

RFA Ringversuch GeoPT 51, IAG - GMN-1, Leucomonzogranit

Veranstalter des Ringversuchs: International Association of Geoanalysts and Geostandards Newsletter
- GeoPT51

Ringversuchsmaterial: GMN-1, Leucomonzogranit

RV geschlossen: 2022 – 8

Literatur: Report - GeoPT51 Proficiency Testing Round 51 (Laborcode CRB = N42)

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
SiO ₂	73,510	73,500	0,770	0,010
TiO ₂	0,211	0,210	0,005	0,110
Al ₂ O ₃	13,510	13,470	0,182	0,110
Fe ₂ O ₃ tot	1,980	1,960	0,035	0,280
MnO	0,050	0,050	0,002	0,000
MgO	0,360	0,370	0,009	-0,580
CaO	1,030	1,000	0,020	0,750
Na ₂ O	3,850	3,828	0,063	0,180
K ₂ O	4,800	4,800	0,076	0,000
P ₂ O ₅	0,062	0,060	0,002	0,550
L.O.I. *	0,430	0,440	0,100	-0,070
F *	0,112	0,103	0,038	0,110

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
Ba	332,00	343,60	11,41	-0,51
Cr	550,00	545,00	16,89	0,15
Ga	19,00	17,60	0,91	0,77
Hf	4,80	5,26	0,33	-0,70
Nb	25,00	22,60	1,13	1,06
Pb	33,00	31,90	1,52	0,36
Rb	237,00	255,20	8,86	-1,03
Sr	137,00	135,50	5,18	0,14
Y	38,00	29,70	1,43	2,91
Zn	36,00	31,80	1,51	1,40

Legende

CRB: Ergebnisse CRB – **RV:** Ergebnisse Ringversuch -- **1s-RV:** Standardabweichung Ringversuch

Z-Score: Differenz des Messwertes vom Mittelwert des Ringversuchs -- * Wert nicht zertifiziert



GeoPT

Proficiency Testing Programme for Geochemical Laboratories

Organised by the International Association of Geoanalysts (IAG)

Certificate of Performance



Subscriber: **GeoPT240**
Round: **GeoPT51**

Laboratory Code: **N42**

Test Material: **GMN-1**
Date: **June 2022**

Analyte	Z-Score	Data Quality	Consensus Value	Result Submitted
			g/100g	g/100g
SiO ₂	0.01	2	73.50	73.51
TiO ₂	0.11	2	0.2098	0.211
Al ₂ O ₃	0.11	2	13.47	13.51
Fe ₂ O ₃ T	0.28	2	1.960	1.98
MnO	0	2	0.05000	0.05
MgO	-0.58	2	0.3700	0.36
CaO	0.75	2	1.000	1.03
Na ₂ O	0.17	2	3.828	3.85
K ₂ O	0	2	4.800	4.8
P ₂ O ₅	0.55	2	0.06000	0.062
			mg/kg	mg/kg
As	-	2	2.120	
Ba	-0.51	2	343.6	332
Be	-	2	5.000	
Bi	-	2	0.1602	
C(tot)	-	2	862.0	
Cd	-	2	0.02600	
Ce	-	2	70.00	
Co	-	2	2.109	
Cr	0.15	2	545.0	550
Cs	-	2	8.069	
Cu	-	2	2.494	
Dy	-	2	4.752	
Er	-	2	2.975	
Eu	-	2	0.5998	
Ga	0.77	2	17.60	19
Gd	-	2	4.514	
Ge	-	2	1.670	
Hf	-0.7	2	5.262	4.8

Analyte	Z-Score	Data Quality	Consensus Value	Result Submitted
			mg/kg	mg/kg
Ho	-	2	0.9720	
In	-	2	0.03300	
La	-	2	36.24	
Li	-	2	56.41	
Lu	-	2	0.4755	
Mo	-	2	1.641	
Nb	1.06	2	22.60	25
Nd	-	2	26.64	
Ni	-	2	8.930	
Pb	-	2	31.90	
Pr	-	2	7.795	
Rb	-1.02	2	255.2	237
Sb	-	2	0.09500	
Sc	-	2	4.987	
Sm	-	2	5.241	
Sn	-	2	5.620	
Sr	0.14	2	135.5	137
Ta	-	2	1.802	
Tb	-	2	0.7374	
Th	-	2	35.10	
Tl	-	2	1.520	
Tm	-	2	0.4500	
U	-	2	12.40	
V	-	2	13.16	
W	-	2	3.900	
Y	2.91	2	29.69	38
Yb	-	2	3.042	
Zn	1.4	2	31.76	36
Zr	1.28	2	142.2	156

The principles upon which GeoPT z-scores are based are detailed in the full report for this round

- indicates result within acceptable range of z-score limits $|z| < 2$

- indicates result outside z-score limits $|z| > 2$ but within the z-score limits $|z| < \text{or} = 3$

- indicates result outside z-score limits $|z| > 3$ and likely to require investigation

Consensus values are assigned values unless otherwise indicated

Shaded Consensus values have provisional status

Peter Webb . Peter Webb - Administrator of GeoPT on behalf of the International Association of Geoanalysts

RFA Ringversuch GeoPT 51, IAG - GMN-1, Leucomonzogranit

Veranstalter des Ringversuchs: International Association of Geoanalysts and Geostandards Newsletter
- GeoPT51

Ringversuchsmaterial: GMN-1, Leucomonzogranit

RV geschlossen: 2022 – 8

Literatur: Report - GeoPT51 Proficiency Testing Round 51 (Laborcode CRB = N42)

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
SiO ₂	73,510	73,500	0,770	0,010
TiO ₂	0,211	0,210	0,005	0,110
Al ₂ O ₃	13,510	13,470	0,182	0,110
Fe ₂ O ₃ tot	1,980	1,960	0,035	0,280
MnO	0,050	0,050	0,002	0,000
MgO	0,360	0,370	0,009	-0,580
CaO	1,030	1,000	0,020	0,750
Na ₂ O	3,850	3,828	0,063	0,180
K ₂ O	4,800	4,800	0,076	0,000
P ₂ O ₅	0,062	0,060	0,002	0,550
L.O.I. *	0,430	0,440	0,100	-0,070
F *	0,112	0,103	0,038	0,110

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
Ba	332,00	343,60	11,41	-0,51
Cr	550,00	545,00	16,89	0,15
Ga	19,00	17,60	0,91	0,77
Hf	4,80	5,26	0,33	-0,70
Nb	25,00	22,60	1,13	1,06
Pb	33,00	31,90	1,52	0,36
Rb	237,00	255,20	8,86	-1,03
Sr	137,00	135,50	5,18	0,14
Y	38,00	29,70	1,43	2,91
Zn	36,00	31,80	1,51	1,40

Legende

CRB: Ergebnisse CRB – **RV:** Ergebnisse Ringversuch -- **1s-RV:** Standardabweichung Ringversuch

Z-Score: Differenz des Messwertes vom Mittelwert des Ringversuchs -- * Wert nicht zertifiziert



GeoPT

Proficiency Testing Programme for Geochemical Laboratories

Organised by the International Association of Geoanalysts (IAG)

Certificate of Performance



Subscriber: **GeoPT240**
Round: **GeoPT51**

Laboratory Code: **N42**

Test Material: **GMN-1**
Date: **June 2022**

Analyte	Z-Score	Data Quality	Consensus Value	Result Submitted
			g/100g	g/100g
SiO ₂	0.01	2	73.50	73.51
TiO ₂	0.11	2	0.2098	0.211
Al ₂ O ₃	0.11	2	13.47	13.51
Fe ₂ O ₃ T	0.28	2	1.960	1.98
MnO	0	2	0.05000	0.05
MgO	-0.58	2	0.3700	0.36
CaO	0.75	2	1.000	1.03
Na ₂ O	0.17	2	3.828	3.85
K ₂ O	0	2	4.800	4.8
P ₂ O ₅	0.55	2	0.06000	0.062
			mg/kg	mg/kg
As	-	2	2.120	
Ba	-0.51	2	343.6	332
Be	-	2	5.000	
Bi	-	2	0.1602	
C(tot)	-	2	862.0	
Cd	-	2	0.02600	
Ce	-	2	70.00	
Co	-	2	2.109	
Cr	0.15	2	545.0	550
Cs	-	2	8.069	
Cu	-	2	2.494	
Dy	-	2	4.752	
Er	-	2	2.975	
Eu	-	2	0.5998	
Ga	0.77	2	17.60	19
Gd	-	2	4.514	
Ge	-	2	1.670	
Hf	-0.7	2	5.262	4.8

Analyte	Z-Score	Data Quality	Consensus Value	Result Submitted
			mg/kg	mg/kg
Ho	-	2	0.9720	
In	-	2	0.03300	
La	-	2	36.24	
Li	-	2	56.41	
Lu	-	2	0.4755	
Mo	-	2	1.641	
Nb	1.06	2	22.60	25
Nd	-	2	26.64	
Ni	-	2	8.930	
Pb	-	2	31.90	
Pr	-	2	7.795	
Rb	-1.02	2	255.2	237
Sb	-	2	0.09500	
Sc	-	2	4.987	
Sm	-	2	5.241	
Sn	-	2	5.620	
Sr	0.14	2	135.5	137
Ta	-	2	1.802	
Tb	-	2	0.7374	
Th	-	2	35.10	
Tl	-	2	1.520	
Tm	-	2	0.4500	
U	-	2	12.40	
V	-	2	13.16	
W	-	2	3.900	
Y	2.91	2	29.69	38
Yb	-	2	3.042	
Zn	1.4	2	31.76	36
Zr	1.28	2	142.2	156

The principles upon which GeoPT z-scores are based are detailed in the full report for this round

- indicates result within acceptable range of z-score limits $|z| < 2$

- indicates result outside z-score limits $|z| > 2$ but within the z-score limits $|z| < \text{or} = 3$

- indicates result outside z-score limits $|z| > 3$ and likely to require investigation

Consensus values are assigned values unless otherwise indicated

Shaded Consensus values have provisional status

Peter Webb . Peter Webb - Administrator of GeoPT on behalf of the International Association of Geoanalysts



GeoPT51 – AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES – REPORT ON ROUND 51

(Leucomonzogranite, GMN-1) / July 2022

Peter C. Webb^{1*}, Philip J. Potts¹, Michael Thompson²,
Charles J. B. Gowing³ and Axel D. Renno⁴

¹Retired from the Faculty of Science, Technology, Engineering and Mathematics, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.

²School of Biological and Chemical Sciences, Birkbeck University of London, Malet Street, London WC1E 7HX, UK.

³British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK.

⁴Helmholtz-Zentrum Dresden - Rossendorf (HZDR), Helmholtz Institute Freiberg for Resource Technology, Freiberg, Germany

*Corresponding author, Peter Webb: e-mail: geopt.iag@gmail.com

Keywords: proficiency testing, quality assurance, GeoPT, GeoPT51, Round 51, GMN-1, Leucomonzogranite

Abstract

Results are presented for Round 51 of the GeoPT Proficiency Testing programme for analytical geochemistry laboratories organised by the International Association of Geoanalysts (IAG). The test material distributed in this round was the Leucomonzogranite, GMN-1, provided by Dr Renno of Helmholtz Institute Freiberg for Resource Technology, Freiberg, Germany. In this report, the data contributed by 112 laboratories are listed, together with an assessment of consensus values, consequent *z*-scores and a series of charts to show for each analyte the distribution of contributed results and the overall performance of participating laboratories.

Introduction

This fifty-first round of GeoPT, the international proficiency testing programme for geoanalytical laboratories, was conducted in a similar manner to earlier rounds (reports listed in Appendix 1). The programme is designed to be a key part of the routine quality assurance procedures employed by an analytical geochemistry laboratory. It is organised by the International Association of Geoanalysts and is conducted in accordance with a published protocol, recently revised (IAG, 2020). The overall aim of the programme is to provide participating laboratories with information on their performance in the form of *z*-scores for each reported measurement result so that individual laboratories can decide whether the quality of their data is satisfactory in relation both to their chosen fitness-for-purpose criteria and to the performance of other laboratories participating in this round. In circumstances where its *z*-scores are unsatisfactory, a participating laboratory is encouraged to investigate for unsuspected analytical bias and to take corrective action when it appears justified.

Steering Committee for Round 51: P.C. Webb (administrator and results assessor), P.J. Potts (results reviewer), C.J.B. Gowing (results reviewer and distribution manager), M. Thompson (statistical advisor), A. Renno (provision of GMN-1 material).

Timetable for Round 51:

Distribution of sample: March 2022
Results accepted from: 10th May 2022
Results submission deadline: 15th June 2022
Release of report: July 2022

Test Material details

GeoPT51: The Leucomonzogranite test material, GMN-1, was collected by Dr Axel Renno of the Helmholtz Institute Freiberg for Resource Technology from the Jansen Beton- und Granitwerke GmbH granite quarry, Granitbruch Meissen-Cölln, in Meissen, and was processed both at the Deutsches GeoForschungsZentrum GFZ, Telegrafenberg, Potsdam, and at the British Geological Survey (BGS), Keyworth, where it was divided and packeted under the direction of Dr Charles Gowing.

The test material was evaluated for homogeneity at BGS, Keyworth, and an assessment of the results showed that this material was suitable for use in this proficiency test.

Submission of results

For GeoPT51 (GMN-1), a total of 3919 measurement results submitted by 112 laboratories are listed in Table 1. We are pleased to report that these numbers reflect the highest level of participation in any round of GeoPT since its inception. Of the measurements submitted, 1802 results were designated by their originators as data quality 1 (see **z-score analysis section** below for explanation of data quality) and are shown in **bold**, whereas 2117 results were specified as data quality 2 and are shown underlined. Results from all laboratories submitting data were used to assess consensus values for each measurand.

Only two laboratories reported values of '0' (i.e. zero) in this round. We continue to remind participants not to report zeros or values that are close to detection limits, and below their recognised limits of quantification that have an unacceptably large uncertainty associated with them. However, it is apparent that a few laboratories reported **results for C(tot) and S in units of g/100g instead of mg/kg**. The distribution of C(tot) data would have been improved considerably by correct reporting. Consequently, we must respectfully, but **firmly remind analysts that measurement results of all constituents listed as elements must be reported in mg/kg**. Please be aware that **erroneous results cannot be altered or removed once they have been submitted** and that corresponding **z-scores will be adversely affected**.

Assigned values and results summary

Following procedures described in earlier rounds, and detailed fully in the GeoPT protocol (IAG, 2020), robust statistical procedures were used to derive consensus values for measurands in this test material: these consensus values being judged to be the best available estimates of the true composition of the test material. Values were assigned on the basis that: i) sufficient laboratories (15 or more) had contributed data for estimating the consensus, ii) visual assessment gave confidence that a substantial proportion of the results distribution was symmetrically disposed about the consensus value, iii) the ratio of the uncertainty in the location estimate to the target precision was an acceptably small value, and iv) an evaluation of measurement results by procedure – including both methods of analysis and sample preparation – indicated that no significant procedural bias was discernible amongst measurement results from which the consensus was derived. Where these criteria were largely, but not fully met, or where

obvious anomalies in the dataset could be accommodated by judicious selection of the consensus, values were credited with 'provisional' rather than 'assigned' status.

Data assessments involved an examination of bar charts showing the distribution of results contributed for each measurand (as presented in Figures 1 and 2). In addition, when appropriate, a variety of plots, permitting discrimination of data by method of measurement and by sample preparation procedure, as developed by Thomas Meisel using the Shiny App (<https://www.shinyapps.io>) and linked to the statistical package 'R', were also examined. This enables us, when necessary, to refine the selection of consensus values by taking account of data distributions according to measurement procedure. As previously notified to participants, the facility now exists for participants to observe GeoPT data distributions using Shiny App graphics through the link: <https://geoanalyst.shinyapps.io/GeoPTcommon2/>. You will be able to view all data submitted according to the principle of measurement, the method of sample preparation, and the chosen fitness-for-purpose criterion.

Consensus values derived from contributed data were provided in 9 instances by the Huber robust mean. Although outliers can be accommodated by this procedure, it is less effective when a dataset is skewed, when it frequently does not provide a satisfactory estimation of the consensus. In such circumstances, the median is often a more appropriate robust estimator and was employed in 23 cases. For more severely skewed and strongly tailed datasets, the median may not be an adequate estimator and a mode can provide a more effective means of estimating the location of the consensus. In this round the use of a mode as a consensus estimator was preferred in 25 cases, and in 17 of these, the distribution of data was sufficiently compatible with the conditions outlined above to justify its designation as an assigned value. Although the choice of a mode may be sometimes be used to 'fine tune' the location of the consensus, the extensive use of modes in this round was necessary because a large number of datasets were skewed and the source of the skew could be attributed to a known analytical problem or problems as discussed later. The procedure used to determine modes was mostly as described by Thompson (2017) involving the estimation of the mass fraction corresponding to the maximum value of the kernel density distribution for the dataset. Such modes can provide a robust estimate of the consensus location that represents the most coherent part of the data distribution where the data may often be symmetrically disposed, although the dataset as a whole may be asymmetric.

Table 2 lists assigned and provisional values for 10 major components and 47 trace elements in GeoPT51 (GMN-1). Bar charts that were judged to have satisfactory distributions for consensus values to be designated as assigned or provisional values, enabling z -scores to be calculated, are shown in Figure 1. Statistical data, consensus values and status designations are listed in Table 2 for the 57 analytes: SiO₂, TiO₂, Al₂O₃, Fe₂O₃T, MnO, MgO*, CaO, Na₂O, K₂O, P₂O₅, As*, Ba, Be, Bi, C(tot)*, Cd*, Ce, Co, Cr*, Cs, Cu*, Dy, Er, Eu, Ga, Gd, Ge*, Hf, Ho, In*, La, Li, Lu, Mo, Nb*, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tl, Tm, U, V, W, Y, Yb, Zn and Zr. Of these, the measurands of the 9 analytes marked ‘*’ could be credited only with provisional status. Such instances of provisional status were conferred because either: i) a relatively small number of results (less than 15, but usually more than 9) contributed to the consensus, or ii) the results were unduly dispersed in relation to the target value, or iii) the distribution of results was significantly skewed, or iv) the dataset was affected by bias in one or more methods employed but the remaining data defined a viable consensus. Of the provisional results, those for C(tot) and Cd, with fewer data reported, have a relatively high degree of uncertainty associated with them.

Bar charts for the 12 analytes: Fe(II)O, H₂O⁺, CO₂, LOI, Ag, B, Br, Cl, F, Hg, S and Se are plotted in Figure 2 for

information only, as the data were either insufficient in number, or the distribution was too highly skewed or too highly dispersed for a sufficiently reliable determination of a consensus for the estimation of z -scores.

In this round, many datasets are symmetrically disposed, but asymmetry with notable low tails is a common feature, especially for the REEs, as well as Hf, Th, U, Y and Zr, elements known to reside in refractory accessory minerals in granitic rocks. This effect was less striking for GMN-1 than for CSd-1 in GeoPT50, but evidence of procedures from metadata supplied indicated that this effect was again, in many cases associated with acid digestion (AD) as a means of dissolution. This effect is apparent for a small number of laboratories as illustrated in Figure 0.1 for Nd, as representative of LREEs, where there is also evidence of a tendency for much of the XRF powder pellet (PP) data to be low, although some of those results are high, well above the consensus. The consensus here is defined by a coherent set of ICP-MS results using various forms of sample preparation, permitting assigned status to be conferred. Potts *et al.* (2014) demonstrated that incomplete dissolution of refractory minerals, such as zircon, does not affect all data obtained by acid digestion but can be observed when the dissolution procedure is not sufficiently rigorous. For many asymmetric distributions in this round it was necessary to use a mode to obtain a value to represent the most coherent consensus location.

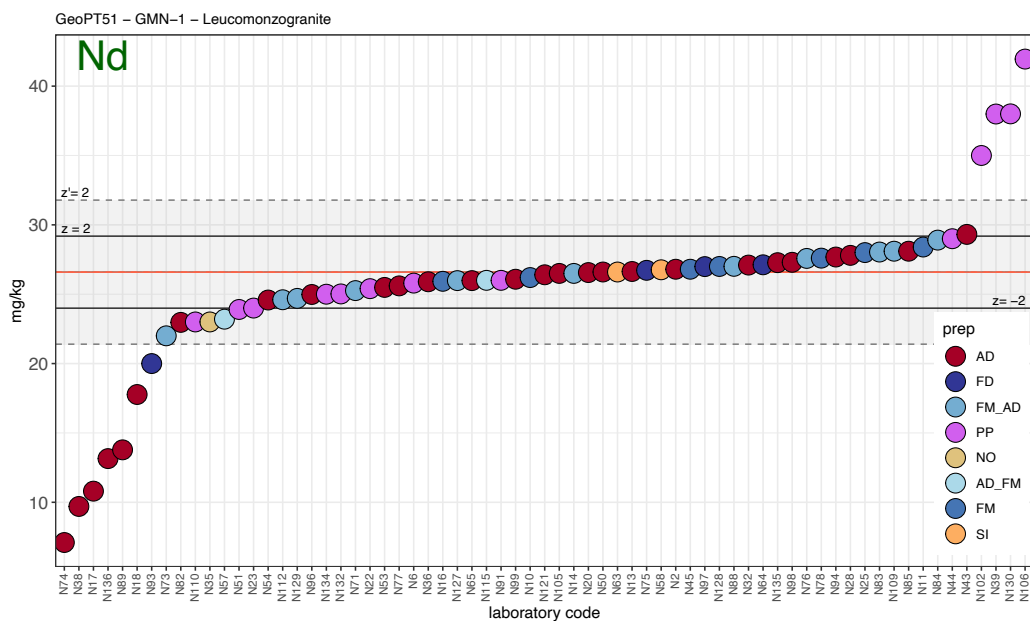


Figure 0.1 A sequential plot for GMN-1 of sorted Nd results distinguished according to method of sample preparation typifies many LREE data distributions. Some of the acid digestion (AD) data form a striking low tail and XRF powder pellet (PP) data are spread across the range, frequently forming for LREEs a greater spread than the ICP-MS results. ICP-MS data derived by a variety of forms of sample preparation including many by acid digestion, form a convincing consensus, sufficient to confer an assigned value. FM procedures involve fusion, SI is sintering. FD is fusion disc.

For HREEs it is apparent that low values are recorded by the same laboratories that reported low values for LREEs, but in addition there are a number of other laboratories undertaking acid digestion which also record what appear to be systematically low values. It is suggested that the HREEs and the LREEs are dominantly hosted by different mineral phases which respond differently to different dissolution procedures. For HREEs, the most coherent part of the results distribution involving a variety of

analytical procedures was chosen as providing the best consensus, as shown in Figure 0.2.

For some elements the asymmetry of data distributions is due to high tails, examples of which are apparent in Figure 1, most notably for As, Cd, Co, Cu, Mo and Sb. In all of these cases the quantities of the analytes are at low mass fractions (As: 2.12 mg/kg, Cd: 2.108 mg/kg, Cu: 2.494 mg/kg and Mo: 1.641 mg/kg). Figure 0.3 reveals the distribution of data for As where XRF results contribute to

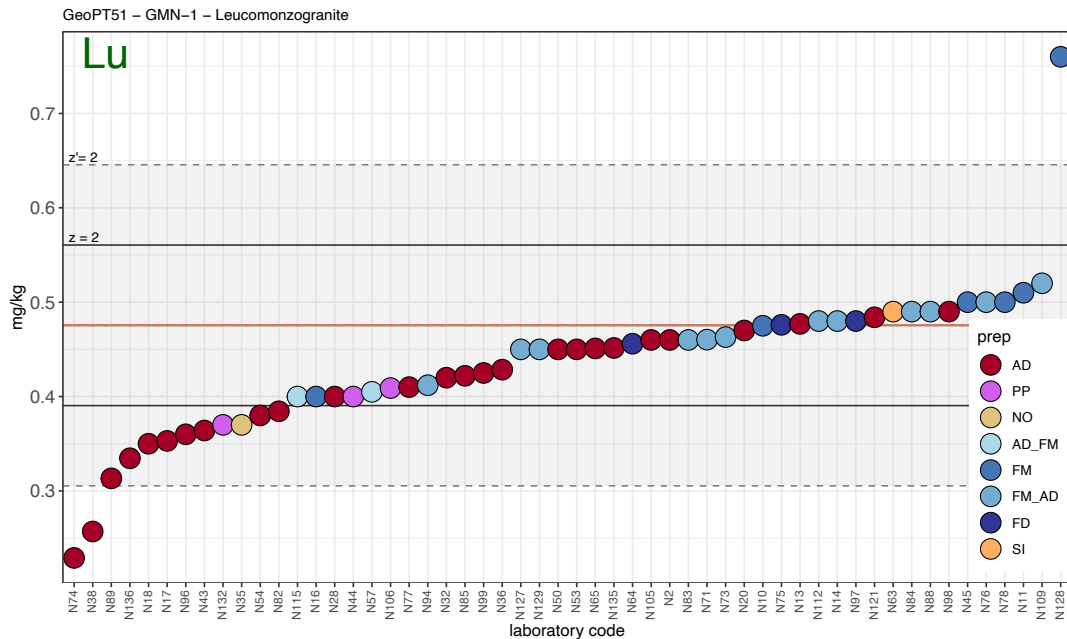


Figure 0.2 A sequential plot of sorted Lu results for GMN-1 distinguished according to method of sample preparation. Much of the acid digestion (AD) data tends to be low and less well aligned compared to most of the data derived from other forms of sample preparation, usually involving fusion. See Figure 0.1 caption for definition of the symbols.

