1	0.16	2	620	26	0.18	0	9	535	0	0.52	0	0	71	0	12
10	0.43	20	0.05	22	2	0.16	3	470	31	0.29	0	6	336	0	0.39	0	0	51	0	20
10	1.27	20	0.19	66	4	0.35	5	360	29	0.08	0	10	133	0	0.38	0	0	79	0	21
10	0.53	20	0.05	34	2	0.21	3	440	37	0.2	0	6	176	0	0.38	0	0	44	0	13
10	0.38	30	0.03	22	2	0.16	1	520	29	0.23	0	6	450	0	0.46	0	0	55	0	7
10	0.61	20	0.05	28	1	0.2	5	530	34	0.14	0	8	216	0	0.41	0	0	64	0	10
10	0.61	20	0.06	40	2	0.23	2	540	43	0.09	0	9	221	0	0.44	0	0	70	0	8
10	0.38	20	0.03	24	2	0.18	4	450	26	0.24	0	6	381	0	0.44	0	0	56	0	11
20	2.28	30	0.18	181	3	0.48	6	1520	23	0.08	0	13	80	0	0.36	0	0	119	0	46
20	1.68	30	0.26	236	2	0.44	9	1340	54	0.07	5	9	69	0	0.34	0	0	87	0	57
20	1.69	30	0.24	280	1	0.41	8	1270	33	0.07	0	10	73	0	0.37	0	0	89	0	51
20	1.68	30	0.24	327	1	0.44	11	1180	31	0.07	0	10	70	0	0.39	0	0	91	0	67
20	1.72	30	0.22	380	1	0.41	9	1370	34	0.08	0	10	67	0	0.39	0	0	97	0	46
20	1.92	30	0.17	142	1	0.4	9	980	36	0.08	0	11	71	0	0.4	0	0	84	0	30
20	1.85	40	0.19	172	3	0.47	8	2050	26	0.1	0	12	81	0	0.39	0	0	100	0	60
20	1.76	30	0.21	388	2	0.5	10	1220	25	0.08	0	12	89	0	0.38	0	0	122	0	43
20	2.11	40	0.18	129	2	0.46	6	1240	20	0.09	0	13	79	0	0.41	0	0	102	0	67
20	1.99	40	0.14	74	1	0.45	4	390	20	0.06	0	13	93	0	0.49	0	0	93	0	19
20	1.74	40	0.13	72	2	0.39	5	450	33	0.07	0	12	82	0	0.47	0	0	87	0	26
10	0.76	30	0.09	43	2	0.31	4	480	26	0.09	0	8	164	0	0.45	0	0	61	0	13
10	0.66	20	0.06	30	1	0.23	2	430	26	0.08	0	8	201	0	0.48	0	0	65	0	16
10	0.55	30	0.03	32	1	0.23	2	310	15	0.05	0	7	170	0	0.54	0	0	55	0	7
10	0.67	30	0.05	32	1	0.28	5	410	17	0.06	0	8	194	0	0.53	0	0	59	0	5
10	0.59	30	0.05	34	1	0.24	1	420	17	0.07	0	7	371	0	0.47	0	0	64	0	7
10	0.44	20	0.04	36	1	0.22	6	310	23	0.08	0	5	100	0	0.41	0	0	42	0	17
10	0.64	30	0.04	40	1	0.23	3	280	17	0.04	0	7	135	0	0.52	0	0	55	0	9
10	0.6	30	0.04	27	1	0.2	3	250	13	0.04	0	7	157	0	0.58	0	0	57	0	6
10	0.51	20	0.03	16	1	0.13	2	310	29	0.05	0	7	139	0	0.44	0	0	65	0	9
10	0.39	30	0.03	21	1	0.16	2	310	26	0.05	0	7	248	0	0.51	0	0	56	0	7
10	0.28	30	0.03	13	1	0.14	3	470	31	0.07	0	9	268	0	0.43	0	0	78	0	10
10	0.28	30	0.02	21	2	0.18	2	370	34	0.06	0	6	281	0	0.53	0	0	57	0	8
10	0.33	20	0.04	21	1	0.18	2	270	42	0.08	0	6	119	0	0.47	0	0	49	0	21
20	1.95	40	0.17	109	2	0.47	6	610	18	0.06	0	14	118	0	0.5	0	0	104	0	25
20	1.83	40	0.19	161	2	0.48	8	530	20	0.06	5	13	101	0	0.48	0	0	104	0	26
20	1.78	30	0.25	165	2	0.54	12	680	23	0.07	0	12	99	0	0.39	0	0	94	0	37
20	1.87	30	0.26	173	2	0.56	12	680	22	0.07	0	13	103	0	0.4	0	0	97	0	37
30	1.87	30	0.24	198	2	0.54	9	640	17	0.08	0	14	104	0	0.38	0	0	102	0	39
20	1.94	40	0.22	360	2	0.41	11	1440	30	0.08	0	13	97	0	0.45	0	0	116	0	48
20	1.72	40	0.19	254	2	0.39	9	1090	26	0.06	0	11	86	0	0.44	10	0	98	0	41
20	1.65	40	0.23	197	1	0.46	11	810	23	0.07	0	11	88	0	0.49	0	0	94	0	40
20	1.61	40	0.23	179	1	0.46	12	890	26	0.07	0	10	84	0	0.46	0	0	93	0	40
20	1.45	30	0.31	309	1	0.5	13	940	24	0.05	0	9	74	0	0.42	0	0	105	0	46
10	0.37	20	0.03	19	1	0.2	3	590	23	0.3	5	7	570	0	0.56	0	0	63	0	9

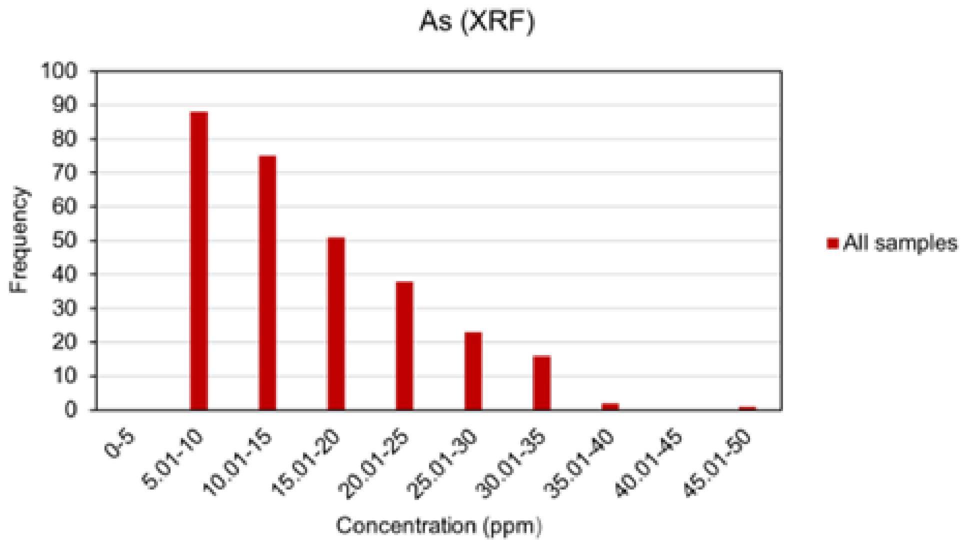
Appendix 5: Raw Ionic Leach Data

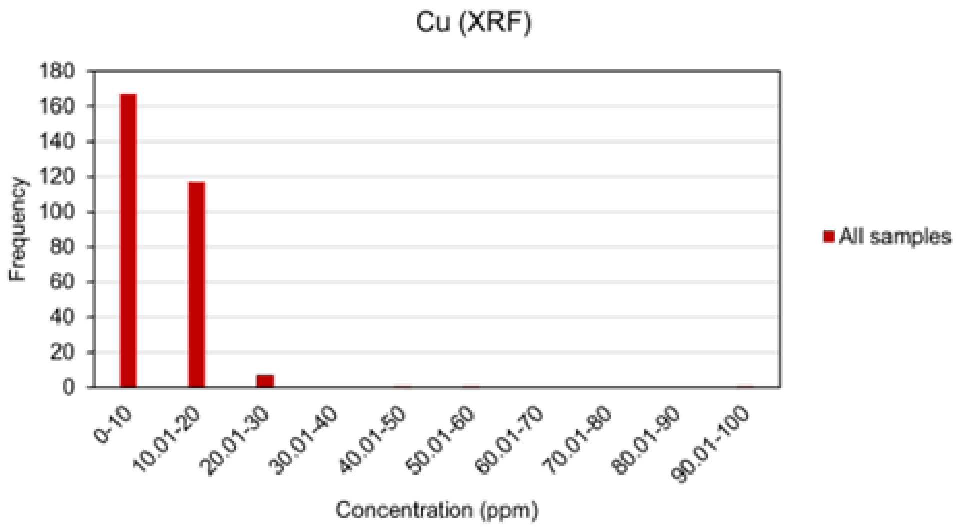
SAMPLE ID	GPS SAMPLE ID	X_BNG	Y_BNG	Z	Sampler	Ag	As	Au	Ba	Be	Bi	Br	Ca	Cd	Ce	Co	Cr	Cs	Cu
DESCRIPTION	NA	NA	NA	NA	NA	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppm	ppb	ppb	ppb	ppb	ppb	ppb
S10709A001IL	S10709A001	191296	222596	123.4119	MP AC	1.4	27	0	780	1.5	6.2	1.33	2.3	1.9	100	20.3	81	9.1	34
S10709A002IL	S10709A002	191292	222638	122.7746	MP AC	1.2	54.2	0	730	1.7	18.1	2.01	4.7	5.2	130.5	11	89	9.3	52
S10709A003IL	S10709A003	191297	222673	122.5846	MP AC	0.3	21	0	340	0.7	8.6	0.4	2.6	0.8	31.3	12.7	25	2.4	14
S10709A004IL	S10709A004	191297	222714	124.6135	MP AC	1.5	62.6	0	780	1.4	9	2.94	3.3	3.4	143.5	6.7	139	8.6	52
S10709A005IL	S10709A005	191301	222754	122.3633	MP AC	0.7	109.5	0.02	690	1.9	21.3	3.08	4.5	8	213	13.3	93	8.4	85
S10709A006IL	S10709A006	191298	222799	129.889	MP AC	0.5	102	0	780	2	19.8	3.24	3	7.6	141.5	11.7	100	6.2	62
S10709A007IL	S10709A007	191298	222837	128.756	MP AC	0.2	36.1	0	290	1.7	11.9	0.42	2.9	2.3	29.7	17.6	19	3.7	25
S10709A008IL	S10709A008	191294	222873	132.1528	MP AC	0.1	41.2	0	270	0.6	12.9	0.75	2.6	2.2	28	11.1	31	2.5	36
S10709A009IL	S10709A009	191296	222916	131.8886	MP AC	0.5	30	0	330	1.2	9.3	0.93	1.8	1.2	34.6	13.4	33	4.5	15
S10709A010IL	S10709A010	191294	222957	135.8955	MP AC	0.2	31.6	0	280	0.5	5.9	0.99	3.9	1.1	24.1	7.5	39	2.9	24
S10709A011IL	S10709A011	191299	222994	137.8274	MP AC	0.5	26.2	0	270	0.6	4.9	1.08	1.7	0.6	26.7	7.2	38	3.7	28
S10709A012IL	S10709A012	191298	223035	140.7992	MP AC	0.3	12.4	0	250	0.9	11.6	0.39	5.7	0.6	17.3	15.8	16	2.4	11
S10709A013IL	S10709A013	191296	223074	141.62	MP AC	0.4	7.3	0	260	2.2	9.6	0.17	3.7	1.4	13.5	37	11	1.5	48
S10709A014IL	S10709A014	191294	223117	144.8649	MP AC	0.2	22.1	0	270	1.8	8.4	0.22	7.2	2.1	18	39.6	13	2.6	18
S10709A015IL	S10709A015	191299	223158	147.5938	MP AC	1.4	8.5	0.02	280	4.5	4.6	0.73	2.7	5.4	85.7	52.3	25	9.9	576
S10709A016IL	S10709A016	191296	223197	150.2641	MP AC	0.9	10.8	0	340	1.3	3	0.38	65	30	36.8	15.1	15	5.3	42
S10709A017IL	S10709A017	191296	223236	155.2015	MP AC	0.3	7.6	0	520	1.1	3.6	0.26	48.3	1.8	10.8	24.2	12	2.8	11
S10709A018IL	S10709A018	191298	223275	157.7513	MP AC	0.5	23.7	0	430	1.4	5.1	0.63	25.6	6.3	28.8	23	25	4.8	25
S10709A019IL	S10709A019	191297	223315	160.9162	MP AC	0.3	15.3	0	550	1.6	2.3	0.54	37.5	8.6	21.4	15.4	20	3	22
S10709A020IL	S10709A020	191296	223355	163.023	MP AC	0.5	17	0	700	2.7	0.7	0.49	61.8	16.5	32.7	22.5	26	4.9	31
S10709A021IL	S10709A021	191296	223394	164.903	MP AC	0.3	11.2	0	440	2.5	0.5	0.43	42.2	14.4	16.9	41.2	26	5.7	36
S10709A022IL	S10709A022	191296	223435	168.5219	MP AC	0.3	7.1	0	670	2.2	0.7	0.27	101.5	13.4	8.3	39.5	16	4.1	27
S10710A001IL	S10710A001	191297	223474	165.3955	MP AC	4	16.7	0.03	390	1.8	0.4	1.07	76.5	31	34.8	22.5	47	4.9	108
S10710A002IL	S10710A002	191296	223515	165.7944	MP AC	5.9	25.3	0.04	350	1.7	0.4	1.29	120.5	35.4	33.3	10	46	5.1	85
S10710A003IL	S10710A003	191297	223555	163.7292	MP AC	5.1	25	0.02	550	1.9	0.3	1.2	135.5	40.4	31.1	9.5	40	4.4	67
S10710A004IL	S10710A004	191297	223594	161.9001	MP AC	3.9	16.5	0.02	460	1.6	0	0.72	149.5	41.6	25.9	7.5	26	4.2	61
S10710A005IL	S10710A005	191507	222766	118.6726	MP AC	0.1	12	0	210	0.5	4.4	0.11	8.5	0.7	6.2	56.5	14	2.9	19
S10710A004DIL	S10710A004	191297	223594	161.9001	MP AC	5.1	19.2	0.02	320	1.3	0	0.86	151	37.2	27.3	6.7	30	3.3	72
S10710A005DIL	S10710A005	191507	222766	118.6726	MP AC	0.2	17	0	200	0.7	4.6	0.17	6.8	0.7	11.5	76.5	26	2.6	43
S10710A006IL	S10710A006	191496	222795	123.6772	MP AC	0.4	32.6	0	490	1.1	24.6	0.87	4.8	2.4	34.8	29.2	40	8.9	29
S10710A007IL	S10710A007	191498	222837	123.367	MP AC	0.1	38.3	0	260	1.9	41.5	0.52	8.5	15	10.5	20.6	13	2.8	44
S10710A008IL	S10710A008	191498	222875	125.087	MP AC	0.2	35.4	0	450	2.1	31	0.54	4.6	5.2	28.2	44.2	30	1.8	39
S10710A009IL	S10710A009	191498	222914	127.4228	MP AC	0.3	49.4	0	490	1.4	25.5	0.93	5.1	4.1	36.1	25	43	4.7	39
S10710A010IL	S10710A010	191497	222955	128.1036	MP AC	0.3	19.6	0	340	1.5	7.8	0.59	2.8	1.4	36.5	12.3	31	6.7	18
S10710A011IL	S10710A011	191496	222994	129.8925	MP AC	0.3	104.5	0	430	2.5	27.4	2.02	5.8	16.6	83.7	16.5	59	9.2	89
S10727A001IL	S10727A001	191296	223635	153.164	MP AC	0.9	21.3	0	600	2.2	1	0.77	38.5	49.5	23.2	16.1	71	7.4	57
S10727A002IL	S10727A002	191297	223955	116.1632	MP AC	1.4	40.6	0.06	470	2.8	1.4	0.75	56.8	64.7	92.1	16	76	5.4	115
S10727A003IL	S10727A003	191297	223915	112.0367	MP AC	1.6	28.6	0.04	560	2.7	1	0.73	67.6	68.5	71.5	14.4	50	7	92
S10727A004IL	S10727A004	191297	223874	115.232	MP AC	1.2	69	0.08	400	3.1	2.1	0.66	75.5	54.2	96.9	20.2	72	6.8	93
S10727A005IL	S10727A005	191297	223836	118.4691	MP AC	1.7	90	0.06	500	3	2.6	1.07	47.5	49.2	73.7	17.8	108	7.1	101
S10727A006IL	S10727A006	191297	223795	121.9243	MP AC	2.4	86.1	0.06	610	3.4	1.7	0.73	106	58.4	70.5	18.3	71	4.6	160
S10727A007IL	S10727A007	191296	223763	124.4085	MP AC	1	36.2	0.05	280	1.8	1.2	0.77	57	20.9	26.3	39	35	7.2	213
S10727A024IL	S10727A024	191297	223715	135.0745	MP AC	4.5	35.1	0.02	420	2.6	1.4	1.04	43.9	59.3	43.7	7.3	88	4.5	69
S10727A026IL	S10727A026	191297	223673	144.1777	MP AC	1.6	16.5	0	420	2	0.9	0.92	59.1	54.3	36.5	10.5	54	6.4	44
S10709B001IL	S10709B001	191100	222880	145.8519	JB TE	0.2	15.7	0	410	1.3	10.1	0.31	3.7	1.1	33.4	13	38	4.2	11
S10709B002IL	S10709B002	191097	222916	148.0687	JB TE	0.1	50.7	0	350	1.2	20.9	0.82	4.9	6.3	39.3	16.9	36	3.6	29
S10709B003IL	S10709B003	191092	222957	148.3373	JB TE	2.7	124.5	0.03	790	2.4	12	5.56	9.1	18	300	9.5	162	10.4	136
S10709B004IL	S10709B004	191097	222994	149.9072	JB TE	1.8	11.8	0.02	460	1.9	3.7	0.92	1.3	0.6	55	11.5	57	7.3	7
S10709B005IL	S10709B005	191093	223038	151.4471	JB TE	4.1	172.5	0.02	1110	2.3	15.9	8.04	9.1	14.6	304	13.2	190	15.8	190
S10709B006IL	S10709B006	191090	223070	151.1377	JB TE	0.2	33.5	0	250	0.9	13.4	0.31	3.6	0.8	17	17.4	16	4.9	15
S10709B007IL	S10709B007	191097	223114	154.3738	JB TE	0.6	16.2	0	280	0.6	10.9	0.56	2.8	0.9	30.2	8.8	22	9.2	17
S10709B008IL	S10709B008	191096	223150	156.5469	JB TE	0.2	34.7	0	160	1.1	14.5	0.3	4.7	1.7	10.1	19.5	11	3.1	7
S10709B009IL	S10709B009	191102	223197	159.4296	JB TE	0.4	118	0	430	1.6	22.3	1.28	11.2	31.2	44	12	77	6.7	297
S10709B010IL	S10709B010	191094	223236	157.2936	JB TE	0.3	43.2	0	130	2.3	23	0.66	12.2	32.3	22.5	18.8	20	2.6	65
S10709B011IL	S10709B011	191093	223274	160.3079	JB TE	0.2	95.3	0	160	2.1	21	1.05	8.6	16	22.7	18	28	2.5	37
S10709B012IL	S10709B012	191099	223313	161.612	JB TE	0.3	82.9	0	90	1.8	21.4	0.73	8.7	25.2	17.9	21.3	23	2.9	71
S10709B013IL	S10709B013	191095	223345	160.2079	JB TE	0.1	26.3	0	120	0.7	20.1	0.1	14	1.2	9.2	33.4	12	2.4	7
S10709B014IL	S10709B014	191095	223437	162.0586	JB TE	1.4	12.5	0	700	1.8	0.7	0.84	79.9	21.6	22.7	16.1	42	6.4	30
S10709B015IL	S10709B015	191097	223473	160.2786	JB TE	1.7	13.6	0	530	2	0.8	0.87	63.8	22.1	34.1	15	47	8.1	28
S10709B016DIL	S10709B016	191100	223513	159.0374	JB TE	1.8	33.9	0.03	390	2.6	1.6	2.56	31.9	20.7	60.8	25.3	143	9.6	92
S10709B016IL	S10709B016	191100	223513	159.0374	JB TE	1.5	30.1	0.03	350	2.5	1.3	2.41	37.8	20.8	55.3	23.9	120	8.7	83
S10709B017IL	S10709B017	191099	223624	136.8428	JB TE	2	121	0.06	440	5.3	2.9	6.1	6.9	3.5	95.9	18.9	327	22.9	112
S10709B018IL	S10709B018	191094	223671	130.7078	JB TE	2.7	11.1	0.04	190	1.1	0	0.7	188.5	51.9	41	9.8	25	3.8	280
S10709B019IL	S10709B019	191095	223712	125.7835	JB TE	2	16.2	0.04	330	1.7	0.5	0.54	177.5	56.6	46.6	14.9	28	4.7	199
S10709B020IL	S10709B020	191096	223756	123.6335	JB TE	3.1	23.4	0.11	290	1.7	0.8	0.4	189.5	44.1	90.7	16	68	4.8	354
S10709B021IL	S10709B021	191095	223792	122.6192	JB TE	1.8	22.2	0.1	270	2.1	1.1	0.33	135	43.3	82.3	17.1	62	5.1	389
S10709B022IL	S10709B022	191093	223834	117.808	JB TE	2.1	26.3	0.1	280	1.8	0.8	0.37	128.5	48.5	74.3	15.2	115	4.7	367
S10709B023IL	S10709B023	191491	223316	160.8071	JB TE	0.1	33.1	0	130	2.1	18.2	0.78	15.4	43.5	19.6	25.7	16	1.9	51
S10710B001IL	S10710B001	191496	223555	160.1823	JB TE	1.5	38.5	0.02	250	1.8	1	0.49	79.5	18.5	36.1	14.6	45	5.5	86
S10710B002IL	S10710B002	191498	223513	163.8274	JB TE	2	23.6	0.14	150	1.5	0.6	1.21	106.5	24.7	57.5	25.4	92	5	330
S10710B002DIL	S10710B002	191498	223513	163.8274	JB TE	2.6	29.6	0.09	160	1.3	0.9	1.55	136	19.5	67.1	22.5	127	4.9	396
S10710B003IL	S10710B003	191496	223475	164.4016	JB TE	0.8	66.4	0.03	260	2.2	1.1	1.8	53.7	14.8	64.2	14.3	128	5.3	134
S10710B004IL	S10710B004	191498	223432	163.7826	JB TE	0.2	70.2	0	130	2.1	19.8	0.57	14.5	24.2	19.7	18.7	70	1.3	55
S10710B005IL	S10710B005	191494	223392	163.9279	JB TE	0.2	17.8	0	100	1.4	46	0.07	22.3	18.9	5.7	25.3	10	2.4	33
S10710B006IL	S10710B006	191502	223355	159.6202	JB TE	0	12.4	0	160	0.7	8.8	0	21.2	1.3	2.4	29.1	3	1.5	1
S10710B007IL	S10710B007	191498	223277	152.7593	JB TE	0	30.4	0	150	1.1	19.1	0.07	16.1	5.5	3.9	19.8	5	1.3	5
S10710B008IL	S10710B008	191498	223234	147.8376	JB TE	2	181.5	0.14	340	1.1	9.6	7.24	4.7	2.8	52.1	10.6	432	6	358
S10710B009IL	S10710B009	191503	223197	143.4037	JB TE	0.7	23.7	0	160	0.5	9.7	0.83	1.4	0.7	16.3	7.2	24	5.5	16
S10710B010IL	S10710B010	191496	223157	141.2519	JB TE	1.3	46.6	0	240	1	10.7	2.14	1.7	1.5	52	8.6	47	2.5	36
S10710B011IL	S10710B011	191498	223121	137.584	JB TE	0.7	26	0	210	1.1	12.7	0.73	1.2	0.8	35.2	5.8	47	2.9	15
S10710B012IL	S10710B012	191504	223076	134.4812	JB TE	1.4	16.3	0	160	0.9	6.2	0.68	1	0.4	26.1	5.9	29	2.2	13
S10710B013IL	S10710B013	191498	223037	133.3043	JB TE	0.2	130	0	190	1.2	22	1.24	3.8	2.1	44.4	13.4	41	2.1	43
S10711B014IL	S10711B014	191097	223560	146.6891	JB TE	1.6	21.8	0	220	1.4	2	0.6	2	1.6	8.6	13.8	44	4.9	20
S10711B016IL	S10711B016	191096	223593	140.088	JB TE	0.5	37.3	0	350	1.8	3.7	0.31	6.3	1.5	8.2	12.7	53	3.6	20
S10727B001IL	S10727B001	191408	223618	157.6607	JB JP TE	3.5	82.2	0.03	260	1.8	3.1	0.91	46.6	26.5	29.1	34.2	148	2.5	336
S10727B002IL	S10727B002	191492	223901	115.5809	JB JP TE	2.7	50.7	0.1	360	2.1	2.3	1.23	22.4	30	37.5	55	97	5.4	230
S10727B003IL	S10727B003	191482	223872	117.3779	JB JP TE	2.9	34.2	0.11	250	1.8	1.3	0.58	90.6	51.3	49.5	17.6	44	2.8	269
S10727B004IL	S10727B004	191467	223837	120.9758	JB JP TE	2.5	42.7	0.09	330	2	1.3	0.92	45	36.9	51.8	22.2	98	4.8	174
S10727B005IL	S10727B005	191457	223806	123.7548	JB JP TE	2.3	33.9	0.04	280	1.6	0.9	0.63	75.1	48.1	42	16.5	64	3.5	132
S10727B006IL	S10727B006	191451	223779	128.7207	JB JP TE	4.3	55.4	0.04	320	1.7	2.2	1.37	16.5	7.8	40.6	58.4	85	4.3	175
S10727B007IL	S10727B007	191440	223731	136.7168	JB JP TE	1.6	59.2	0.04	300	1.2	2	0.42	37.1	25	19.8	36.2	92	4.1	290
S10727B008IL	S10727B008	191430	223691	145.3588	JB JP TE	4.2	55	0.04	330	2	1.3	1.79	51.3	47.3	47.1	12.8	190	5.5	150
S10727B009IL	S10727B009	191420	223655	149.0227	JB JP TE	2.1	62.8	0.02	310	1.4	2.9	0.55	28	18.1	20.8	56.7	106	3.7	179