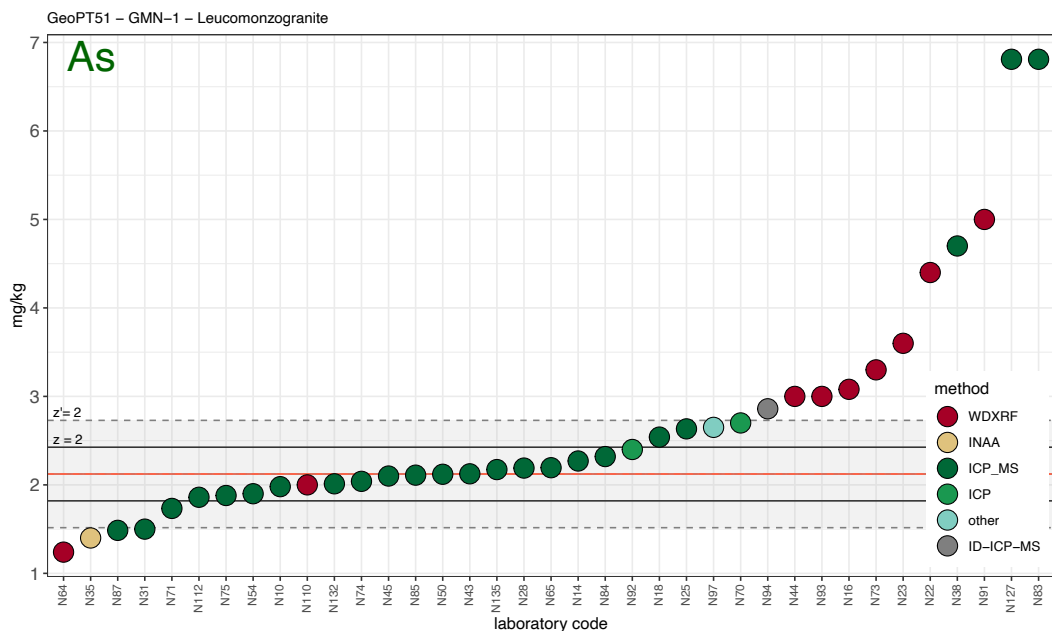


Figure 0.3 A sequential plot of sorted As results for GMN-1 distinguished according to measurement principle. Most of the XRF data contributes to the high tail. Key: WDXRF – Wavelength dispersive XRF; INAA – Instrumental neutron activation analysis; ICP-MS – Inductively coupled plasma – mass spectrometry; ICP – Inductively coupled plasma – atomic/optical emission spectrometry; ID-ICP-MS – Isotope dilution inductively coupled plasma – mass spectrometry

the high tail. In other examples, however, a varied range of measurement procedures contribute to the high tail.

For Nb, a data distribution that might have been conferred with assigned status was limited to provisional on account of the disparity between the results of different methods. As illustrated in Figure 0.4, most XRF powder pellet data would suggest a lower value and most ICP-MS acid digestion data would suggest a higher value. Choice of an intermediate value, in accord with much of the XRF fusion disc data, but with provisional status was the compromise outcome.

As is often the case, some sets of results, especially those of TiO₂, MnO, MgO, CaO, P₂O₅, Cu, Ga, Hf, Ni and V feature stepped distributions caused by over-rounding of much of the contributed data. We continue to recommend that for proficiency testing purposes all measurands should be quoted to **at least one decimal place more than would be routinely presented** to a client. This would enable our statistical procedures to define the consensus more effectively. This recommendation is especially relevant to distributions of major element components when reported at low mass fractions.

Z-score analysis

As in previous rounds, laboratories were invited to choose one of two performance standards against which their analytical results would be judged:

Data quality 1 for laboratories working to a 'pure geochemistry' standard of performance, where analytical

results are designed for geochemical research and where care is taken to provide data of high precision and accuracy, sometimes at the expense of a reduced sample throughput rate.

Data quality 2 for laboratories working to an 'applied geochemistry' standard of performance, where, although precision and accuracy are still important, the main objective is to provide results on large numbers of samples collected, for example, as part of geochemical mapping projects or geochemical exploration programmes.

The **standard deviation for proficiency** (σ_{pt}) – also referred to as the target precision – for each measurand assessed was calculated from a modified form of the Horwitz function as follows:

$$\sigma_{pt} = k \cdot x_{pt}^{0.8495}$$

Where x_{pt} is the mass fraction of the element; the factor $k = 0.01$ for pure geochemistry laboratories (quality 1) and $k = 0.02$ for applied geochemistry laboratories (quality 2).

Z-scores were calculated for each elemental measurement submitted by each laboratory from:

$$z_i = [x_i - x_{pt}] / \sigma_{pt}$$

Where x_i is the contributed measurement result, x_{pt} is the assigned (or provisional) value and σ_{pt} is the target standard deviation (all as mass fractions). Z-scores for results contributed to GeoPT51 are listed in Table 3.

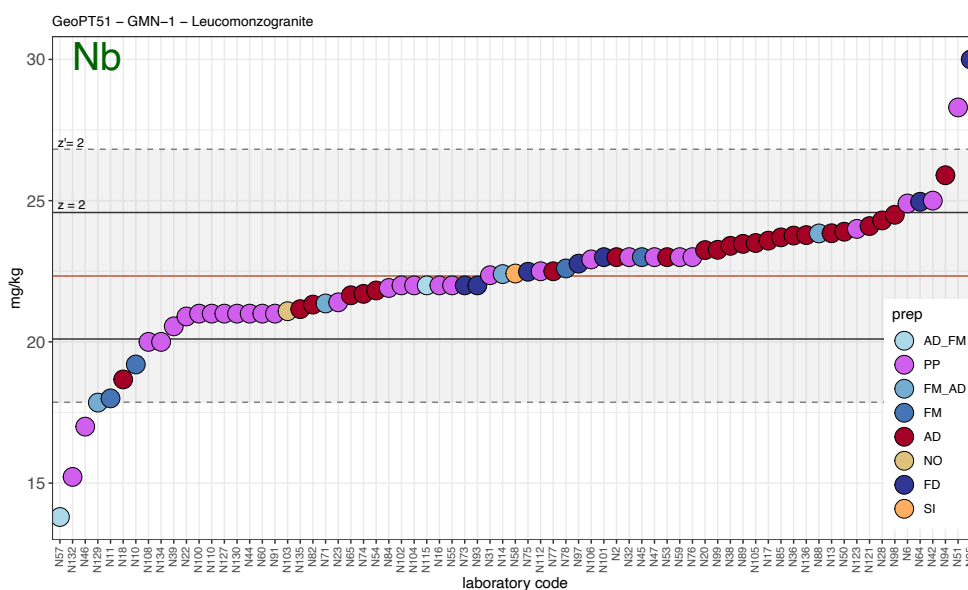


Figure 0.4 A sequential plot of sorted Nb results for GMN-1 distinguished according to method of sample preparation. Much of the powder pellet (XRF, PP) data tends to be lower than the consensus whereas most of the acid digestion (ICP-MS, AD) data tends to be higher than the consensus. See Figure 0.1 caption for definition of the symbols.

Those of results designated as data **quality 1** are shown in **bold**: those of data quality 2 are shown underlined. Z-scores derived from *provisional values* of measurands are shown in *italics*.

Participating laboratories are invited to assess their performance using the following criteria:–

Z-score results in the range $-2 < z < 2$ are considered to be 'satisfactory' (in the sense that no action is called for by the participating laboratory). If the z-score for an element falls outside this range, more especially if it is outside the range $-3 < z < 3$, laboratories are advised to examine their procedures, and if necessary, take appropriate action to ensure that their determinations are not subject to unsuspected analytical bias.

Overall performance

A summary of the overall performance of individual laboratories for this round is plotted in multiple z-score charts in Figure 3. In these charts, the z-score performance for each element is distinguished by symbols that make it easy to identify whether the results were satisfactory or gave z-scores that exceeded the action limits. This chart is designed to help individual laboratories judge their overall performance in this proficiency testing round. Participants should always review their z-scores in accordance with their own fitness-for-purpose criteria.

Participation in future rounds

The benefit from proficiency testing arises from regular participation and laboratories are invited to contribute to Round 52, the test materials for which will be distributed during September 2022.

Acknowledgements

The authors once again thank Andrea Mills (BGS) for much-valued assistance in distributing these samples and Thomas Meisel (Montanuniversität Leoben, Austria) for both maintaining the system and developing procedures involving the package 'R' and the Shiny App which has greatly assisted in the investigation of data according to analytical procedure, provided the graphics featured in Figures 0.1, 0.2 and 0.3, as well as facilitating the analysis of datasets involving modes derived according to Thompson (2017).

We are also very grateful for the assistance given in the collection of this test material by the quarry operator,

Jansen Beton- und Granitwerke GmbH, Meissen, and in particular, Mr Detlef Guzowski, who provided considerable support. We would also thank Johannes Glodny of Deutsches GeoForschungsZentrum GFZ, Telegrafenberg, Potsdam, for initial processing of the material and Michael Wiedenbeck of the same institution for facilitating the acquisition and shipment of the material.

References

IAG (2020) Protocol for the operation of the GeoPT Proficiency testing scheme. International Association of Geoanalysts (Keyworth, UK), 18pp.

<http://www.geoanalyst.org/wp-content/uploads/2020/07/GeoPT-revised-protocol-2020.pdf>.

Potts P.J., Webb P.C. and Thompson M. (2014) Bias in the determination of Zr, Y and rare earth element concentrations in selected silicate rocks by ICP-MS when using some routine acid dissolution procedures: Evidence from the GeoPT proficiency testing programme. *Geostandards and Geoanalytical Research*, 39, 403–416.

Thompson, M. (2017) On the role of the mode as a location parameter for the results of proficiency tests in chemical measurement. *Anal. Methods*, 9, p.5534-5540.

References of more general relevance

Meisel, T. C., Webb, P. C., and Rachetti, A. (2022). Highlights from 25 Years of the GeoPT Programme: What Can be Learnt for the Advancement of Geoanalysis. *Geostandards and Geoanalytical Research*.

<https://onlinelibrary.wiley.com/doi/10.1111/ggr.12424>

Potts P.J., Webb, P.C. and Thompson M. (2013) An assessment of performance in the routine analysis of silicate rocks based on an analysis of data submitted to the GeoPT proficiency testing programme for geochemical laboratories (2001–2011) *Geostandards and Geoanalytical Research*, 37, 403–416.

Potts P.J., Thompson M., and Webb, P.C. (2015) The reliability of assigned values from the GeoPT proficiency testing programme from an evaluation of data for six test materials that have been characterised as certified reference materials. *Geostandards and Geoanalytical Research*, 39, 407–417.

Potts P.J., Webb, P.C. and Thompson M. (2019) The GeoPT proficiency testing programme as a scheme for the certification of geological reference materials. *Geostandards and Geoanalytical Research*, 43, 409–418.

Potts P.J. and Webb, P.C (2019) An evaluation of methods for assessing the competence of laboratories based on performance in the GeoPT proficiency testing scheme. *Geostandards and Geoanalytical Research*, **43**, 217–22.

Webb, P.C., Potts P.J., Thompson M., Wilson, S.A. and Gowing, C.J.B. (2019) The long-term robustness and stability of consensus values as composition location estimators for a typical geochemical test material in the GeoPT proficiency testing programme. *Geostandards and Geoanalytical Research*, **43**, 397–408.

ADDENDUM **— IMPORTANT NOTICES TO ANALYSTS**

New procedural coding for Round 52

New procedural codes will be available for Round 52. Please note that on account of the number of laboratories now measuring by **LA-ICP-MS on nano-particulate pellets (NP) and glass discs (FD)** there will be **new analytical technique and sample preparation method codes** available for more accurate definition of procedures in subsequent rounds.

Change in uncertainty estimation, 2020

A change was made to the algorithm for the estimation of the uncertainty of median values and implemented for the first time in Round 47/47A. As described in the revised GeoPT protocol (IAG, 2020), median uncertainties are increased by a factor of 1.2533 compared to those from rounds prior to that date. Uncertainty values previously reported for values estimated as medians should be increased by this factor.

Explicit advice to analysts for reporting of procedures involving ignition and fusion

Note that some laboratories are still listing their procedure for determining LOI as the same as that employed for major elements, rather than providing separate, specific details. We must remind analysts that it is important to provide information that is appropriate for every analyte. Indeed, analysts reporting measurement results for procedures involving fusion, sintering or ignition, and in particular, LOI determinations, should specify the correct method used and give details both of the temperature used and where appropriate, the end-point criterion, e.g., the duration of ignition. This information should be supplied in the description of the relevant **Procedure**, as **Additional Details**.

We recommend that details of gravimetric procedures are included under **Analytical Technique details** rather than under **Sample Preparation details**. For gravimetric analysis, other than drying, which should in any case be carried out according to our instructions, there is no other sample preparation involved.

Access to graphical displays of GeoPT data distributions

Via Shiny App graphics:

<https://www.geoanalyst.shinyapps.io/GeoPTcommon2>

Appendix 1

Publication status of proficiency testing reports.

Previous reports are available for download from the IAG website (<http://www.geoanalyst.org/>).

GeoPT1

Thompson M., Potts P.J., Kane J.S. and Webb P.C. (1996)
GeoPT1. International proficiency test for analytical geochemistry laboratories - Report on round 1. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 20, 295-325.

GeoPT2

Thompson M., Potts P.J., Kane J.S., Webb P.C. and Watson, J.S. (1998)
GeoPT2. International proficiency test for analytical geochemistry laboratories - Report on round 2. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 22 127-156.

GeoPT3

Thompson M., Potts P.J., Kane J.S. and Chappell B.W. (1999a)
GeoPT3. International proficiency test for analytical geochemistry laboratories - Report on round 3. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 23, 87-121.

GeoPT4

Thompson M., Potts P.J., Kane J.S., Webb P.C. and Watson J.S. (1999b)
GeoPT4. International proficiency test for analytical geochemistry laboratories - Report on round 4. Published in the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

GeoPT5

Thompson M., Potts P.J., Kane J.S., and Wilson S. (1999c)
GeoPT5. International proficiency test for analytical geochemistry laboratories - Report on round 5. Published in the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

GeoPT6

Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GeoPT6 - an international proficiency test for analytical geochemistry laboratories - report on round 6 (OU-3: Nanhoron microgranite) and 6A (CAL-S: CRPG limestone). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT7

Potts P.J., Thompson M., Kane J.S., and Petrov L.L. (2000)
GeoPT7 - an international proficiency test for analytical geochemistry laboratories - report on round 7 (GBPG-1 Garnet-biotite plagiogneiss). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT8

Potts P.J., Thompson M., Kane J.S., Webb, P.C. and Watson J.S. (2000)
GeoPT8 - an international proficiency test for analytical geochemistry laboratories - report on round 8 / February 2001 (OU-4 Penmaenmawr microdiorite). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT9

Potts P.J., Thompson M., Webb, P.C. and Watson J.S. (2001)
GeoPT9 - an international proficiency test for analytical geochemistry laboratories - report on round 9 / July 2001 (OU-6 Penrhyn slate). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT10

Potts P.J., Thompson M., Webb, P.C., Watson J.S. and Wang Yimin (2001)
GeoPT10 - an international proficiency test for analytical geochemistry laboratories - report on round 10 / December 2001 (CH-1 Marine sediment). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT11

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Watson J.S. (2002)
GeoPT11 - an international proficiency test for analytical geochemistry laboratories - report on round 11 / July 2002 (OU-5 Leaton dolerite). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT12

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Batjargal B. (2003)
GeoPT12 - an international proficiency test for analytical geochemistry laboratories - report on round 12 / January 2003 (GAS Serpentine). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT13

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Kasper H.U. (2003)
GeoPT13 - an international proficiency test for analytical geochemistry laboratories - report on round 13 / July 2003 (Köln Loess). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT14

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and B. Batjargal (2004)
GeoPT14 - an international proficiency test for analytical geochemistry laboratories - report on round 14 / January 2004 (OShBO - alkaline granite). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT15

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Wang Yimin (2004)
GeoPT15 - an international proficiency test for analytical geochemistry laboratories - report on round 15 / June 2004 (Ocean floor sediment MSAN). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT16

Potts P.J., Thompson M., Webb, P.C. and S.Wilson (2005)
GeoPT16 - an international proficiency test for analytical geochemistry laboratories - report on round 16 / February 2005 (Nevada basalt, BNV-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT17

Potts P.J., Thompson M., Webb, P.C. and J. Nicholas Walsh (2005)
GeoPT17 - an international proficiency test for analytical geochemistry laboratories - report on round 17 / July 2005 (Calcareous sandstone, OU-8). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT18

Webb, P.C., Thompson M., Potts P.J. and L. Paul Bedard (2006)
GeoPT18 - an international proficiency test for analytical geochemistry laboratories - report on round 18 / Jan 2006 (Quartz Diorite, KPT-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT19

Webb, P.C., Thompson M., Potts P.J. and B. Batjargal (2006)
GeoPT19 - an international proficiency test for analytical geochemistry laboratories - report on round 19 / July 2006 (Gabbro, MGR-N). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT20

Webb, P.C., Thompson M., Potts P.J. and M. Burnham (2007) GeoPT20 - an international proficiency test for analytical geochemistry laboratories - report on round 20 / Jan 2007 (Ultramafic rock, OPY-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT21

Webb, P.C., Thompson M., Potts P.J. and B. Batjargal (2007)
GeoPT21 - an international proficiency test for analytical geochemistry laboratories - report on round 21 / July 2007 (Granite, MGT-1). International Association of Geoanalysts, Keyworth. Unpublished report.

Appendix 1 (Cont'd)

GeoPT22

Webb, P.C., Thompson, M., Potts, P.J. and Batjargal, B. (2008)
GeoPT22 - an international proficiency test for analytical geochemistry laboratories - report on round 22 / January 2008 (Basalt, MBL-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT23

Webb, P.C., Thompson, M., Potts, P.J., Watson, J.S. and Kriete, C. (2008)
GeoPT23 - an international proficiency test for analytical geochemistry laboratories - report on round 23 / September 2008 (Separation Lake pegmatite, OU-9) and 23A (Manganese nodule, FeMn-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT24

Webb, P.C., Thompson, M., Potts, P.J. and Watson, J.S. (2009)
GeoPT24 - an international proficiency test for analytical geochemistry laboratories - report on round 24 / January 2009 (Longmyndian greywacke, OU-10). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT25

Webb, P.C., Thompson, M., Potts, P.J. and Enzweiler, J. (2009)
GeoPT25 - an international proficiency test for analytical geochemistry laboratories - report on round 25 / July 2009 (Basalt, HTP-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT26

Webb, P.C., Thompson, M., Potts, P.J. and Loubser, M. (2010)
GeoPT26 - an international proficiency test for analytical geochemistry laboratories - report on round 26 / January 2010 (Ordinary Portland cement, OPC-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT27

Webb, P.C., Thompson, M., Potts, P.J. and Batjargal, B. (2010)
GeoPT27 - an international proficiency test for analytical geochemistry laboratories - report on round 27 / July 2010 (Andesite, MGL-AND). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT28

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2011)
GeoPT28 - an international proficiency test for analytical geochemistry laboratories - report on round 28 / January 2011 (Shale, SBC-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT29

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2011)
GeoPT29 - an international proficiency test for analytical geochemistry laboratories - report on round 29 / July 2011 (Nephelinite, NKT-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT30

Webb, P.C., Thompson, M., Potts, P.J., Long, D. and Batjargal, B. (2012)
GeoPT30 - an international proficiency test for analytical geochemistry laboratories - report on round 30 / January 2012 (Syenite, CG-2) and 30A (Limestone, ML-2). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT31

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2012)
GeoPT31 - an international proficiency test for analytical geochemistry laboratories - report on round 31 / July 2012 (Modified river sediment, SdAR-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT32

Webb, P.C., Thompson, M., Potts, P.J. and Webber, E. (2013)
GeoPT32 - an international proficiency test for analytical geochemistry laboratories - report on round 32 / January 2013 (Woodstock Basalt, WG-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT33

Webb, P.C., Thompson, M., Potts, P.J., Prusisz, B., and Young, K. (2013)
GeoPT33 - an international proficiency test for analytical geochemistry laboratories - report on round 33 / July-August 2013 (Ball Clay, DBC-1). International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT34

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2014)
GeoPT34 - an international proficiency test for analytical geochemistry laboratories - report on round 34 (Granite, GRI-1) / January 2014. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT35

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2014)
GeoPT35 - an international proficiency test for analytical geochemistry laboratories - report on round 35 (Tonalite, TLM-1) / August 2014. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT35A

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2014)
GeoPT35A - an international proficiency test for analytical geochemistry laboratories - report on round 35A (Metalliferous sediment, SdAR-H1) / August 2014. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT36

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2015)
GeoPT36 - an international proficiency test for analytical geochemistry laboratories - report on round 36 (Gabbro, GSM-1) / January 2015. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT36A

Webb, P.C., Thompson, M., Potts, P.J. and Wilson, S. (2015)
GeoPT36A - an international proficiency test for analytical geochemistry laboratories - report on round 36A (Metal-rich sediment, SdAR-M2) / January 2015. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT37

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Burnham, M. (2015)
GeoPT37 - an international proficiency test for analytical geochemistry laboratories - report on round 37 (Rhyolite, ORPT-1) / July 2015. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT37A

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Wilson, S. (2015)
GeoPT37A - an international proficiency test for analytical geochemistry laboratories - report on round 37A (Blended sediment, SdAR-L2) / July 2015. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT38

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Wilson, S.A. (2016)
GeoPT38 - an international proficiency test for analytical geochemistry laboratories - report on round 38 (Gabbro, OU-7) / January 2016. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT38A

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Meisel, T. (2016)
GeoPT38A - an international proficiency test for analytical geochemistry laboratories - special report on round 38A (Modified harzburgite, HARZ01) / June 2016. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT39

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Wilson, S.A. (2016)
GeoPT39 - an international proficiency test for analytical geochemistry laboratories - report on round 39 (Syenite, SyMP-1) / July 2016. International Association of Geoanalysts: Unpublished report.

Appendix 1 (Cont'd)

GeoPT39A

Webb, P.C., Thompson, M., Potts, P.J. and Gowing, C.J.B. (2016)
GeoPT39A - an international proficiency test for analytical geochemistry laboratories - report on round 39A (Nepheline syenite, MNS-1) / July 2016. International Association of Geoanalysts: Unpublished report.

GeoPT40

Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
GeoPT40 - an international proficiency test for analytical geochemistry laboratories - report on round 40 (Silty marine shale, ShWYO-1) / January 2017. International Association of Geoanalysts: Unpublished report.

GeoPT40A

Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
GeoPT40A - an international proficiency test for analytical geochemistry laboratories - report on round 40A (Calcareous organic-rich shale, SHTX-1) / January 2017. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT41

Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
GeoPT41 - an international proficiency test for analytical geochemistry laboratories - report on round 41 (Andesite, ORA-1) / July 2017. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT41A

Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
GeoPT41A - an international proficiency test for analytical geochemistry laboratories - report on round 41A (Mineralized stream sediment, SSCO-1) / July 2017. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT42

Webb, P.C., Thompson, M., Potts, P.J., Gowing, C.J.B. and Burnham, M. (2018)
GeoPT42 – an international proficiency test for analytical geochemistry laboratories – report on round 42 (Queenston shale, QS-1) / January 2018. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT43

Webb, P.C., Potts, P.J., Thompson, M. and Gowing, C.J.B. (2018)
GeoPT43 – an international proficiency test for analytical geochemistry laboratories – report on round 43 (Dolerite, ADS-1) / July 2018. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT44

Webb, P.C., Potts, P.J., Thompson, M., Gowing, C.J.B. (2019)
GeoPT44 – an international proficiency test for analytical geochemistry laboratories – report on round 44 (Calcareous shale, ShCX-1) / January 2019. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT44A

Webb, P.C., Potts, P.J., Thompson, M. Gowing, C.J.B. and Wilson, S.A. (2019)
GeoPT44A – an international proficiency test for analytical geochemistry laboratories – report on round 44A (Calcareous mudrock, CM-1) / January 2019. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT45

Webb, P.C., Potts, P.J., Thompson, M. Gowing, C.J.B. and Wilson, S.A. (2019)
GeoPT45 – an international proficiency test for analytical geochemistry laboratories – report on round 45 (Silicified siltstone, GONV-1) / July 2019. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT46

Webb, P.C., Potts, P.J., Thompson, M. and Gowing, C.J.B. (2020)
GeoPT46 – an international proficiency test for analytical geochemistry laboratories – report on round 46 (Granodiorite, HG-1) / January 2020. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT46A

Webb, P.C., Potts, P.J., Thompson, M. Gowing, C.J.B. and Wilson, S.A. (2020)
GeoPT46A – an international proficiency test for analytical geochemistry laboratories – report on round 46A (Phosphate rock, POLC-1) / January 2020. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT47

Webb, P.C., Potts, P.J., Thompson, M. and Gowing, C.J.B. (2020)
GeoPT47 – an international proficiency test for analytical geochemistry laboratories – report on round 47 (Silty Soil BIM-1) / December 2020. International Association of Geoanalysts, Keyworth, Keyworth. Unpublished report.

GeoPT47A

Webb, P.C., Potts, P.J., Thompson, M. and Gowing, C.J.B. (2020)
GeoPT47A – an international proficiency test for analytical geochemistry laboratories – report on round 47A (Silty Soil, NES-1) / December 2020. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT48

Webb, P.C., Potts, P.J., Thompson, M., Gowing, C.J.B., Glodny, J., Wiedenbeck, M. (2021)
GeoPT48 – an international proficiency test for analytical geochemistry laboratories – report on round 48 (Monzonite, MzBP-1) / April 2021. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT49

Webb, P.C., Potts, P.J., Thompson, M., Gowing, C.J.B., and Wilson, S.A. (2021)
GeoPT49 – an international proficiency test for analytical geochemistry laboratories – report on round 49 (Basalt, BVA-1) / July 2021. International Association of Geoanalysts, Keyworth. Unpublished report.

GeoPT50

Webb, P.C., Potts, P.J., Thompson, M., and Gowing, C.J.B. (2022)
GeoPT50 – an international proficiency test for analytical geochemistry laboratories – report on round 50 (Calcified sediment, CSd-1) / January 2022. International Association of Geoanalysts, Keyworth. Unpublished report.

Table 2 - GeoPT51 Consensus values and statistical summary for Leucomonzogranite, GMN-1.

	Consensus Value	Uncertainty of consensus value	Horwitz Target Precision	Uncertainty/Target Precision	Number of reported results	Robust Mean of results	Robust SD of results	Median of results	Status of consensus value	Type of consensus value
	X_{pt}	$u(x_{pt})$	σ_{pt}	$u(x_{pt})/\sigma_{pt}$	n					
	g 100g ⁻¹	g 100g ⁻¹	g 100g ⁻¹			g 100g ⁻¹	g 100g ⁻¹	g 100g ⁻¹		
SiO2	73.5	0.07324	0.7699	0.09512	103	73.44	0.662	73.5	Assigned	Median
TiO2	0.2098	0.0009958	0.005308	0.1876	105	0.2098	0.0102	0.21	Assigned	Robust Mean
Al2O3	13.47	0.02551	0.1821	0.14	104	13.48	0.2226	13.47	Assigned	Median
Fe2O3T	1.96	0.00531	0.03542	0.1499	103	1.953	0.05728	1.96	Assigned	Median
MnO	0.05	0.0001831	0.00157	0.1166	103	0.04953	0.002837	0.05	Assigned	Median
MgO	0.37	0.00298	0.008594	0.3467	100	0.3797	0.03212	0.3778	Provisional	Mode
CaO	1	0.003662	0.02	0.1831	103	1.001	0.0362	1	Assigned	Median
Na2O	3.828	0.0164	0.06256	0.2621	100	3.836	0.1363	3.828	Assigned	Median
K2O	4.8	0.015	0.07581	0.1979	104	4.77	0.1117	4.78	Assigned	Mode
P2O5	0.06	0.0003833	0.001833	0.2092	94	0.06037	0.005365	0.06	Assigned	Median
	mg kg ⁻¹	mg kg ⁻¹	mg kg ⁻¹			mg kg ⁻¹	mg kg ⁻¹	mg kg ⁻¹		
As	2.12	0.0859	0.1514	0.5672	38	2.5	0.8434	2.232	Provisional	Mode
Ba	343.6	2.476	11.41	0.217	93	343.6	23.88	345	Assigned	Robust Mean
Be	5	0.112	0.3139	0.3568	46	4.845	0.4519	4.905	Assigned	Mode
Bi	0.1602	0.006121	0.01688	0.3626	22	0.1632	0.02836	0.1602	Assigned	Median
C(tot)	862	39.1	24.93	1.568	19	740.6	279	842	Provisional	Mode
Cd	0.026	0.006001	0.003602	1.666	21	0.04514	0.04026	0.03	Provisional	Mode
Ce	70	0.929	2.954	0.3145	71	68.55	5.473	69.01	Assigned	Mode
Co	2.108	0.0393	0.1507	0.2607	58	2.244	0.3756	2.175	Assigned	Mode
Cr	545	11.7	16.89	0.6928	89	527.4	62.85	537	Provisional	Mode
Cs	8.069	0.09565	0.4713	0.2029	50	8.04	0.71	8.069	Assigned	Median
Cu	2.494	0.237	0.1738	1.363	62	3.05	1.313	2.8	Provisional	Mode
Dy	4.752	0.0788	0.3006	0.2622	55	4.526	0.4353	4.559	Assigned	Mode
Er	2.975	0.0376	0.2019	0.1862	54	2.841	0.2689	2.87	Assigned	Mode
Eu	0.5998	0.00904	0.05181	0.1745	54	0.5998	0.06643	0.6	Assigned	Robust Mean
Ga	17.6	0.2732	0.9142	0.2989	71	17.74	1.661	17.6	Assigned	Median
Gd	4.514	0.05602	0.2878	0.1946	53	4.514	0.4078	4.51	Assigned	Robust Mean
Ge	1.67	0.1365	0.1237	1.104	24	1.684	0.5487	1.67	Provisional	Median
Hf	5.262	0.04829	0.3278	0.1473	58	5.005	0.7559	5.125	Assigned	Mode
Ho	0.972	0.0345	0.07808	0.4419	53	0.9382	0.106	0.96	Assigned	Mode
In	0.033	0.00179	0.00441	0.4058	12	0.03922	0.01125	0.0355	Provisional	Mode
La	36.23	0.3812	1.688	0.2258	74	35.92	2.813	36.23	Assigned	Median
Li	56.41	0.6322	2.459	0.2571	42	56.41	4.097	56.42	Assigned	Robust Mean
Lu	0.4755	0.0155	0.04253	0.3644	54	0.4362	0.05806	0.45	Assigned	Mode
Mo	1.641	0.05096	0.1218	0.4183	47	1.695	0.4276	1.641	Assigned	Median
Nb	22.6	0.6	1.131	0.5307	73	22.34	1.653	22.42	Provisional	Mode
Nd	26.64	0.21	1.3	0.1615	67	26.04	2.257	26.4	Assigned	Mode
Ni	8.93	0.2311	0.5137	0.4499	74	8.9	1.744	8.93	Assigned	Median
Pb	31.9	0.3787	1.515	0.2499	78	32.11	3.116	31.9	Assigned	Median
Pr	7.795	0.0639	0.4577	0.1396	54	7.614	0.4804	7.679	Assigned	Mode
Rb	255.2	1.436	8.863	0.1621	82	254.3	11.61	255.2	Assigned	Median
Sb	0.095	0.003001	0.01083	0.2771	24	0.1176	0.05791	0.0965	Assigned	Mode
Sc	4.986	0.1258	0.3132	0.4016	58	4.953	0.8816	4.986	Assigned	Median
Sm	5.241	0.0576	0.3267	0.1763	59	5.039	0.5264	5.17	Assigned	Mode
Sn	5.62	0.168	0.3466	0.4846	46	5.878	1.088	5.76	Assigned	Mode
Sr	135.5	0.6894	5.177	0.1332	89	134.8	6.8	135.5	Assigned	Median
Ta	1.802	0.02992	0.1319	0.2268	47	1.802	0.2051	1.8	Assigned	Robust Mean
Tb	0.7374	0.008974	0.06175	0.1453	52	0.7374	0.06471	0.735	Assigned	Robust Mean
Th	35.1	0.389	1.643	0.2367	74	34.39	2.725	34.8	Assigned	Mode
Tl	1.52	0.02588	0.1142	0.2267	33	1.5	0.1981	1.52	Assigned	Median
Tm	0.45	0.01041	0.04059	0.2564	51	0.4369	0.05678	0.45	Assigned	Median
U	12.4	0.15	0.679	0.2209	68	12.02	1.408	12.25	Assigned	Mode
V	13.16	0.2507	0.7142	0.351	74	13.1	1.943	13.16	Assigned	Median
W	3.9	0.15	0.2542	0.5902	32	4.216	0.8524	4	Assigned	Mode
Y	29.69	0.387	1.426	0.2715	84	29.36	3.263	29.69	Assigned	Median
Yb	3.042	0.04469	0.2058	0.2172	56	2.963	0.3575	3.042	Assigned	Median
Zn	31.76	0.3375	1.51	0.2236	87	31.76	3.148	31.94	Assigned	Robust Mean
Zr	142.2	1.902	5.392	0.3528	89	142.2	17.95	143	Assigned	Robust Mean

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N1	N2	N5	N6	N8	N10	N11	N12	N13	N14	N15	N16	N17
SiO2	<u>0.27</u>	*	-3.47	0.14	-0.32	-0.56	<u>0.41</u>	*	0.31	<u>0.25</u>	<u>-0.19</u>	-0.69	-0.20
TiO2	<u>-0.64</u>	0.03	-16.92	0.41	-0.72	0.03	<u>-0.36</u>	<u>-1.87</u>	0.35	<u>0.96</u>	<u>-0.64</u>	1.92	0.52
Al2O3	<u>-0.04</u>	0.71	18.72	0.93	-0.38	-0.27	<u>-1.56</u>	<u>-1.30</u>	-0.14	<u>-0.03</u>	<u>-0.47</u>	1.76	0.42
Fe2O3T	<u>1.98</u>	*	-29.36	-0.99	0.65	0.56	<u>-0.71</u>	<u>2.12</u>	0.07	<u>0.28</u>	<u>-0.56</u>	-0.28	0.40
MnO	<u>-1.27</u>	-1.27	*	1.59	-1.27	-0.64	<u>0.32</u>	<u>-1.27</u>	-0.76	<u>0.00</u>	<u>-1.59</u>	0.00	0.38
MgO	<u>0.17</u>	2.33	44.21	-2.33	-3.26	0.00	<u>-1.16</u>	<u>2.33</u>	2.82	<u>1.16</u>	<u>0.41</u>	3.49	4.31
CaO	<u>0.30</u>	*	-15.00	1.00	-0.95	2.50	<u>0.25</u>	<u>3.50</u>	0.66	<u>-0.50</u>	<u>0.00</u>	3.50	1.15
Na2O	<u>-0.51</u>	*	34.72	0.99	4.14	0.35	<u>-1.18</u>	<u>7.13</u>	-0.03	<u>0.01</u>	<u>0.49</u>	4.66	4.57
K2O	<u>-0.26</u>	*	-18.60	0.26	0.13	0.13	<u>-0.53</u>	<u>-6.46</u>	0.22	<u>-0.20</u>	<u>0.26</u>	3.17	0.05
P2O5	<u>1.09</u>	-1.09	*	0.00	-6.00	*	<u>0.00</u>	*	0.82	<u>0.00</u>	<u>0.00</u>	5.46	1.75
As	*	*	*	*	*	-0.92	*	*	*	<u>0.50</u>	*	6.34	*
Ba	<u>0.85</u>	0.56	*	0.16	-0.91	-0.75	<u>0.55</u>	<u>-0.71</u>	-0.33	<u>-0.02</u>	<u>-9.18</u>	7.23	-7.17
Be	*	-0.13	*	*	0.25	-0.83	<u>0.00</u>	*	0.22	<u>-0.75</u>	*	-2.07	2.27
Bi	*	*	*	*	*	0.58	*	*	*	<u>-0.75</u>	*	*	-1.73
C(tot)	*	*	*	*	*	*	*	*	*	<u>0.76</u>	*	*	*
Cd	*	*	*	*	*	1.11	*	*	*	<u>-2.92</u>	*	514.74	*
Ce	*	0.14	*	-3.96	*	-0.34	<u>0.98</u>	*	-0.17	<u>-0.22</u>	*	0.16	-18.26
Co	<u>-0.36</u>	0.54	*	*	*	-0.06	*	0.14	0.10	<u>0.57</u>	*	165.13	-5.63
Cr	<u>-2.55</u>	1.36	*	-1.98	0.19	0.83	*	<u>-1.90</u>	-0.90	<u>-2.81</u>	<u>-1.81</u>	-0.12	2.31
Cs	*	0.55	*	*	*	0.00	*	*	-0.59	<u>0.12</u>	*	-0.89	-0.69
Cu	<u>10.08</u>	-3.13	*	*	2.11	1.76	*	<u>-5.48</u>	1.56	<u>0.10</u>	<u>19.60</u>	-14.34	*
Dy	*	0.16	*	*	*	0.63	<u>0.25</u>	*	0.56	<u>-0.34</u>	*	-1.83	-5.93
Er	*	0.52	*	*	*	0.27	<u>0.06</u>	*	0.66	<u>0.04</u>	*	-1.16	-4.22
Eu	*	0.00	*	*	*	0.14	<u>0.19</u>	*	0.41	<u>-0.67</u>	*	1.35	-5.48
Ga	<u>-0.33</u>	-0.66	*	0.55	*	0.88	*	*	-0.12	<u>0.82</u>	*	11.59	-0.09
Gd	*	-0.05	*	*	*	-0.26	<u>-0.03</u>	*	-0.17	<u>0.11</u>	*	0.02	-6.78
Ge	*	*	*	*	*	-0.08	*	*	*	<u>-6.03</u>	*	3.56	*
Hf	<u>-1.93</u>	0.33	*	*	*	0.70	<u>-0.25</u>	*	0.81	<u>-2.25</u>	*	-3.94	0.69
Ho	*	0.10	*	*	*	1.00	<u>0.18</u>	*	0.53	<u>-0.08</u>	*	-1.69	-3.97
In	*	*	*	*	*	*	*	*	*	<u>0.57</u>	*	*	*
La	*	0.16	*	1.16	*	-0.08	<u>0.82</u>	*	0.36	<u>0.52</u>	*	-0.29	-14.02
Li	<u>-0.29</u>	*	*	*	0.94	0.68	*	<u>0.08</u>	-0.36	<u>-0.57</u>	*	*	-0.69
Lu	*	-0.36	*	*	*	-0.01	<u>0.41</u>	*	0.04	<u>0.05</u>	*	-1.78	-2.88
Mo	*	*	*	<u>28.97</u>	-1.57	-0.50	*	*	-0.70	<u>-0.29</u>	*	12.14	5.48
Nb	*	0.35	*	2.03	*	-3.01	<u>-2.03</u>	*	1.10	<u>-0.09</u>	*	-0.53	0.87
Nd	*	0.13	*	-0.64	*	-0.34	<u>0.68</u>	*	0.00	<u>-0.05</u>	*	-0.54	-12.18
Ni	<u>0.07</u>	*	*	<u>-1.39</u>	-8.14	2.47	*	<u>-1.55</u>	0.68	<u>0.38</u>	<u>25.37</u>	11.82	-6.21
Pb	<u>3.33</u>	*	*	-2.24	1.95	0.00	*	*	0.85	<u>0.16</u>	*	4.69	-12.63
Pr	*	0.08	*	*	*	-0.43	<u>0.29</u>	*	-0.45	<u>0.03</u>	*	-0.49	-10.51
Rb	*	0.10	*	-0.16	*	0.21	<u>0.10</u>	*	0.19	<u>0.39</u>	*	5.51	-9.31
Sb	*	*	*	*	*	3.23	*	*	*	<u>-0.23</u>	*	54.02	-0.37
Sc	*	*	*	*	-0.28	0.39	<u>0.02</u>	*	-0.82	<u>-0.51</u>	*	-2.83	-6.59
Sm	*	0.27	*	*	*	-0.00	<u>0.55</u>	*	0.00	<u>0.32</u>	*	-0.12	-8.61
Sn	*	4.16	*	*	-5.08	0.29	<u>0.55</u>	*	-0.20	<u>-0.91</u>	*	6.12	-0.20
Sr	<u>1.79</u>	0.68	*	-0.75	0.27	-0.10	<u>-0.05</u>	*	0.06	<u>0.24</u>	*	-0.29	-15.29
Ta	*	1.73	*	*	*	1.50	<u>-0.77</u>	*	0.08	<u>-0.01</u>	*	9.69	-4.90
Tb	*	0.04	*	*	*	0.35	<u>-0.30</u>	*	1.05	<u>-0.30</u>	*	-0.61	-4.82
Th	*	0.00	*	-2.31	*	0.73	<u>-0.52</u>	<u>-1.71</u>	1.04	<u>-0.09</u>	*	-0.24	-10.48
Tl	*	4.99	*	*	*	*	*	*	0.17	<u>-0.61</u>	*	0.96	*
Tm	*	0.25	*	*	*	0.79	<u>0.49</u>	*	0.99	<u>0.49</u>	*	-1.23	-2.71
U	*	0.00	*	1.62	*	0.00	<u>-0.29</u>	*	0.10	<u>-0.44</u>	*	-0.87	-10.52
V	*	0.90	*	-3.45	-1.46	-1.90	<u>1.99</u>	<u>-3.96</u>	0.19	<u>1.15</u>	<u>0.03</u>	-14.23	3.42
W	*	*	*	<u>3.74</u>	*	0.67	*	*	*	<u>-0.08</u>	*	1.97	5.25
Y	<u>-0.94</u>	0.85	*	0.85	*	0.15	<u>-0.94</u>	*	2.03	<u>0.04</u>	*	43.01	-5.93
Yb	*	0.53	*	<u>7.92</u>	*	0.72	*	*	1.27	<u>-0.17</u>	*	-1.95	-3.31
Zn	<u>0.08</u>	*	*	-3.09	0.21	1.35	*	<u>-2.83</u>	-1.67	<u>0.54</u>	<u>-3.47</u>	-0.51	1.43
Zr	<u>13.80</u>	0.16	*	-0.34	*	-0.21	<u>-0.76</u>	*	2.81	<u>1.93</u>	*	4.79	4.16

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N18	N19	N20	N21	N22	N23	N25	N26	N27	N28	N29	N30	N31
SiO2	1.02	<u>0.21</u>	-6.12	<u>-0.45</u>	-0.51	<u>-0.04</u>	<u>0.65</u>	<u>-0.06</u>	0.52	-2.13	<u>0.00</u>	0.00	*
TiO2	0.79	<u>0.02</u>	-1.85	<u>1.81</u>	0.03	<u>-1.87</u>	<u>-0.03</u>	<u>1.24</u>	0.03	0.03	<u>0.21</u>	-1.28	<u>-1.55</u>
Al2O3	-0.03	<u>-0.05</u>	-0.49	<u>1.24</u>	0.49	<u>0.33</u>	<u>0.19</u>	<u>-0.36</u>	2.09	-1.48	<u>0.08</u>	-1.48	*
Fe2O3T	0.42	<u>0.56</u>	-1.13	<u>0.85</u>	-3.67	<u>1.13</u>	<u>-0.10</u>	<u>1.27</u>	1.41	-1.98	<u>-0.71</u>	0.00	*
MnO	0.89	<u>0.00</u>	-1.27	<u>0.32</u>	0.00	<u>-0.96</u>	<u>-1.43</u>	<u>1.27</u>	0.64	1.27	<u>0.32</u>	-0.13	<u>-0.90</u>
MgO	2.68	<u>-0.58</u>	-0.23	<u>4.07</u>	3.49	<u>3.49</u>	<u>-0.91</u>	<u>1.75</u>	1.16	-1.16	<u>1.34</u>	0.00	*
CaO	1.30	<u>0.00</u>	0.50	<u>0.50</u>	0.00	<u>1.25</u>	<u>-0.68</u>	<u>-0.25</u>	2.00	-2.00	<u>0.25</u>	1.50	*
Na2O	0.25	<u>-0.47</u>	-0.77	<u>1.93</u>	1.95	<u>1.53</u>	<u>-0.35</u>	<u>-0.55</u>	2.91	-0.77	<u>0.57</u>	-0.13	*
K2O	0.61	<u>0.07</u>	-1.71	<u>0.86</u>	-1.19	<u>0.13</u>	<u>-1.24</u>	<u>-0.13</u>	-1.85	-1.32	<u>0.46</u>	-0.79	*
P2O5	-2.18	<u>-2.73</u>	-8.73	*	-5.46	<u>-0.27</u>	<u>2.86</u>	<u>1.64</u>	1.09	0.55	<u>0.00</u>	-1.64	*
As	2.77	*	*	*	15.06	<u>4.89</u>	<u>1.69</u>	*	*	0.46	*	*	<u>-2.05</u>
Ba	-4.70	<u>-0.77</u>	-0.07	<u>0.72</u>	-2.35	<u>-1.25</u>	<u>-0.43</u>	*	*	1.35	*	*	<u>-1.48</u>
Be	-7.45	*	*	*	*	*	<u>0.32</u>	*	*	0.54	*	*	*
Bi	-5.34	*	*	*	*	*	*	*	*	1.77	*	*	<u>-0.45</u>
C(tot)	*	*	*	*	*	<u>-17.29</u>	<u>-1.31</u>	*	*	*	*	*	*
Cd	1.11	*	50.25	*	*	*	*	*	*	1.11	*	*	<u>-2.58</u>
Ce	-13.53	*	-0.22	*	0.20	<u>-1.22</u>	<u>0.34</u>	*	*	2.03	*	*	<u>-1.25</u>
Co	-8.08	*	0.81	*	5.91	<u>1.30</u>	<u>0.41</u>	*	*	-1.98	*	*	<u>-0.92</u>
Cr	-21.06	<u>-0.71</u>	0.05	*	-6.06	<u>-3.25</u>	<u>-9.48</u>	*	*	-0.95	<u>-0.47</u>	*	<u>-2.04</u>
Cs	-5.20	*	-0.55	*	-1.63	*	*	*	*	-0.27	*	*	*
Cu	-9.57	*	5.79	*	*	<u>-2.57</u>	<u>0.59</u>	*	*	-2.27	*	*	<u>-1.39</u>
Dy	-4.70	*	-0.30	*	*	*	<u>0.08</u>	*	*	-1.37	*	*	*
Er	-3.84	*	-0.87	*	*	*	<u>0.31</u>	*	*	-1.56	*	*	*
Eu	-2.70	*	-0.09	*	*	*	*	*	*	0.78	*	*	*
Ga	-8.19	<u>0.22</u>	-0.33	*	-1.64	<u>0.66</u>	<u>-0.05</u>	*	*	1.53	*	*	<u>-0.36</u>
Gd	-4.39	*	0.61	*	*	*	<u>0.67</u>	*	*	0.58	*	*	*
Ge	8.65	*	*	*	*	<u>-1.90</u>	*	*	*	-5.90	*	*	*
Hf	-5.38	*	0.02	*	-1.41	<u>-1.93</u>	*	*	*	-0.22	*	*	*
Ho	-3.48	*	0.00	*	*	*	<u>0.18</u>	*	*	-1.31	*	*	*
In	*	*	*	*	*	*	*	*	*	*	*	*	<u>-0.72</u>
La	-7.63	*	-0.78	*	1.87	<u>-0.60</u>	<u>0.52</u>	*	*	1.28	*	*	<u>-0.13</u>
Li	-9.59	*	-0.15	*	*	*	<u>2.02</u>	*	*	-2.16	<u>-0.08</u>	*	*
Lu	-2.95	*	-0.13	*	*	*	*	*	*	-1.78	*	*	*
Mo	-3.87	*	-1.90	*	-2.80	<u>4.35</u>	<u>-0.17</u>	*	*	0.07	*	*	<u>-3.12</u>
Nb	-3.48	*	0.57	*	-1.50	<u>-0.53</u>	*	*	*	1.50	*	*	<u>-0.11</u>
Nd	-6.82	*	-0.06	*	-0.95	<u>-1.01</u>	<u>0.52</u>	*	*	0.89	*	*	*
Ni	-9.54	*	0.49	*	-3.56	<u>-3.05</u>	<u>1.53</u>	*	*	-2.20	*	*	<u>-2.87</u>
Pb	-13.26	*	-0.28	<u>0.03</u>	-0.40	<u>-0.23</u>	<u>0.69</u>	*	*	-0.86	<u>-0.96</u>	*	<u>0.07</u>
Pr	-5.95	*	0.25	*	*	*	<u>0.11</u>	*	*	0.12	*	*	*
Rb	-15.22	*	-0.82	<u>-0.69</u>	-1.29	<u>-0.64</u>	<u>3.51</u>	*	*	0.10	*	*	<u>0.01</u>
Sb	1.39	*	*	*	*	*	*	*	*	0.09	*	*	<u>-2.00</u>
Sc	-5.32	*	-0.63	*	11.54	<u>3.37</u>	<u>1.30</u>	*	*	-7.49	*	*	*
Sm	-5.14	*	-0.52	*	-3.80	<u>-4.35</u>	<u>0.40</u>	*	*	0.73	*	*	*
Sn	-3.52	*	*	*	*	<u>5.60</u>	<u>-0.22</u>	*	*	1.10	*	*	*
Sr	-11.48	<u>-1.11</u>	-1.97	<u>0.34</u>	-1.20	<u>-0.71</u>	<u>-0.30</u>	*	*	-0.10	*	*	<u>-0.26</u>
Ta	6.50	*	-0.09	*	*	*	<u>-0.39</u>	*	*	0.29	*	*	*
Tb	-3.20	*	0.82	*	*	*	*	*	*	-0.28	*	*	*
Th	-8.69	*	-1.40	<u>0.88</u>	-0.97	<u>-0.33</u>	<u>-0.33</u>	*	*	-2.55	*	*	<u>-0.10</u>
Tl	-3.59	*	*	*	*	<u>2.54</u>	<u>0.79</u>	*	*	-0.44	*	*	<u>-5.41</u>
Tm	-2.46	*	1.03	*	*	*	*	*	*	-1.23	*	*	*
U	-10.82	*	-0.15	*	-0.88	<u>0.22</u>	<u>0.44</u>	*	*	-1.33	*	*	<u>0.25</u>
V	-2.90	<u>-0.81</u>	-0.83	*	0.48	<u>-1.37</u>	<u>0.82</u>	*	*	0.90	*	*	<u>-1.81</u>
W	-2.91	*	*	*	14.95	<u>-0.98</u>	<u>5.31</u>	*	*	6.18	*	*	*
Y	-6.31	*	-0.26	<u>1.51</u>	0.22	<u>0.60</u>	<u>0.11</u>	*	*	-4.55	*	*	<u>-0.30</u>
Yb	-3.36	*	1.11	*	*	*	<u>0.14</u>	*	*	-2.00	*	*	*
Zn	-13.19	<u>-0.91</u>	-0.62	*	-0.70	<u>-1.18</u>	*	*	*	1.02	<u>121.63</u>	*	<u>-0.03</u>
Zr	*	<u>-3.35</u>	-0.55	<u>-0.85</u>	-0.79	<u>-0.47</u>	<u>-5.63</u>	*	*	-0.03	<u>4.44</u>	*	<u>-0.63</u>