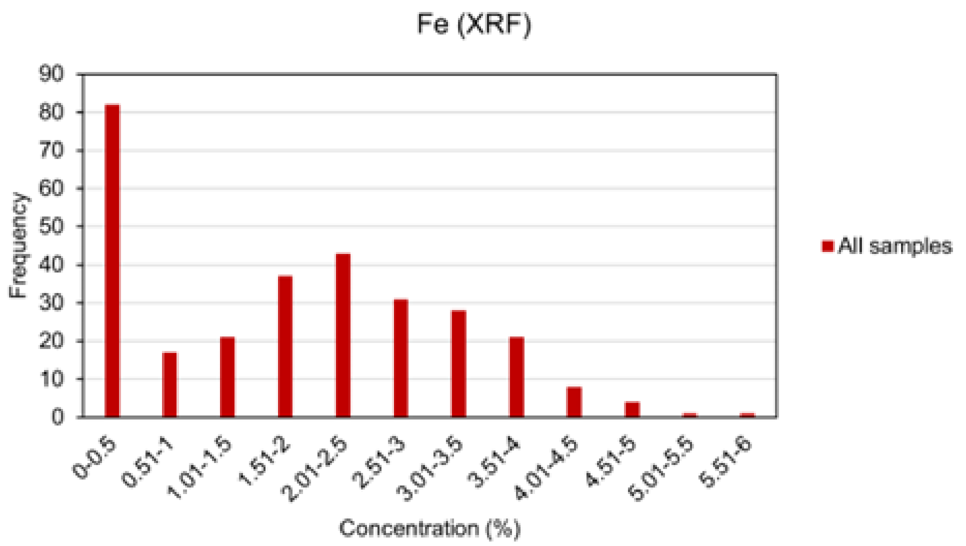
Dy	Er	Eu	Fe	Ga	Gd	Ge	Hf	Hg	Ho	I	In	La	Li	Lu	Mg	Mn	Mo	Nb	Nd	Ni	Pb	Pd
ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppm	ppm	ppb	ppb	ppb	ppb	ppb	ppb
2.9	1.8	1.2	192.5	39.4	3.4	3.9	2.37	0.8	0.6	0.19	0.4	53.7	17.2	0.5	2.88	0.05	2.7	4.5	38.4	95	202	0
3.3	1.9	1.5	185.5	36.7	4.2	3	2.27	1	0.6	0.28	1.2	71.4	12.7	0.5	6.23	0.14	3.9	4.2	46.4	57	854	0
0.9	0.8	0.4	184.5	25.4	1.1	1.1	0.96	0.4	0.3	0.08	0.5	16.1	5.7	0.3	6.2	0.02	1.9	1.7	11.6	22	94.1	0
4.4	2.7	1.9	248	46.5	5.5	3.7	4	1.5	0.8	0.36	0.7	77.5	15.1	0.6	4.24	0.08	7.6	6.2	54.9	62	407	0
5	2.8	2.4	213	52.7	7.7	4.5	4.17	1.4	1	0.37	1.8	104.5	11.9	0.5	5.91	0.03	6.6	6.6	70.3	56	1150	0
4.3	2.7	1.8	218	52.9	5.8	5.2	4.27	1.4	0.9	0.37	1.5	70.5	18.2	0.5	4.08	0.07	6.6	5.9	50.4	54	1080	0
1.2	0.8	0.4	199.5	36.5	1.2	2	1.03	0.3	0.3	0.08	1	14.8	4.9	0.2	8.02	0.01	3.1	2	11.1	22	404	0
0.9	0.9	0.3	298	25.2	1.2	2.1	0.99	0.7	0.3	0.1	1.2	14.1	7.7	0.3	7.76	0.02	2.2	1.7	9.7	26	297	0
1.2	1	0.4	203	36.2	1.5	2.8	1.23	0.6	0.3	0.14	0.8	18.5	7.2	0.2	5.21	0.01	1.9	2.7	13.1	34	137.5	0
1	0.8	0.3	315	24.6	1.1	2.6	1.14	0.7	0.3	0.14	0.9	12.3	10.1	0.2	8.24	0.05	2.5	2.4	9.1	41	112	0
1.1	0.8	0.4	330	24.6	1.3	2.7	1.01	0.4	0.3	0.14	0.6	13.9	8.9	0.2	5.01	0.02	1.3	2.1	9.8	31	62.6	0
0.6	0.6	0.2	198	22	0.7	1.8	0.49	0.4	0.3	0.05	1	9.3	5.6	0.3	13	0.02	0.5	1.3	6.2	36	57.1	0
1.3	2.1	0.2	69.9	23.8	1.1	1.1	0.36	0.2	0.5	0.03	1.1	6.8	7.1	1.1	9.26	0.03	0.8	0.8	5.3	41	262	0
0.8	0.7	0.2	140.5	37.5	0.8	1.2	0.49	0.2	0.3	0.04	0.7	8.8	4.3	0.3	18.8	0.01	2.1	1.2	7.2	34	291	0
73.5	87.3	3.5	32.7	19.1	21.9	1.2	0.66	0.3	22.4	0.13	0.4	32.1	7.4	11.4	3.35	0.06	6.4	0.9	48.7	101	5520	0
10.3	5.9	1.8	130.5	9.1	7.6	0.9	0.7	0.3	2.1	0.06	0.8	12.6	4.6	0.6	15.55	0.34	0.9	0.7	28	59	4320	0
0.7	1.4	0.2	241	11.8	0.5	1.5	0.39	0.2	0.3	0.03	0.7	5.2	3.1	0.4	24.6	0.02	0	0.6	4	21	303	0
2.1	3	0.5	291	19	1.7	2	0.99	0.4	0.7	0.08	0.6	13.4	6.7	0.5	11.85	0.02	7.6	1.1	12.6	44	1040	0
2.3	2.8	0.4	257	12.8	1.5	1.8	0.53	0.3	0.7	0.07	0.8	10	3.4	0.5	19.85	0.04	1.1	0.7	9.9	27	988	0
6.5	5	1.4	217	12	5.1	1.7	0.68	0.3	1.5	0.08	0.6	13.3	3.3	0.7	11.25	0.08	0.9	0.8	21.3	46	828	0
5.5	5.4	0.7	181	10.4	2.8	1.6	0.73	0.4	1.5	0.09	0.5	6.9	5.1	0.9	16.75	0.17	0.6	0.7	9.9	49	624	0
5.5	6.2	0.5	187.5	9.6	1.9	1.4	0.46	0.5	1.6	0.05	0.7	3.7	2.6	1	26.6	0.16	0.6	0.5	5.3	48	918	0
8.8	5.3	1.8	149.5	11.6	7.2	1.4	1.28	0.9	1.9	0.24	0.2	14.6	3.8	0.6	24.4	1.91	2.3	0.7	23.1	109	912	0.06
6.9	4	1.7	95.5	11.8	6.2	1.2	1.25	0.8	1.5	0.25	0.2	15	4.3	0.4	29.1	1.47	2.6	0.8	20.6	103	1365	0
7.9	4.9	1.7	84.2	11.4	6.3	1.4	0.86	0.7	1.7	0.2	0.2	14.2	4.5	0.5	34	1.38	1.9	0.7	20.5	102	1730	0
8.3	5.1	1.5	68.5	5.3	6.1	0.7	0.62	0.6	1.8	0.12	0.2	11.7	1.1	0.5	33.5	1.23	1.4	0.3	18.1	97	1360	0
0.4	0.5	0.1	282	16	0.3	1.3	0.58	0.5	0.2	0.03	0.6	4	9.8	0.2	8.91	0.12	1.1	0.9	2.4	21	88.9	0
7.2	4.3	1.4	58.4	4.9	6	0.6	0.69	0.7	1.6	0.14	0.2	12.9	1	0.5	26.2	0.87	1.8	0.3	17.9	108	1085	0
0.7	1	0.2	280	19	0.6	1.6	0.65	0.8	0.3	0.05	0.5	6.6	11.3	0.3	7.06	0.16	2.1	1.4	4.1	41	277	0
1.4	1.1	0.4	202	40.3	1.4	4.1	1.79	0.9	0.4	0.11	1.9	17.5	10.4	0.2	7.95	0.06	2.8	3.3	12.6	39	276	0
0.6	0.5	0.1	188	39.4	0.5	1.4	0.5	0.6	0.2	0.1	3	4.7	2.9	0.1	18.6	0.08	5.2	1.4	3.8	44	2100	0
1.4	1.1	0.4	114.5	33.3	1.4	2.4	0.9	0.9	0.4	0.08	2.7	14.9	5.9	0.3	7.74	0.04	5.8	1.7	10.2	67	1420	0
1.3	1.1	0.5	182.5	35.7	1.6	3.4	1.44	0.8	0.4	0.13	2.2	18.3	9	0.2	9.52	0.03	5.2	2.7	13.7	40	719	0
1.1	0.9	0.5	147.5	28.2	1.5	2	1.23	0.3	0.3	0.09	0.5	18	4.7	0.2	5.73	0.01	2.6	2.2	13.9	27	291	0
2.5	1.5	1.2	180.5	46.4	3.8	2.2	2.01	1	0.5	0.25	2.4	41.3	5.1	0.3	7.07	0.04	10.7	3.7	31.2	54	2440	0
12.5	10.9	1.4	152	10.6	6.3	1.2	1.21	0.7	3	0.15	0.6	10.7	4.8	1.7	7.21	2.66	1.5	0.8	16.4	65	1045	0
26.1	18.8	3.9	126.5	12.8	17.3	1.5	1.49	0.8	5.9	0.2	0.4	41	8.3	2.3	7.13	4.93	2.9	2	60.3	181	2300	0
30.3	22.3	3.9	130	9.3	17.8	1.1	1.08	0.8	6.9	0.2	0.4	30.6	5.5	2.6	10.5	3.59	2	1.4	54.7	194	2430	0
34.7	24.1	5.5	154	17.9	22.9	1.3	1.77	0.8	8	0.17	0.4	43.1	11.4	2.9	9.18	8.21	4.6	2.3	73.4	258	2850	0.07
30.8	23.8	4.5	218	22.5	19.1	1.5	2.42	1.1	7.4	0.24	0.5	35.3	12.8	3.2	7.53	9.61	5	2.8	53.9	230	2090	0
36.4	25.7	5.7	206	12.9	22.9	1.1	1.74	1	8.4	0.2	0.5	34.2	3.6	3.1	17.2	8.2	4.4	1.3	54.3	264	1605	0.06
15.3	13.2	1.6	195	9.7	6.7	0.8	1.6	0.5	3.8	0.17	0.4	11	4.6	1.8	19.15	3.11	2.8	0.8	15.7	110	1010	0
25.3	19.6	3.7	179	12.4	15.5	1	1.85	1.3	6.1	0.25	0.8	21.6	2.7	2.7	6.69	4.99	2.8	1.1	39.2	153	1580	0
22.2	17.8	3.1	137	9.6	13.7	0.7	1.34	0.9	5.5	0.17	0.6	18.2	3	2.6	11.15	3.65	1.7	0.7	32.9	101	1380	0.07
1.5	1.2	0.5	110	45.4	1.6	1.5	2.38	0.4	0.3	0.04	1.4	19	20.2	0.4	12.7	0.22	2.7	2.8	12.3	40	79.4	0
1.8	1.4	0.5	151.5	43.8	1.7	1.3	2.58	0.6	0.4	0.12	2.5	22.9	8.6	0.4	8.58	0.07	6.4	2.5	13.7	38	968	0
12.6	7.5	5.3	124	55.1	17.7	3	12.05	1.4	2.5	0.59	1.4	158	20.1	1.4	5.16	0.15	17.1	9.6	118.5	118	2020	0
3.3	2.8	0.9	37.6	87.7	3.1	1.9	4.68	0.5	0.7	0.12	0.3	29	17.2	0.8	2.64	0.03	3.9	5	21.6	40	238	0
8.3	5.2	3.9	236	69.8	11.8	4.1	9.41	1.6	1.7	0.88	1.4	173	31.2	1	7.95	0.14	12.4	7.9	105	135	2050	0
0.7	0.7	0.2	149.5	37.1	0.7	1.2	1.23	0.3	0.2	0.06	1.4	9.7	4.9	0.3	8.64	0.02	2.2	1.8	6.4	24	156.5	0
1.2	1	0.4	184.5	33.8	1.4	1.5	1.71	0.3	0.2	0.08	1.1	16.7	6.4	0.3	6.11	0.02	1.8	2.3	11.2	28	67.8	0
0.5	0.5	0.1	164	39.3	0.5	0.9	0.71	0.2	0.1	0.06	1.5	5.7	4.3	0.2	11.85	0.01	3.6	1.1	3	26	413	0
3.9	2.5	1.2	238	28.9	4.8	1.8	3.7	0.8	0.8	0.17	1.9	23.2	10.2	0.5	8.25	0.1	42.8	2.6	20.4	42	3810	0
2.2	1.7	0.6	112	39.7	2.3	1	1.43	0.4	0.5	0.11	2.3	11	5.3	0.4	14.65	0.06	13	1.9	10.7	68	4800	0
1.7	1.2	0.4	192	41	1.8	1.2	1.67	0.7	0.4	0.19	2.3	11.5	5.9	0.3	14.95	0.06	19.5	2.1	9.4	62	2310	0
1.7	1.2	0.4	143	32.9	1.8	0.8	0.95	0.5	0.3	0.14	2.3	9.3	3.3	0.3	9.98	0.1	22.5	1.8	8.9	54	3470	0
0.5	0.7	0.1	170.5	38	0.4	0.9	0.98	0.1	0.1	0.04	1	5.2	3.4	0.3	17.65	0.02	1.3	1.4	2.7	21	153.5	0
6.6	5.7	1.1	152.5	13.1	4.5	1	0.89	0.6	1.6	0.11	0.6	10.8	3.7	1.1	21.8	0.8	1.4	0.8	14.9	64	783	0
8.7	6.4	1.5	100.5	11.3	6.3	0.8	0.92	0.5	2	0.11	0.6	15.3	5	1	16.7	0.98	1.1	0.8	22	77	1020	0
10.8	7.7	2.2	186.5	27.4	8.9	1.6	3.02	1.2	2.4	0.38	0.5	29.8	17	1.1	9.89	1.53	4.1	2.1	34.1	120	1070	0
10.3	7.1	2	161.5	21.7	8.4	1.3	2.68	1	2.2	0.35	0.5	26.9	12.8	1.1	12.6	1.54	3.3	1.7	30.8	110	1075	0
12	7.8	3	579	115	10.9	5	10.45	1.8	2.5	1.33	0.5	45.1	64.4	1.2	6.06	2.24	15.9	5.6	47.1	84	561	0
14.6	10.3	2.6	63.7	4.8	11.6	0.3	0.86	0.4	3.4	0.18	0.1	20.7	1.5	1.3	14.2	1.88	2.6	0.4	30.5	216	904	0
22.4	16.7	3.3	107.5	6.7	14.8	0.6	0.81	0.5	5.3	0.16	0.3	22.8	2.4	2.2	19.55	3.84	2.8	0.6	36.1	194	1310	0.09
17.2	11.3	3.7	66.8	7.7	15.3	0.6	1.5	0.6	3.8	0.08	0.2	45.2	4.8	1.5	4.33	3.49	5.2	1.3	53.8	177	1625	0
19.2	13.1	3.5	84.8	8.4	15.1	0.7	1.53	0.6	4.3	0.06	0.3	38.6	6.1	1.7	7.12	4.05	4.1	1.4	50	149	2360	0.07
16.5	11.6	3.1	86.2	11.8	13.6	0.8	2.24	0.6	3.8	0.07	0.2	37.1	15.6	1.6	6.08	4.14	5	2.3	45.7	183	1500	0
2	1.5	0.5	119.5	35.9	2.1	0.8	1.17	0.6	0.4	0.13	1.9	9.2	2.4	0.4	21.3	0.39	17.5	1.4	9.5	79	4410	0
6.4	4.9	1.4	222	17.9	5	1.2	0.88	0.5	1.5	0.07	0.4	17.7	5.2	0.8	7.29	0.27	3.7	0.9	20.7	67	1350	0
7.7	4.9	2.1	141.5	10	8	0.7	2.35	0.8	1.6	0.26	0.3	29.3	5.3	0.7	8.96	1.02	3	1	31.7	120	1530	0
6.6	4	2.3	138.5	10.2	8.1	0.6	2.87	1	1.3	0.32	0.2	35.7	4.2	0.6	9.09	0.99	3.8	1.1	34.5	112	1125	0
4.5	2.8	1.8	306	34.5	6.2	1.7	2.38	0.5	0.9	0.27	0.3	31.5	8.1	0.5	14.55	1.6	5.8	2.1	33.4	55	491	0
1.5	1.4	0.5	213	24.2	1.8	0.8	0.79	0.5	0.4	0.11	1.7	10	3.1	0.3	12.75	0.14	5.8	2.4	9.6	34	3340	0
0.7	0.8	0.2	139.5	23.2	0.7	0.9	0.52	0.3	0.2	0.03	4.1	2.6	3.1	0.2	41.1	0.12	5	1.2	3	47	3970	0
0.2	0.2	0.1	132	20.1	0.2	0.5	0.23	0.1	0	0.02	1.5	1.2	1.7	0.1	36.7	0	4	0.7	1.1	20	114.5	0
0.3	0.4	0.1	96.5	22.1	0.4	0.6	0.31	0.3	0.1	0.03	2.4	2	2.8	0.2	31.1	0.2	15.8	0.7	2	32	662	0
4.1	2.4	1.1	573	27.7	4.4	2.2	5.84	4.5	0.8	0.78	1.3	30.6	17.5	0.3	6.73	0.28	17.1	4.9	23.2	71	2480	0
0.8	0.6	0.3	267	15.3	1.1	1.1	0.69	0.6	0.2	0.1	0.8	9.1	4.9	0.2	2.87	0.01	1.5	1.4	6.5	29	73	0
1.6	1	0.8	238	17.4	2.6	1.2	1.02	1	0.3	0.24	0.8	28.7	5.5	0.2	2.3	0.01	3.7	1.8	19.8	38	190.5	0
1.2	0.9	0.6	128.5	18.8	1.7	1.1	1.47	0.8	0.2	0.1	1	18.7	5.7	0.3	2.61	0.01	3	2.1	13.2	24	206	0
1.1	0.9	0.5	158	14.7	1.5	0.9	0.98	0.7	0.2	0.11	0.4	13.9	4.4	0.3	1.89	0	1.6	1.3	10.3	27	189	0
1.2	0.8	0.7	260	24.6	2.3	1.1	1.12	0.7	0.2	0.16	1.5	23.2	4.6	0.2	7.83	0	10.9	2.8	16.9	28	614	0
0.9	1.1	0.2	190.5	13.9	0.8	1.4	0.78	0.7	0.2	0.1	0.6	5.2	4.4	0.4	4.61	0.13	2	1	3.8	46	257	0
0.7	0.8	0.2	218	18	0.6	2	0.84	0.5	0.1	0.06	1.2	4.7	6.6	0.3	13.55	0.15	2.3	1.4	3.1	37	108.5	0
6.4	5.7	1.1	347	15.3	3.7	1.7	2.23	1.1	1.5	0.16	0.5	17.1	3.9	0.8	14.05	6.13	5.3	2.1	14.7	122	635	0
10.6	10.4	1.2	270	12.5	5.1	1.4	1.79	1.2	2.6	0.25	0.5	19.7	9.1	1.6	11.95	3.74	3.8	1.9	19.7	145	3180	0
19.1	14.1	2.7	182	6	11.9	0.6	1.05	0.9	4.1	0.18	0.3	24.6	2.6	1.7	13.7	6.4	3.4	0.8	34.5	149	1350	0
18.5	15.3	2.7	200	6.8	11.6	0.8	1.37	1	4.5	0.23	0.5	23.9	4.8	1.7	10.85	6.92	2.5	1.7	32.6	128	1330	0
19.9	16.3	2.9	171	5.4	12.7	0.6	0.91	0.9	4.9	0.22	0.4	19.9	3	1.7	17.5	6.76	2.3	1.1	31.1	132	1565	0
6.6	7.2	1.3	273	13.4	4.8	1.3	1.4	1.1	1.8	0.47	0.4	21.1	5.6	1.1	6.8	1.13	2.5	1.6	19.4	147	1010	0
6.6	7.1	0.8	304	8.6	3.2	1	1.26	0.7	1.8	0.08	0.2	11.1	3.8	0.9	14.5	4.79	4	1.7	11	93	726	0
16.2	12.4	3	176.5	10.1	11.9	1	1.97	1.4	3.9	0.45	0.4	24.8	5.8	1.3	9.25	7.9	3.7	1.8	33.1	143	987	0
3.2	3.5	0.7	354	11.8	2.3	1.3	1.57	0.9	0.9	0.08	0.4	11.3	4.2	0.6	11.65	4.82	3.3	1.8	9.8	113	460	0