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N32	N33	N35	N36	N38	N39	N40	N42	N43	N44	N45	N46	N47
SiO2	<u>0.32</u>	<u>0.19</u>	15.68	<u>0.45</u>	*	<u>-0.22</u>	<u>0.36</u>	<u>0.01</u>	-5.56	<u>-0.24</u>	<u>0.01</u>	<u>0.10</u>	<u>-0.06</u>
TiO2	<u>0.96</u>	<u>-0.92</u>	1.33	<u>1.51</u>	*	<u>-0.21</u>	<u>1.71</u>	<u>0.11</u>	-5.05	<u>-0.92</u>	<u>0.02</u>	<u>0.02</u>	<u>0.02</u>
Al2O3	<u>-0.47</u>	<u>0.36</u>	2.58	<u>0.54</u>	*	<u>-0.77</u>	<u>0.01</u>	<u>0.11</u>	-0.17	<u>-0.49</u>	<u>0.25</u>	<u>-0.66</u>	<u>-0.16</u>
Fe2O3T	<u>1.98</u>	<u>-0.14</u>	1.13	<u>0.35</u>	*	<u>-0.69</u>	<u>0.16</u>	<u>0.28</u>	1.07	<u>-1.41</u>	<u>-0.28</u>	<u>0.14</u>	<u>0.14</u>
MnO	<u>2.23</u>	<u>0.00</u>	0.70	<u>-1.16</u>	*	<u>0.06</u>	<u>0.00</u>	<u>0.00</u>	-1.27	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>-1.27</u>
MgO	<u>0.58</u>	<u>0.58</u>	*	<u>0.50</u>	*	<u>-0.48</u>	<u>2.04</u>	<u>-0.58</u>	-3.49	<u>1.16</u>	<u>0.00</u>	<u>5.24</u>	<u>2.33</u>
CaO	<u>2.50</u>	<u>0.75</u>	-1.75	<u>-0.05</u>	*	<u>-0.44</u>	<u>-0.63</u>	<u>0.75</u>	-0.95	<u>-0.50</u>	<u>0.00</u>	<u>-0.75</u>	<u>1.75</u>
Na2O	<u>0.57</u>	<u>0.17</u>	1.79	<u>1.02</u>	*	<u>0.72</u>	<u>0.37</u>	<u>0.17</u>	0.56	<u>0.73</u>	<u>-0.15</u>	<u>-2.14</u>	<u>0.49</u>
K2O	<u>1.32</u>	<u>-0.59</u>	-1.45	<u>-0.83</u>	*	<u>-0.65</u>	<u>0.96</u>	<u>0.00</u>	-3.57	<u>-0.40</u>	<u>-0.20</u>	<u>-1.25</u>	<u>0.07</u>
P2O5	<u>0.00</u>	<u>0.00</u>	*	<u>-0.35</u>	*	<u>0.27</u>	<u>0.55</u>	<u>0.55</u>	2.73	<u>0.00</u>	<u>-0.55</u>	<u>2.73</u>	<u>0.27</u>
As	*	*	-4.75	*	17.04	*	*	*	0.03	<u>2.91</u>	<u>-0.07</u>	*	*
Ba	<u>0.98</u>	*	-0.31	<u>-0.11</u>	-6.18	<u>-0.44</u>	<u>0.50</u>	<u>-0.51</u>	2.12	<u>1.99</u>	<u>-0.13</u>	<u>0.98</u>	<u>0.19</u>
Be	<u>-0.33</u>	*	*	<u>-0.63</u>	-0.73	*	*	*	0.39	*	<u>-0.16</u>	*	<u>-0.99</u>
Bi	*	*	*	*	-1.61	*	*	*	7.63	*	<u>0.29</u>	*	*
C(tot)	*	*	*	<u>0.24</u>	*	<u>-0.48</u>	*	*	*	*	<u>0.76</u>	*	*
Cd	*	*	*	<u>-1.39</u>	*	*	*	*	0.28	*	*	*	*
Ce	<u>0.29</u>	*	-0.68	<u>-0.51</u>	-16.57	<u>-0.74</u>	*	*	4.35	<u>0.51</u>	<u>0.08</u>	*	<u>-0.51</u>
Co	<u>-0.06</u>	*	-1.05	<u>0.24</u>	-7.49	*	*	*	0.06	<u>6.27</u>	<u>0.30</u>	<u>-0.36</u>	*
Cr	*	*	0.89	<u>0.79</u>	-2.37	<u>-1.16</u>	<u>-0.56</u>	<u>0.15</u>	*	<u>1.89</u>	<u>0.09</u>	<u>1.39</u>	<u>-2.37</u>
Cs	*	*	0.07	<u>0.95</u>	-3.10	*	*	*	0.97	*	<u>0.03</u>	*	*
Cu	*	*	*	<u>0.25</u>	-1.40	*	*	*	-3.90	<u>2.89</u>	<u>0.88</u>	<u>-1.42</u>	*
Dy	<u>-0.43</u>	*	3.82	<u>-0.32</u>	-8.09	*	*	*	-14.17	<u>-1.25</u>	<u>0.08</u>	*	*
Er	<u>-0.38</u>	*	*	<u>-0.34</u>	-6.91	*	*	*	-2.73	<u>1.05</u>	<u>-0.19</u>	*	*
Eu	<u>0.58</u>	*	0.00	<u>-0.04</u>	-5.48	*	*	*	-1.17	<u>3.86</u>	<u>0.00</u>	*	*
Ga	<u>0.33</u>	*	-6.13	<u>0.19</u>	-2.67	<u>0.28</u>	*	<u>0.77</u>	3.20	<u>0.22</u>	<u>0.00</u>	<u>-0.33</u>	<u>-0.33</u>
Gd	*	*	*	<u>-0.41</u>	-8.04	*	*	*	-0.05	<u>0.84</u>	<u>-0.39</u>	*	*
Ge	*	*	*	*	1.78	*	*	*	*	<u>1.33</u>	<u>0.12</u>	*	*
Hf	*	*	0.73	<u>-0.38</u>	2.25	<u>1.57</u>	*	<u>-0.70</u>	11.78	<u>-1.93</u>	<u>-0.25</u>	*	*
Ho	<u>-0.46</u>	*	*	<u>-0.27</u>	-6.02	*	*	*	-2.15	<u>-2.38</u>	<u>0.18</u>	*	*
In	*	*	*	<u>-0.14</u>	3.85	*	*	*	*	*	*	*	*
La	<u>0.20</u>	*	-0.55	<u>-0.53</u>	-15.30	<u>1.17</u>	*	*	-0.89	<u>0.52</u>	<u>0.02</u>	*	<u>-0.07</u>
Li	<u>0.08</u>	*	*	<u>-0.50</u>	-5.70	*	*	*	-0.91	*	<u>-0.69</u>	*	<u>-0.39</u>
Lu	<u>-0.65</u>	*	-2.48	<u>-0.55</u>	-5.14	*	*	*	-2.62	<u>-0.89</u>	<u>0.29</u>	*	*
Mo	*	*	*	<u>-0.00</u>	3.11	*	*	*	1.08	<u>-2.63</u>	<u>-0.17</u>	*	*
Nb	<u>0.18</u>	*	*	<u>0.51</u>	0.71	<u>-0.91</u>	*	<u>1.06</u>	*	<u>-0.71</u>	<u>0.18</u>	<u>-2.48</u>	<u>0.18</u>
Nd	<u>0.18</u>	*	-2.80	<u>-0.28</u>	-13.03	<u>4.37</u>	*	*	2.06	<u>0.91</u>	<u>0.06</u>	*	*
Ni	<u>-0.22</u>	*	*	<u>0.30</u>	-4.11	<u>1.04</u>	<u>-1.88</u>	*	1.40	<u>-0.91</u>	<u>0.07</u>	<u>-0.91</u>	*
Pb	<u>0.00</u>	*	*	<u>-0.02</u>	-15.70	<u>0.45</u>	<u>0.03</u>	*	7.33	<u>0.69</u>	<u>-0.10</u>	<u>-0.30</u>	<u>0.36</u>
Pr	<u>0.01</u>	*	*	<u>-0.39</u>	-11.18	*	*	*	-0.16	<u>1.32</u>	<u>-0.10</u>	*	*
Rb	<u>-0.40</u>	*	1.11	<u>-0.02</u>	-17.56	<u>0.31</u>	*	<u>-1.02</u>	-1.10	<u>0.27</u>	<u>-0.01</u>	<u>-0.74</u>	<u>-0.01</u>
Sb	<u>10.39</u>	*	*	<u>0.09</u>	*	*	*	*	-0.45	*	*	*	*
Sc	*	*	-0.08	<u>-0.25</u>	-12.38	<u>1.30</u>	*	*	2.18	<u>1.62</u>	<u>1.62</u>	<u>-3.17</u>	*
Sm	<u>0.34</u>	*	-1.96	<u>-0.35</u>	-9.64	*	*	*	0.05	<u>1.16</u>	<u>-0.37</u>	*	*
Sn	<u>0.78</u>	*	*	<u>0.10</u>	3.12	<u>1.58</u>	*	*	11.47	<u>7.76</u>	<u>0.55</u>	*	*
Sr	<u>0.34</u>	*	*	<u>-0.12</u>	-18.23	<u>-0.08</u>	<u>-0.72</u>	<u>0.14</u>	-2.47	<u>-0.53</u>	<u>0.12</u>	<u>0.43</u>	<u>0.05</u>
Ta	*	*	-1.00	<u>-0.14</u>	-6.65	*	*	*	17.68	<u>0.75</u>	<u>-0.01</u>	*	*
Tb	*	*	-0.61	<u>-0.22</u>	-5.98	*	*	*	*	<u>2.13</u>	<u>0.51</u>	*	*
Th	*	*	0.91	<u>-0.86</u>	*	<u>-0.05</u>	*	*	1.28	<u>2.10</u>	<u>-0.24</u>	<u>-0.94</u>	<u>-0.03</u>
Tl	<u>0.09</u>	*	*	<u>0.11</u>	-0.44	*	*	*	4.04	*	<u>0.09</u>	*	*
Tm	<u>-0.25</u>	*	*	<u>-0.20</u>	-4.85	*	*	*	-1.87	<u>-3.08</u>	<u>-0.62</u>	*	*
U	<u>0.00</u>	*	-4.57	<u>-0.60</u>	*	<u>2.38</u>	*	*	4.59	<u>-1.77</u>	<u>-0.07</u>	*	*
V	<u>0.45</u>	*	5.38	<u>0.32</u>	-0.84	<u>-2.67</u>	<u>-6.41</u>	*	3.36	<u>-0.81</u>	<u>-0.11</u>	<u>1.99</u>	*
W	*	*	-6.30	<u>-0.28</u>	0.00	*	*	*	3.64	<u>0.20</u>	<u>0.20</u>	*	*
Y	<u>1.51</u>	*	*	<u>-0.07</u>	-11.54	<u>0.75</u>	*	<u>2.91</u>	-4.32	<u>-0.24</u>	<u>-0.52</u>	<u>-0.59</u>	<u>0.11</u>
Yb	<u>-0.44</u>	*	-0.69	<u>-0.21</u>	-6.47	*	*	*	-2.83	<u>3.30</u>	<u>0.09</u>	*	*
Zn	<u>1.11</u>	*	11.42	<u>0.42</u>	-16.89	<u>-0.88</u>	<u>0.41</u>	<u>1.40</u>	-5.64	<u>0.41</u>	<u>-0.25</u>	<u>0.08</u>	<u>-0.25</u>
Zr	<u>2.58</u>	*	12.58	<u>0.60</u>	6.28	<u>0.25</u>	<u>-0.11</u>	<u>1.28</u>	-9.86	<u>0.08</u>	<u>1.10</u>	<u>-0.20</u>	<u>0.45</u>

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N48	N49	N50	N51	N52	N53	N54	N55	N56	N57	N58	N59	N60
SiO2	<u>0.88</u>	<u>0.01</u>	<u>0.16</u>	<u>-5.59</u>	<u>-0.13</u>	<u>0.08</u>	<u>0.11</u>	<u>-0.40</u>	<u>-0.23</u>	<u>-1.14</u>	<u>0.13</u>	<u>-0.06</u>	<u>-0.03</u>
TiO2	*	<u>-0.27</u>	<u>0.49</u>	<u>-1.21</u>	<u>-0.92</u>	<u>0.03</u>	<u>-1.21</u>	<u>1.92</u>	<u>-0.92</u>	<u>7.57</u>	<u>-0.15</u>	<u>0.96</u>	<u>0.96</u>
Al2O3	<u>-0.05</u>	<u>-0.14</u>	<u>0.27</u>	<u>0.63</u>	<u>0.77</u>	<u>0.22</u>	<u>-0.68</u>	<u>-1.21</u>	<u>1.02</u>	<u>-1.21</u>	<u>0.65</u>	<u>-0.11</u>	<u>1.25</u>
Fe2O3T	<u>-1.27</u>	<u>-0.40</u>	<u>-0.38</u>	<u>-2.82</u>	<u>0.42</u>	<u>0.85</u>	<u>0.10</u>	<u>-1.13</u>	<u>0.28</u>	<u>7.73</u>	<u>0.12</u>	<u>0.28</u>	<u>0.30</u>
MnO	*	<u>0.00</u>	<u>1.27</u>	<u>-1.27</u>	<u>4.78</u>	<u>0.00</u>	<u>0.00</u>	*	<u>0.00</u>	<u>-3.19</u>	<u>0.25</u>	<u>0.00</u>	<u>-2.55</u>
MgO	*	<u>0.00</u>	<u>-1.98</u>	*	<u>2.33</u>	<u>-3.49</u>	<u>2.62</u>	<u>-1.16</u>	<u>-0.58</u>	<u>3.49</u>	<u>1.82</u>	<u>-2.91</u>	<u>1.51</u>
CaO	*	<u>-0.25</u>	<u>0.25</u>	<u>-1.18</u>	<u>-1.00</u>	<u>0.00</u>	<u>0.00</u>	<u>-3.50</u>	<u>-21.00</u>	<u>5.05</u>	<u>0.42</u>	<u>-0.25</u>	<u>0.15</u>
Na2O	<u>-0.79</u>	<u>-0.07</u>	<u>-0.39</u>	*	<u>-0.79</u>	<u>-0.61</u>	<u>0.21</u>	<u>-0.13</u>	<u>1.29</u>	<u>-0.29</u>	<u>-0.26</u>	<u>1.29</u>	<u>-0.51</u>
K2O	<u>-1.58</u>	<u>-0.53</u>	<u>0.31</u>	<u>-3.76</u>	<u>-1.06</u>	<u>-0.53</u>	<u>0.42</u>	<u>-2.24</u>	<u>1.45</u>	<u>0.26</u>	<u>0.26</u>	<u>1.52</u>	<u>-0.13</u>
P2O5	*	<u>-1.09</u>	<u>0.82</u>	*	<u>0.00</u>	<u>0.00</u>	<u>-3.27</u>	<u>0.00</u>	<u>0.00</u>	<u>-2.73</u>	<u>-0.44</u>	<u>0.00</u>	<u>-0.55</u>
As	*	*	<u>0.00</u>	*	*	69.93	<u>-0.73</u>	*	*	*	*	*	*
Ba	*	<u>0.46</u>	<u>1.12</u>	<u>-0.73</u>	*	<u>-1.15</u>	<u>0.28</u>	<u>3.37</u>	*	<u>-0.93</u>	<u>0.46</u>	<u>-0.81</u>	<u>12.68</u>
Be	*	*	<u>-0.81</u>	*	*	<u>-0.76</u>	<u>-0.96</u>	*	*	*	*	*	*
Bi	*	*	<u>-0.30</u>	*	*	*	<u>-0.60</u>	*	*	*	*	*	*
C(tot)	*	<u>-0.24</u>	*	*	<u>-15.28</u>	*	*	*	*	<u>2.97</u>	*	*	*
Cd	*	*	<u>4.72</u>	*	*	<u>1.11</u>	<u>-0.83</u>	*	*	*	*	*	*
Ce	*	<u>-0.68</u>	<u>0.22</u>	<u>-1.03</u>	*	<u>-1.52</u>	<u>-0.17</u>	*	*	<u>-1.15</u>	*	*	*
Co	*	*	<u>0.37</u>	*	*	<u>-0.19</u>	<u>-0.53</u>	*	*	*	*	*	<u>6.27</u>
Cr	*	<u>-0.09</u>	<u>2.58</u>	<u>1.60</u>	*	<u>1.11</u>	<u>2.02</u>	<u>1.78</u>	*	<u>-15.83</u>	<u>-0.93</u>	<u>-2.34</u>	<u>1.45</u>
Cs	*	*	<u>2.26</u>	*	*	<u>-0.25</u>	<u>-0.94</u>	*	*	*	*	*	*
Cu	*	*	<u>0.71</u>	<u>18.71</u>	*	<u>6.76</u>	<u>0.85</u>	*	*	*	<u>4.50</u>	*	<u>4.33</u>
Dy	*	*	<u>0.10</u>	*	*	<u>-1.04</u>	<u>-1.12</u>	*	*	<u>-2.00</u>	*	*	*
Er	*	*	<u>-0.28</u>	*	*	<u>-0.52</u>	<u>-1.08</u>	*	*	<u>-1.56</u>	*	*	*
Eu	*	*	<u>0.39</u>	*	*	<u>-0.38</u>	<u>-0.29</u>	*	*	<u>-0.29</u>	*	*	*
Ga	*	*	<u>1.37</u>	<u>-0.82</u>	*	<u>-0.15</u>	<u>-1.03</u>	*	*	<u>0.93</u>	*	<u>-2.52</u>	*
Gd	*	*	<u>0.34</u>	*	*	<u>-0.64</u>	<u>-0.69</u>	*	*	<u>-13.44</u>	*	*	*
Ge	*	*	<u>-0.61</u>	*	*	*	<u>4.77</u>	*	*	*	*	*	*
Hf	*	*	<u>-1.65</u>	*	*	<u>-1.65</u>	*	*	*	<u>-3.83</u>	<u>2.21</u>	*	*
Ho	*	*	<u>-0.01</u>	*	*	<u>-0.54</u>	<u>-1.04</u>	*	*	<u>-1.29</u>	*	*	*
In	*	*	*	*	*	<u>-0.68</u>	*	*	*	*	*	*	*
La	*	<u>-0.37</u>	<u>0.17</u>	<u>-1.49</u>	*	<u>-0.26</u>	<u>0.15</u>	<u>0.82</u>	*	<u>-1.32</u>	<u>0.04</u>	*	*
Li	*	*	<u>1.12</u>	*	*	*	<u>-0.45</u>	*	*	<u>0.81</u>	<u>-0.80</u>	*	*
Lu	*	*	<u>-0.30</u>	*	*	<u>-0.60</u>	<u>-1.12</u>	*	*	<u>-1.66</u>	*	*	*
Mo	*	*	<u>0.49</u>	*	*	*	<u>-0.50</u>	*	*	*	*	*	*
Nb	*	*	<u>0.57</u>	<u>2.52</u>	*	<u>0.35</u>	<u>-0.34</u>	<u>-0.53</u>	*	<u>-3.89</u>	<u>-0.08</u>	<u>0.18</u>	<u>-0.71</u>
Nd	*	*	<u>-0.01</u>	<u>-1.05</u>	*	<u>-0.88</u>	<u>-0.79</u>	*	*	<u>-2.64</u>	<u>0.05</u>	*	*
Ni	*	*	<u>0.92</u>	*	*	<u>1.50</u>	<u>-0.60</u>	*	*	<u>34.03</u>	<u>1.80</u>	<u>-1.88</u>	<u>6.88</u>
Pb	*	*	<u>0.92</u>	<u>1.12</u>	*	<u>1.87</u>	<u>-1.00</u>	*	*	<u>-0.03</u>	*	<u>0.69</u>	<u>-1.95</u>
Pr	*	*	<u>0.09</u>	*	*	<u>-0.73</u>	<u>-0.67</u>	*	*	<u>-2.30</u>	*	*	*
Rb	*	*	<u>2.42</u>	<u>0.22</u>	*	<u>-0.67</u>	<u>-0.90</u>	<u>0.43</u>	*	<u>-0.96</u>	<u>0.36</u>	<u>-0.46</u>	<u>0.27</u>
Sb	*	*	<u>-0.69</u>	*	*	*	<u>0.23</u>	*	*	*	*	*	*
Sc	*	*	<u>0.74</u>	*	*	<u>2.50</u>	*	*	*	<u>0.02</u>	<u>-0.19</u>	*	*
Sm	*	*	<u>0.23</u>	*	*	<u>-0.95</u>	<u>-0.69</u>	*	*	<u>-2.30</u>	*	*	*
Sn	*	*	<u>0.22</u>	*	*	*	*	*	*	*	*	*	*
Sr	*	*	<u>1.11</u>	<u>0.24</u>	*	<u>-1.06</u>	<u>-1.06</u>	<u>2.80</u>	*	<u>-1.68</u>	<u>-0.09</u>	<u>-0.14</u>	<u>0.05</u>
Ta	*	*	<u>0.37</u>	*	*	<u>-9.49</u>	*	*	*	*	*	*	*
Tb	*	*	<u>0.34</u>	*	*	<u>-0.12</u>	<u>-0.63</u>	*	*	<u>-1.32</u>	*	*	*
Th	*	*	<u>-0.64</u>	<u>-1.79</u>	*	<u>0.45</u>	<u>0.42</u>	*	*	<u>-0.97</u>	*	<u>1.19</u>	<u>0.58</u>
Tl	*	*	<u>0.39</u>	*	*	*	<u>-1.31</u>	*	*	*	*	*	*
Tm	*	*	<u>0.12</u>	*	*	<u>0.00</u>	<u>-0.86</u>	*	*	<u>-1.48</u>	*	*	*
U	*	*	<u>-0.52</u>	<u>-1.91</u>	*	<u>0.03</u>	<u>-1.47</u>	*	*	<u>-0.59</u>	*	<u>0.44</u>	*
V	*	<u>-2.91</u>	<u>-0.11</u>	*	*	<u>-0.01</u>	<u>-0.77</u>	*	*	<u>-1.16</u>	<u>0.27</u>	<u>-0.81</u>	<u>29.29</u>
W	*	*	<u>-0.33</u>	*	*	*	*	*	*	*	*	*	*
Y	*	<u>-0.24</u>	<u>0.00</u>	<u>0.70</u>	*	<u>0.22</u>	<u>-1.43</u>	<u>0.92</u>	*	<u>-1.61</u>	<u>0.94</u>	<u>-0.59</u>	<u>0.81</u>
Yb	*	*	<u>0.14</u>	*	*	<u>-0.54</u>	*	*	*	<u>-0.78</u>	*	*	*
Zn	*	<u>-0.58</u>	<u>-0.58</u>	<u>-0.15</u>	*	<u>-1.00</u>	<u>-1.46</u>	*	*	*	<u>-0.52</u>	<u>-2.24</u>	<u>0.41</u>
Zr	*	<u>-0.48</u>	<u>-3.72</u>	<u>-1.22</u>	*	<u>3.65</u>	<u>-6.29</u>	<u>2.20</u>	*	<u>-0.44</u>	<u>1.92</u>	<u>-0.20</u>	<u>-0.76</u>