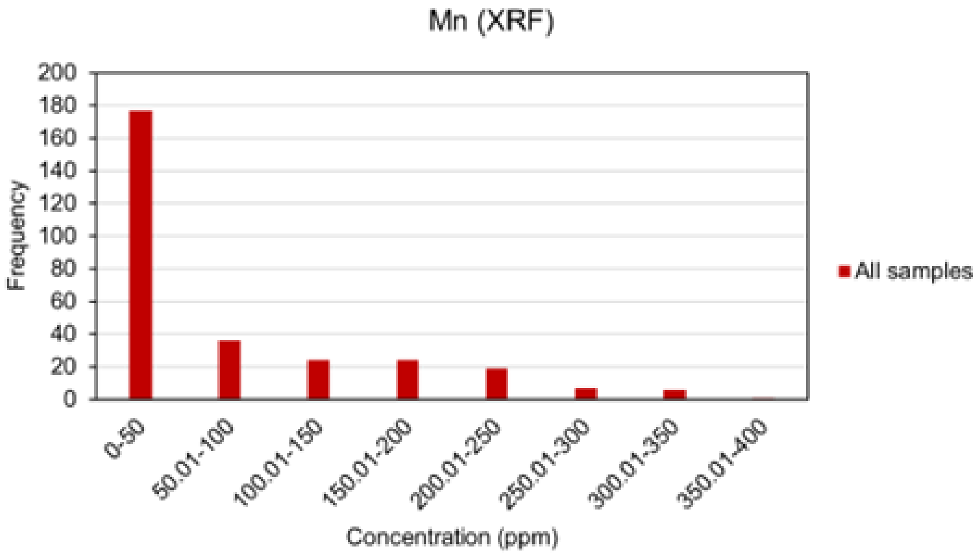
Pr	Pt	Rb	Re	Sb	Sc	Se	Sm	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr
ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
10.6	0	127	0	1.5	44	30	6	4.2	69	0.3	0.4	1	20.6	1405	1.36	0.3	6.71	80.9	1.1	15.1	2.6	170	114
13.6	0	134.5	0	1.9	45	39	7.4	7.1	87	0.25	0.5	1.4	38.7	1270	1.13	0.3	8.42	89.7	1.5	14.2	2.4	480	112
3.1	0	70.3	0.02	1.1	20	12	1.9	2.8	56	0.1	0.1	0.8	8.09	482	0.62	0.2	3.17	41.9	0.8	5.6	1.2	100	52.6
15.1	0	169.5	0	1.6	49	57	9.2	7.2	88	0.41	0.7	2.9	39.7	2060	1.34	0.5	9.91	125	1.5	20.8	3.5	250	174.5
21.1	0	83.4	0	2.2	72	59	11.2	14.5	101	0.41	0.8	1.8	83.6	2600	0.75	0.4	10.2	114.5	2.2	20.2	3.2	510	192.5
14.8	0	113	0	2.5	73	59	8.6	9.1	91	0.4	0.6	2.9	58.1	2720	0.97	0.4	8.54	132.5	1.8	19	3.1	360	191
3.3	0	76.7	0.01	1.3	32	12	1.8	3.8	73	0.12	0.2	0.9	18.8	658	0.29	0.1	3.75	84.2	1.4	4.4	1.1	330	51.1
2.8	0	77.7	0.01	1.6	24	20	1.5	6.6	56	0.1	0.1	1.4	9.8	776	0.44	0.1	2.37	52.1	0.8	4.5	1.5	150	46.3
3.9	0	89.6	0.01	1.1	35	18	2.1	4.3	51	0.15	0.2	1.1	11.55	1160	0.55	0.2	3.27	63.6	1	5.7	1.4	120	62.5
2.3	0	85.7	0	1	29	20	1.4	4.8	59	0.14	0.1	1.3	8.6	1100	0.72	0.1	2.41	66.8	0.5	5.4	1.3	30	50
2.8	0	108	0	1.1	31	20	1.5	2.8	39	0.13	0.1	1.4	8.5	971	0.91	0.1	2.62	57.5	0.5	5.5	1.3	10	48.6
1.7	0	102.5	0	0.5	30	8	0.9	3	67	0.08	0.1	0	7.36	571	0.74	0.1	2.17	29.4	0.4	3.4	1.5	10	35.2
1.4	0	51	0.01	0.5	40	10	0.9	1.2	62	0.05	0.1	0.7	5.83	338	0.64	0.5	2.68	29.3	0.7	8.7	6	40	19.3
1.8	0	79.7	0.02	0.9	40	11	1.2	1.9	111	0.07	0.1	0	11.15	405	0.25	0.1	2.77	49	0.8	3.8	1.4	330	26.5
10.7	0	117.5	0.01	0.5	50	36	12.3	1.1	35	0.06	5.4	0	8.18	387	0.81	11.9	7.27	31	0.6	624	76.9	230	32.1
5.6	0	137	0	0	35	10	7.2	0.9	129	0	1.2	0.5	29.7	250	0.54	0.7	7.04	22.9	0.2	42	4.3	540	27.1
1.1	0	118	0.01	0	24	8	0.7	1.5	182	0	0.1	0	6.45	273	0.52	0.3	1.62	21	0.3	3.1	2.5	150	19.4
3.2	0	128	0	0.7	30	16	2.3	2.4	105	0.07	0.2	1.4	13.55	528	0.6	0.4	3.28	56.7	0.7	11.2	3.5	350	48.5
2.5	0	136.5	0	0.6	30	12	1.9	1.9	142	0	0.2	0.6	14.65	319	0.62	0.4	2.49	29.2	0.4	10.1	3.3	480	24.7
4.6	0	225	0	0.5	39	16	5.2	1.9	261	0	0.7	0.9	20.7	284	0.87	0.6	7.85	34	0.3	30.5	4.8	230	31.4
2.3	0	231	0	0	34	12	2.5	1.2	236	0	0.5	1.1	20.9	264	0.75	0.8	9.45	27.8	0.2	29.3	5.7	260	34.6
1.1	0	260	0	0	36	6	1.5	1.2	434	0	0.4	0.5	11.85	155	0.81	0.9	7.29	22.1	0.2	27.7	6.9	400	19.2
4.9	0	197	0	0.8	38	34	6.3	0.9	164	0.05	1	1.1	25.4	325	0.4	0.6	13.25	36.3	0.3	41.5	4.2	1300	50.2
4.5	0	213	0	0.9	36	40	5	1.1	208	0.05	0.9	1	24.5	353	0.55	0.5	22.4	42.1	0.2	37.1	3	240	57.1
4.3	0	219	0	0.8	36	32	5.1	1.5	251	0.05	0.9	0.9	17.05	319	0.67	0.6	20.9	39.6	0.2	45	3.5	410	40.5
3.8	0	155.5	0	0.5	27	21	4.5	0.6	254	0	0.9	0	16.55	84	0.38	0.6	20.7	15.2	0.1	52	3.9	570	27.7
0.7	0	83.8	0.01	0.8	21	6	0.4	1.8	75	0.05	0	3.2	3.42	383	0.48	0.1	1	39.1	0.4	1.7	1.5	40	23.7
3.9	0	134	0	0.6	25	23	4.7	0.6	223	0	0.9	0.5	16.65	85	0.4	0.5	21.5	15.6	0.2	43	3.2	570	29.5
1.1	0	77	0.01	1.2	24	13	0.7	2.8	62	0.08	0.1	5.1	5.95	646	0.55	0.2	1.52	62.7	0.5	3	2.2	80	34.5
3.6	0	124.5	0.01	2	50	19	1.9	12.3	77	0.2	0.2	0.6	12.65	1470	0.79	0.1	2.75	71	1.2	7.4	1.3	100	92.7
1.2	0	42	0.01	3	21	13	0.7	10.6	105	0.06	0.1	0	14.1	290	0.25	0.1	2.23	85.1	3.6	2.7	0.8	930	25.7
3.1	0	65.3	0	1.9	44	17	1.8	10.5	75	0.09	0.2	0	15.7	606	0.6	0.2	3.56	52	2.5	7.1	1.7	250	45.1
3.7	0	102	0.01	2	47	24	2.2	14.4	110	0.15	0.2	0.9	16.15	1070	0.77	0.2	3.56	68.7	1.4	7.3	1.5	280	72.9
3.8	0	89	0.01	0.7	40	16	2.3	2.9	71	0.12	0.2	0	14.95	858	0.43	0.1	3.45	57.9	0.7	5.7	1.4	170	72.4
8.8	0	86.7	0	2.2	47	42	5.5	8.7	103	0.19	0.4	1.3	63.8	1040	0.49	0.2	6.39	79.2	2.5	9.6	1.7	1080	105.5
3.5	0	197.5	0	0.8	43	19	4.6	1.5	151	0	1.2	1	21.6	232	0.76	1.5	15.3	52	1.8	85.9	11	460	52.7
13.1	0	194.5	0	2	52	38	14.3	2	270	0.13	2.8	0.9	35.8	620	1.07	2.3	44.6	106	2	170.5	15.1	770	65.4
11.2	0	206	0	1.4	48	27	13.7	1.3	338	0.09	3	0.7	26.6	402	1.19	2.7	44.7	65.8	1.4	209	18	930	46.6
15.3	0	201	0	2.2	75	26	18.9	2.9	265	0.13	4.3	0.9	30.2	615	0.99	3.2	61.8	144	2.8	230	19.4	720	64.6
11.5	0	180	0.01	2.5	83	35	14.1	3.5	212	0.18	3.7	1.7	36.8	808	1.14	3.3	56.5	148	3.6	204	21.1	770	101
11.4	0	181.5	0	2.1	57	24	15.3	2	409	0.06	4.4	1.2	30.3	290	0.95	3.4	67.3	90.6	2.4	235	20.7	1360	72.3
3.5	0	244	0	0.9	47	22	4.6	1	193	0	1.6	0.9	25.3	244	0.51	2	12.8	33.8	0.6	76.3	11.9	2850	57.6
7.7	0	184.5	0	1.4	61	22	11	2.2	142	0.06	2.9	1.2	34.8	222	0.71	2.7	45.6	60.7	2.6	184.5	16.9	960	75.1
6.7	0	239	0	0.8	51	22	9.6	1	210	0	2.6	0.7	31	139	1.08	2.5	40.4	30.3	1.7	167	16.2	700	50.5
3.4	0	90.2	0	0.8	89	9	2.1	3.2	75	0.19	0.2	0.7	13.55	1145	0.81	0.3	4.36	61.6	1	8.4	1.6	50	90.9
4.1	0	71.9	0.01	1.7	70	16	2.5	6.6	85	0.15	0.3	0.8	25	883	0.5	0.4	6.62	60.4	2.6	8.9	1.8	740	99.1
32.7	0.1	104.5	0	2.3	179	87	22.8	12.6	156	0.65	2.3	2.1	127.5	3400	0.98	1.2	19.9	115	3.3	53.4	8.4	950	481
6.3	0	97.3	0	0.9	99	17	3.8	2.6	80	0.33	0.4	0.9	16.15	2110	0.76	0.6	6.19	77.3	1.1	16.7	4	80	178.5
32.4	0	174	0	2.5	202	118	17.2	14.8	182	0.49	1.5	3	109.5	3020	1.17	0.9	16.95	160.5	2.9	36.3	5.9	800	367
1.8	0	53.7	0.01	0.7	53	7	1	4	62	0.1	0.1	0	9.02	556	0.21	0.2	3.36	42.7	1.5	3.8	1.1	120	51
3.4	0	74.8	0	1	63	11	2	4.3	50	0.13	0.2	0	9.74	752	0.43	0.3	3.05	36.3	1	5.6	1.2	30	62.1
0.9	0	74.6	0.01	1.1	38	9	0.5	4.1	77	0.06	0.1	0	9.49	314	0.15	0.2	3.68	41.8	1.8	2.6	0.6	400	26.4
5.2	0	106.5	0.02	3.5	77	47	5	8.7	117	0.15	0.7	4.7	40.5	901	0.53	0.5	7.55	221	1.4	16.6	2.6	1450	168.5
2.8	0	46	0.01	2.7	51	16	2.3	8.2	102	0.09	0.3	0.5	27.8	466	0.43	0.4	4.67	142.5	3.2	9.9	2	2090	57.9
2.5	0	56.4	0.01	2.4	51	26	1.8	8.9	155	0.11	0.2	0.8	21	568	0.49	0.3	5.76	89	2.5	8.3	1.5	1040	63.3
2.3	0	72.6	0.02	2.7	39	17	1.9	9.1	83	0.07	0.3	0.5	21.3	316	0.34	0.3	4.6	95.6	5.5	7.6	1.5	1340	42.4
0.9	0	57.5	0.01	0.9	50	7	0.6	2.7	148	0.1	0.1	0	6.87	422	0.49	0.2	2.77	21.9	0.8	2.9	0.9	160	34.7
3.3	0	204	0	0.5	59	19	3.9	1.2	212	0	0.8	0.5	19.15	260	0.75	0.9	9.79	33.4	0.4	41.5	5.9	890	33.3
5	0	250	0	0.6	63	16	5.7	1.5	192	0.05	1.1	0.5	22.8	255	1.01	1	12.05	32.9	0.3	50.1	6	590	32.4
8.2	0	206	0	1	80	47	8.4	3.1	114	0.13	1.5	1.9	56.2	770	0.87	1.2	22	77.5	0.7	60.7	7	530	108
7.5	0	201	0	0.9	69	44	7.5	2.2	118	0.1	1.4	1.6	52.7	581	0.78	1.1	21.1	59.5	0.6	56.8	6.8	520	94.9
11.9	0	272	0	2.4	175	98	11.6	4.2	107	0.36	1.8	4.8	79.8	2480	1.84	1.2	26.6	292	1.1	48.8	8.1	320	415
6.4	0	128.5	0	0.7	28	19	8.2	0.7	361	0	1.9	0	15.15	83	0.43	1.4	69.1	19.2	0.7	108.5	8.2	780	32.2
7.5	0	153.5	0	1	46	22	9.8	0.8	417	0	2.7	0.6	16.5	139	0.68	2.3	78	25.6	0.8	168	14	1090	32.4
12.5	0	114.5	0	1.2	46	23	12.4	1.1	311	0.07	2.4	0.6	18.85	256	0.85	1.6	82.6	62.6	2.1	108	9.6	330	55.5
11.5	0	114.5	0	1.1	55	20	12.2	1.1	269	0.07	2.5	0.5	23.5	283	0.86	1.8	80	59.2	1.9	124.5	11.1	500	58.9
10.6	0	125.5	0	1.4	61	30	11.1	1.8	229	0.13	2.2	0	32.5	560	0.76	1.6	88.3	108	3.1	109.5	10.1	410	84.6
2.5	0	67.7	0.01	2.7	42	17	2.2	9.2	121	0.07	0.3	0.6	22.1	315	0.31	0.4	5.56	103.5	3.2	9.6	1.8	2630	40.7
4.9	0	200	0	1	63	19	4.8	1.8	196	0.05	0.8	1.7	14.65	323	0.72	0.8	14.45	68.6	0.5	36.4	4.9	260	33.1
7.5	0	144	0	1.1	48	53	7.3	1.2	149	0.07	1.2	1.1	67.3	345	0.52	0.7	35.8	27.2	0.3	46.3	4.1	240	82.2
8.5	0	141	0	1.4	41	65	7.8	1.8	156	0.07	1.1	1.4	73.2	383	0.53	0.6	34.4	28.8	0.4	38.4	3.5	170	101.5
8.5	0	140	0	1	74	42	7.4	1.6	156	0.13	0.8	3.2	72.2	852	0.55	0.5	13.3	89.9	0.5	20.4	2.6	1080	87.1
2.4	0	64.6	0.01	2.4	30	21	1.9	6.2	120	0.07	0.2	0.8	21.6	326	0.21	0.3	3.53	266	4.1	8.4	2	860	41.3
0.7	0	74.1	0.01	4.9	27	6	0.6	8.3	180	0.05	0.1	0	13.95	163	0.12	0.2	1.05	52	3.9	4.2	1.2	1240	34
0.3	0	38	0.01	0.9	12	<2	0.2	3	261	0	0	0	4.07	80	0.17	0.1	1.33	15.3	0.7	0.9	0.3	110	11.3
0.5	0	29.8	0.01	1.1	14	5	0.3	3.4	200	0	0	0	9.02	98	0.11	0.1	1.65	29.1	1.5	2.2	0.6	780	15.4
6.3	0	137	0	7.2	56	188	4.6	14.8	101	0.21	0.6	5	78.1	1395	0.99	0.4	9.31	135.5	1.3	17.8	2.5	200	242
1.8	0	72.2	0	1.1	29	16	1.1	3.9	35	0.07	0.1	0	6.15	411	0.55	0.2	1.9	27.3	1	4	0.8	10	36.5
5.6	0	72.1	0.01	1.4	39	36	3.7	6.4	44	0.08	0.3	0.6	14.2	463	0.52	0.2	3.3	37.8	1.3	7.3	1.4	40	53.3
3.6	0	57.4	0	1.2	49	16	2.3	5.7	43	0.09	0.2	0	15.95	575	0.69	0.2	3.6	43.4	2.3	5.9	1.2	30	81.4
2.9	0	72.3	0.01	0.7	31	16	1.9	2.9	31	0.06	0.2	0	9.96	389	0.89	0.2	3.26	29	1	5.1	1.6	20	46.4
4.8	0	45.9	0.01	2.1	29	32	3.1	8	93	0.12	0.2	0.8	23.2	517	0.5	0.2	3.49	98	1.9	5.6	0.9	250	61.4
1	0	191	0	0.6	44	12	0.8	2.1	59	0.05	0.1	0.6	11.35	315	0.87	0.3	2.05	45.3	0.3	4.4	2.2	80	40.7
0.8	0	208	0	0.7	56	8	0.6	5.8	112	0.06	0.1	0.6	8.65	437	0.82	0.2	2.01	64.8	0.4	3.4	1.9	140	38.9
3.5	0	405	0	1.5	41	40	3.3	4.3	141	0.1	0.7	5.1	21.8	391	0.54	0.8	11.35	118	3.9	41.4	6.3	3890	87.3
4.6	0	344	0	6.5	49	36	4.3	3	101	0.13	1	2.4	27.6	523	1.02	1.6	19.5	84.8	1.5	73.2	12.2	2310	73.2
7.3	0	187.5	0	1.8	35	29	9.7	1.5	199	0.05	2	1.8	22.2	195	0.87	2	48.6	49.6	1	143.5	13	1530	42.5
7.1	0	267	0	1.2	40	34	8.7	1.4	162	0.07	2	1	33.7	336	0.99	1.7	27.8	64.3	2.2	133.5	14.5	1600	70.5
6.5	0	250	0	1.2	36	25	8.6	1	216	0	2.1	0.8	23.5	202	0.66	1.7	29.3	45.9	1.8	152.5	14.9	1110	49.1
5	0	224	0	1.1	42	42	4.3	2.8	92	0.07	0.8	2	21.5	530	0.95	0.9	6.1	60.2	1	39.8	8.8	1000	68.6
2.7	0	319	0	1.3	29	32	2.7	1.5	155	0.07	0.6	2.1	18.15	311	0.98	0.9	8.82	74.5	1.8	45.5	7.5	2270	78.5
7	0	188	0	1.5	47	51	9.2	1.9	146	0.07	1.9	2.2	34.7	327	0.89	1.4	31.9	96.1	3.3	128	11.1	680	99.9
2.5	0	271	0	1.5	33	30	2.1	2.5	155	0.07	0.4	3.2	18.3	394	0.81	0.5	5.64	84.7	1.4	19.6	4.3	2670	91.5

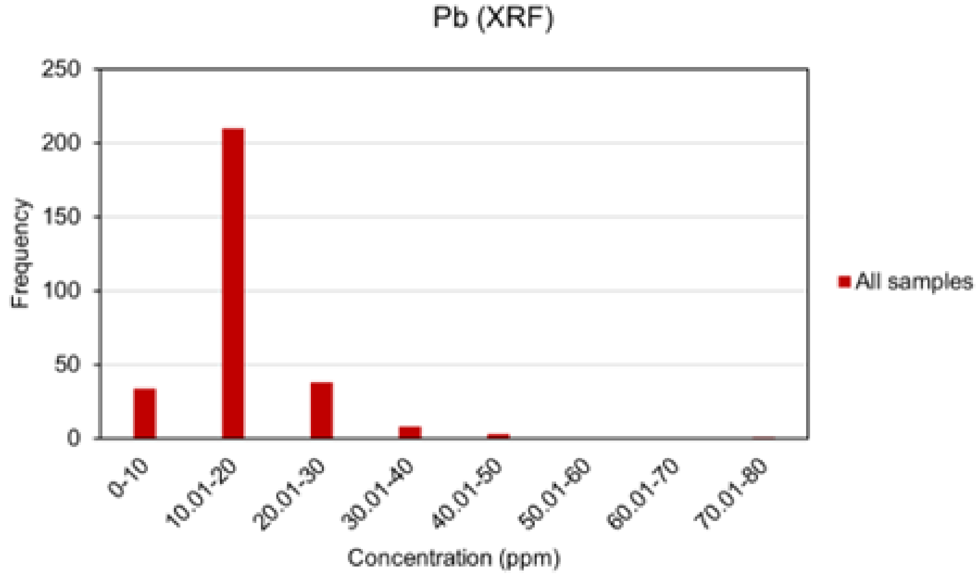
Appendix 6: Histograms (Au-Al-As-Cu-Fe-Mn-Pb-Zn)