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - *Entries in italics* are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N62	N63	N64	N65	N68	N70	N71	N72	N73	N74	N75	N76	N77
SiO2	<u>-0.32</u>	*	1.23	-0.58	0.08	-0.89	3.03	-0.44	0.12	-4.57	0.20	-0.29	0.57
TiO2	<u>0.93</u>	*	1.92	1.54	0.21	0.02	0.58	-0.92	-0.08	-1.11	3.22	0.02	0.03
Al2O3	<u>-0.08</u>	*	2.20	-0.99	<u>-0.03</u>	<u>-0.74</u>	0.66	<u>-0.22</u>	0.16	0.00	-0.05	0.00	0.38
Fe2O3T	<u>0.63</u>	*	0.00	0.34	<u>-0.64</u>	1.69	<u>-0.32</u>	<u>-1.55</u>	0.28	<u>-0.14</u>	0.82	<u>-1.98</u>	0.56
MnO	<u>0.16</u>	*	-2.55	0.64	<u>-1.75</u>	<u>-3.19</u>	<u>-0.64</u>	<u>-3.19</u>	0.96	0.00	0.25	0.00	-1.27
MgO	<u>-2.88</u>	*	2.33	1.98	0.00	<u>-3.49</u>	<u>-1.69</u>	<u>-1.16</u>	1.16	0.12	-3.49	4.65	-1.16
CaO	<u>-0.52</u>	*	1.00	0.05	0.27	<u>-5.00</u>	<u>-0.30</u>	<u>-0.25</u>	<u>-0.03</u>	<u>-0.60</u>	1.40	<u>-0.25</u>	1.00
Na2O	<u>-0.72</u>	*	0.99	-2.05	0.75	<u>-1.66</u>	2.84	<u>-0.31</u>	<u>-1.10</u>	*	0.40	<u>-2.14</u>	-1.57
K2O	<u>-0.12</u>	*	0.26	-0.79	0.15	<u>-0.46</u>	0.83	0.20	<u>-0.73</u>	<u>-0.79</u>	-0.08	<u>-0.46</u>	0.13
P2O5	<u>0.27</u>	*	1.64	2.73	*	0.00	0.00	0.00	<u>-0.82</u>	<u>-0.82</u>	2.84	2.73	0.55
As	*	*	-5.81	0.49	*	1.92	<u>-1.27</u>	*	3.90	<u>-0.26</u>	-1.58	*	*
Ba	<u>-4.46</u>	*	0.92	1.96	*	*	0.61	*	0.64	<u>-3.62</u>	0.22	0.06	-0.66
Be	*	*	*	-2.27	*	<u>-1.75</u>	0.97	*	*	0.14	*	<u>-0.16</u>	*
Bi	*	*	*	-0.60	*	*	<u>-0.02</u>	*	*	0.02	0.17	*	*
C(tot)	*	*	*	-0.80	*	<u>-8.06</u>	*	*	*	*	*	*	*
Cd	*	*	*	-2.22	*	93.56	<u>-1.99</u>	*	*	<u>-0.83</u>	23.32	*	*
Ce	*	2.19	1.02	0.29	*	*	<u>-0.42</u>	*	<u>-0.91</u>	<u>-9.31</u>	-0.49	<u>-0.18</u>	-0.85
Co	*	*	1.93	-0.43	*	28.83	0.42	*	*	0.14	*	9.59	-0.72
Cr	<u>2.07</u>	*	4.91	-2.79	*	<u>-2.34</u>	<u>-4.26</u>	*	0.24	<u>-0.24</u>	1.32	1.63	-3.91
Cs	*	*	3.88	-0.00	*	*	<u>-0.00</u>	*	<u>-1.13</u>	<u>-0.47</u>	0.41	*	-0.21
Cu	<u>162.86</u>	*	6.94	5.09	*	4.04	<u>-0.50</u>	*	*	<u>-0.10</u>	15.45	1.46	*
Dy	*	0.49	0.33	-1.23	*	*	0.11	*	<u>-0.68</u>	<u>-4.51</u>	0.00	<u>-0.00</u>	-1.57
Er	*	0.92	0.32	-0.85	*	*	0.09	*	<u>-0.58</u>	<u>-4.05</u>	-0.29	<u>-0.21</u>	-1.71
Eu	*	9.27	0.39	-0.17	*	*	0.53	*	0.84	<u>-3.55</u>	0.22	0.00	-0.38
Ga	*	*	-0.66	1.58	*	*	<u>-1.00</u>	*	0.77	0.49	-0.78	<u>-0.11</u>	0.44
Gd	*	2.42	0.12	-0.02	*	*	<u>-0.09</u>	*	<u>-0.81</u>	<u>-4.91</u>	0.35	0.08	-1.30
Ge	*	*	*	*	*	*	*	*	*	<u>-0.57</u>	1.22	0.04	*
Hf	*	*	-0.10	-0.63	*	*	0.52	*	*	<u>-2.37</u>	-0.02	0.20	-1.62
Ho	*	2.15	-0.41	-0.37	*	*	0.15	*	<u>-0.67</u>	<u>-3.62</u>	0.33	<u>-0.01</u>	-1.05
In	*	*	*	*	*	*	*	*	*	0.45	*	*	*
La	*	1.80	-0.38	-1.66	*	*	<u>-0.26</u>	*	0.34	<u>-8.83</u>	-0.47	0.09	-0.91
Li	*	*	*	-0.82	*	*	<u>-0.44</u>	*	*	<u>-1.22</u>	*	*	0.65
Lu	*	0.34	-0.46	-0.58	*	*	<u>-0.18</u>	*	<u>-0.15</u>	<u>-2.90</u>	0.01	0.29	-1.54
Mo	*	*	-6.00	0.00	*	<u>-0.17</u>	<u>-0.18</u>	*	*	0.20	0.52	*	*
Nb	*	*	2.09	-0.84	*	*	<u>-0.55</u>	*	<u>-0.27</u>	<u>-0.40</u>	<u>-0.10</u>	0.18	<u>-0.04</u>
Nd	*	-0.03	0.37	-0.51	*	*	<u>-0.53</u>	*	<u>-1.78</u>	<u>-7.51</u>	0.07	0.36	-0.80
Ni	*	*	3.25	-0.83	*	0.65	1.15	*	<u>-0.42</u>	<u>-0.01</u>	3.29	<u>-1.68</u>	-1.81
Pb	*	*	4.49	0.34	*	<u>-2.67</u>	<u>-0.33</u>	*	<u>-0.30</u>	<u>-0.53</u>	-1.44	<u>-0.30</u>	0.00
Pr	*	-0.95	-0.32	-0.57	*	*	<u>-0.17</u>	*	<u>-0.85</u>	<u>-6.35</u>	-0.33	<u>-0.09</u>	-0.58
Rb	0.10	*	2.69	0.48	*	*	0.28	*	<u>-0.63</u>	<u>-6.38</u>	0.12	0.16	-0.92
Sb	*	*	*	0.09	*	92.58	<u>-0.39</u>	*	*	0.60	24.38	*	*
Sc	*	*	0.84	0.68	*	*	*	*	0.18	<u>-3.20</u>	0.28	0.18	-1.58
Sm	*	0.61	0.30	-0.22	*	*	<u>-0.05</u>	*	<u>-0.74</u>	<u>-5.45</u>	0.03	<u>-0.22</u>	-0.52
Sn	*	*	*	0.13	*	<u>-0.75</u>	0.74	*	<u>-0.32</u>	<u>-0.36</u>	0.45	*	*
Sr	<u>-0.34</u>	*	1.06	-0.31	*	6.23	0.26	*	<u>-0.14</u>	<u>-3.24</u>	0.21	0.43	-0.48
Ta	*	*	0.21	-0.58	*	*	<u>-0.68</u>	*	*	0.94	0.08	<u>-0.01</u>	<u>-0.01</u>
Tb	*	-0.28	0.11	-0.27	*	*	0.31	*	<u>-0.62</u>	<u>-3.58</u>	0.92	0.43	-0.61
Th	*	*	0.06	-0.87	*	*	<u>-1.33</u>	*	0.24	<u>-6.33</u>	-0.19	<u>-0.64</u>	-0.42
Tl	*	*	*	-0.20	*	<u>-4.20</u>	<u>-0.18</u>	*	*	0.00	0.21	*	*
Tm	*	-0.99	0.25	-0.22	*	*	0.10	*	<u>-0.18</u>	<u>-2.87</u>	0.57	0.62	-0.99
U	*	*	3.09	0.84	*	*	0.27	*	0.37	<u>-3.94</u>	-0.71	<u>-0.23</u>	-0.44
V	*	*	9.58	0.56	*	<u>-1.65</u>	0.43	*	*	<u>-0.25</u>	3.01	<u>-1.51</u>	-1.62
W	*	*	*	0.24	*	*	<u>-0.30</u>	*	*	0.28	*	*	*
Y	<u>-2.00</u>	0.36	0.15	-0.95	*	*	<u>-0.55</u>	*	<u>-0.63</u>	<u>-7.05</u>	0.96	0.46	-2.10
Yb	*	0.67	0.48	-0.75	*	*	0.26	*	0.58	<u>-3.79</u>	0.79	0.19	-1.42
Zn	<u>2.73</u>	*	-0.24	-0.65	*	<u>-1.54</u>	0.38	*	0.34	<u>-0.05</u>	0.49	0.41	0.82
Zr	<u>-1.41</u>	*	1.27	-4.63	*	*	<u>-0.20</u>	*	0.17	<u>-5.36</u>	1.79	0.17	-4.11

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N78	N79	N80	N82	N83	N84	N85	N87	N88	N89	N91	N92	N93
SiO2	<u>-0.47</u>	0.62	<u>-0.30</u>	*	*	3.18	<u>-0.19</u>	<u>-0.71</u>	0.19	*	0.86	0.55	-0.85
TiO2	<u>0.02</u>	-0.08	<u>3.78</u>	*	*	3.41	<u>-0.92</u>	<u>2.84</u>	0.03	*	0.03	<u>-2.15</u>	<u>-0.92</u>
Al2O3	<u>-0.80</u>	0.81	<u>1.43</u>	*	*	<u>7.77</u>	<u>0.05</u>	<u>-1.84</u>	0.38	*	0.88	<u>-0.14</u>	<u>-0.99</u>
Fe2O3T	<u>0.00</u>	-0.71	<u>-1.13</u>	*	*	<u>9.74</u>	<u>-0.28</u>	<u>-0.85</u>	0.00	*	-0.48	<u>-2.47</u>	0.14
MnO	<u>0.00</u>	-0.30	<u>3.19</u>	*	*	<u>4.91</u>	<u>0.00</u>	<u>0.00</u>	-0.64	-1.55	1.91	<u>71.03</u>	<u>-1.91</u>
MgO	<u>2.33</u>	0.37	<u>4.07</u>	*	*	<u>11.69</u>	<u>0.00</u>	<u>4.07</u>	0.00	-21.22	-0.81	<u>-1.69</u>	<u>1.16</u>
CaO	<u>2.50</u>	-0.45	<u>0.75</u>	*	*	<u>9.75</u>	<u>0.25</u>	<u>2.00</u>	0.50	-8.38	0.85	<u>-2.65</u>	<u>-0.75</u>
Na2O	<u>0.09</u>	1.74	<u>-1.10</u>	*	*	<u>6.89</u>	<u>-0.07</u>	<u>-0.39</u>	0.35	*	0.46	<u>-1.22</u>	<u>1.77</u>
K2O	<u>-0.26</u>	1.83	<u>0.13</u>	*	*	<u>1.71</u>	<u>-0.20</u>	<u>-1.78</u>	0.26	-2.80	-0.40	<u>-1.44</u>	<u>2.04</u>
P2O5	<u>0.00</u>	-2.62	<u>0.00</u>	*	*	<u>6.88</u>	<u>-0.55</u>	*	2.73	1.05	8.19	0.55	<u>-2.73</u>
As	*	*	*	*	30.97	<u>0.66</u>	<u>-0.03</u>	<u>-2.09</u>	*	*	19.02	<u>0.92</u>	<u>2.91</u>
Ba	<u>0.16</u>	0.59	*	-3.05	*	<u>1.51</u>	<u>0.68</u>	<u>0.63</u>	0.56	-3.43	-0.22	<u>-0.16</u>	<u>-1.65</u>
Be	<u>0.00</u>	*	*	*	-3.44	<u>-0.48</u>	<u>-0.14</u>	*	*	0.85	*	<u>-1.27</u>	*
Bi	*	*	*	*	*	<u>0.47</u>	<u>-0.07</u>	*	*	*	*	*	*
C(tot)	*	*	*	*	*	<u>2.95</u>	<u>2.77</u>	<u>0.24</u>	*	*	*	*	*
Cd	*	*	*	*	*	<u>0.00</u>	*	*	*	*	*	*	*
Ce	0.19	*	*	-2.73	-0.24	<u>0.30</u>	0.46	*	0.38	*	1.35	*	<u>-1.69</u>
Co	1.30	*	*	*	*	<u>-0.69</u>	0.27	<u>0.69</u>	*	0.23	*	<u>3.62</u>	*
Cr	<u>1.17</u>	-1.74	<u>-16.13</u>	*	*	<u>0.35</u>	<u>-2.16</u>	<u>2.20</u>	0.65	-0.12	4.97	<u>-2.44</u>	<u>-1.81</u>
Cs	<u>0.03</u>	*	*	-0.98	*	<u>0.03</u>	<u>0.43</u>	*	0.24	0.15	8.34	*	<u>0.99</u>
Cu	<u>2.89</u>	*	<u>-7.13</u>	*	*	<u>1.74</u>	<u>-0.10</u>	<u>3.87</u>	2.91	-0.09	14.42	<u>-3.43</u>	<u>1.46</u>
Dy	<u>-0.09</u>	*	*	-1.92	-0.67	<u>0.75</u>	<u>-0.30</u>	*	0.46	-6.84	*	*	*
Er	<u>0.06</u>	*	*	-2.06	-0.52	<u>0.56</u>	<u>-0.46</u>	*	0.62	-5.73	*	*	*
Eu	<u>0.00</u>	*	*	1.43	0.58	<u>1.45</u>	<u>0.07</u>	*	0.00	-5.39	*	*	*
Ga	<u>-0.11</u>	*	*	*	*	<u>1.36</u>	<u>0.36</u>	*	-0.66	*	1.53	<u>-1.80</u>	<u>-0.88</u>
Gd	<u>0.84</u>	*	*	*	0.78	<u>0.43</u>	<u>-0.34</u>	*	0.44	-7.23	*	*	*
Ge	*	*	*	*	-3.15	<u>3.60</u>	<u>-6.27</u>	*	*	*	*	*	*
Hf	<u>0.32</u>	*	*	-1.87	-0.10	<u>0.45</u>	<u>-2.31</u>	*	0.66	0.21	*	*	<u>-0.40</u>
Ho	<u>0.82</u>	*	*	-1.76	-1.18	<u>0.37</u>	<u>-0.44</u>	*	0.87	-4.97	*	*	*
In	*	*	*	*	*	<u>0.00</u>	<u>0.11</u>	*	*	-0.44	*	2649.08	*
La	<u>0.43</u>	*	*	-3.34	0.81	<u>0.85</u>	<u>0.46</u>	*	0.42	-10.42	-4.29	<u>0.40</u>	<u>-0.66</u>
Li	*	*	*	*	*	<u>0.12</u>	<u>0.30</u>	*	*	1.17	*	<u>-0.63</u>	*
Lu	<u>0.29</u>	*	*	-2.14	-0.36	<u>0.17</u>	<u>-0.63</u>	*	0.34	-3.81	*	*	*
Mo	<u>0.24</u>	*	*	*	*	<u>0.08</u>	<u>-0.05</u>	*	*	*	*	<u>-0.99</u>	*
Nb	<u>0.00</u>	*	*	-1.13	*	<u>-0.31</u>	<u>0.49</u>	*	1.10	0.77	-1.42	*	<u>-0.27</u>
Nd	<u>0.37</u>	*	*	-2.82	1.08	<u>0.87</u>	<u>0.56</u>	*	0.29	-9.89	-0.49	*	<u>-2.55</u>
Ni	<u>-0.03</u>	*	<u>-8.68</u>	*	*	<u>-0.03</u>	<u>0.70</u>	<u>2.44</u>	7.92	0.18	-1.81	<u>-0.71</u>	<u>-0.91</u>
Pb	<u>2.67</u>	*	*	-0.79	*	<u>1.64</u>	<u>-0.07</u>	<u>-0.45</u>	1.21	1.54	-1.91	<u>-2.97</u>	<u>-0.63</u>
Pr	<u>0.33</u>	*	*	-2.99	0.67	<u>0.18</u>	<u>0.53</u>	*	0.38	-8.22	*	*	*
Rb	<u>0.38</u>	*	*	0.58	0.28	<u>-0.06</u>	<u>1.23</u>	<u>-0.48</u>	0.36	-4.74	-0.02	*	<u>-0.23</u>
Sb	*	*	*	*	*	<u>-2.54</u>	<u>0.23</u>	*	*	-0.31	*	*	*
Sc	*	-0.04	*	-3.00	*	<u>0.64</u>	<u>-0.49</u>	*	0.04	*	6.43	<u>-1.26</u>	*
Sm	<u>-0.06</u>	*	*	-2.75	0.06	<u>0.29</u>	<u>0.50</u>	*	0.52	-7.76	*	*	<u>-1.90</u>
Sn	<u>0.40</u>	*	*	*	-1.30	2.91	<u>-0.55</u>	<u>-0.65</u>	*	1.04	*	<u>-1.04</u>	<u>1.99</u>
Sr	<u>0.31</u>	0.64	<u>-13.08</u>	-1.62	*	<u>0.72</u>	<u>0.58</u>	<u>-1.19</u>	0.48	*	*	<u>0.82</u>	<u>-0.24</u>
Ta	<u>1.13</u>	*	*	-1.11	-0.85	<u>-0.39</u>	<u>-0.35</u>	*	0.59	0.49	*	*	*
Tb	<u>0.51</u>	*	*	-0.30	1.01	<u>0.34</u>	<u>0.07</u>	*	1.34	-5.09	*	*	*
Th	<u>0.09</u>	*	*	-0.00	-0.14	<u>-0.03</u>	<u>0.52</u>	*	0.70	*	1.77	*	<u>-0.33</u>
Tl	<u>-1.40</u>	*	*	*	*	<u>0.39</u>	<u>-0.18</u>	*	*	*	*	*	*
Tm	<u>0.62</u>	*	*	-0.88	0.49	<u>0.37</u>	<u>-0.32</u>	*	1.23	-3.62	*	*	*
U	<u>0.07</u>	*	*	-1.27	-3.58	<u>-0.44</u>	<u>0.41</u>	*	0.43	-0.85	2.36	*	<u>0.44</u>
V	<u>1.08</u>	*	*	*	*	<u>0.01</u>	<u>0.31</u>	<u>0.31</u>	1.18	-0.41	1.18	<u>-1.79</u>	<u>-0.81</u>
W	<u>0.79</u>	*	*	*	*	<u>0.51</u>	<u>-0.26</u>	*	*	-0.97	*	*	*
Y	<u>0.70</u>	-0.49	*	-3.45	*	<u>-0.07</u>	<u>-0.80</u>	*	1.11	-8.53	1.62	<u>-1.01</u>	<u>-0.24</u>
Yb	<u>0.39</u>	*	*	-1.15	0.09	<u>0.70</u>	<u>-0.27</u>	*	0.87	-4.65	*	*	*
Zn	<u>1.40</u>	0.22	<u>-10.51</u>	*	*	<u>-0.35</u>	<u>0.58</u>	<u>0.32</u>	-1.17	3.81	1.48	<u>0.21</u>	<u>-0.91</u>
Zr	<u>0.15</u>	2.07	<u>-13.18</u>	0.16	*	<u>0.63</u>	<u>-5.14</u>	*	1.45	0.25	0.16	<u>-5.37</u>	<u>-0.39</u>

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N94	N95	N96	N97	N98	N99	N100	N101	N102	N103	N104	N105	N106
SiO2	0.39	-1.44	<u>0.46</u>	<u>-0.20</u>	*	0.08	<u>0.34</u>	0.64	<u>-0.74</u>	<u>-12.33</u>	<u>-0.01</u>	0.00	<u>-0.34</u>
TiO2	-1.47	-1.85	<u>0.02</u>	<u>0.02</u>	-1.85	0.03	<u>0.02</u>	0.03	<u>-0.27</u>	<u>-3.37</u>	<u>-0.08</u>	-1.85	1.16
Al2O3	3.24	0.11	<u>0.08</u>	<u>-0.44</u>	*	-5.65	<u>0.38</u>	0.93	<u>-1.14</u>	<u>-1.24</u>	<u>0.05</u>	1.26	<u>-0.52</u>
Fe2O3T	0.79	0.00	<u>-3.81</u>	<u>0.28</u>	*	-0.56	<u>0.14</u>	-2.54	<u>-0.06</u>	<u>-8.57</u>	<u>0.00</u>	-0.51	0.51
MnO	-6.37	0.00	<u>0.64</u>	<u>0.00</u>	0.00	-2.68	<u>0.00</u>	0.00	<u>4.14</u>	<u>-6.17</u>	<u>0.00</u>	1.27	0.64
MgO	0.00	0.00	*	<u>1.16</u>	*	-3.26	<u>-2.33</u>	9.31	<u>12.74</u>	*	<u>-0.58</u>	8.49	<u>-0.35</u>
CaO	-1.30	1.00	<u>-0.75</u>	<u>5.50</u>	*	-2.15	<u>0.25</u>	2.00	<u>-1.35</u>	<u>2.80</u>	<u>-0.25</u>	-4.55	0.55
Na2O	-0.48	-8.92	<u>-1.74</u>	<u>3.45</u>	*	-3.62	<u>-0.71</u>	-0.45	<u>-0.37</u>	*	<u>-0.23</u>	2.27	<u>-1.68</u>
K2O	-5.94	-0.53	<u>0.79</u>	<u>1.12</u>	*	-3.44	<u>0.53</u>	0.53	<u>0.37</u>	<u>-1.84</u>	<u>-0.73</u>	-1.45	<u>-0.28</u>
P2O5	4.37	0.00	*	<u>0.00</u>	*	-2.73	<u>0.00</u>	0.00	<u>-0.27</u>	<u>194.78</u>	*	76.39	<u>-8.19</u>
As	4.89	*	*	<u>1.75</u>	*	*	*	*	*	*	*	*	*
Ba	2.97	-1.54	<u>-0.64</u>	<u>1.39</u>	0.83	0.33	<u>-1.91</u>	-0.31	<u>0.72</u>	<u>-6.30</u>	<u>-0.49</u>	0.21	<u>-0.82</u>
Be	-0.13	*	<u>-0.62</u>	*	0.83	0.89	*	*	*	*	*	-0.35	<u>1.33</u>
Bi	2.36	*	*	*	*	*	*	*	*	<u>1362.56</u>	*	*	*
C(tot)	-5.70	<u>-24.55</u>	*	<u>2.87</u>	*	*	*	*	*	*	*	*	*
Cd	20.55	*	*	*	*	*	*	*	*	*	*	6.94	*
Ce	9.48	3.39	<u>-1.19</u>	<u>0.32</u>	1.29	-0.35	<u>1.18</u>	*	<u>0.34</u>	*	*	-0.14	<u>9.66</u>
Co	4.32	32.45	<u>1.13</u>	<u>1.43</u>	0.47	-0.52	*	*	<u>29.49</u>	*	*	-0.12	<u>4.56</u>
Cr	*	<u>-0.00</u>	*	<u>1.32</u>	<u>-0.47</u>	<u>-0.10</u>	<u>-2.40</u>	<u>-0.12</u>	<u>-3.20</u>	<u>-7.85</u>	<u>-0.54</u>	0.83	<u>-6.12</u>
Cs	*	*	<u>-1.17</u>	<u>-0.11</u>	-0.19	-1.82	*	*	<u>-1.13</u>	*	*	0.17	<u>6.83</u>
Cu	12.80	*	*	<u>12.76</u>	0.09	-1.82	*	*	*	<u>59.55</u>	*	-1.06	<u>-0.14</u>
Dy	-0.40	*	<u>-1.57</u>	<u>0.15</u>	0.53	-1.14	*	*	*	*	*	-0.14	<u>1.15</u>
Er	-0.78	*	<u>-1.18</u>	<u>0.16</u>	1.06	-1.28	*	*	*	*	*	-0.12	<u>0.49</u>
Eu	1.74	*	<u>-0.38</u>	<u>-0.09</u>	0.39	-0.63	*	*	*	*	*	0.02	<u>0.90</u>
Ga	-2.52	*	*	<u>-0.25</u>	0.88	-0.59	<u>0.77</u>	0.44	<u>-0.33</u>	*	*	-0.55	<u>4.50</u>
Gd	-0.33	*	<u>0.58</u>	<u>0.10</u>	0.40	-0.76	*	*	*	*	*	-0.19	<u>2.71</u>
Ge	-0.40	*	*	*	*	*	*	*	*	*	*	*	<u>2.15</u>
Hf	-2.26	*	*	<u>0.12</u>	0.45	-2.65	*	-3.85	*	*	*	-0.34	<u>-5.08</u>
Ho	-0.31	*	*	<u>0.31</u>	1.00	-0.77	*	*	*	*	*	0.36	<u>0.33</u>
In	*	*	*	*	*	*	*	*	*	*	*	*	*
La	5.90	1.64	<u>-1.24</u>	<u>0.19</u>	0.81	-0.04	<u>-1.25</u>	*	<u>0.82</u>	*	*	-0.61	<u>10.22</u>
Li	*	*	<u>-0.57</u>	*	0.81	0.80	*	*	*	*	*	0.85	<u>10.49</u>
Lu	-1.49	*	<u>-1.36</u>	<u>0.05</u>	0.34	-1.19	*	*	*	*	*	-0.36	<u>-0.78</u>
Mo	1.85	*	<u>3.53</u>	<u>34.02</u>	0.81	1.54	*	*	*	<u>10.50</u>	*	-0.34	*
Nb	2.92	6.55	*	<u>0.08</u>	1.68	0.58	<u>-0.71</u>	0.35	<u>-0.27</u>	<u>-0.67</u>	<u>-0.27</u>	0.80	<u>0.14</u>
Nd	0.80	*	<u>-0.64</u>	<u>0.14</u>	0.51	-0.43	*	*	<u>3.22</u>	*	*	-0.11	<u>5.89</u>
Ni	2.43	0.14	<u>2.48</u>	<u>88.20</u>	-0.06	-0.49	*	*	<u>2.01</u>	*	*	-0.68	<u>-1.38</u>
Pb	-0.51	*	<u>-1.11</u>	<u>3.28</u>	0.99	1.16	<u>1.02</u>	1.58	<u>1.68</u>	<u>1.96</u>	<u>-0.63</u>	-0.20	<u>4.18</u>
Pr	0.45	*	<u>0.06</u>	<u>0.03</u>	0.34	-0.30	*	*	*	*	*	0.12	<u>5.34</u>
Rb	3.41	-0.92	<u>-1.48</u>	<u>0.49</u>	2.58	-1.19	<u>-0.06</u>	0.55	<u>-0.18</u>	<u>0.43</u>	<u>0.01</u>	-0.36	<u>6.86</u>
Sb	*	*	*	<u>3.92</u>	*	*	*	*	*	*	*	0.00	*
Sc	0.49	*	<u>-1.54</u>	<u>0.92</u>	0.87	-0.71	*	*	*	*	*	0.49	<u>4.16</u>
Sm	-1.59	*	<u>-1.01</u>	<u>0.08</u>	0.76	-0.44	*	*	*	*	*	-0.12	<u>3.07</u>
Sn	-1.38	*	*	*	0.38	*	*	*	<u>0.55</u>	*	*	2.74	*
Sr	1.06	3.38	<u>-1.50</u>	<u>0.79</u>	0.48	-0.55	<u>-0.24</u>	0.48	<u>0.34</u>	<u>0.03</u>	<u>0.14</u>	0.25	<u>-1.15</u>
Ta	-2.09	*	*	<u>-0.54</u>	0.06	0.11	*	*	*	*	*	-0.17	<u>-2.34</u>
Tb	-0.41	*	<u>-0.06</u>	<u>0.10</u>	0.85	-0.30	*	*	*	*	*	0.33	<u>0.94</u>
Th	3.04	-18.92	<u>-0.71</u>	<u>0.17</u>	0.73	0.12	*	0.55	<u>0.88</u>	<u>1.33</u>	*	-0.73	<u>0.17</u>
Tl	*	*	*	*	0.53	*	*	*	*	*	*	-0.19	*
Tm	-0.44	*	*	<u>0.00</u>	0.99	*	*	*	*	*	*	0.59	<u>-0.11</u>
U	1.33	-12.37	<u>-0.99</u>	<u>0.15</u>	1.03	-0.78	*	-9.43	<u>-2.50</u>	*	*	-0.04	<u>2.00</u>
V	*	-3.03	*	<u>2.03</u>	0.06	-0.94	*	-0.22	*	*	*	-0.62	<u>6.95</u>
W	4.25	*	*	*	*	23.84	*	*	*	*	*	-0.94	*
Y	-1.83	7.23	<u>-2.06</u>	<u>-0.01</u>	2.25	-1.78	<u>0.46</u>	1.62	<u>-5.50</u>	*	<u>0.25</u>	-0.70	<u>1.39</u>
Yb	-1.06	*	<u>-1.58</u>	<u>0.41</u>	1.21	-0.78	*	*	*	*	*	0.58	<u>-0.69</u>
Zn	-0.24	53.81	<u>0.06</u>	<u>1.54</u>	-0.17	0.50	*	-3.82	<u>-0.25</u>	<u>58.43</u>	<u>0.64</u>	-1.10	<u>-0.25</u>
Zr	-0.59	5.16	*	<u>-0.83</u>	1.64	-6.85	<u>-0.48</u>	0.71	<u>3.32</u>	<u>0.43</u>	<u>-0.19</u>	0.19	<u>-9.41</u>

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022

Lab Code	N108	N109	N110	N111	N112	N115	N116	N117	N118	N121	N123	N125	N127
SiO2	<u>-0.16</u>	<u>-0.24</u>	<u>-0.22</u>	0.23	<u>-1.18</u>	<u>-0.26</u>	<u>0.32</u>	1.11	1.10	<u>0.04</u>	<u>-0.48</u>	<u>0.05</u>	<u>-0.12</u>
TiO2	<u>0.96</u>	<u>3.78</u>	<u>-1.85</u>	0.03	<u>-0.53</u>	<u>0.02</u>	<u>-0.92</u>	<u>-1.85</u>	5.50	<u>0.96</u>	<u>0.02</u>	<u>-0.74</u>	<u>1.90</u>
Al2O3	<u>1.04</u>	<u>0.22</u>	0.44	1.48	<u>-1.32</u>	<u>0.60</u>	<u>-0.19</u>	<u>-0.92</u>	1.37	<u>-0.11</u>	<u>-0.38</u>	<u>0.27</u>	<u>0.25</u>
Fe2O3T	<u>-0.56</u>	<u>1.13</u>	<u>-1.41</u>	<u>-1.41</u>	0.00	<u>-1.55</u>	<u>7.20</u>	0.23	5.36	<u>0.42</u>	<u>-1.41</u>	<u>-0.21</u>	<u>-2.26</u>
MnO	<u>0.00</u>	<u>0.00</u>	0.00	<u>-6.37</u>	0.64	<u>0.00</u>	*	2.55	<u>-0.64</u>	<u>0.00</u>	<u>0.00</u>	<u>-0.83</u>	<u>-1.59</u>
MgO	<u>1.75</u>	<u>0.58</u>	<u>-1.16</u>	<u>-1.16</u>	<u>-0.93</u>	<u>0.58</u>	<u>-3.49</u>	5.70	3.26	<u>2.33</u>	<u>8.14</u>	<u>2.21</u>	<u>2.33</u>
CaO	<u>0.75</u>	<u>0.50</u>	0.00	<u>-1.00</u>	<u>-0.70</u>	<u>1.25</u>	<u>-2.25</u>	<u>-0.60</u>	<u>-1.10</u>	<u>0.00</u>	<u>0.75</u>	<u>-0.10</u>	<u>0.50</u>
Na2O	<u>0.01</u>	<u>-0.71</u>	0.83	<u>-0.93</u>	<u>-6.69</u>	<u>0.81</u>	<u>-13.65</u>	<u>-4.19</u>	0.19	<u>-0.07</u>	<u>-0.31</u>	<u>0.12</u>	<u>1.77</u>
K2O	<u>0.33</u>	<u>-0.07</u>	0.79	<u>-1.45</u>	<u>-0.75</u>	<u>0.33</u>	<u>-0.07</u>	<u>-0.80</u>	<u>-0.79</u>	<u>0.26</u>	<u>0.20</u>	<u>0.71</u>	<u>0.33</u>
P2O5	<u>0.00</u>	<u>2.73</u>	<u>-5.46</u>	5.46	<u>-4.37</u>	<u>2.73</u>	<u>0.00</u>	<u>-5.46</u>	1.09	<u>0.00</u>	<u>2.73</u>	<u>1.09</u>	<u>0.00</u>
As	*	*	<u>-0.79</u>	*	<u>-1.72</u>	*	*	*	*	*	*	*	<u>15.49</u>
Ba	<u>0.63</u>	<u>0.72</u>	<u>-2.33</u>	0.56	0.83	<u>1.07</u>	*	2.32	<u>2.25</u>	<u>-0.46</u>	<u>2.30</u>	*	<u>2.04</u>
Be	*	<u>0.16</u>	*	*	0.29	*	*	*	*	<u>0.16</u>	*	*	<u>-1.26</u>
Bi	*	<u>0.29</u>	*	*	*	*	*	*	*	*	*	*	*
C(tot)	*	*	*	*	*	*	*	*	*	*	*	*	*
Cd	*	*	*	*	*	*	*	*	*	*	*	*	*
Ce	<u>0.17</u>	<u>0.51</u>	<u>-3.72</u>	*	<u>-2.44</u>	<u>-0.17</u>	*	*	*	<u>-0.76</u>	*	*	<u>-0.63</u>
Co	*	<u>0.97</u>	<u>-0.72</u>	*	<u>-0.32</u>	*	*	*	*	<u>0.20</u>	*	*	*
Cr	<u>-0.42</u>	*	<u>-5.03</u>	0.29	0.41	<u>-1.04</u>	*	18.06	<u>0.27</u>	<u>-0.68</u>	<u>1.60</u>	<u>0.68</u>	<u>-1.78</u>
Cs	*	<u>0.46</u>	<u>-0.15</u>	*	<u>2.81</u>	<u>0.56</u>	*	*	*	<u>0.10</u>	*	*	*
Cu	*	*	<u>-8.59</u>	*	<u>-0.43</u>	<u>4.33</u>	*	*	*	<u>1.40</u>	*	*	<u>4.33</u>
Dy	*	<u>0.58</u>	*	*	<u>-1.00</u>	<u>-0.58</u>	*	*	*	<u>-0.02</u>	*	*	<u>-0.77</u>
Er	*	<u>0.06</u>	*	*	0.32	<u>0.06</u>	*	*	*	<u>0.04</u>	*	*	<u>-0.61</u>
Eu	*	<u>0.77</u>	*	*	<u>-0.77</u>	<u>-0.96</u>	*	*	*	<u>0.17</u>	*	*	<u>0.10</u>
Ga	<u>1.86</u>	<u>0.44</u>	<u>-1.75</u>	*	<u>-0.75</u>	*	*	*	<u>1.86</u>	<u>0.00</u>	<u>0.77</u>	*	<u>0.77</u>
Gd	*	<u>0.84</u>	*	*	<u>-0.12</u>	<u>1.54</u>	*	*	*	<u>0.27</u>	*	*	<u>-0.27</u>
Ge	*	*	*	*	<u>-2.10</u>	*	*	*	*	<u>0.24</u>	*	*	<u>-1.17</u>
Hf	*	<u>0.82</u>	<u>-0.80</u>	*	<u>1.43</u>	*	*	*	*	<u>0.33</u>	*	*	<u>-0.06</u>
Ho	*	<u>0.82</u>	*	*	<u>-0.15</u>	<u>0.18</u>	*	*	*	<u>0.04</u>	*	*	<u>0.18</u>
In	*	*	*	*	*	*	*	*	*	*	*	*	*
La	*	<u>0.82</u>	<u>-1.92</u>	*	<u>-1.62</u>	<u>0.23</u>	*	*	*	<u>-0.37</u>	*	*	<u>-0.50</u>
Li	*	*	*	*	8.70	<u>0.12</u>	*	*	*	<u>0.53</u>	*	*	*
Lu	*	<u>0.52</u>	*	*	0.11	<u>-0.89</u>	*	*	*	<u>0.10</u>	*	*	<u>-0.30</u>
Mo	*	<u>0.24</u>	<u>-5.26</u>	*	<u>-0.99</u>	*	*	*	*	*	*	*	*
Nb	<u>-1.15</u>	*	<u>-1.42</u>	*	<u>-0.04</u>	<u>-0.27</u>	*	*	*	<u>0.66</u>	<u>0.62</u>	*	<u>-0.71</u>
Nd	*	<u>0.56</u>	<u>-2.80</u>	*	<u>-1.57</u>	<u>-0.24</u>	*	*	*	<u>-0.09</u>	*	*	<u>-0.25</u>
Ni	<u>2.01</u>	*	<u>-3.76</u>	*	0.02	<u>1.04</u>	*	*	*	<u>0.11</u>	*	*	<u>1.04</u>
Pb	<u>0.36</u>	*	<u>-0.59</u>	*	<u>-0.13</u>	<u>0.36</u>	*	*	*	<u>0.53</u>	<u>0.03</u>	*	<u>1.02</u>
Pr	*	<u>0.44</u>	*	*	<u>-2.33</u>	<u>0.22</u>	*	*	*	<u>-0.31</u>	*	*	<u>-0.88</u>
Rb	<u>0.56</u>	<u>1.18</u>	<u>-0.58</u>	*	<u>-0.91</u>	<u>-0.12</u>	*	*	<u>-0.06</u>	<u>-0.23</u>	<u>0.33</u>	*	<u>-0.63</u>
Sb	*	*	*	*	*	*	*	*	*	*	*	*	*
Sc	*	<u>-0.14</u>	<u>-3.15</u>	*	<u>-1.72</u>	<u>-0.30</u>	*	*	*	<u>0.69</u>	<u>-1.58</u>	*	*
Sm	*	<u>0.70</u>	2.32	*	<u>-0.80</u>	<u>-0.37</u>	*	*	*	<u>-0.11</u>	*	*	<u>-0.81</u>
Sn	*	<u>2.42</u>	<u>-4.96</u>	*	<u>1.53</u>	*	*	*	*	*	*	*	*
Sr	<u>0.14</u>	<u>0.82</u>	<u>-0.68</u>	*	0.48	<u>0.14</u>	*	2.80	<u>-0.05</u>	<u>0.34</u>	<u>0.05</u>	<u>-0.05</u>	<u>0.63</u>
Ta	*	<u>0.75</u>	*	*	<u>-1.15</u>	*	*	*	*	<u>0.14</u>	*	*	<u>0.26</u>
Tb	*	<u>0.59</u>	*	*	0.04	<u>-0.30</u>	*	*	*	<u>0.23</u>	*	*	<u>-0.14</u>
Th	<u>-1.25</u>	<u>-0.36</u>	<u>-1.28</u>	*	0.43	<u>-1.55</u>	*	*	*	<u>0.49</u>	<u>0.27</u>	*	<u>-0.94</u>
Tl	*	<u>-0.53</u>	4.20	*	<u>-0.09</u>	*	*	*	*	*	*	*	*
Tm	*	<u>0.86</u>	*	*	0.25	<u>-0.62</u>	*	*	*	<u>0.42</u>	*	*	<u>0.12</u>
U	<u>-0.29</u>	<u>0.44</u>	0.88	*	0.29	<u>-0.29</u>	*	*	*	<u>-0.15</u>	*	*	<u>-3.06</u>
V	*	<u>0.38</u>	<u>-0.22</u>	*	<u>-0.92</u>	<u>2.69</u>	*	*	*	<u>0.10</u>	<u>0.59</u>	*	<u>6.19</u>
W	*	<u>0.79</u>	0.39	*	*	*	*	*	*	*	*	*	*
Y	<u>0.46</u>	<u>0.63</u>	<u>-0.48</u>	*	<u>-3.22</u>	<u>-0.07</u>	*	*	*	<u>0.46</u>	<u>0.81</u>	*	<u>1.16</u>
Yb	*	<u>0.63</u>	<u>-5.06</u>	*	0.82	<u>-0.83</u>	*	*	*	<u>0.24</u>	*	*	<u>-0.30</u>
Zn	<u>0.41</u>	<u>0.08</u>	<u>-1.17</u>	*	3.54	<u>0.41</u>	*	*	<u>-0.25</u>	<u>-0.52</u>	<u>0.74</u>	*	<u>1.07</u>
Zr	<u>0.36</u>	<u>0.44</u>	<u>-0.40</u>	*	<u>-1.13</u>	<u>-1.13</u>	*	5.16	<u>1.10</u>	<u>1.28</u>	<u>0.36</u>	<u>1.93</u>	<u>1.19</u>

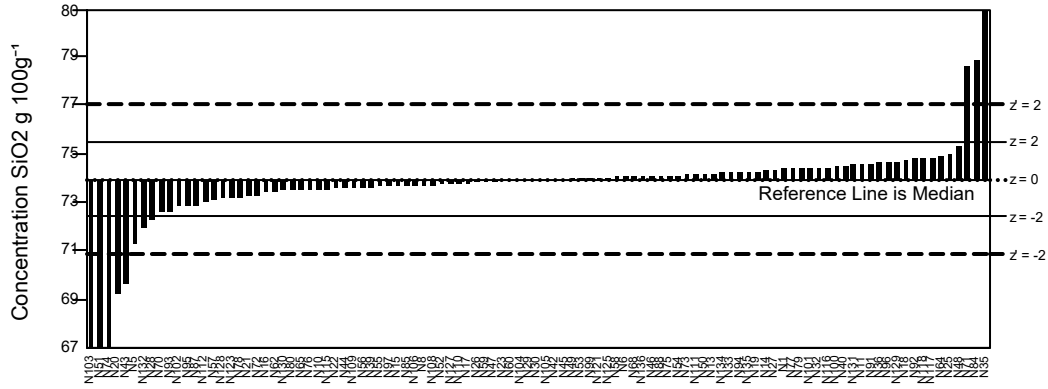
Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - *Entries in italics* are derived from Provisional Values.

Table 3 - GeoPT51 Z-scores for Leucomonzogranite, GMN-1. 15/06/2022 9

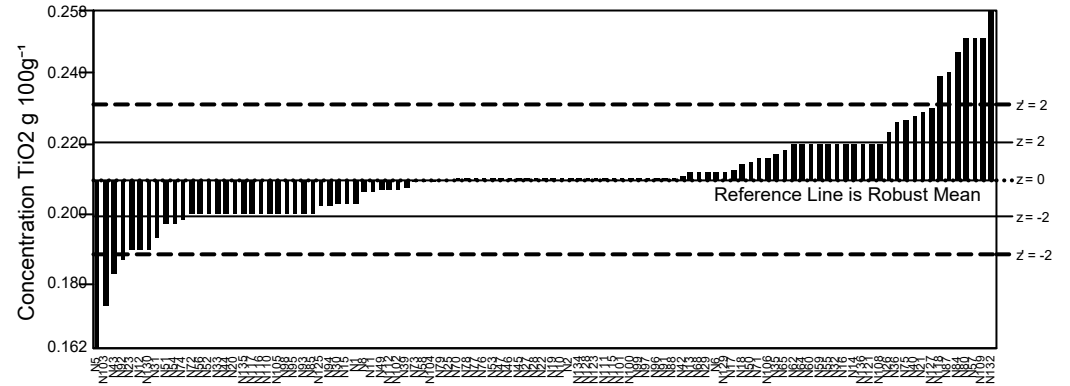
Lab Code	N128	N129	N130	N131	N132	N134	N135	N136
SiO2	<u>-0.51</u>	<u>0.48</u>	-0.61	<u>0.39</u>	-2.62	0.38	0.42	0.16
TiO2	<u>0.02</u>	<u>0.21</u>	-3.73	*	18.21	0.03	-1.85	1.92
Al2O3	<u>0.00</u>	<u>0.10</u>	-1.32	*	-2.64	-0.22	-0.93	1.04
Fe2O3T	<u>-0.28</u>	<u>-0.85</u>	-0.28	*	9.77	0.00	-1.98	-0.28
MnO	<u>3.19</u>	<u>-1.59</u>	0.00	*	7.01	1.27	0.00	-0.64
MgO	<u>0.00</u>	<u>-1.69</u>	1.16	*	0.23	-1.16	1.16	-1.16
CaO	<u>0.00</u>	<u>-0.85</u>	-2.50	*	4.43	-1.00	1.00	-1.50
Na2O	<u>5.21</u>	<u>1.13</u>	-1.89	*	-4.26	1.47	0.03	-1.41
K2O	<u>-0.26</u>	<u>-1.19</u>	-0.26	*	-1.19	-1.32	0.26	-0.13
P2O5	<u>-2.73</u>	<u>-2.46</u>	-5.46	*	37.87	0.00	0.00	-0.55
As	*	*	*	*	<i>-0.71</i>	*	<i>0.35</i>	*
Ba	<u>-0.14</u>	<u>-0.57</u>	0.21	*	-0.57	-0.75	-0.63	*
Be	<u>-0.47</u>	<u>0.08</u>	*	*	11.29	*	0.57	-3.14
Bi	*	*	*	*	54.85	*	*	-0.53
C(tot)	<u>-1.69</u>	*	*	*	*	*	<i>-34.57</i>	*
Cd	*	*	*	*	*	*	<i>4.91</i>	*
Ce	<u>-0.90</u>	<u>0.00</u>	0.00	*	-1.90	-3.05	0.55	-14.57
Co	*	<u>-0.66</u>	*	*	2.54	-0.72	-0.43	-2.05
Cr	<u>0.54</u>	<u>0.84</u>	-2.13	*	-18.60	-1.36	-0.46	*
Cs	*	<u>-0.34</u>	*	*	18.42	-10.75	0.62	-1.09
Cu	<u>4.04</u>	*	*	*	21.61	8.66	-2.90	0.74
Dy	<u>0.31</u>	<u>-0.43</u>	*	*	-1.38	*	0.03	-6.08
Er	<u>-0.06</u>	<u>-0.26</u>	*	*	-2.86	*	0.19	-4.84
Eu	<u>-1.45</u>	<u>-0.19</u>	*	*	-0.93	*	1.24	-3.66
Ga	*	<u>-0.77</u>	-1.75	*	3.98	5.91	1.36	-1.54
Gd	<u>2.32</u>	<u>-0.58</u>	1.69	*	0.15	*	2.07	-6.35
Ge	*	*	*	*	-0.55	*	*	3.98
Hf	*	<u>-0.37</u>	2.25	*	-1.48	-0.80	-1.75	-0.13
Ho	<u>0.82</u>	<u>-0.40</u>	*	*	-1.00	*	0.29	-3.92
In	*	*	*	*	15.03	*	3.15	*
La	<u>0.37</u>	<u>-0.65</u>	1.05	*	-3.94	1.64	0.48	-12.63
Li	<u>1.97</u>	*	*	*	28.06	*	1.12	-3.70
Lu	<u>3.34</u>	<u>-0.30</u>	*	*	-2.48	*	-0.56	-3.31
Mo	<u>0.24</u>	<u>-0.87</u>	*	*	13.91	-5.26	4.52	2.45
Nb	*	<u>-2.10</u>	-1.42	*	-6.53	-2.30	-1.27	1.04
Nd	<u>0.14</u>	<u>-0.74</u>	8.74	*	-1.24	-1.26	0.49	-10.37
Ni	<u>-1.00</u>	<u>-1.59</u>	2.08	*	-6.70	0.14	-1.93	-0.62
Pb	*	<u>-0.35</u>	0.07	*	-4.28	-5.87	0.49	-7.36
Pr	<u>0.06</u>	<u>-0.18</u>	*	*	-0.81	*	0.27	-8.63
Rb	*	<u>-0.70</u>	0.77	*	3.24	-1.71	0.97	*
Sb	*	*	*	*	10.36	*	-2.55	*
Sc	*	<u>-0.46</u>	3.24	*	3.00	6.43	-0.99	-1.81
Sm	<u>-1.10</u>	<u>-0.60</u>	*	*	0.56	*	0.02	-7.39
Sn	<u>-1.04</u>	*	*	*	22.13	-7.56	-3.52	-0.92
Sr	<u>-0.29</u>	<u>0.08</u>	-2.80	*	-5.88	-0.10	0.00	*
Ta	*	<u>-0.65</u>	*	*	6.74	16.66	-1.24	*
Tb	<u>2.37</u>	<u>-0.30</u>	*	*	0.95	*	0.90	-4.13
Th	<u>-0.28</u>	<u>0.76</u>	0.55	*	-8.64	-1.28	0.24	-12.38
Tl	<u>-0.35</u>	<u>-1.53</u>	*	*	0.01	*	0.54	*
Tm	<u>3.94</u>	<u>0.00</u>	*	*	-2.03	*	0.57	-2.92
U	<u>0.49</u>	<u>0.74</u>	*	*	-9.20	-0.59	1.20	-8.64
V	<u>-0.11</u>	*	-1.62	*	0.22	1.18	2.56	-14.55
W	*	*	*	*	-12.94	4.33	-0.87	*
Y	<u>0.34</u>	<u>0.60</u>	3.02	*	-2.64	6.53	-0.01	-11.00
Yb	<u>0.80</u>	<u>0.02</u>	28.96	*	-2.54	*	-0.04	-4.41
Zn	<u>1.34</u>	<u>-0.52</u>	0.82	*	16.29	-1.17	1.63	-5.65
Zr	*	<u>-0.55</u>	-4.29	*	3.62	-1.14	-3.47	-2.38

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - *Entries in italics* are derived from Provisional Values.