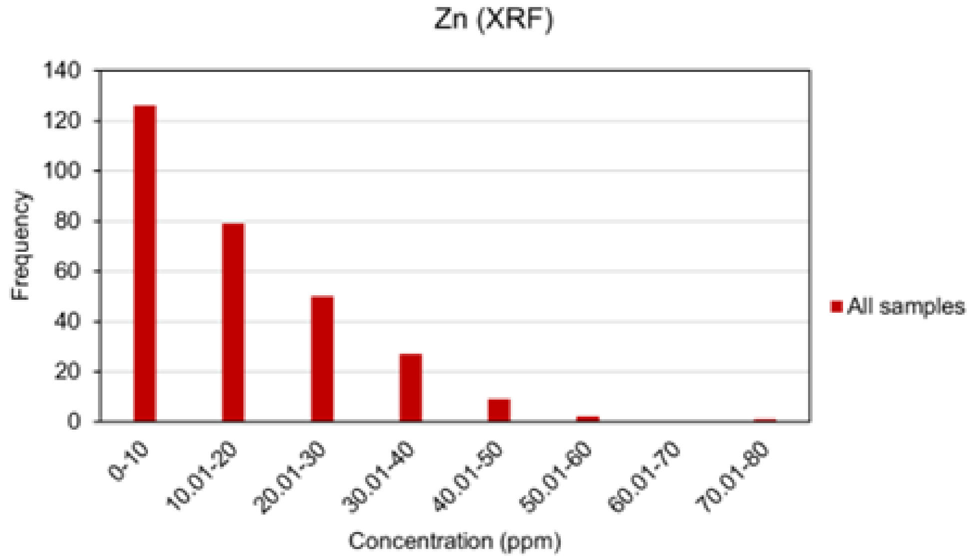


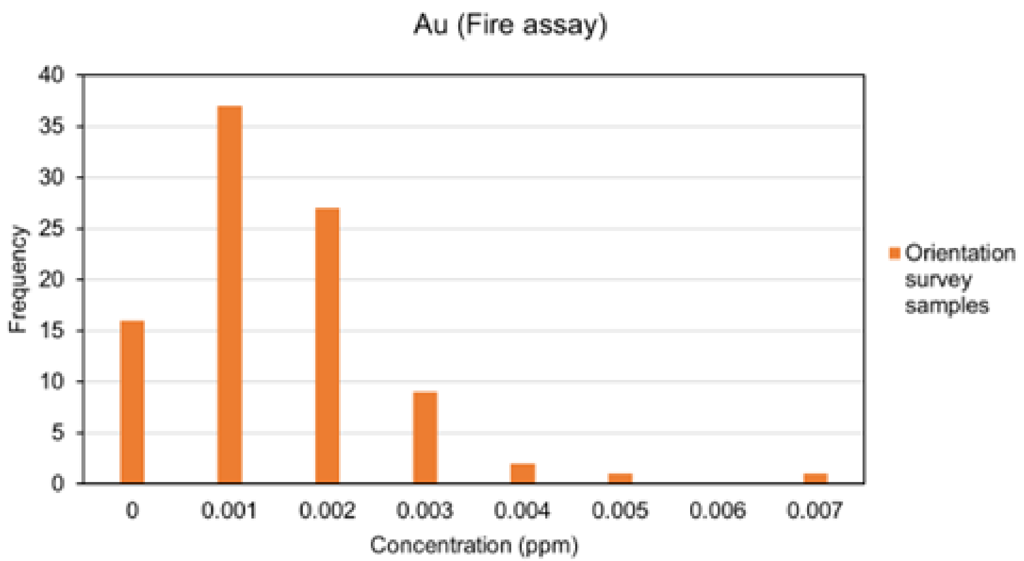


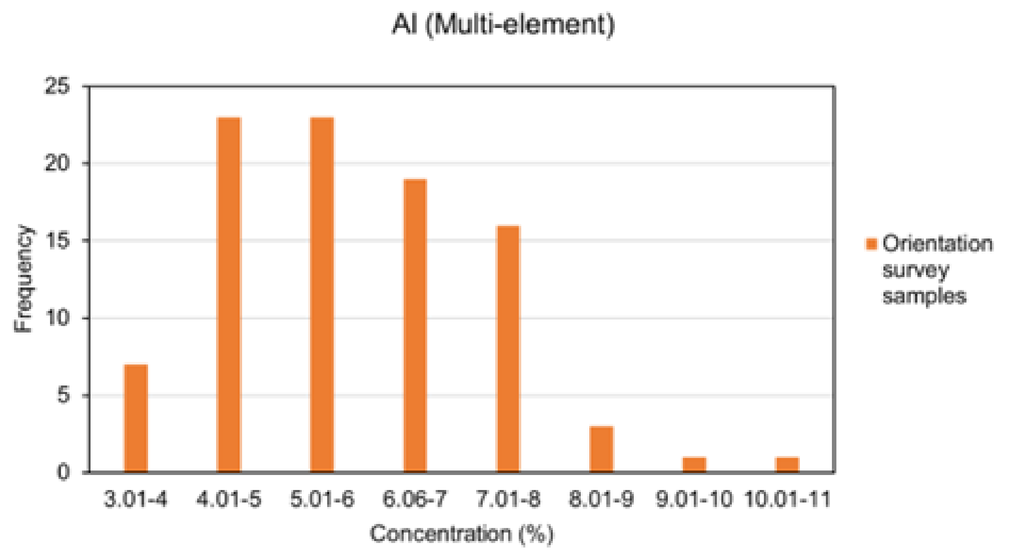


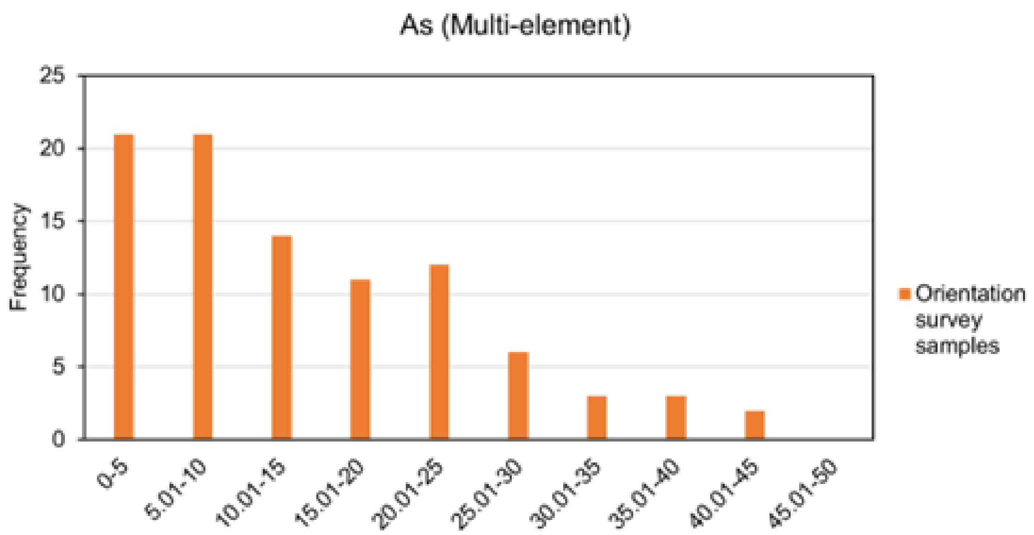

Mn (XRF)
Frequency
200
180
160
140
120
100
80
60
40
20
0
0-50
50.01-100
100.01-150
150.01-200
200.01-250
250.01-300
300.01-350
350.01-400
Concentration (ppm)
All samples

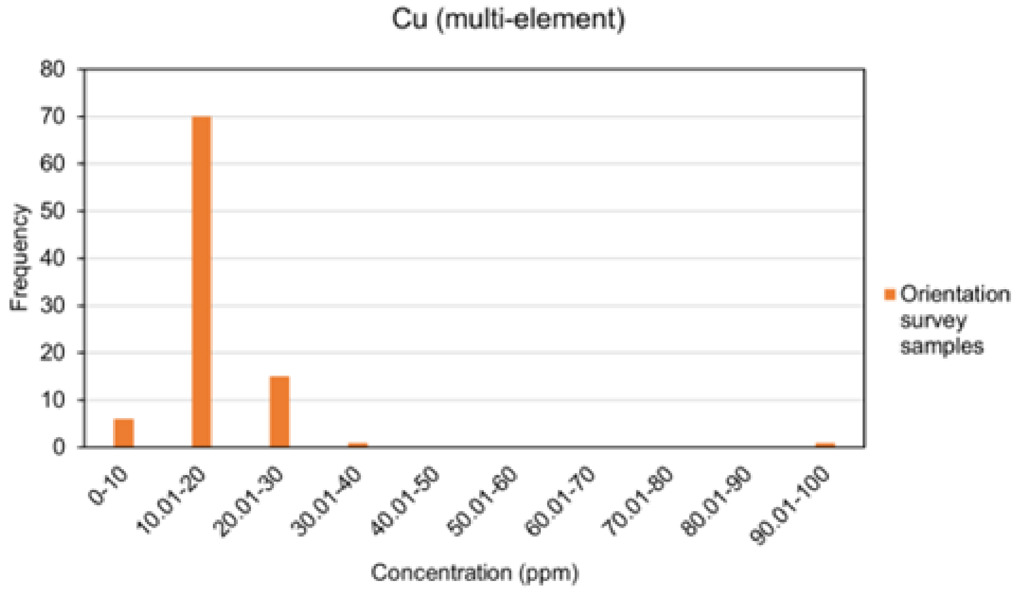

Pb (XRF)
Frequency
250
200
150
100
50
0
0-10
10.01-20
20.01-30
30.01-40
40.01-50
50.01-60
60.01-70
70.01-80
Concentration (ppm)
All samples

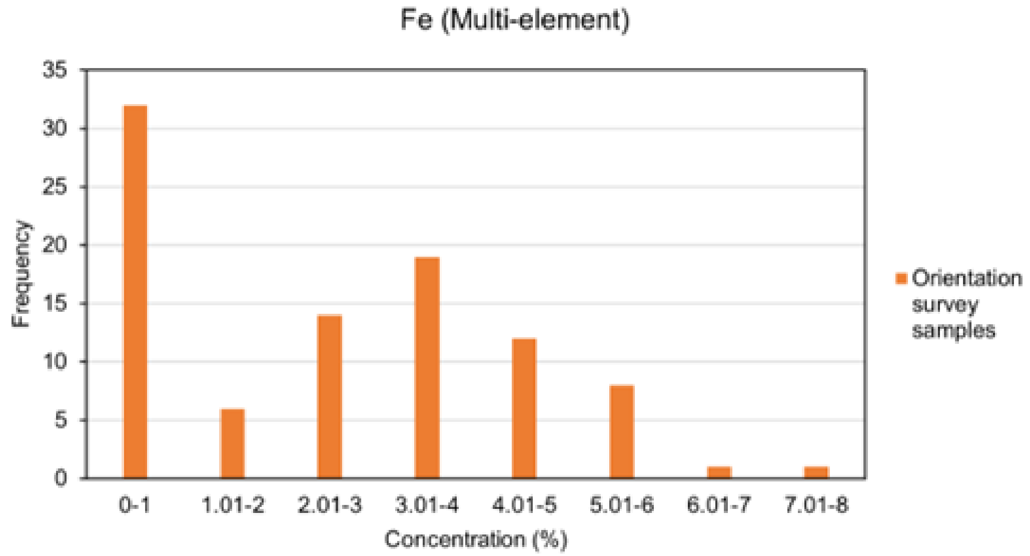

Zn (XRF)
Frequency
140
120
100
80
60
40
20
0
0-10
10.01-20
20.01-30
30.01-40
40.01-50
50.01-60
60.01-70
70.01-80
Concentration (ppm)
All samples

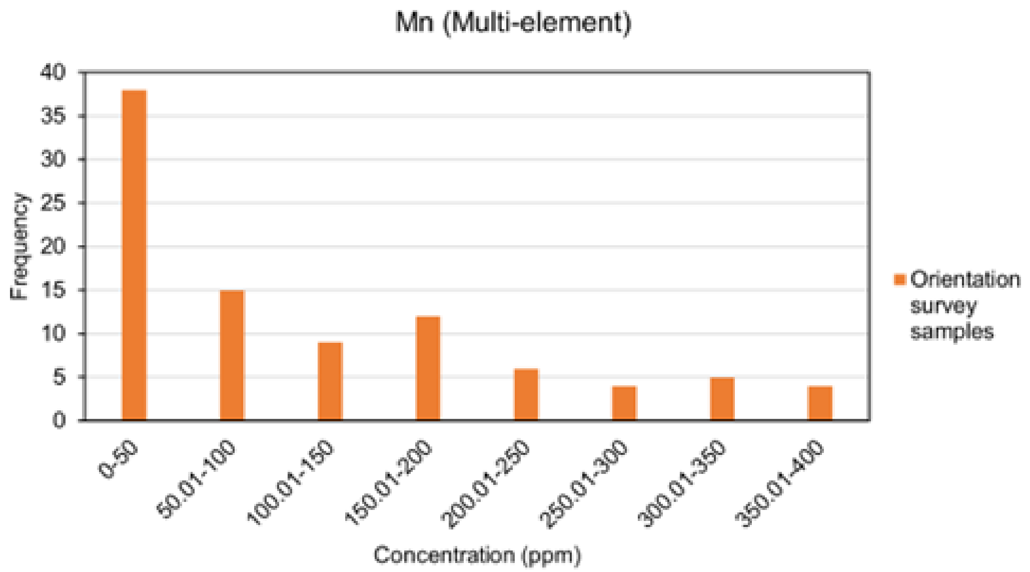

Au (Fire assay)
Frequency
40
35
30
25
20
15
10
5
0
0
0.001
0.002
0.003
0.004
0.005
0.006
0.007
Concentration (ppm)
Orientation survey samples

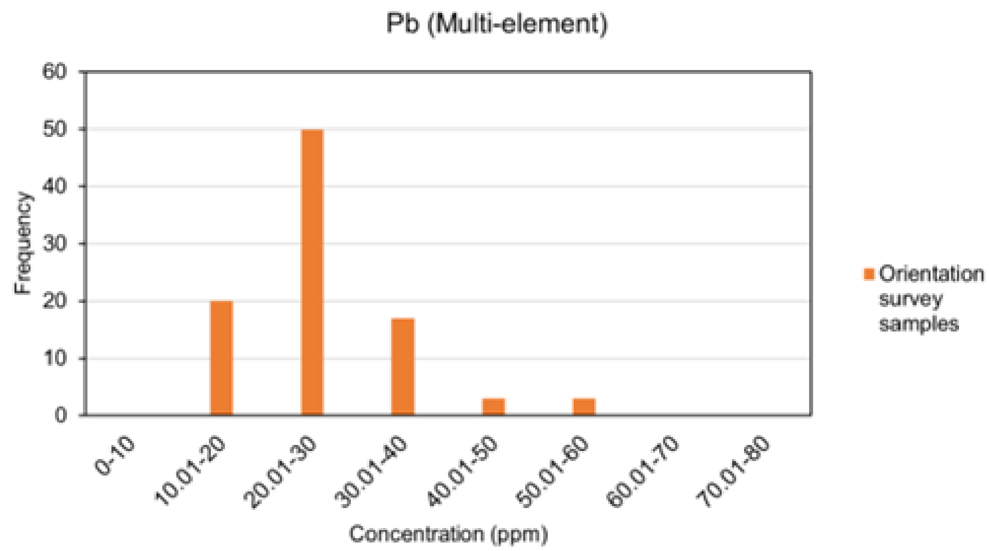

Al (Multi-element)
Frequency
25
20
15
10
5
0
3.01-4
4.01-5
5.01-6
6.06-7
7.01-8
8.01-9
9.01-10
10.01-11
Concentration (%)
Orientation survey samples

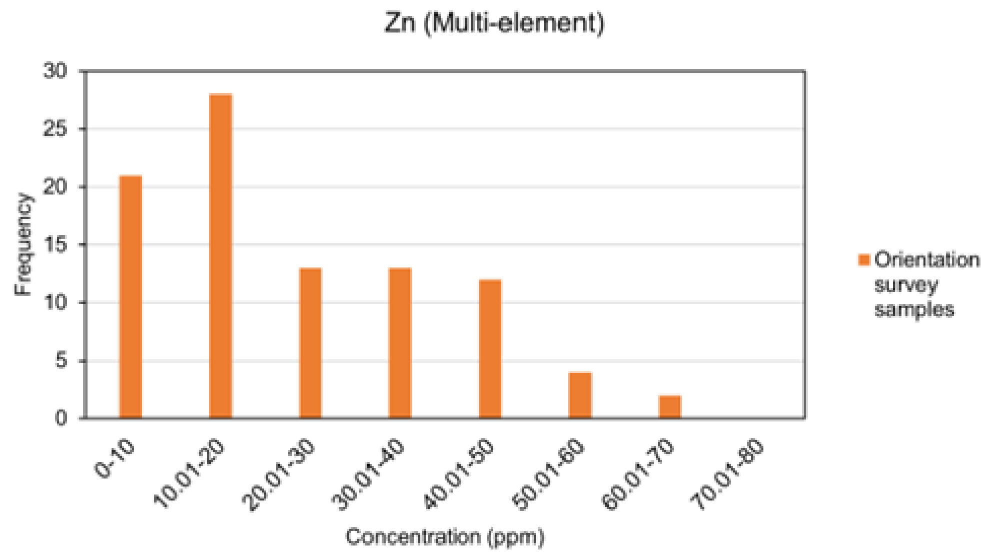

As (Multi-element)
Frequency
25
20
15
10
5
0
0-5
5.01-10
10.01-15
15.01-20
20.01-25
25.01-30
30.01-35
35.01-40
40.01-45
45.01-50
Orientation survey samples

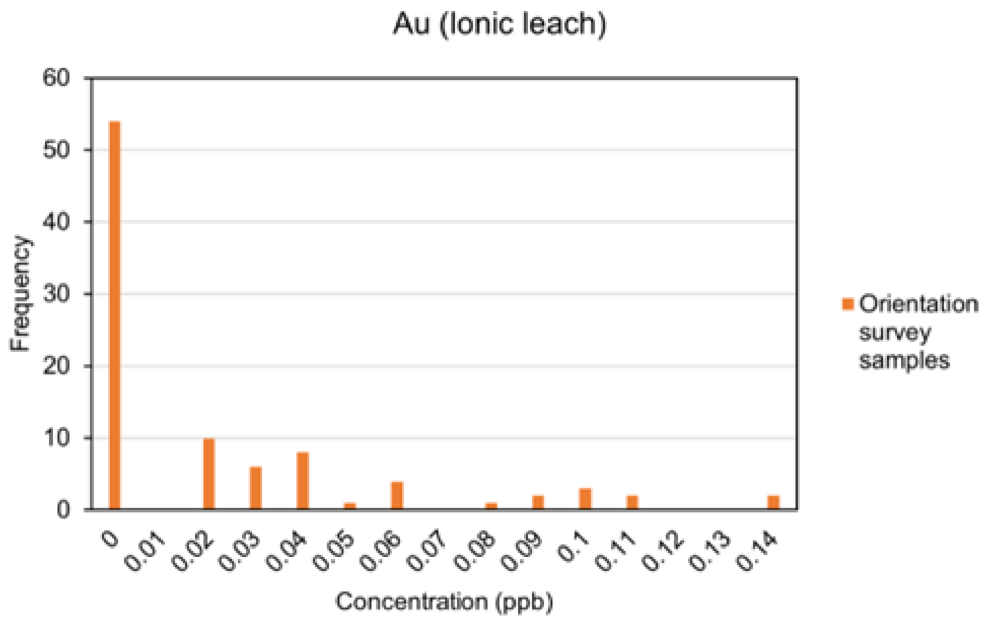

Cu (multi-element)
Frequency
0
10
20
30
40
50
60
70
80
0-10
10.01-20
20.01-30
30.01-40
40.01-50
50.01-60
60.01-70
70.01-80
80.01-90
90.01-100
Concentration (ppm)
Orientation survey samples

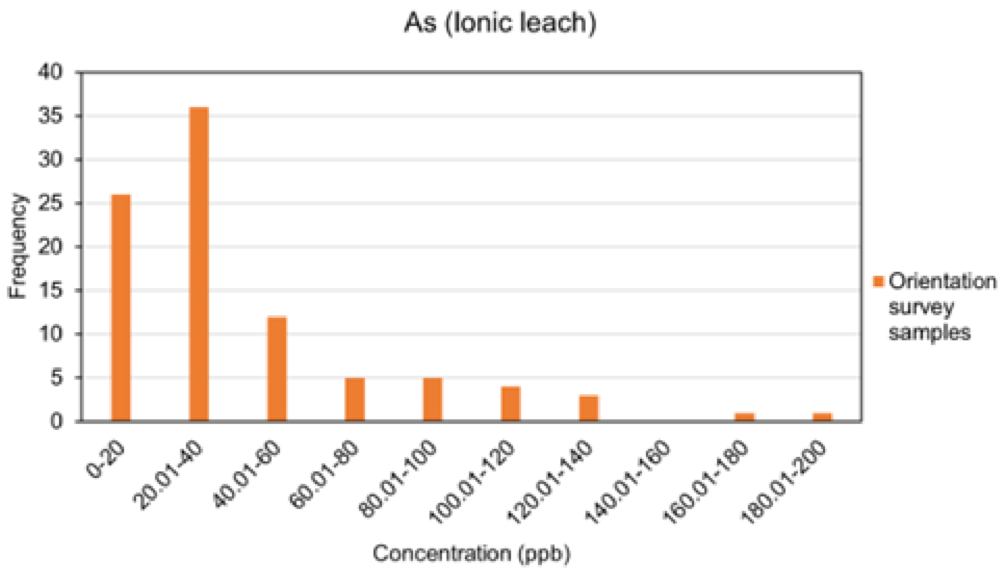

Fe (Multi-element)
Frequency
0
5
10
15
20
25
30
35
0-1
1.01-2
2.01-3
3.01-4
4.01-5
5.01-6
6.01-7
7.01-8
Concentration (%)
Orientation survey samples

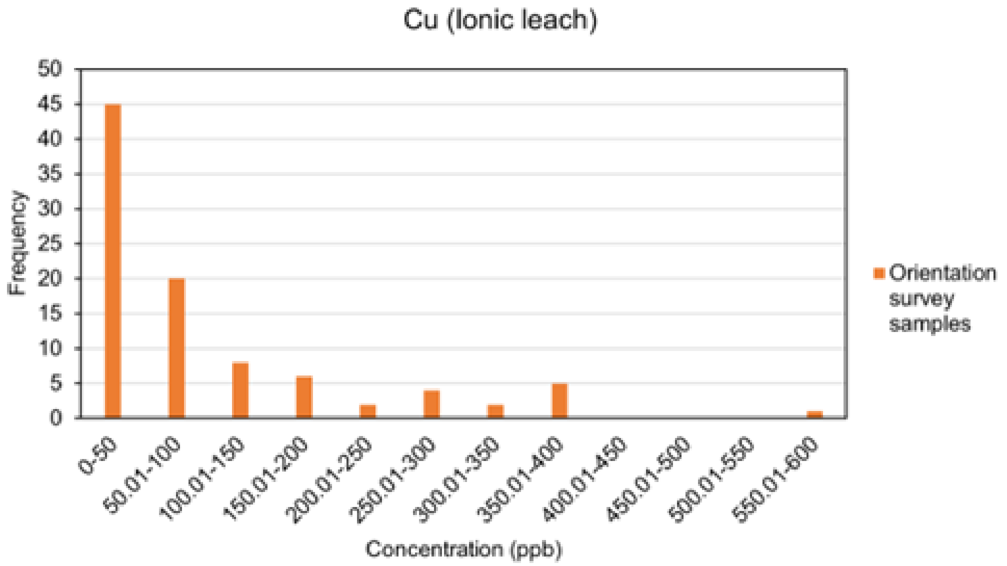

Mn (Multi-element)
Frequency
0
5
10
15
20
25
30
35
40
0-50
50.01-100
100.01-150
150.01-200
200.01-250
250.01-300
300.01-350
350.01-400
Concentration (ppm)
Orientation survey samples

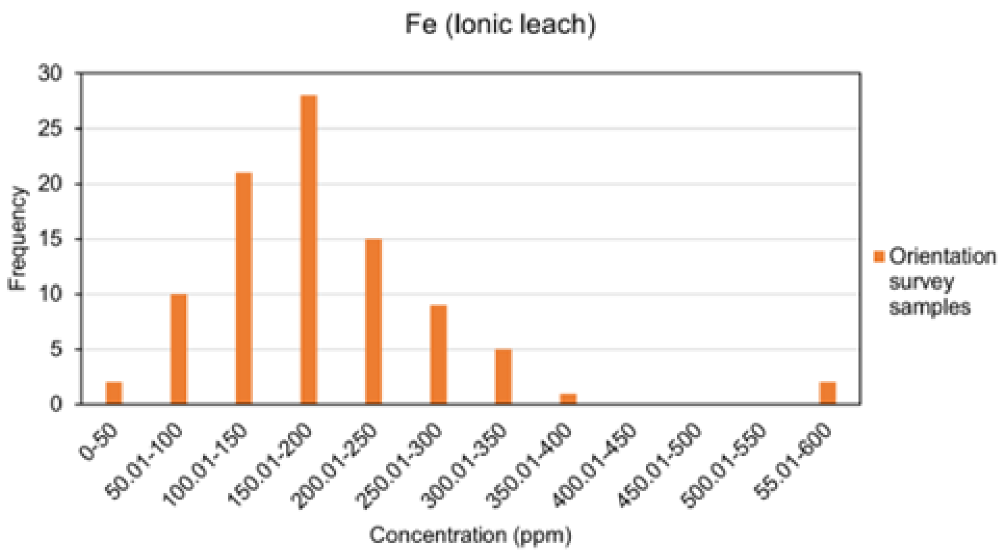

Pb (Multi-element)
Frequency
60
50
40
30
20
10
0
0-10
10.01-20
20.01-30
30.01-40
40.01-50
50.01-60
60.01-70
70.01-80
Concentration (ppm)
Orientation survey samples

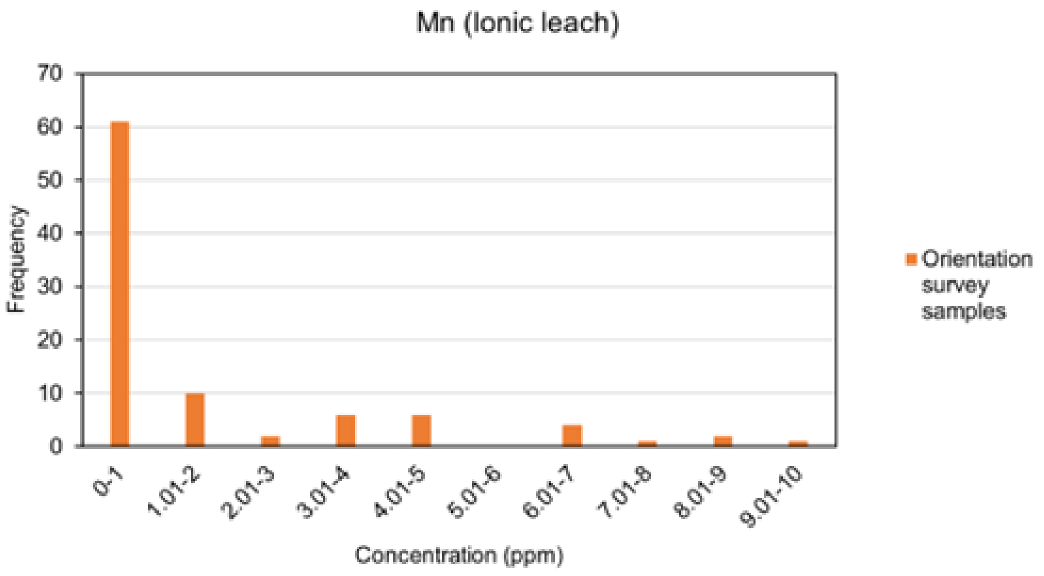

Zn (Multi-element)
Frequency
30
25
20
15
10
5
0
0-10
10.01-20
20.01-30
30.01-40
40.01-50
50.01-60
60.01-70
70.01-80
Concentration (ppm)
Orientation survey samples

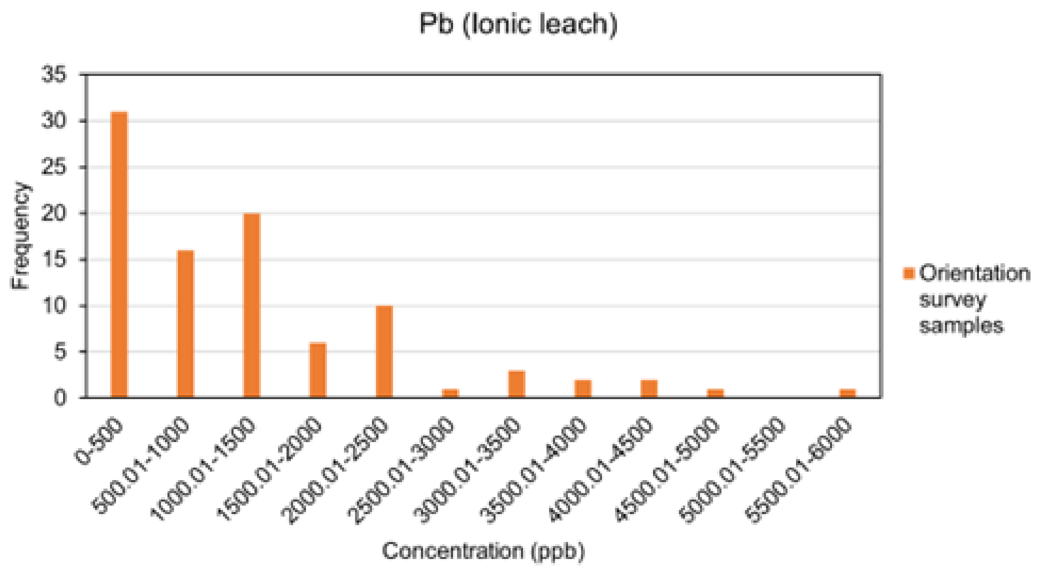

Au (Ionic leach)
Frequency
60
50
40
30
20
10
0
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0.11
0.12
0.13
0.14
Concentration (ppb)
Orientation survey samples

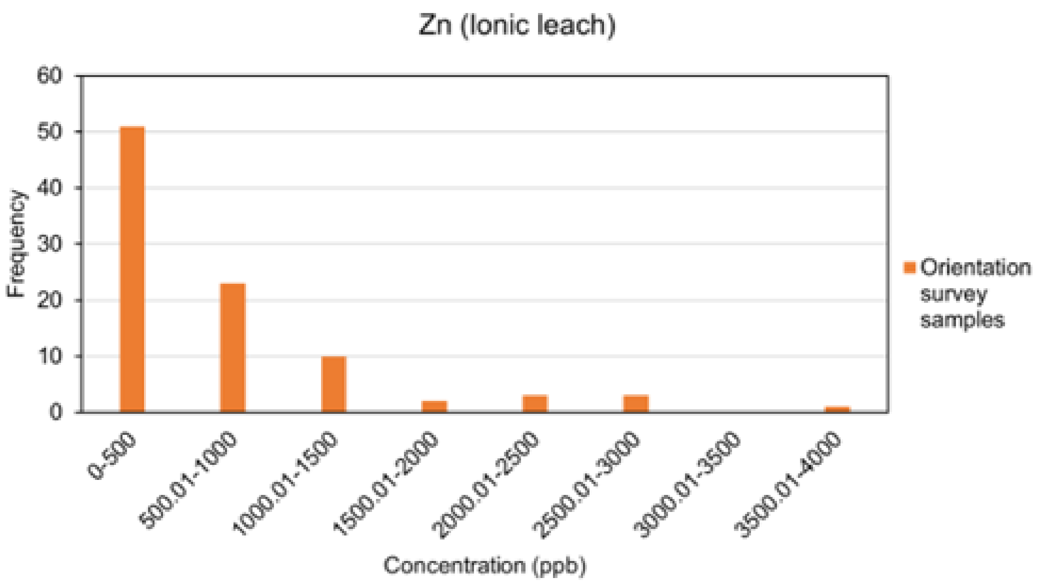

As (Ionic leach)
Frequency
Concentration (ppb)
Orientation survey samples
0-20
20.01-40
40.01-60
60.01-80
80.01-100
100.01-120
120.01-140
140.01-160
160.01-180
180.01-200


Cu (Ionic leach)
Frequency
Concentration (ppb)
Orientation survey samples
0-50
50.01-100
100.01-150
150.01-200
200.01-250
250.01-300
300.01-350
350.01-400
400.01-450
450.01-500
500.01-550
550.01-600

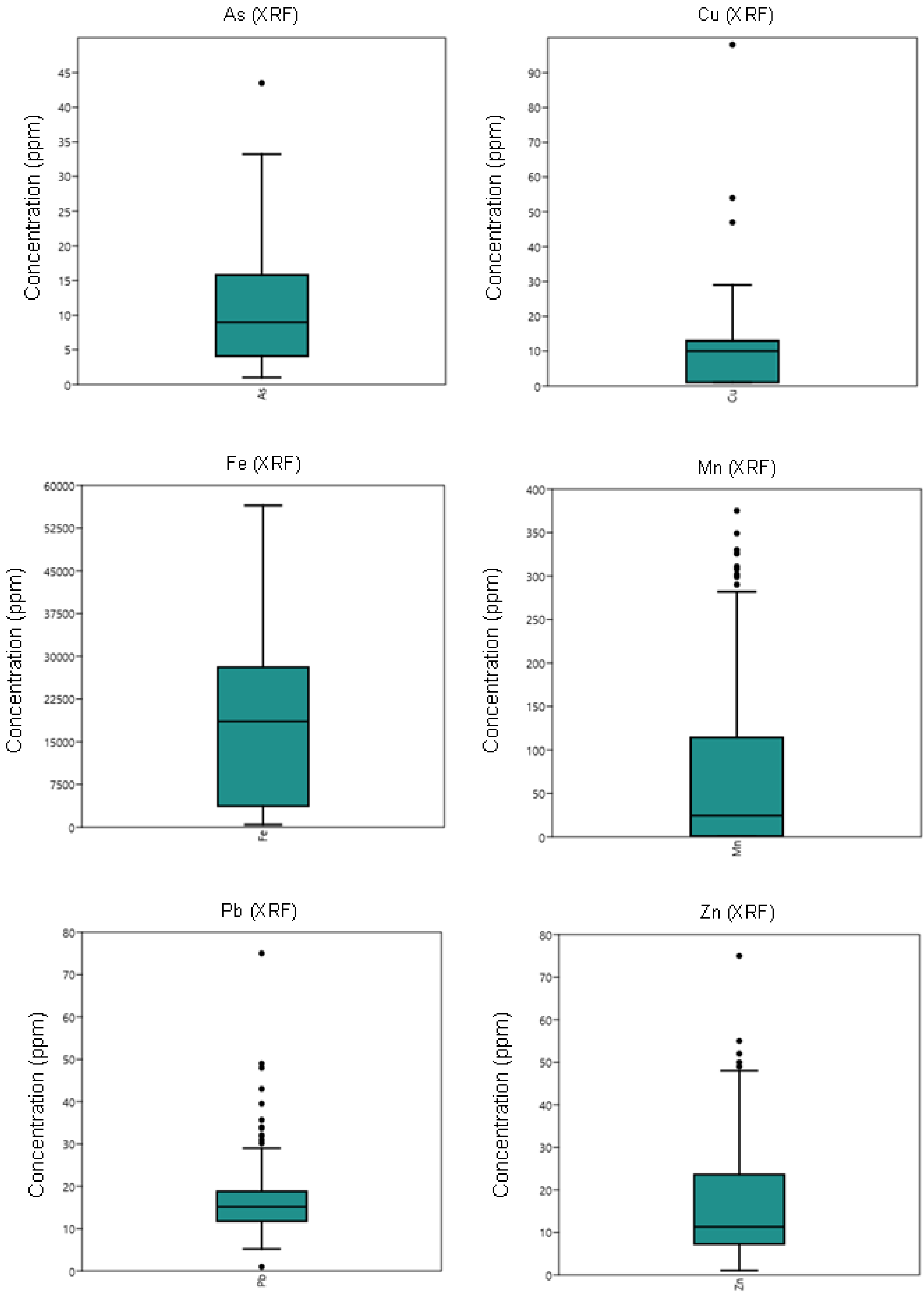

Fe (Ionic leach)
Frequency
Concentration (ppm)
Orientation survey samples
0-50
50.01-100
100.01-150
150.01-200
200.01-250
250.01-300
300.01-350
350.01-400
400.01-450
450.01-500
500.01-550
55.01-600

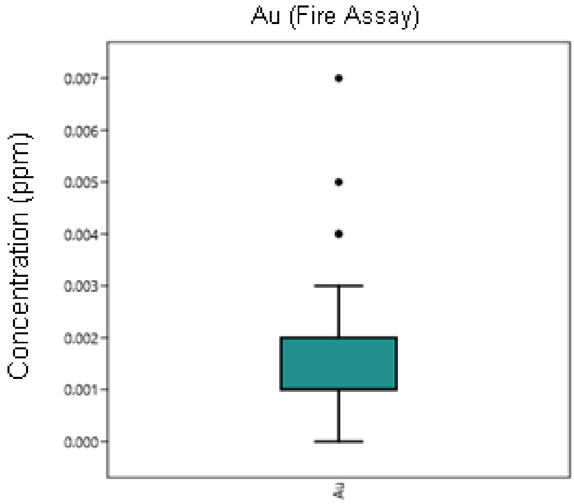

Mn (Ionic leach)
Frequency
70
60
50
40
30
20
10
0
0-1
1.01-2
2.01-3
3.01-4
4.01-5
5.01-6
6.01-7
7.01-8
8.01-9
9.01-10
Concentration (ppm)
Orientation survey samples

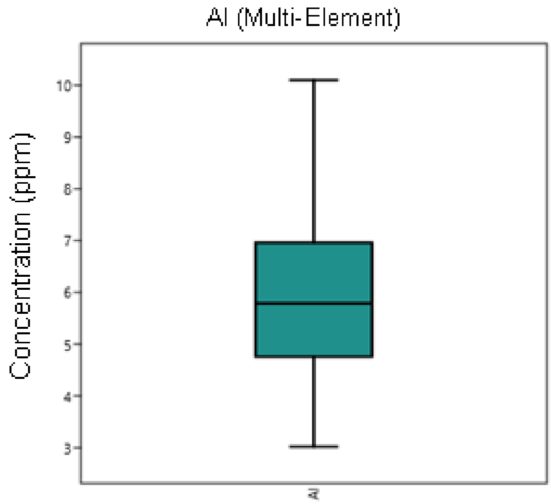

Pb (Ionic leach)
Frequency
35
30
25
20
15
10
5
0
0-500
500.01-1000
1000.01-1500
1500.01-2000
2000.01-2500
2500.01-3000
3000.01-3500
3500.01-4000
4000.01-4500
4500.01-5000
5000.01-5500
5500.01-6000
Concentration (ppb)
Orientation survey samples

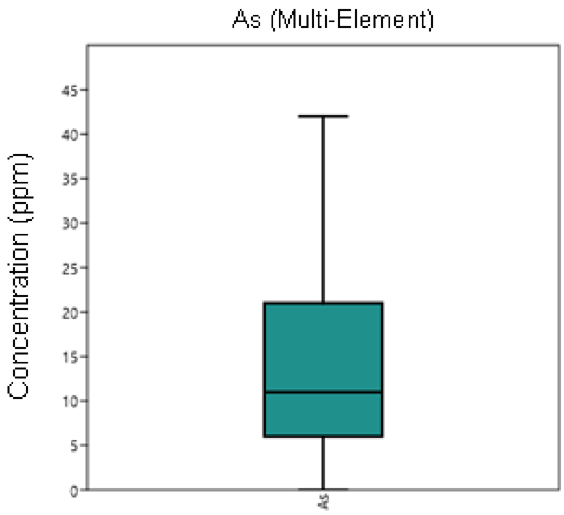

Zn (Ionic leach)
Frequency
60
50
40
30
20
10
0
0-500
500.01-1000
1000.01-1500
1500.01-2000
2000.01-2500
2500.01-3000
3000.01-3500
3500.01-4000
Concentration (ppb)
Orientation survey samples

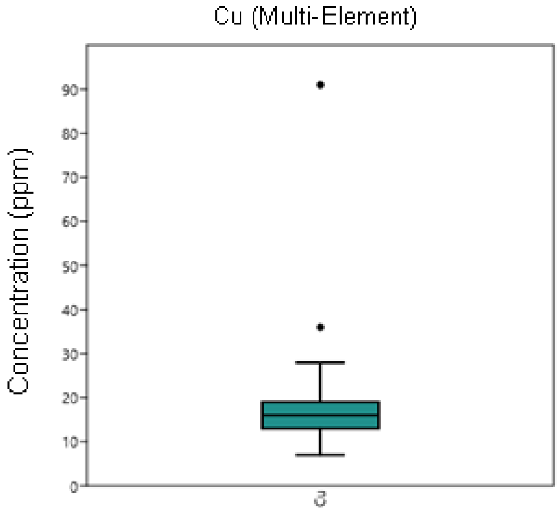
Appendix 7: Box and Whisker Plots (Au-Al-As-Cu-Fe-Mn-Pb-Zn)

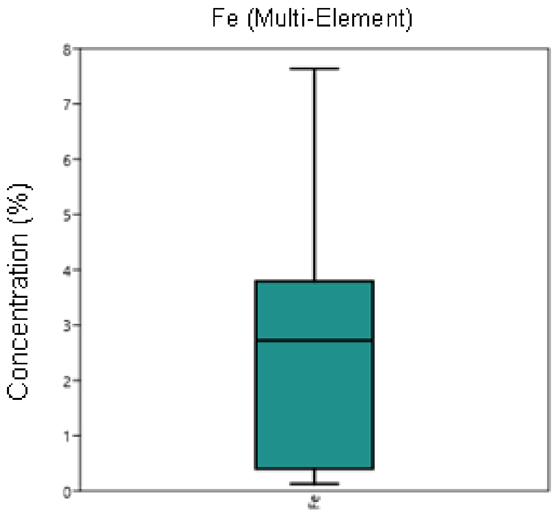


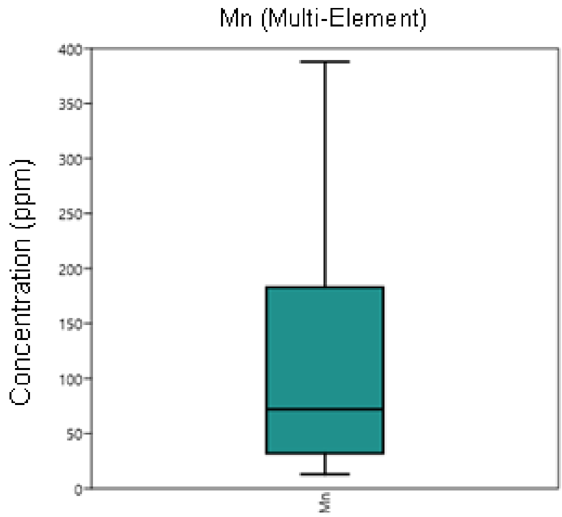

Au (Fire Assay)
Concentration (ppm)
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
Au

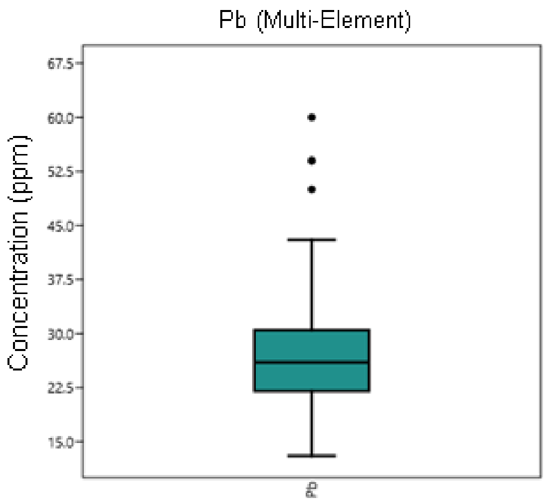

Al (Multi-Element)
Concentration (ppm)
3
4
5
6
7
8
9
10
Al

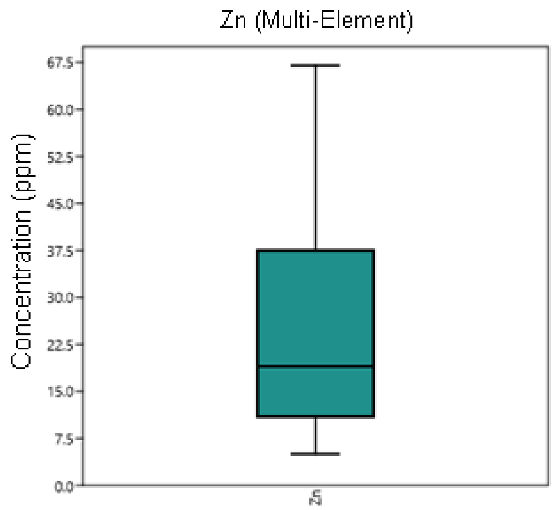

As (Multi-Element)
Concentration (ppm)
0
5
10
15
20
25
30
35
40
45
As

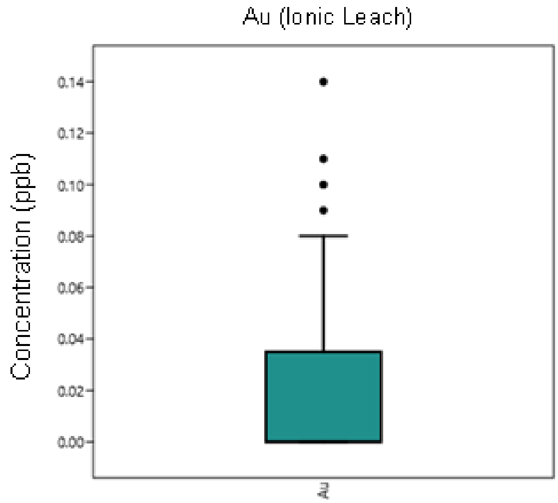

Cu (Multi-Element)
Concentration (ppm)
0
10
20
30
40
50
60
70
80
90
Cu

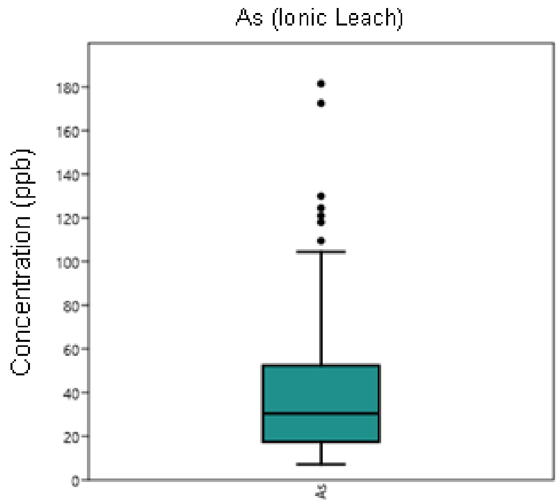

Fe (Multi-Element)
Concentration (%)
0
1
2
3
4
5
6
7
8
Fe

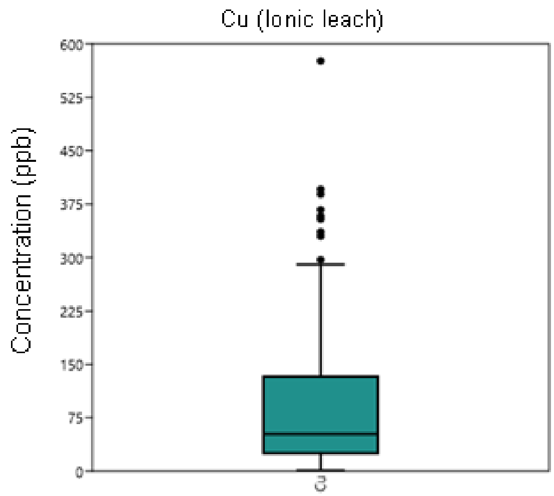

Mn (Multi-Element)
Concentration (ppm)
0
50
100
150
200
250
300
350
400
Mn

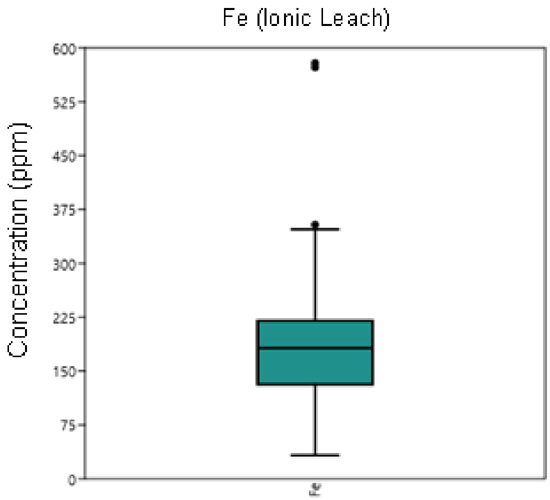

Pb (Multi-Element)
Concentration (ppm)
67.5
60.0
52.5
45.0
37.5
30.0
22.5
15.0
Pb