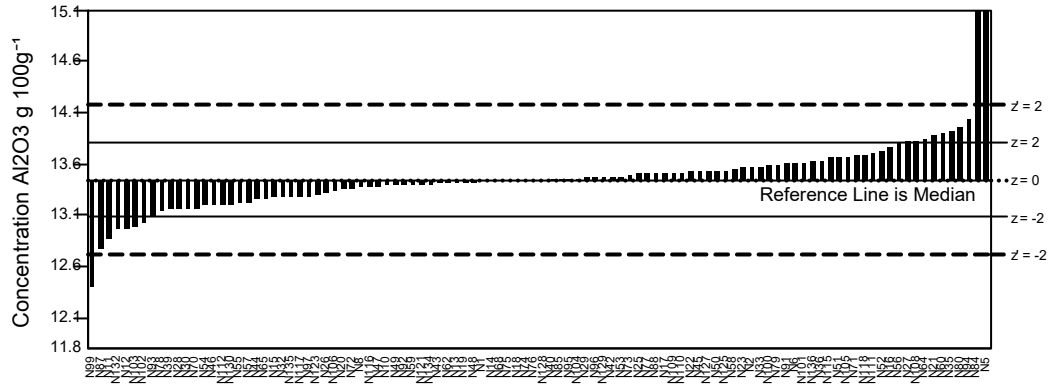
GeoPT51 - Barchart for SiO2



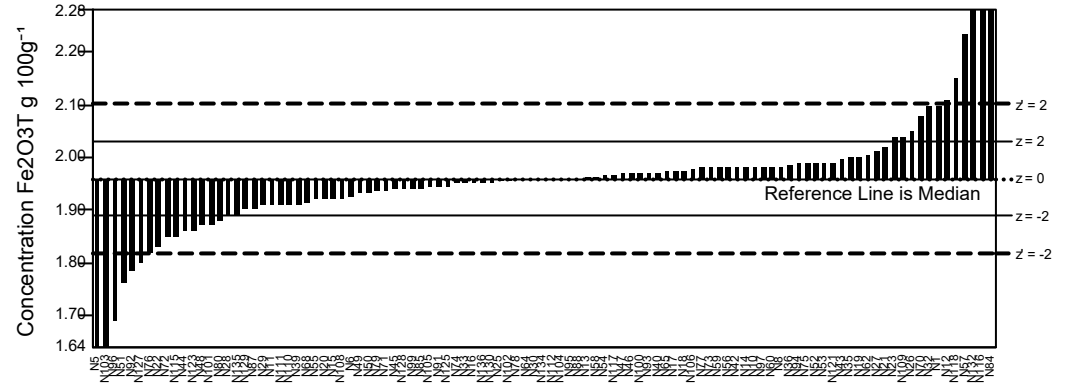
GeoPT51 - Barchart for TiO2



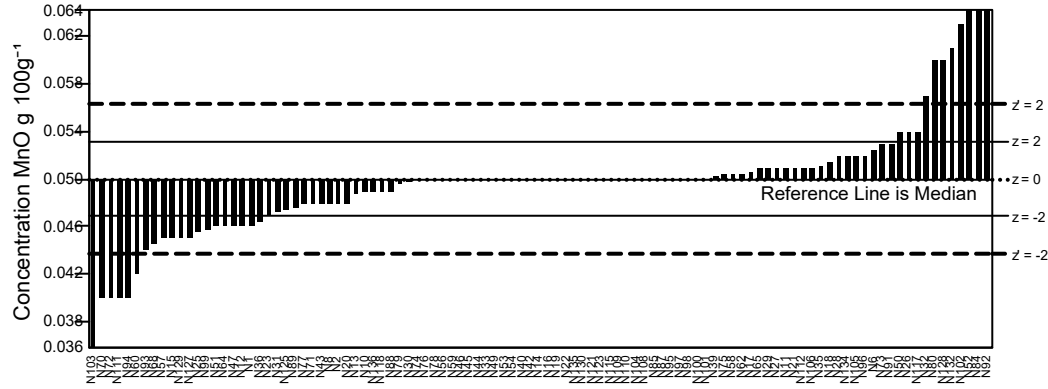
GeoPT51 - Barchart for Al2O3



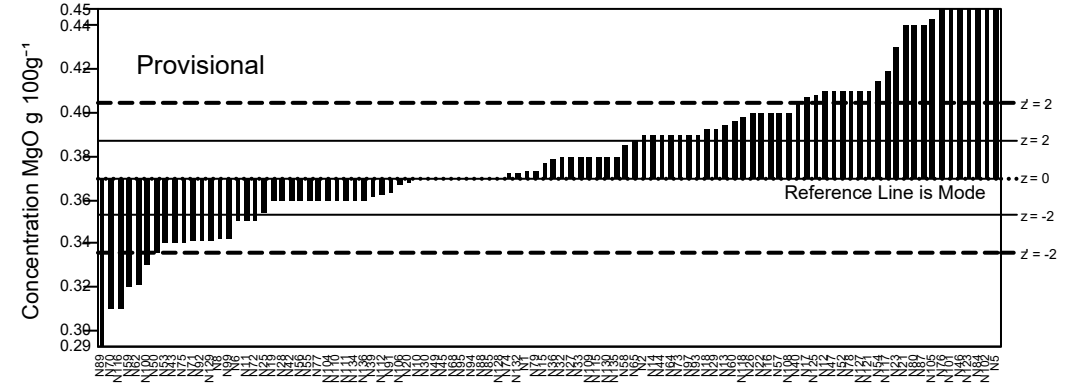
GeoPT51 - Barchart for Fe2O3T



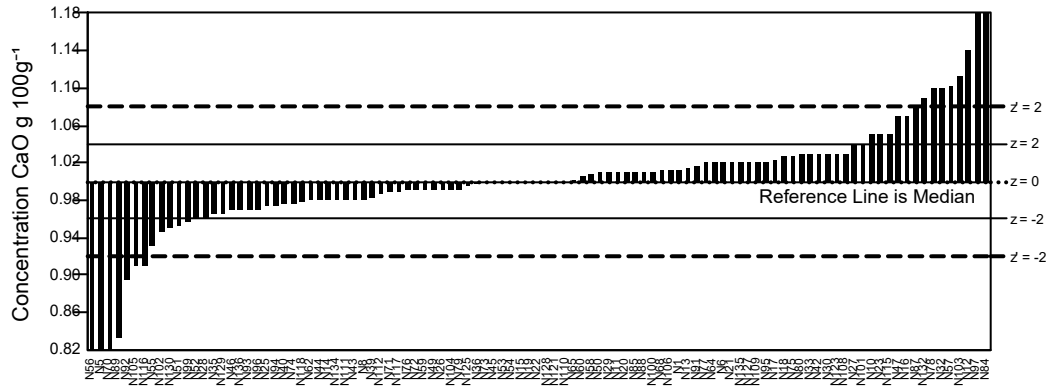
GeoPT51 - Barchart for MnO



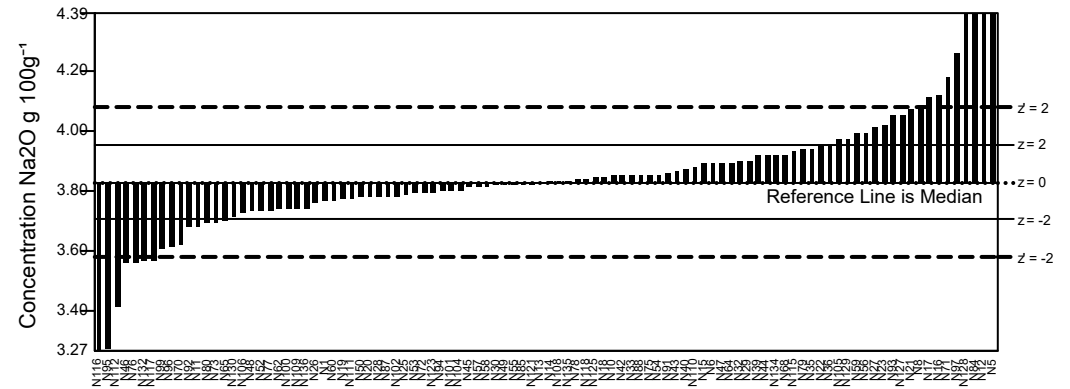
GeoPT51 - Barchart for MgO



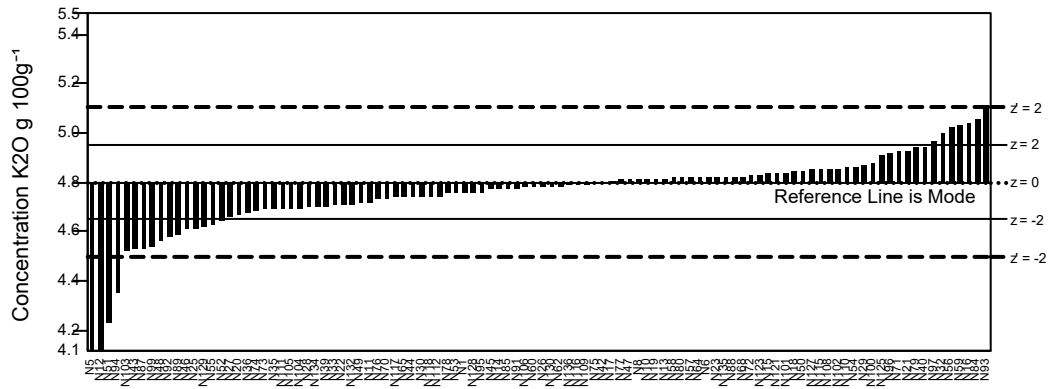
GeoPT51 - Barchart for CaO



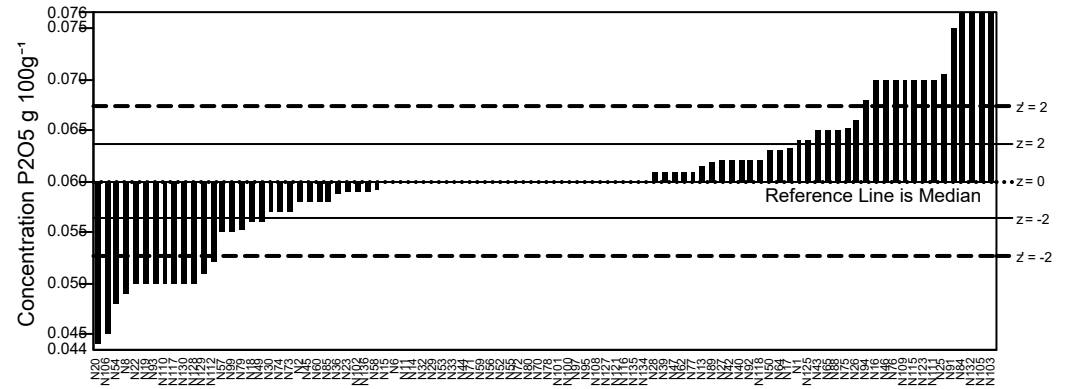
GeoPT51 - Barchart for Na2O



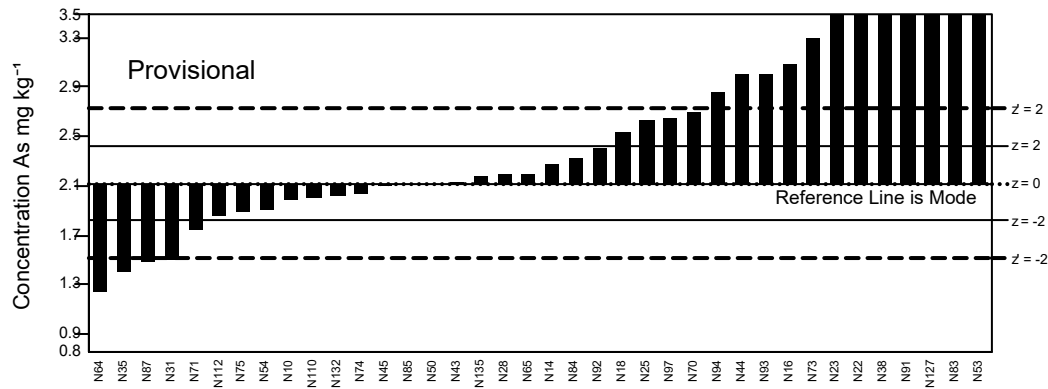
GeoPT51 - Barchart for K2O



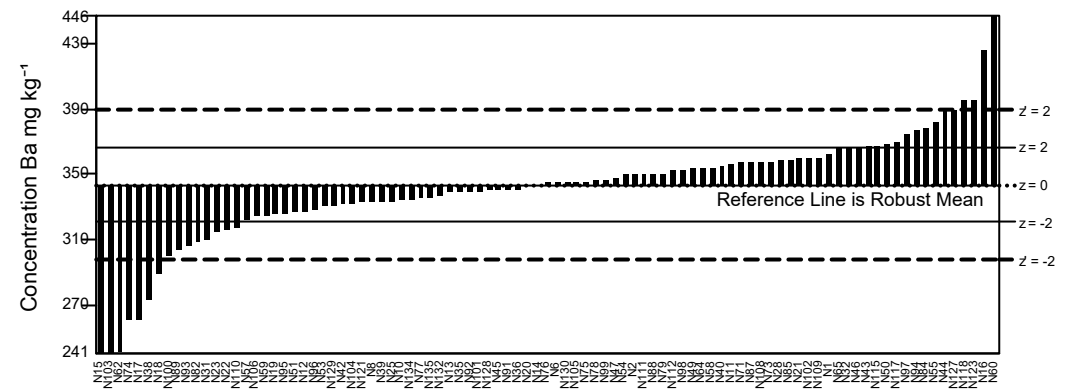
GeoPT51 - Barchart for P2O5



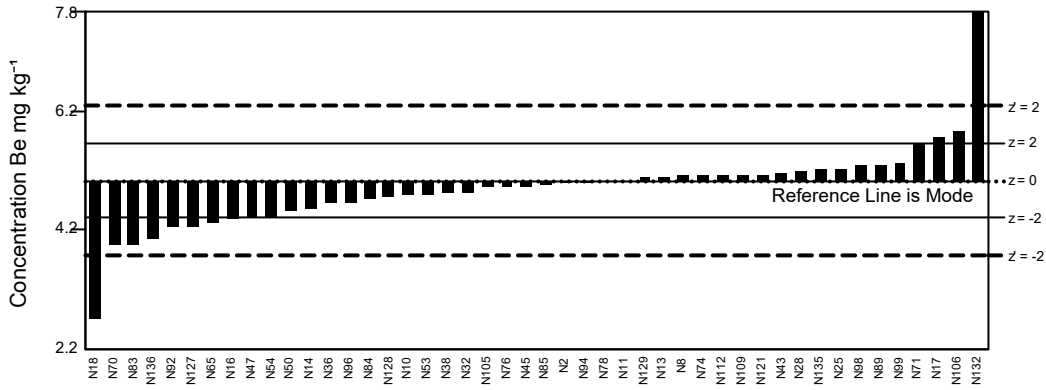
GeoPT51 - Barchart for As



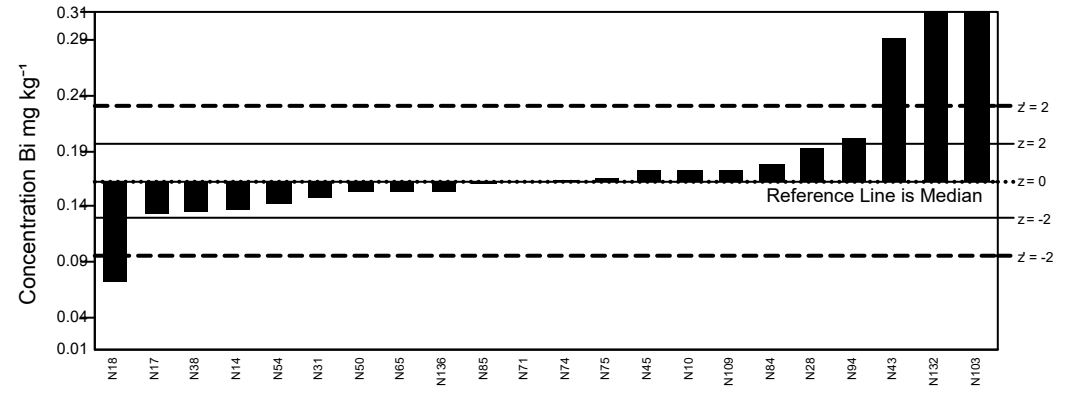
GeoPT51 - Barchart for Ba



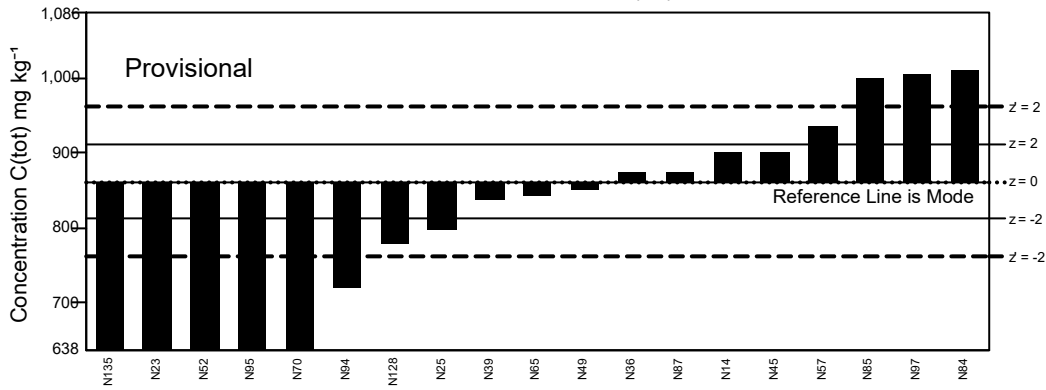
GeoPT51 - Barchart for Be



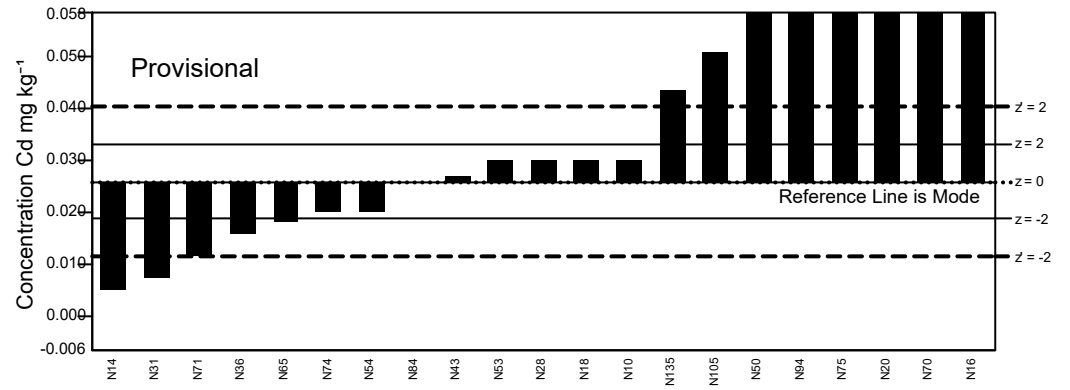
GeoPT51 - Barchart for Bi



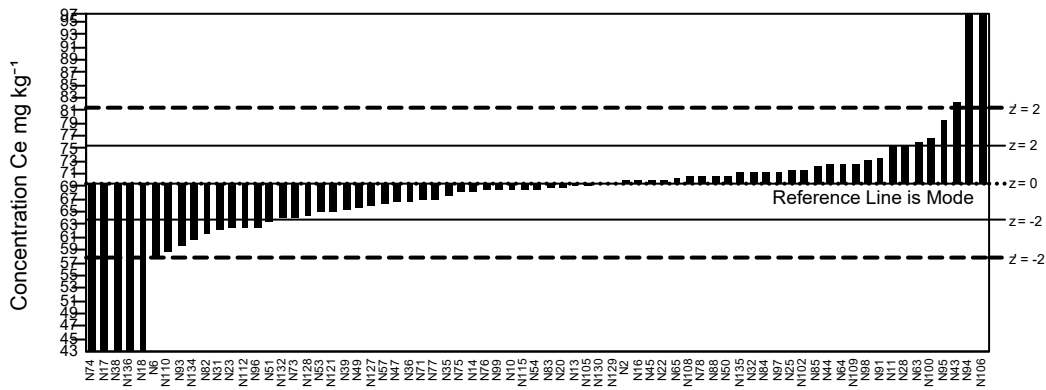
GeoPT51 - Barchart for C(tot)