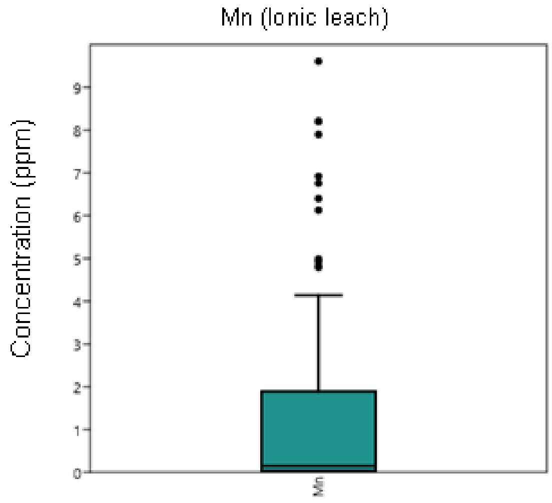

Zn (Multi-Element)
Concentration (ppm)
67.5
60.0
52.5
45.0
37.5
30.0
22.5
15.0
7.5
0.0
Zn

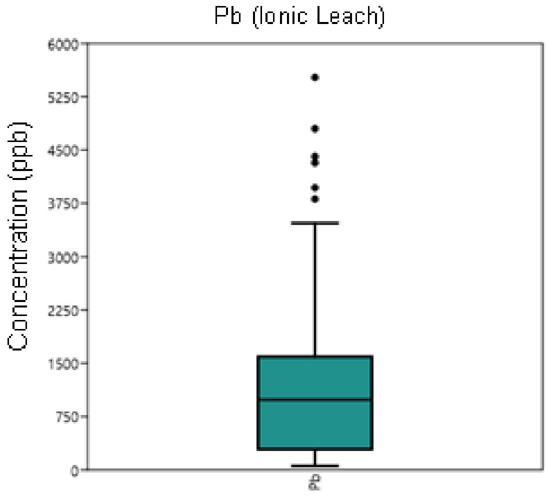

Au (Ionic Leach)
Concentration (ppb)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Au

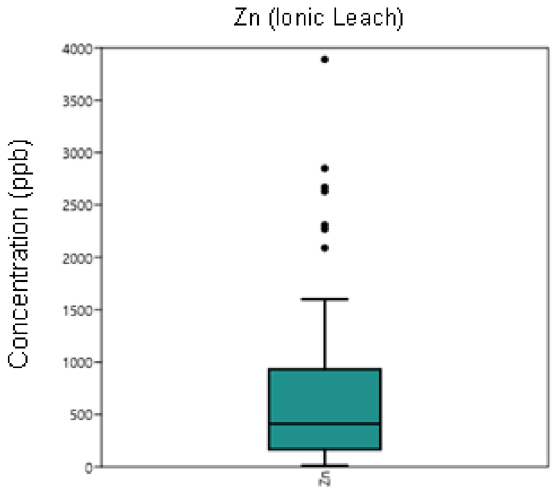

As (Ionic Leach)
Concentration (ppb)
180
160
140
120
100
80
60
40
20
0
As


Cu (Ionic leach)
Concentration (ppb)
600
525
450
375
300
225
150
75
0
Cu

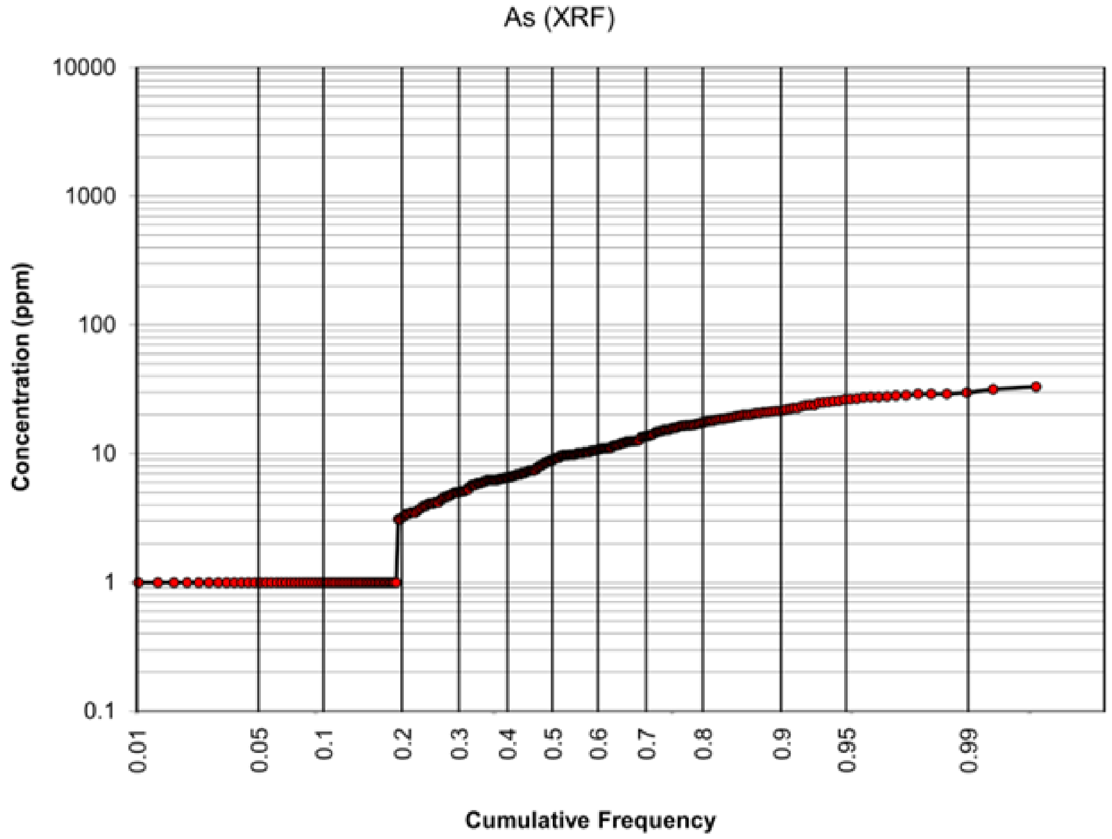

Fe (Ionic Leach)
Concentration (ppm)
600
525
450
375
300
225
150
75
0
Fe

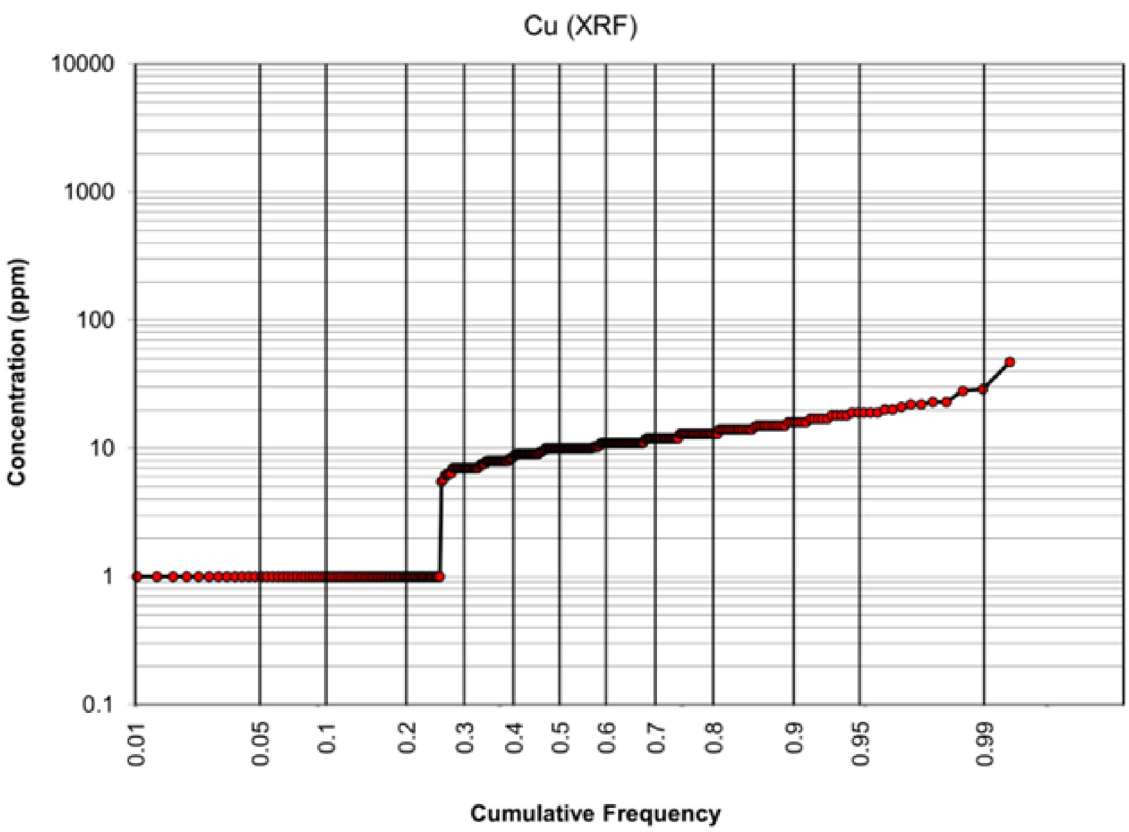

Mn (Ionic leach)
Concentration (ppm)
0
1
2
3
4
5
6
7
8
9
Mn

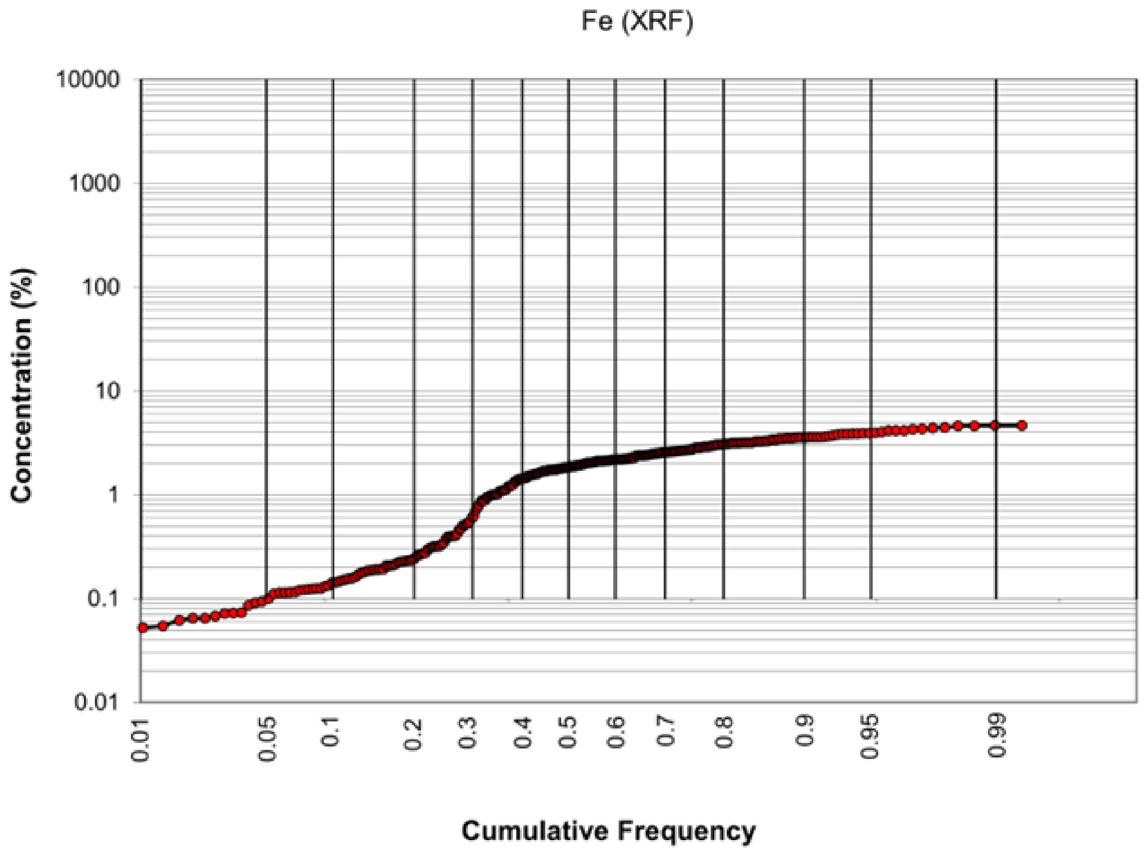

Pb (Ionic Leach)
Concentration (ppb)
0
750
1500
2250
3000
3750
4500
5250
6000
Pb

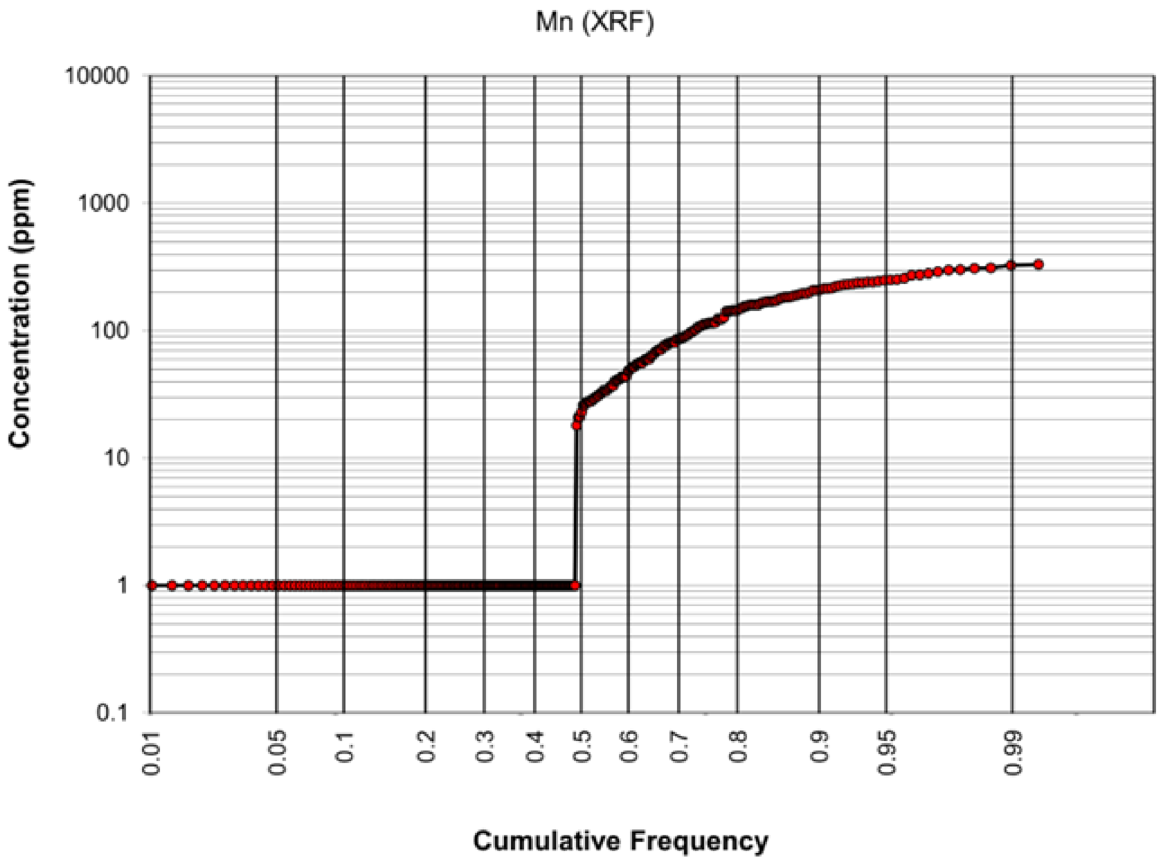

Zn (Ionic Leach)
Concentration (ppb)
0
500
1000
1500
2000
2500
3000
3500
4000
Zn

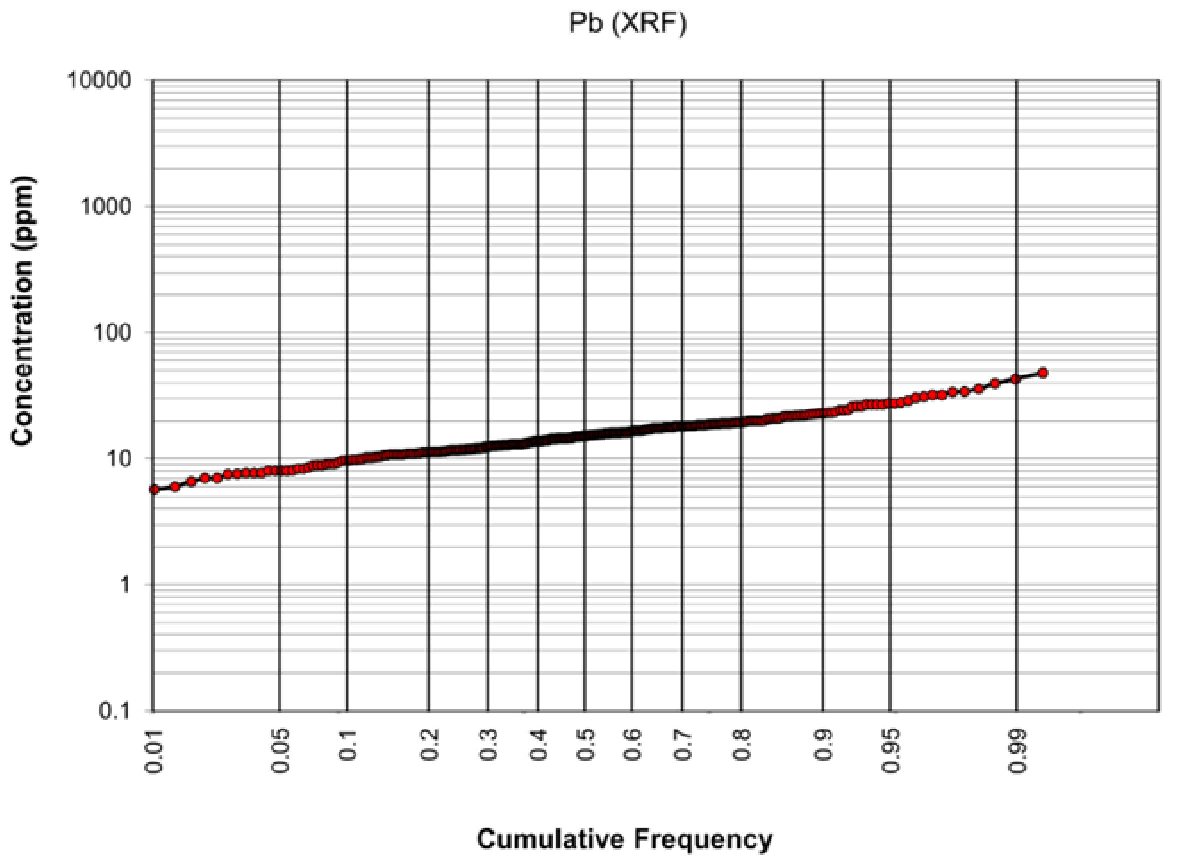
Appendix 8: Log Probability Graphs (Au-Al-As-Cu-Fe-Mn-Pb-Zn)

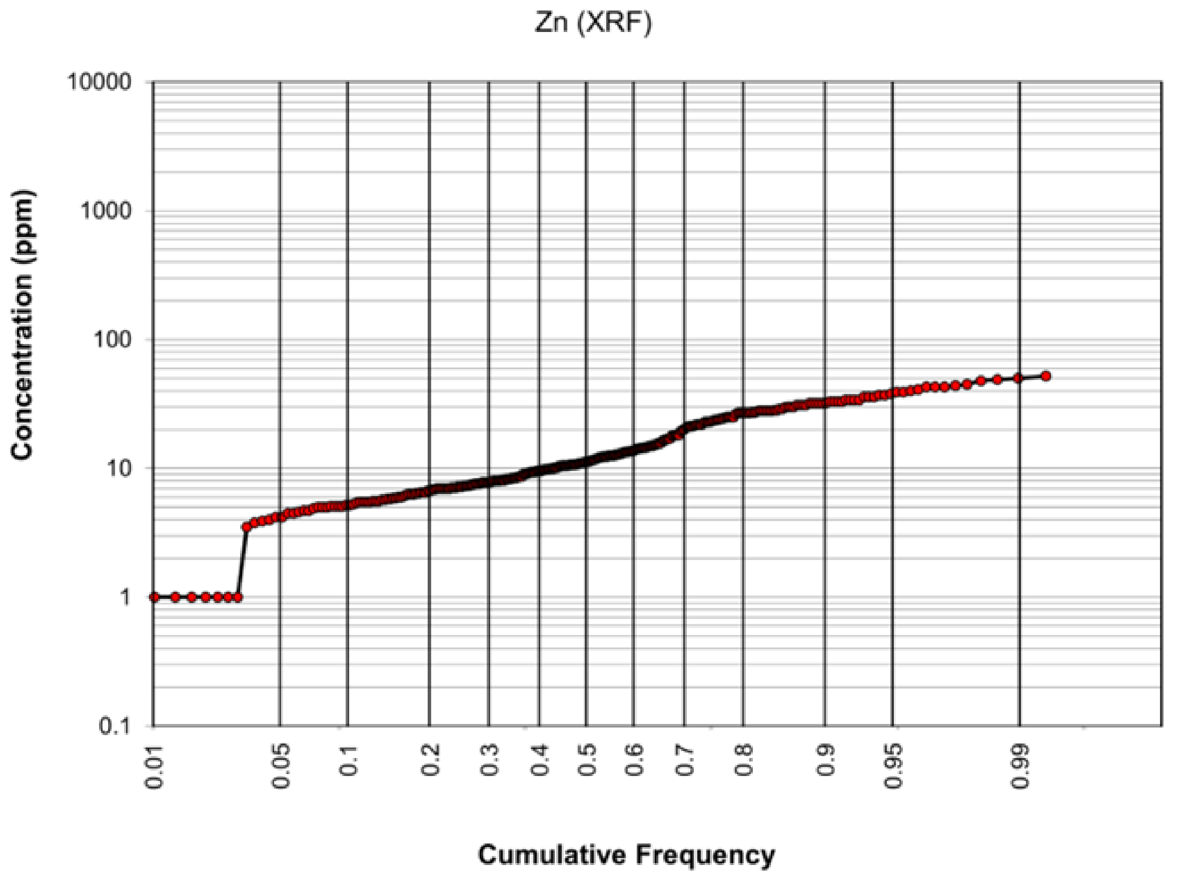


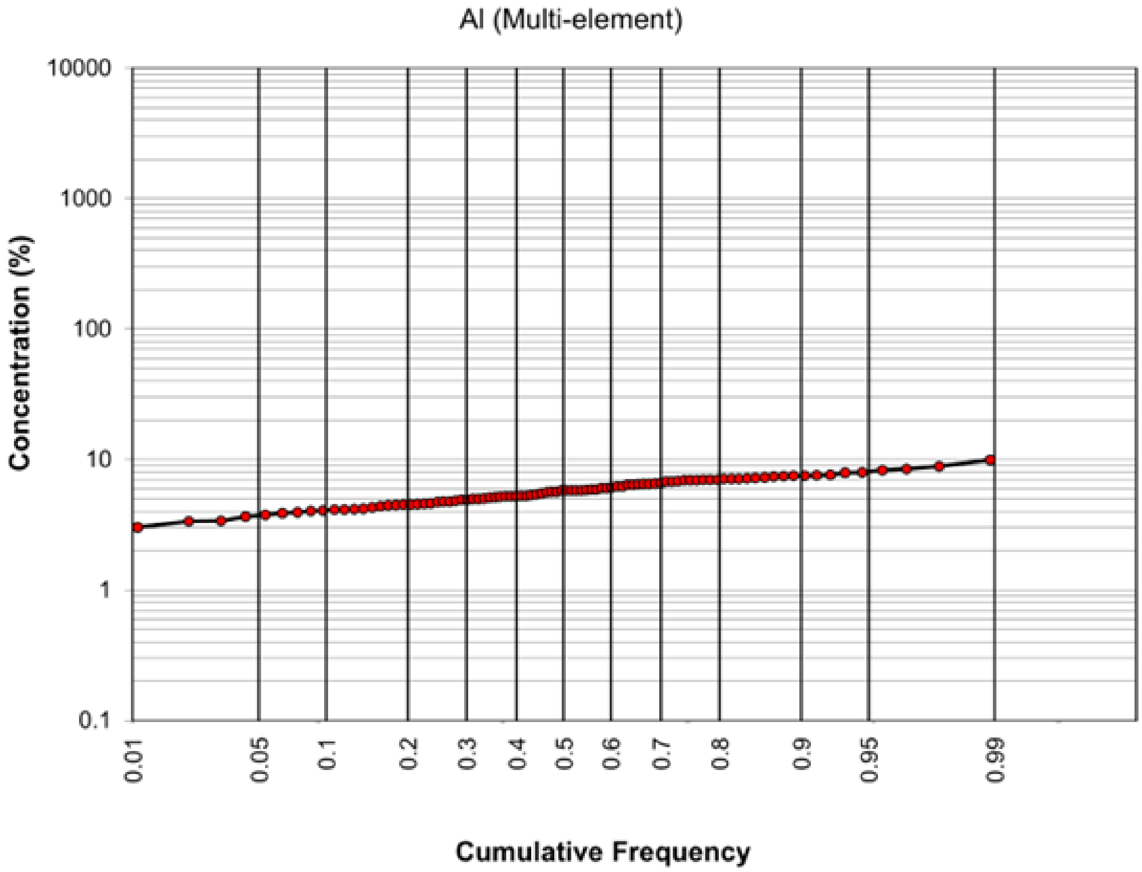


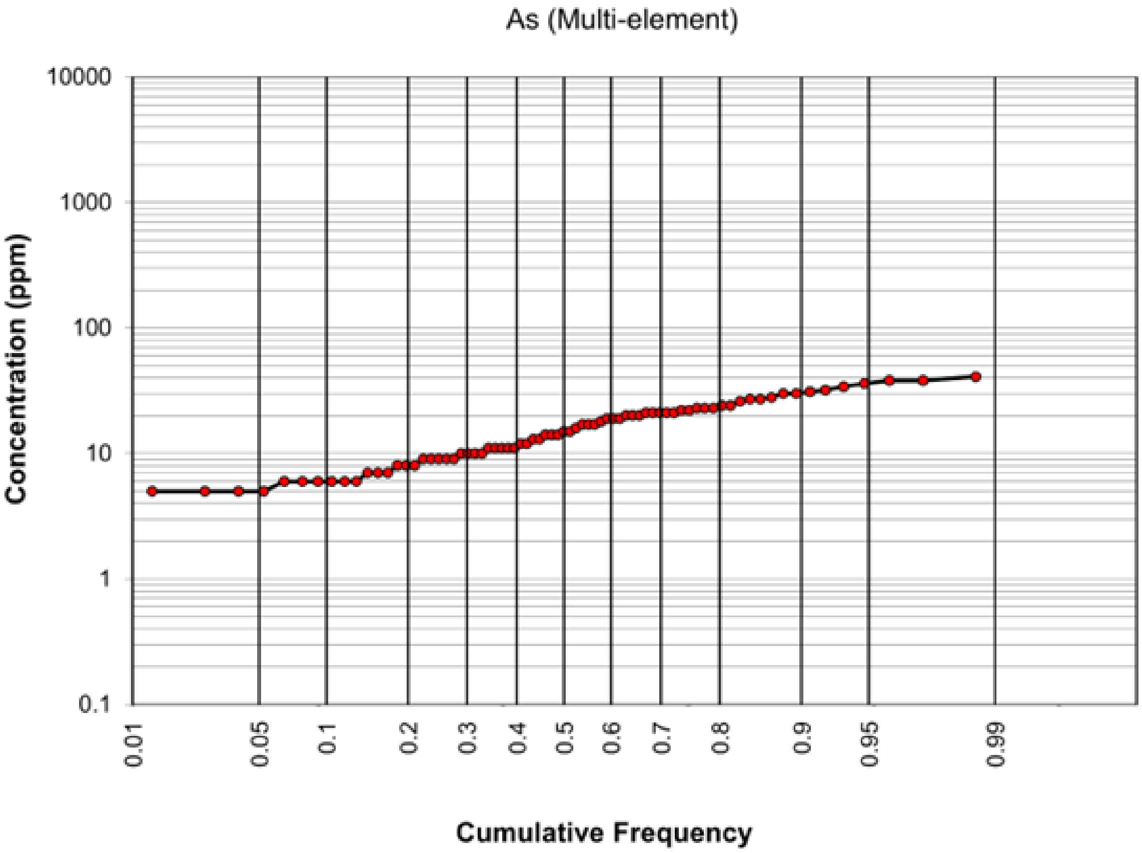

Fe (XRF)
Concentration (%)
10000
1000
100
10
1
0.1
0.01
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

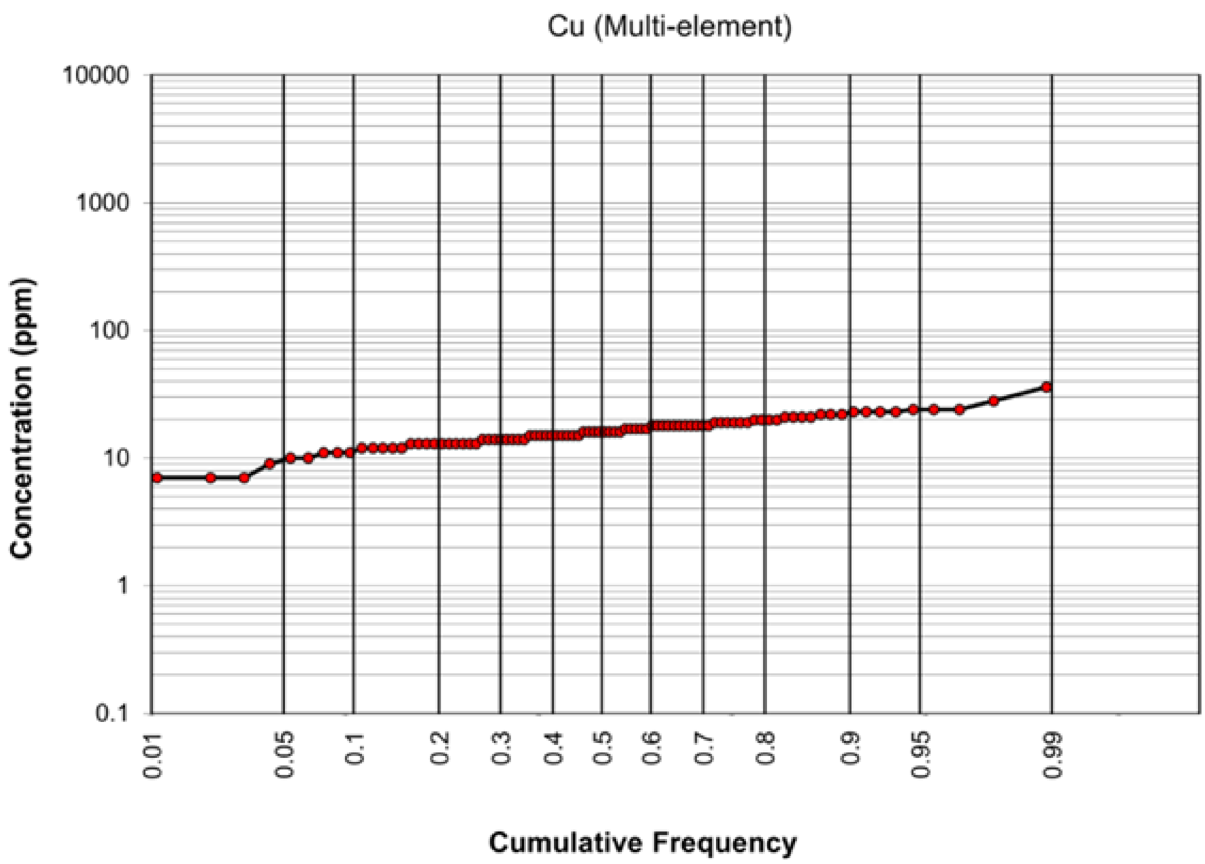

Mn (XRF)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

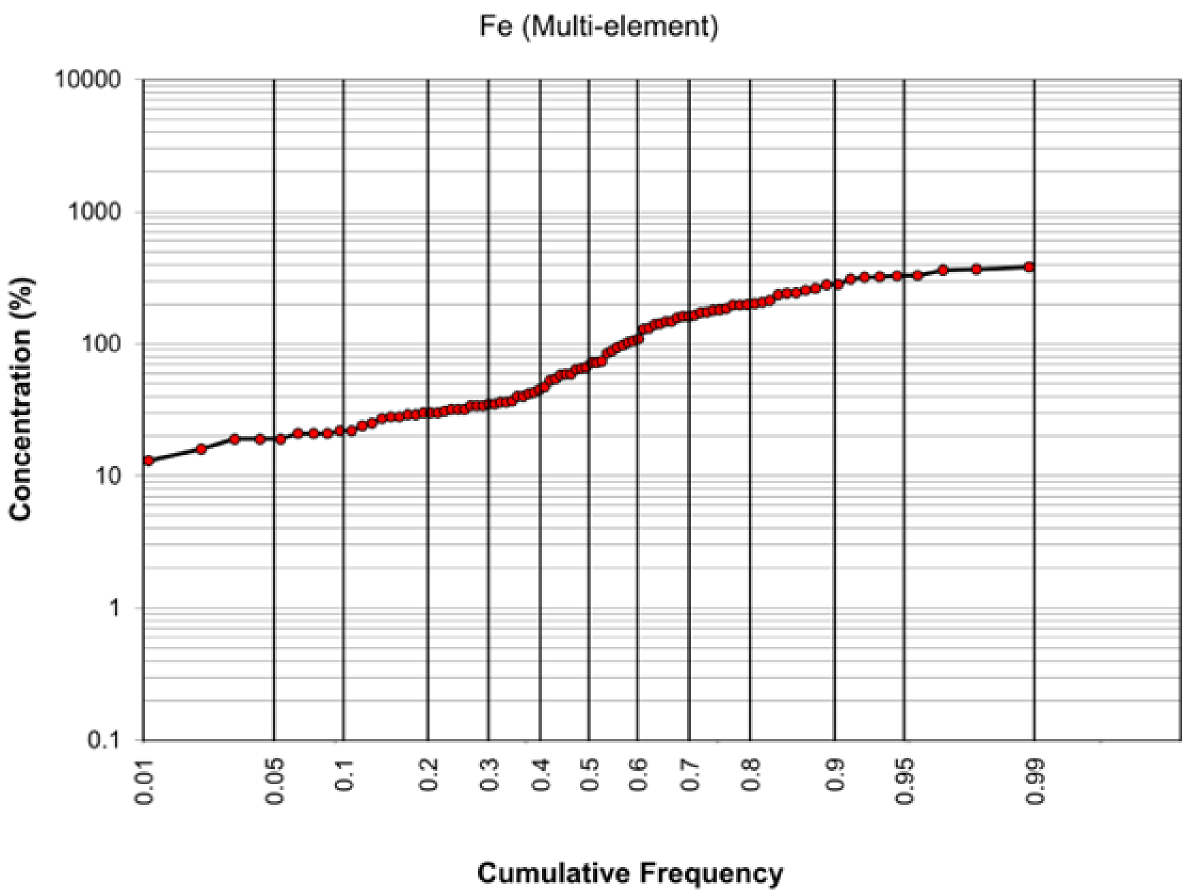

Pb (XRF)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

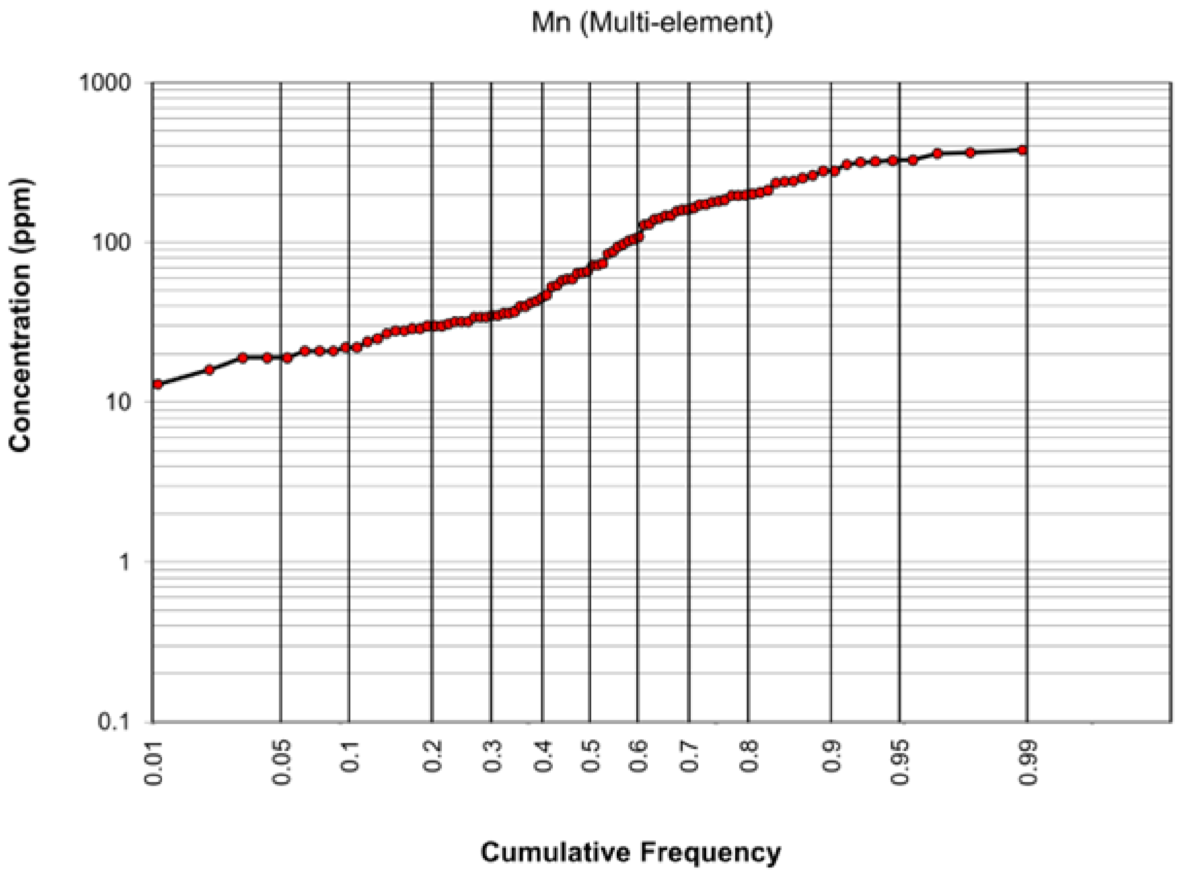

Zn (XRF)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

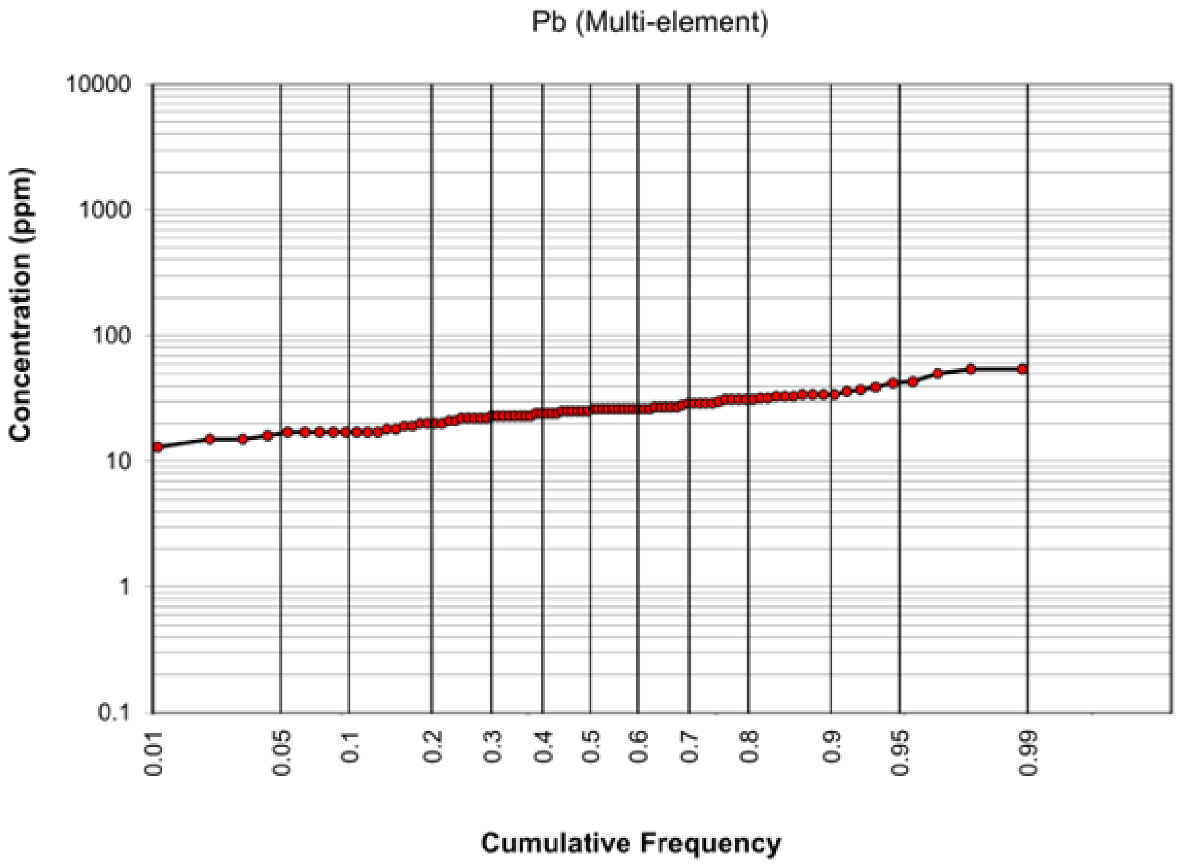

Al (Multi-element)
Concentration (%)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


As (Multi-element)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

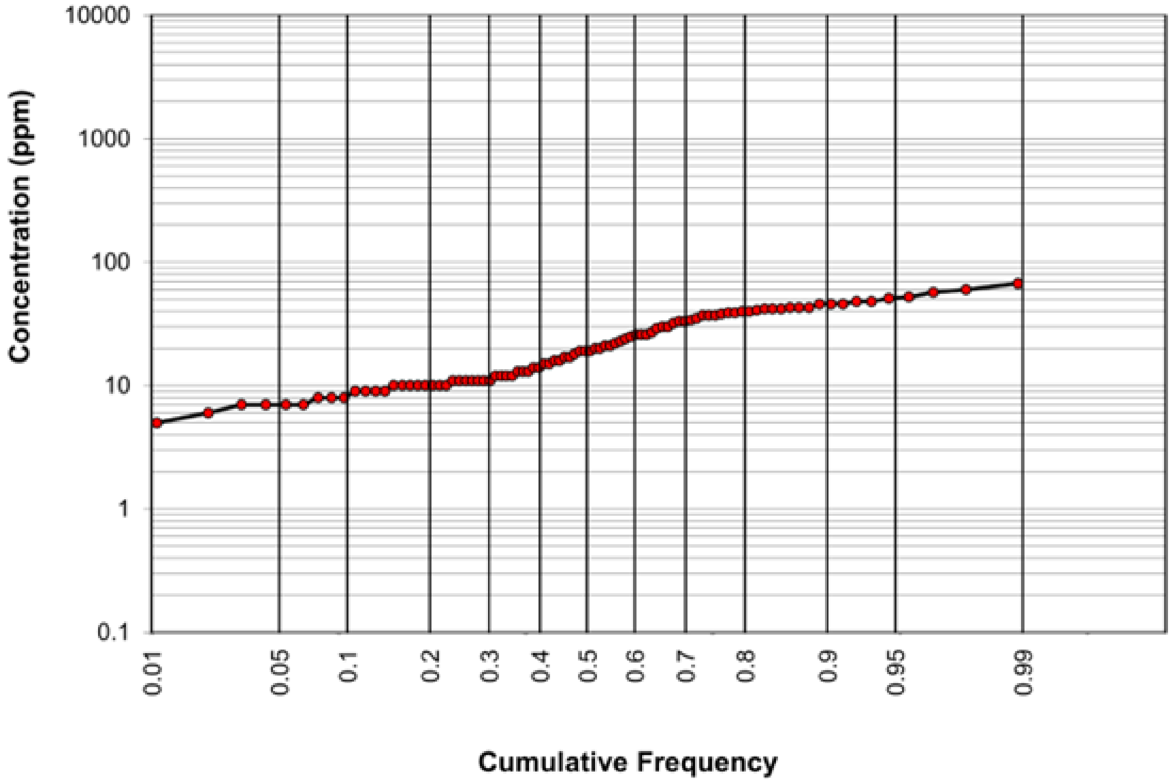

Cu (Multi-element)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Fe (Multi-element)
Concentration (%)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

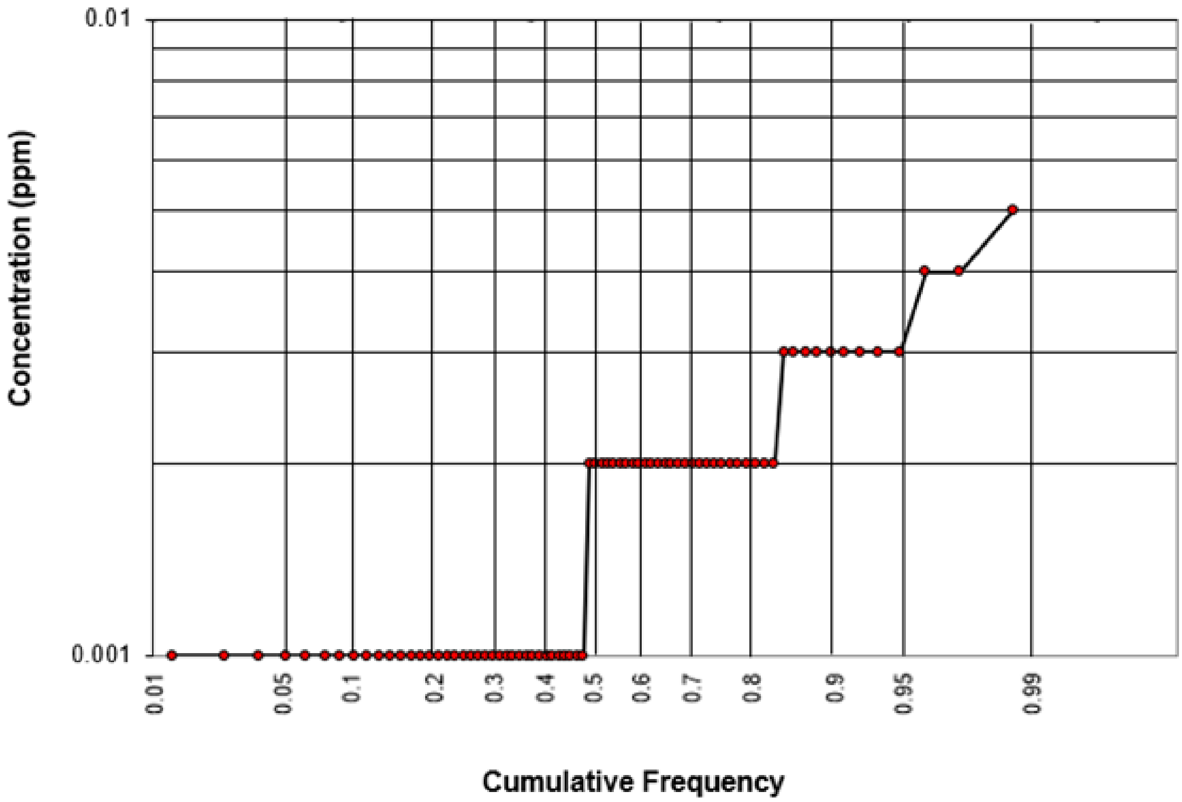

Mn (Multi-element)
Concentration (ppm)
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

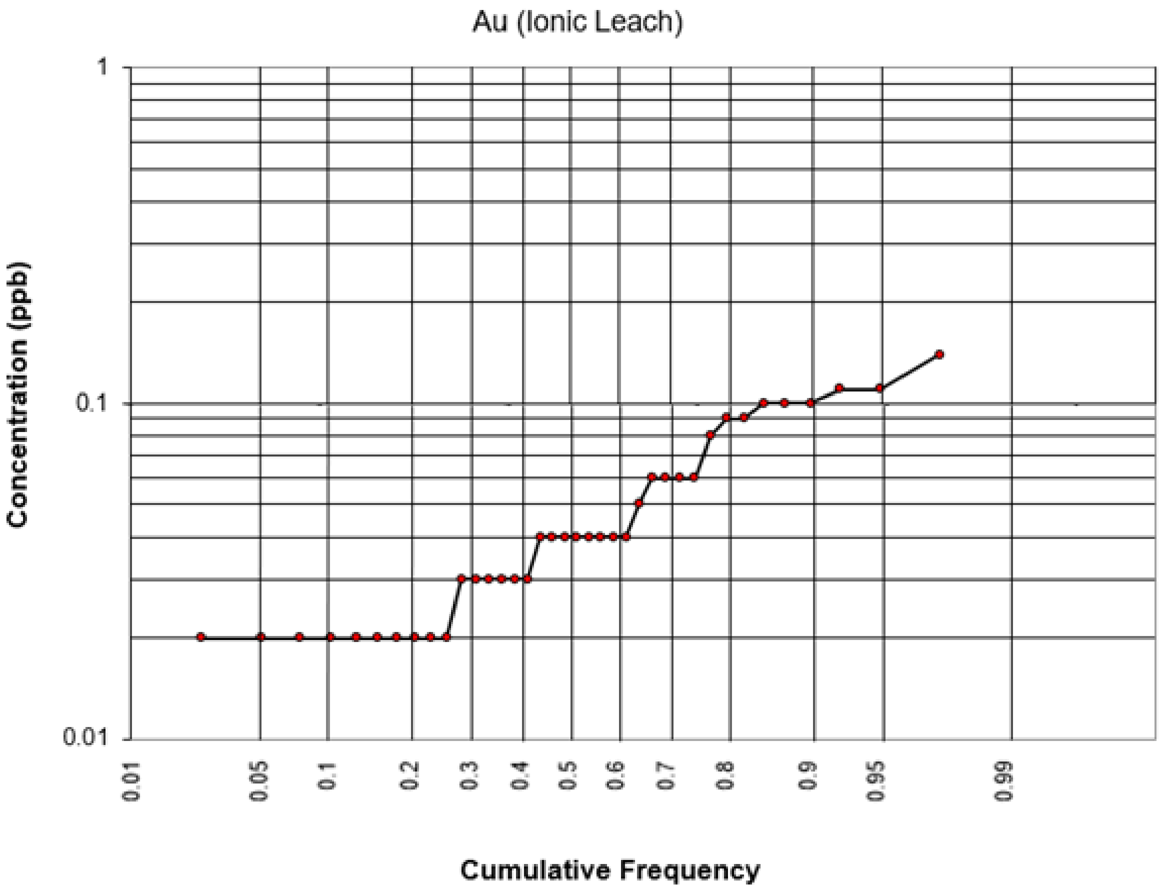

Pb (Multi-element)
Concentration (ppm)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

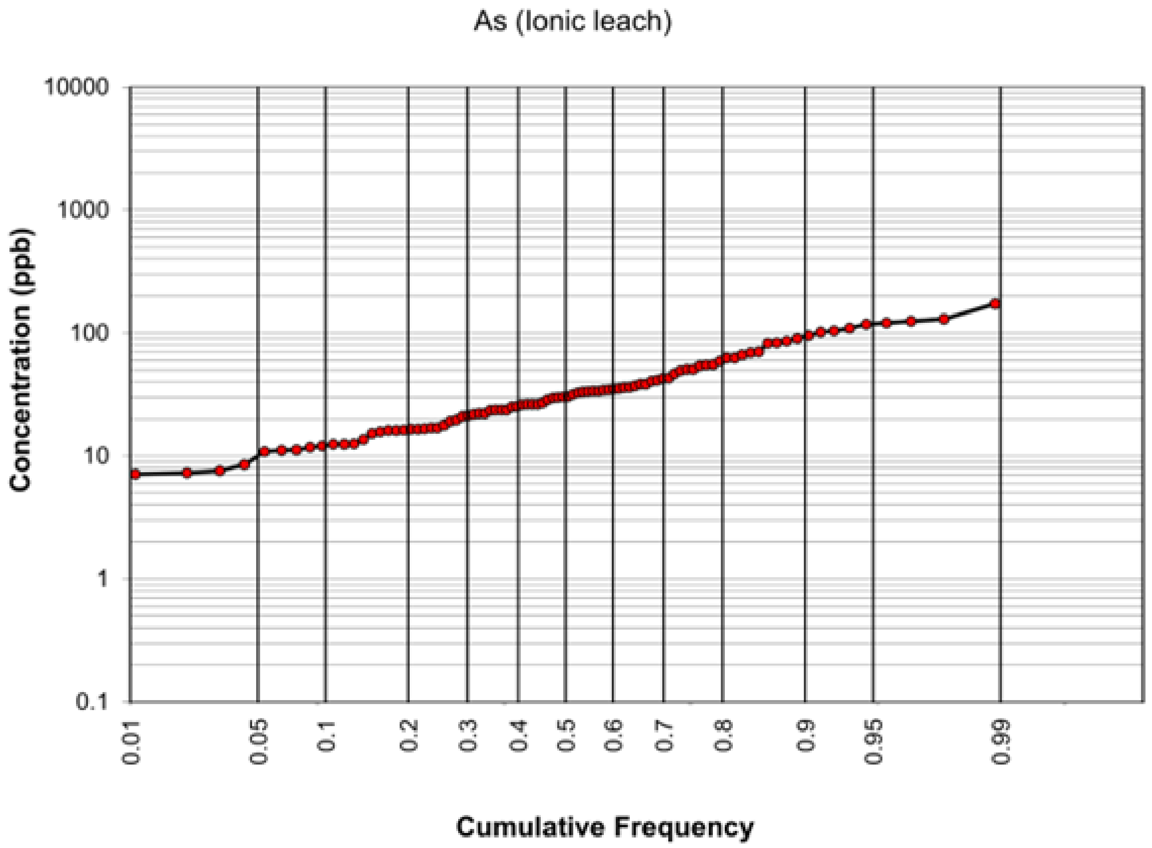
Zn (Multi-element)

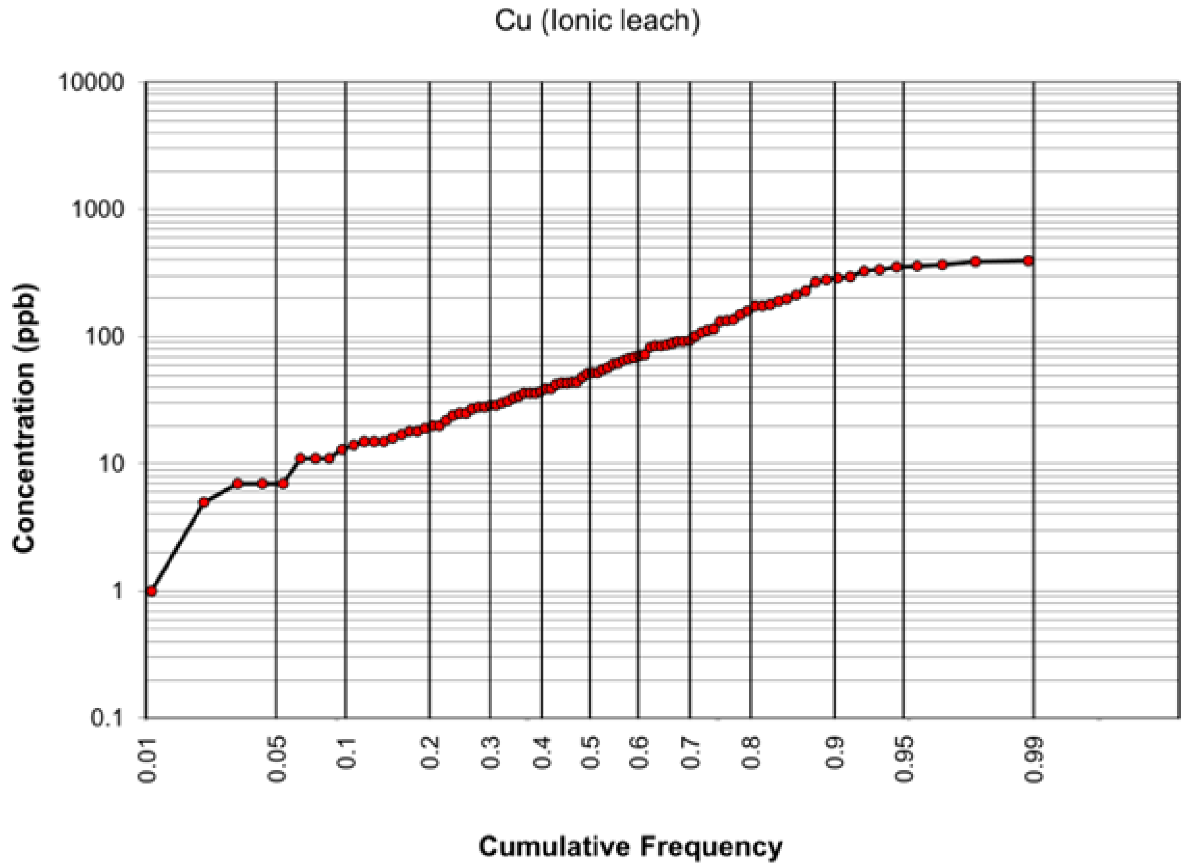


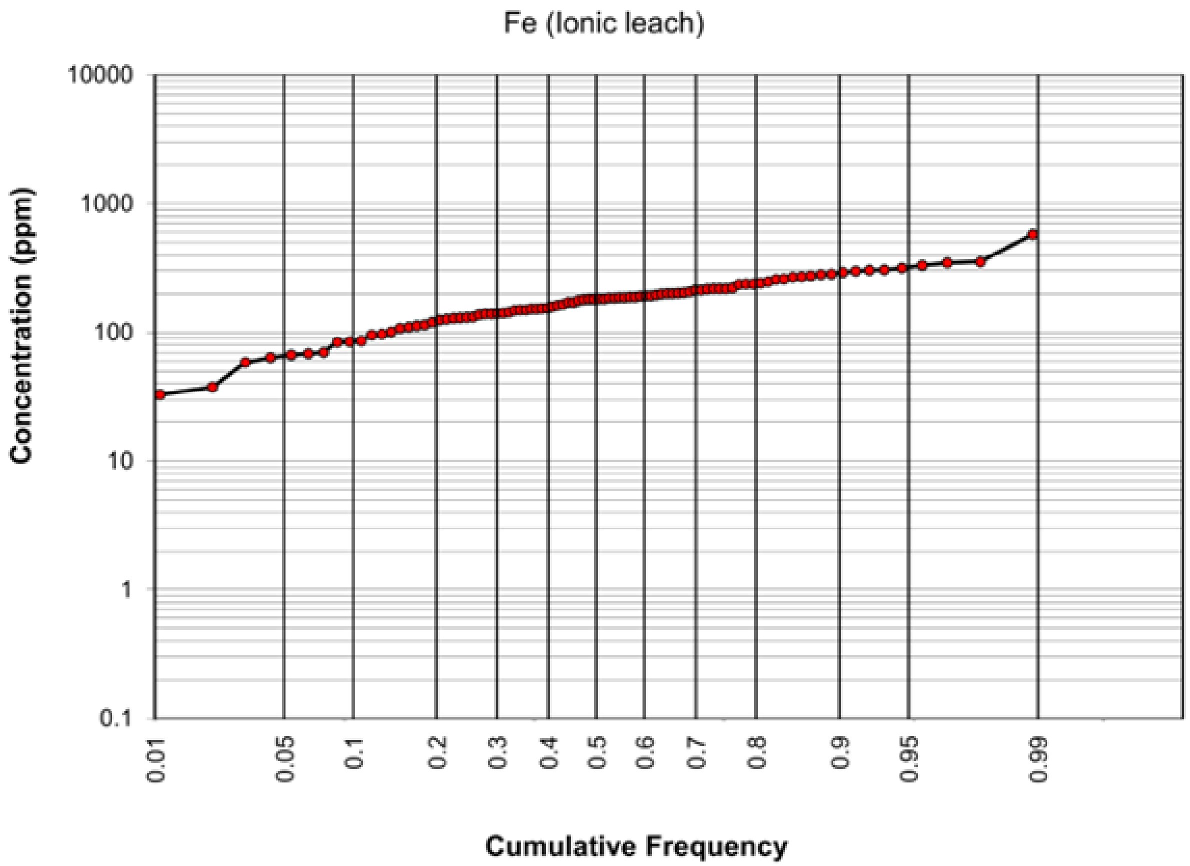
Au (Fire assay)

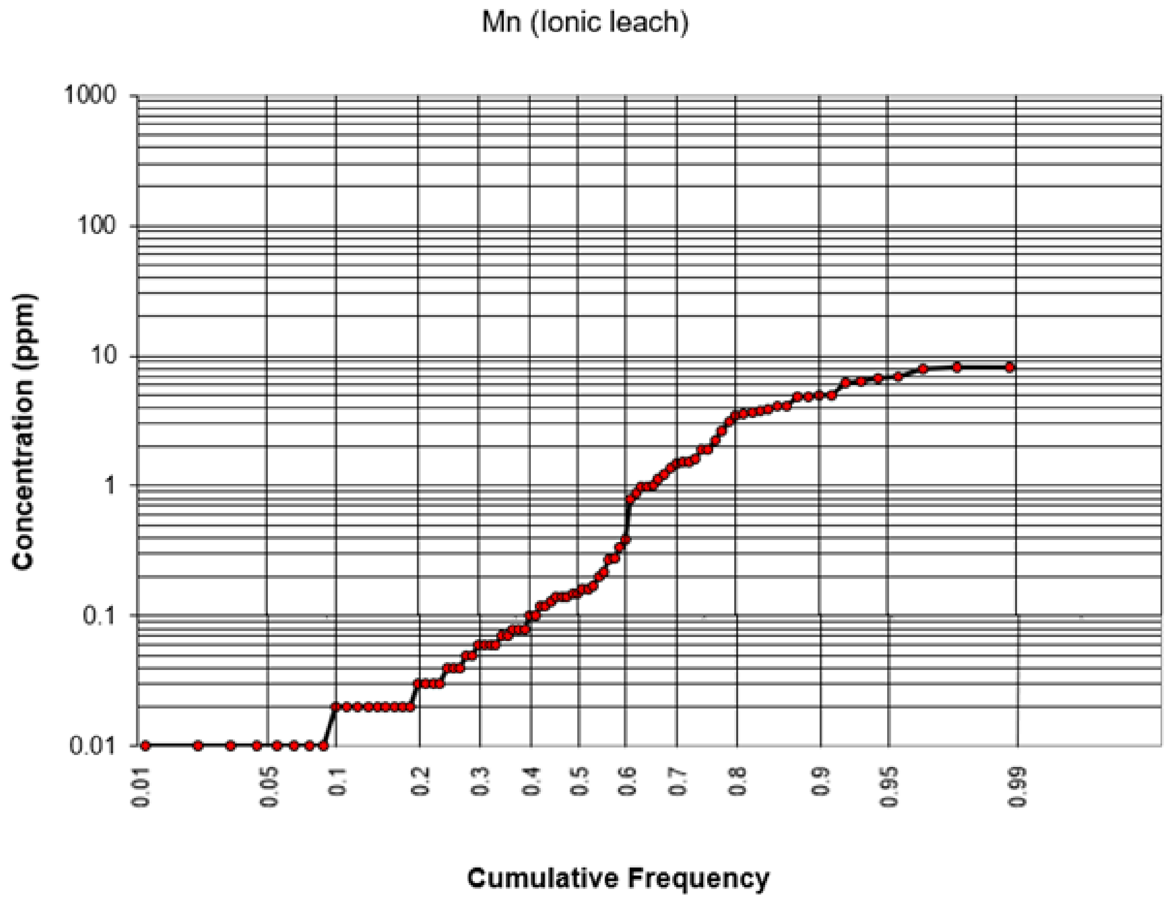


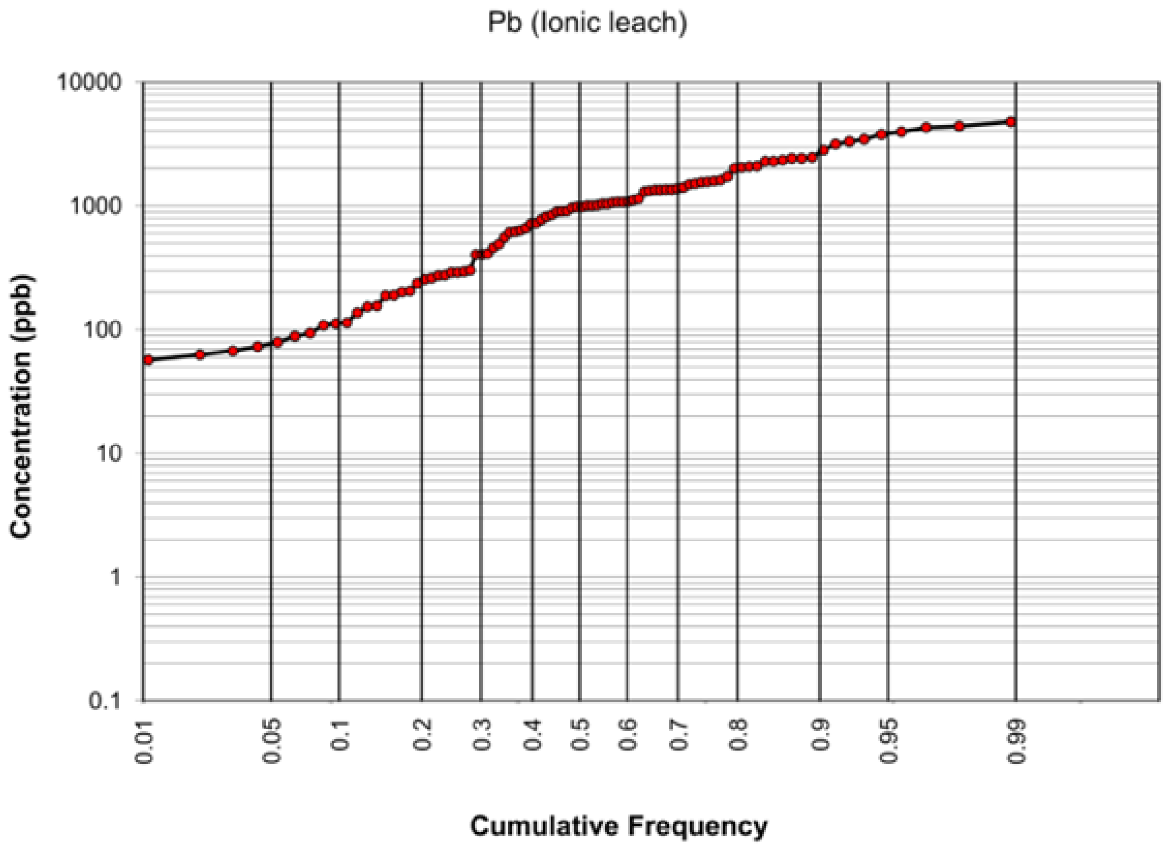

Au (Ionic Leach)
Concentration (ppb)
1
0.1
0.01
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency

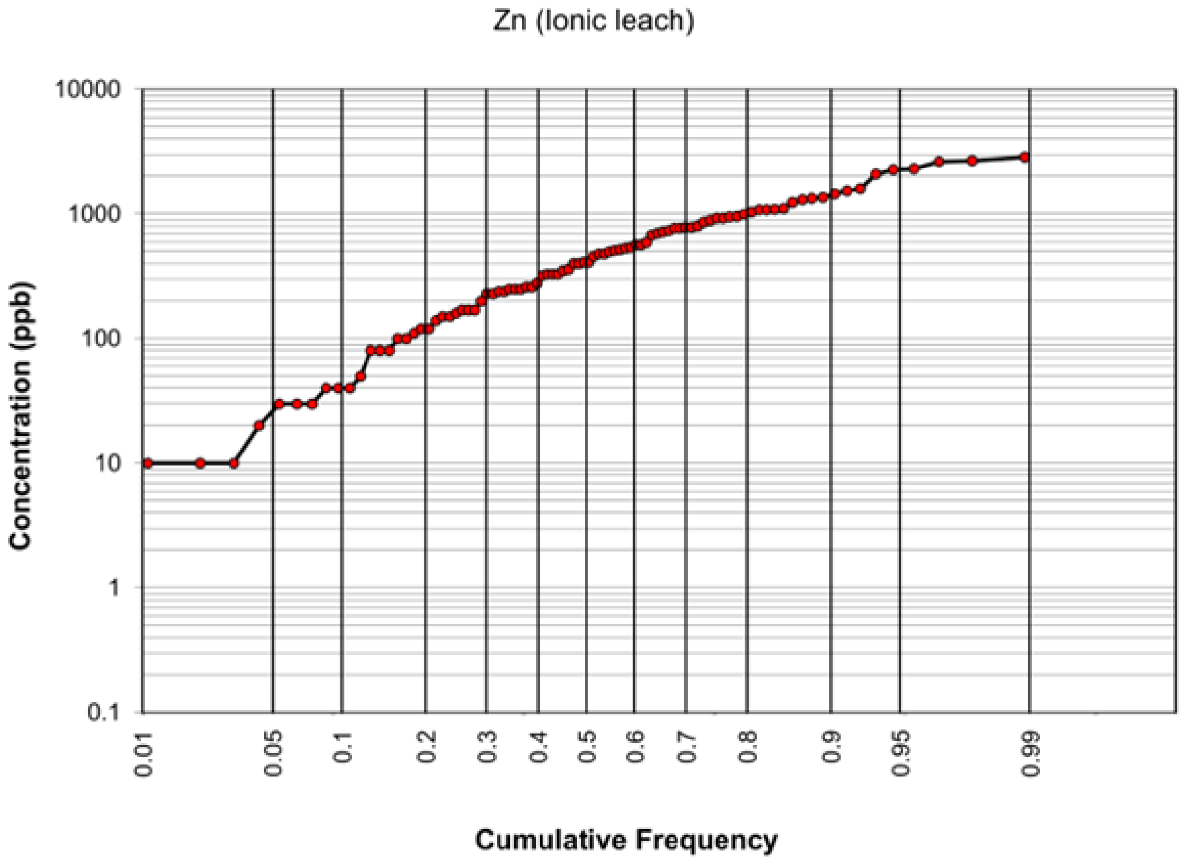

As (Ionic leach)
Concentration (ppb)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Cu (Ionic leach)
10000
1000
100
10
1
0.1
Concentration (ppb)
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Fe (Ionic leach)
10000
1000
100
10
1
0.1
Concentration (ppm)
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Mn (Ionic leach)
1000
100
10
1
0.1
0.01
Concentration (ppm)
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Pb (Ionic leach)
10000
1000
100
10
1
0.1
Concentration (ppb)
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency


Zn (Ionic leach)
Concentration (ppb)
10000
1000
100
10
1
0.1
0.01
0.05
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.95
0.99
Cumulative Frequency