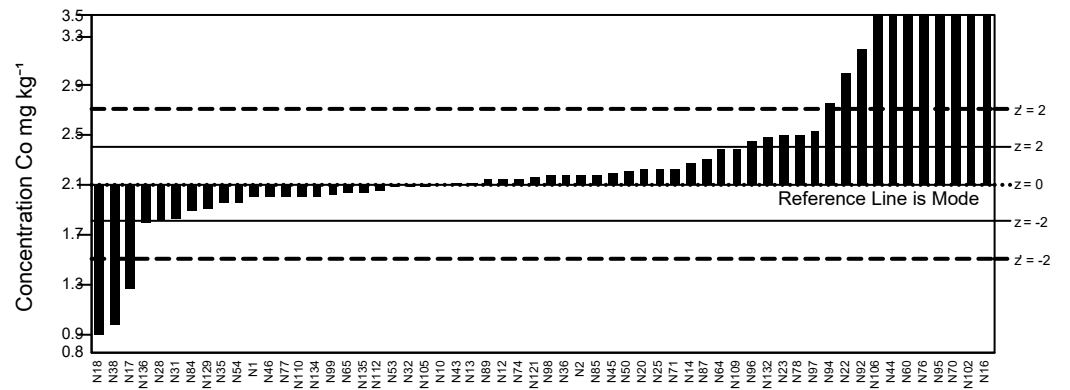
GeoPT51 - Barchart for Cd



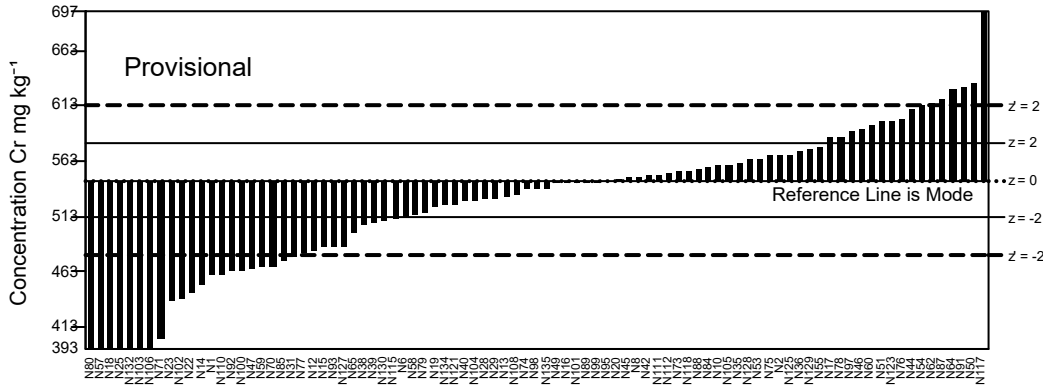
GeoPT51 - Barchart for Ce



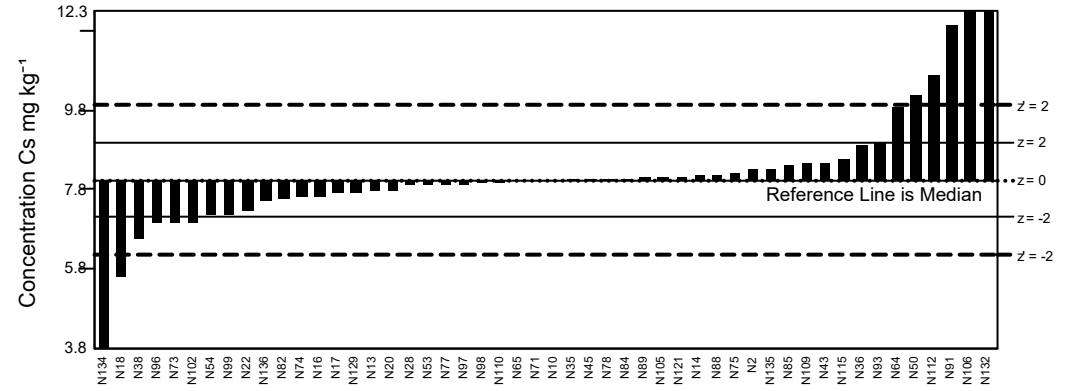
GeoPT51 - Barchart for Co



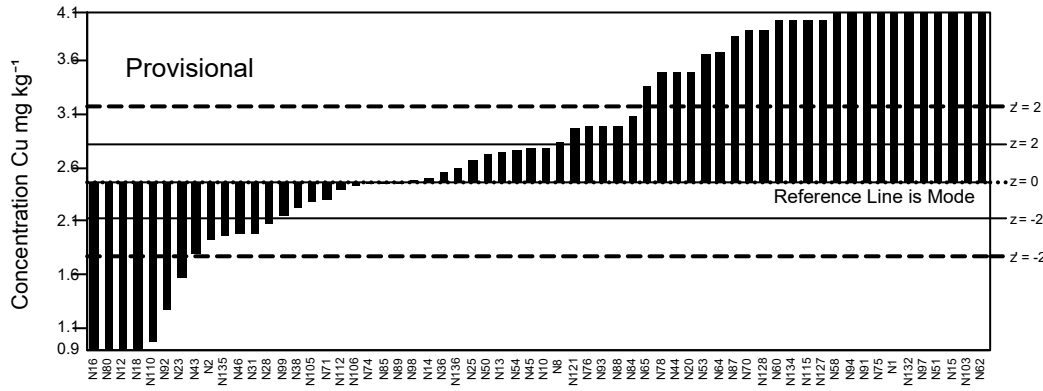
GeoPT51 - Barchart for Cr



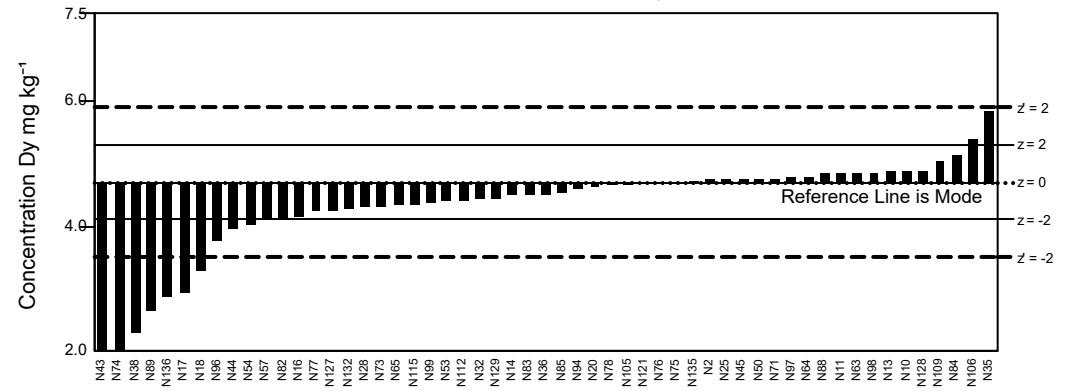
GeoPT51 - Barchart for Cs



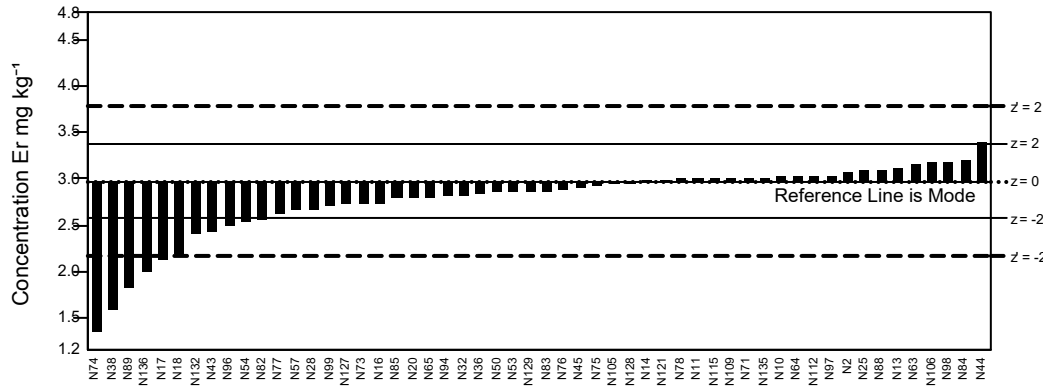
GeoPT51 - Barchart for Cu



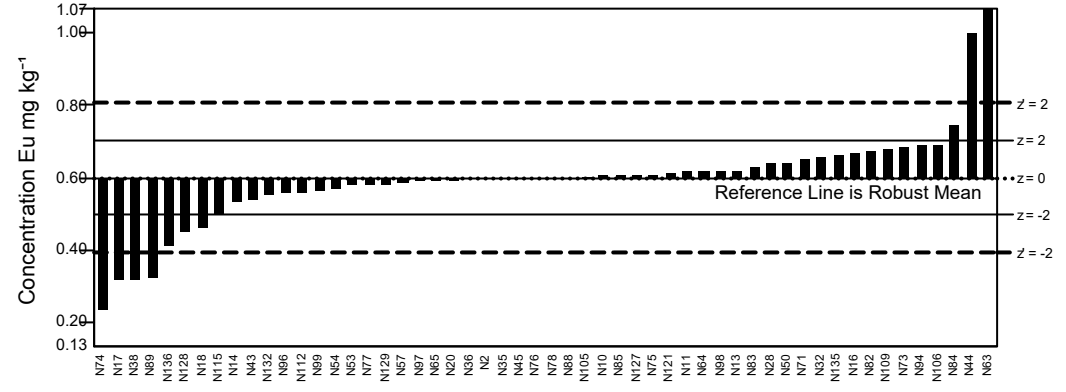
GeoPT51 - Barchart for Dy



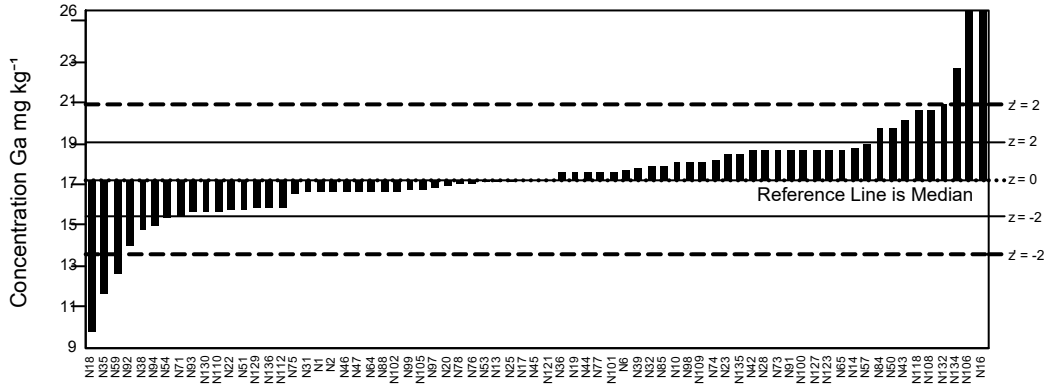
GeoPT51 - Barchart for Er



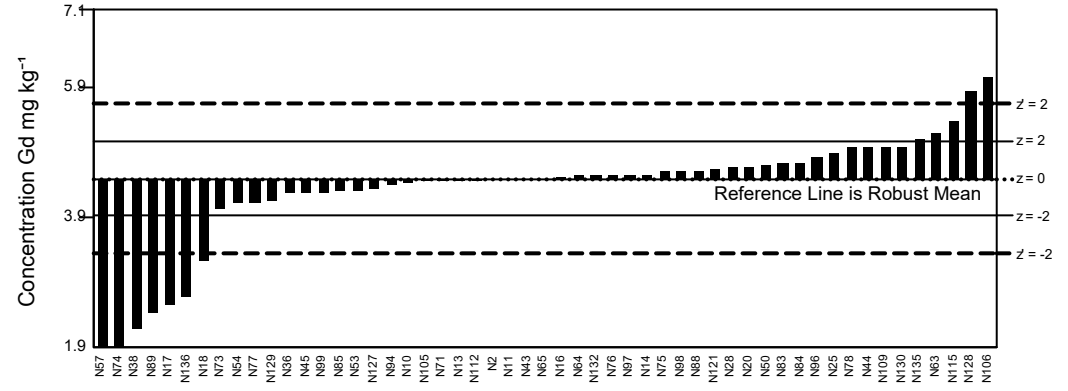
GeoPT51 - Barchart for Eu



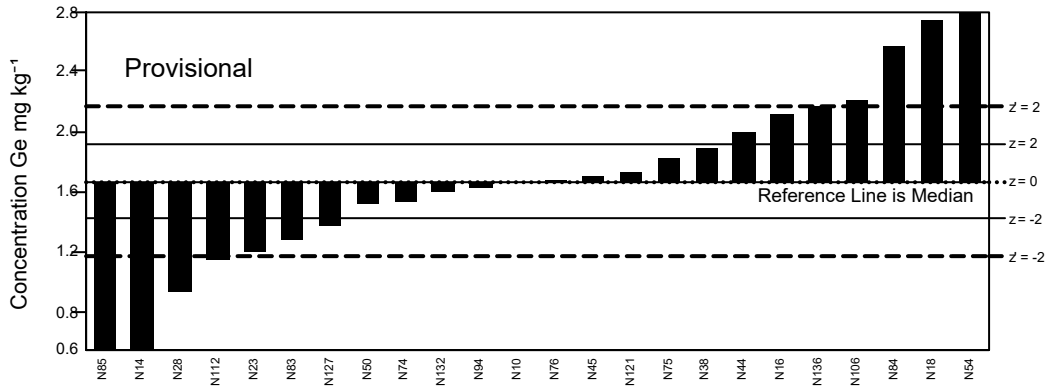
GeoPT51 - Barchart for Ga



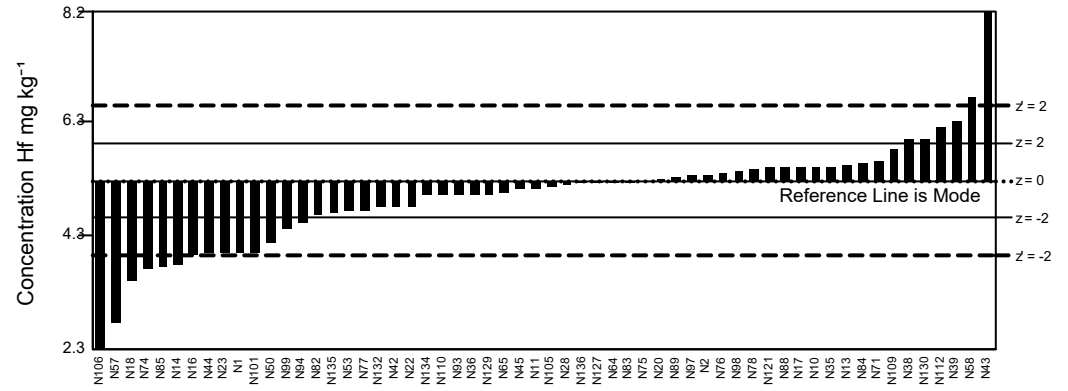
GeoPT51 - Barchart for Gd



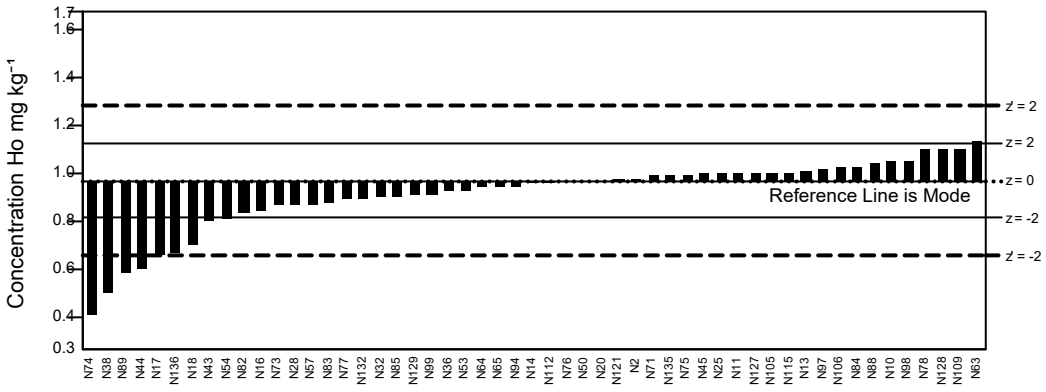
GeoPT51 - Barchart for Ge



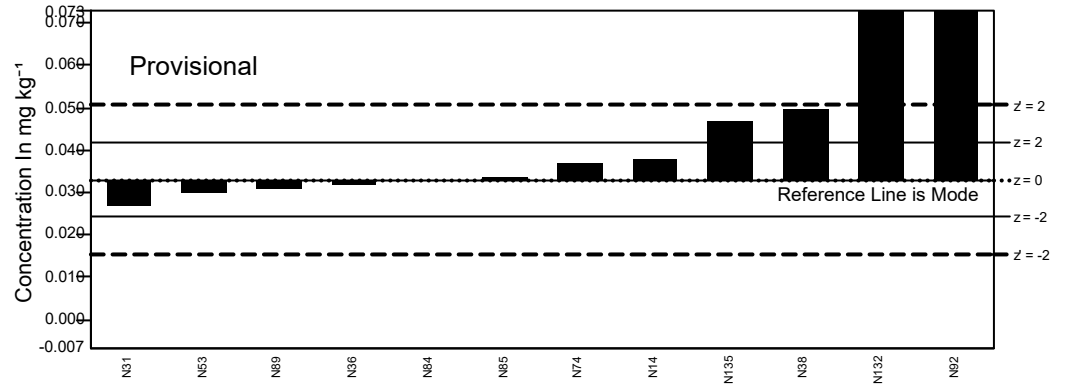
GeoPT51 - Barchart for Hf



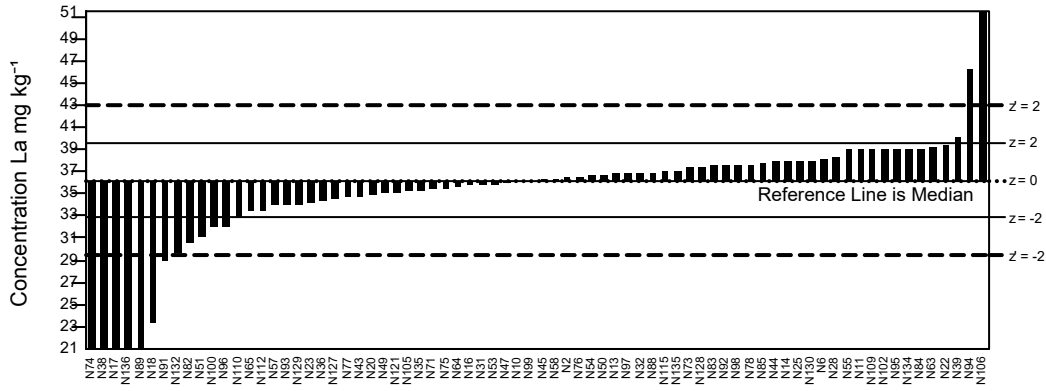
GeoPT51 - Barchart for Ho



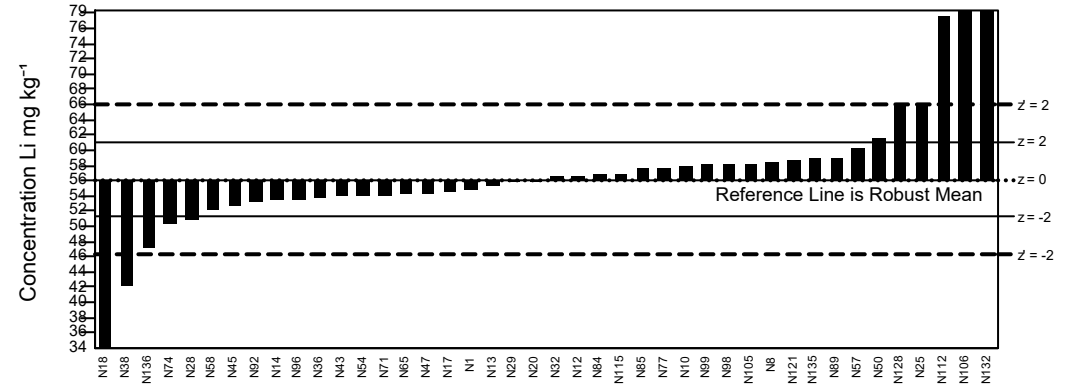
GeoPT51 - Barchart for In



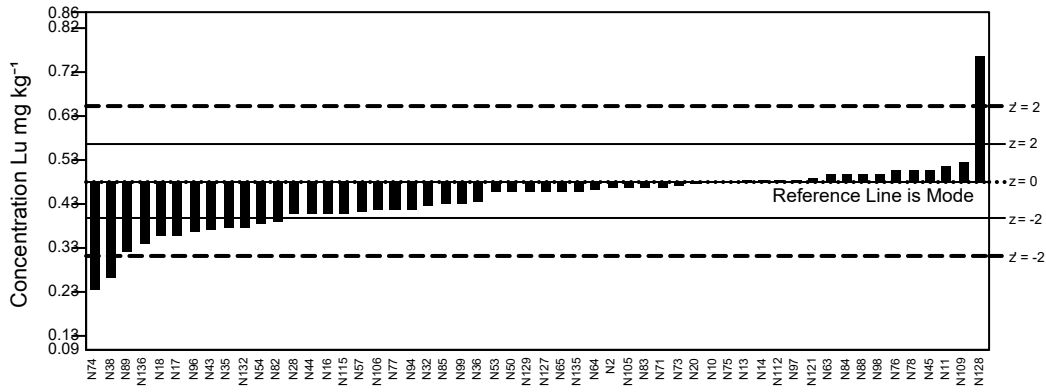
GeoPT51 - Barchart for La



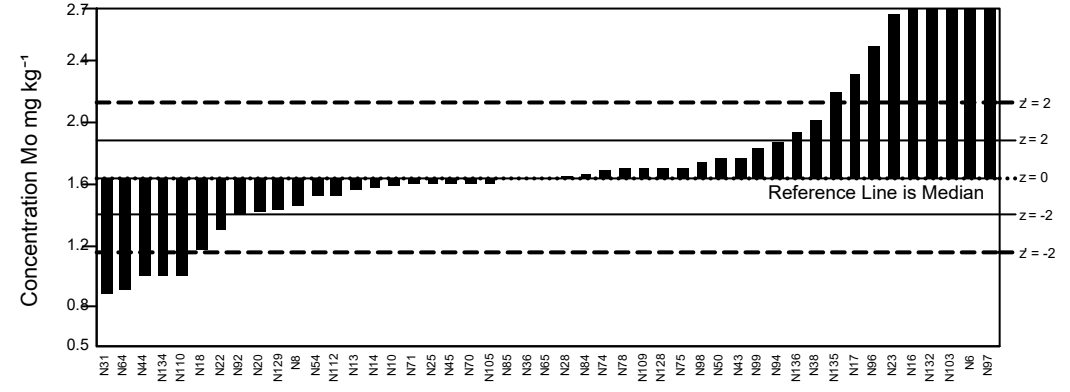
GeoPT51 - Barchart for Li



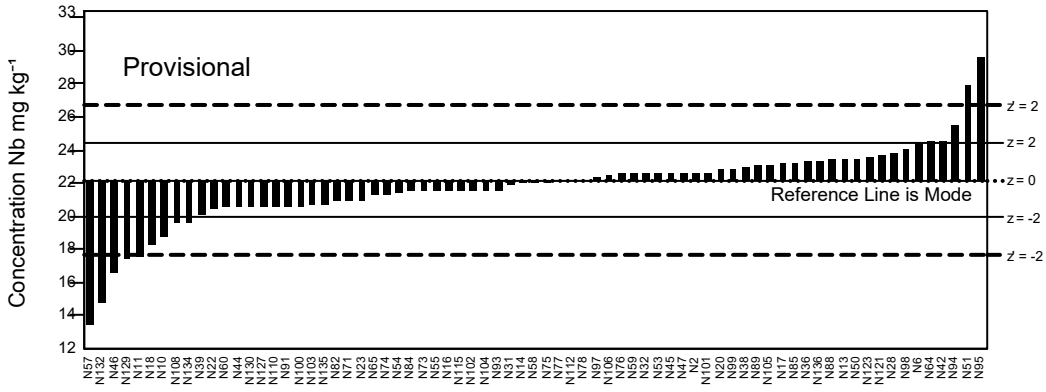
GeoPT51 - Barchart for Lu



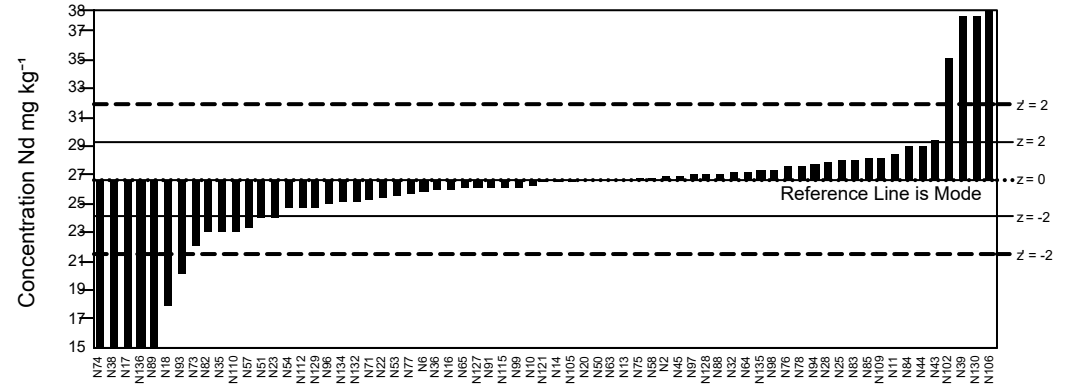
GeoPT51 - Barchart for Mo



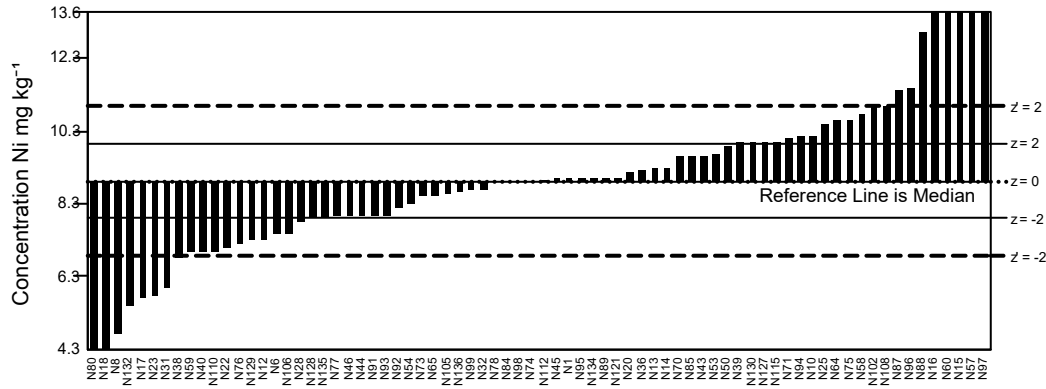
GeoPT51 - Barchart for Nb



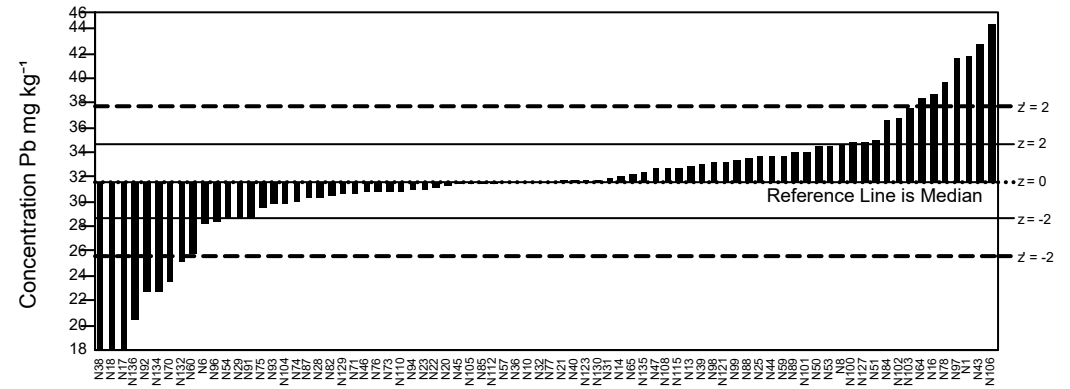
GeoPT51 - Barchart for Nd



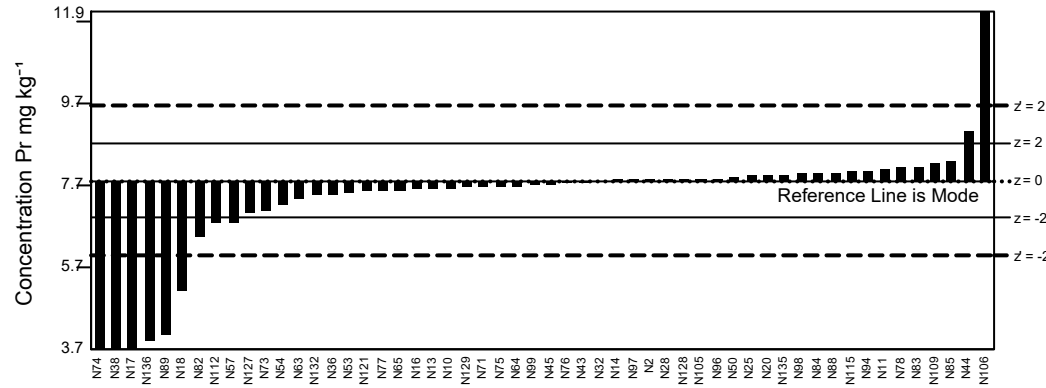
GeoPT51 - Barchart for Ni



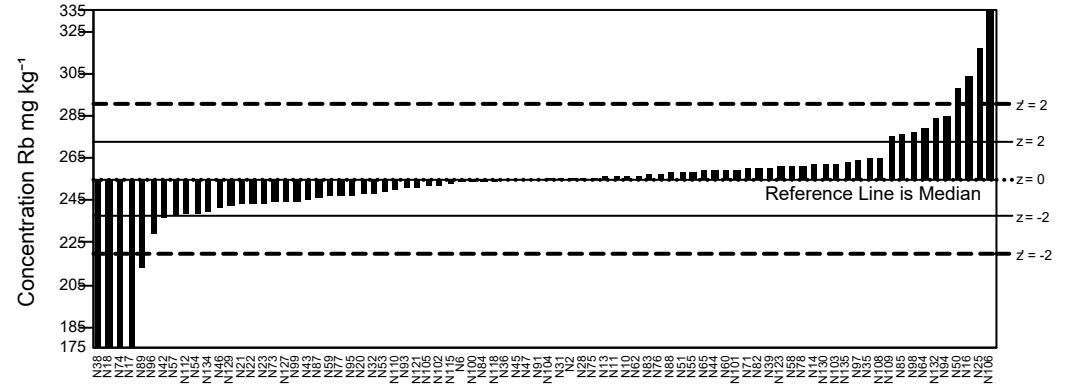
GeoPT51 - Barchart for Pb



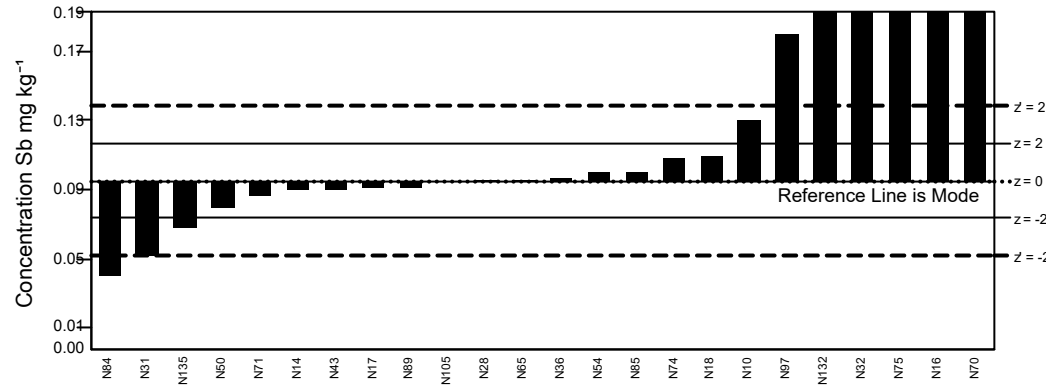
GeoPT51 - Barchart for Pr



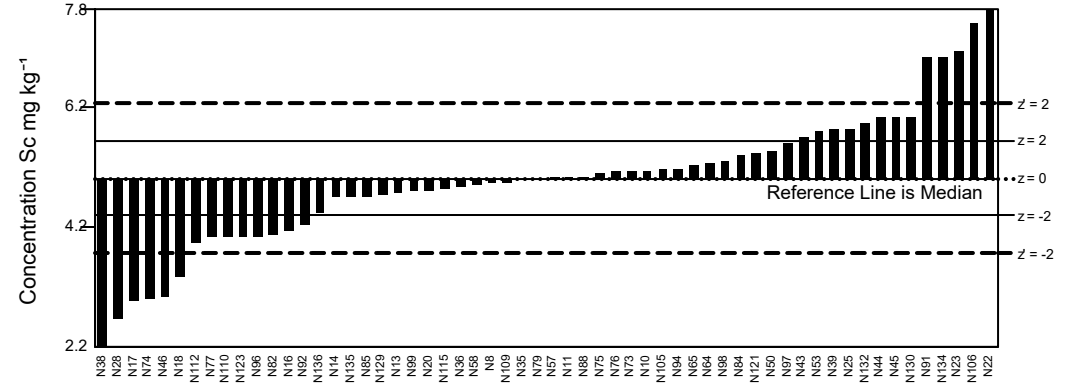
GeoPT51 - Barchart for Rb



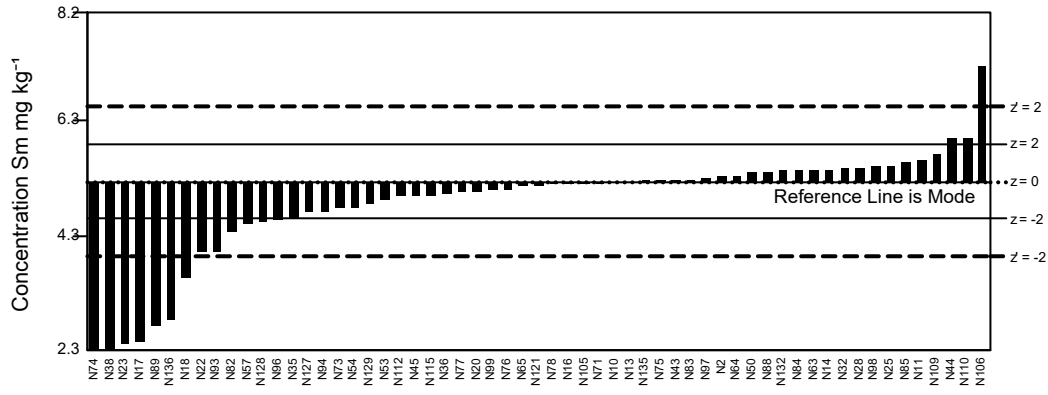
GeoPT51 - Barchart for Sb



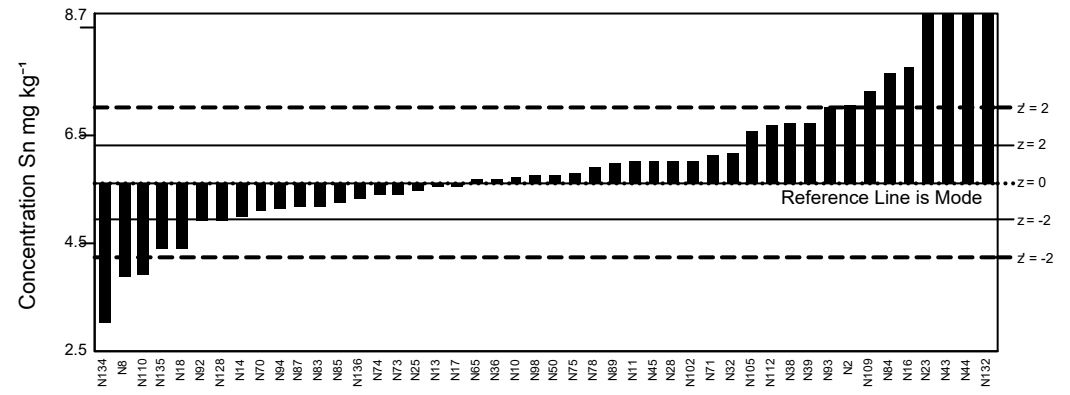
GeoPT51 - Barchart for Sc



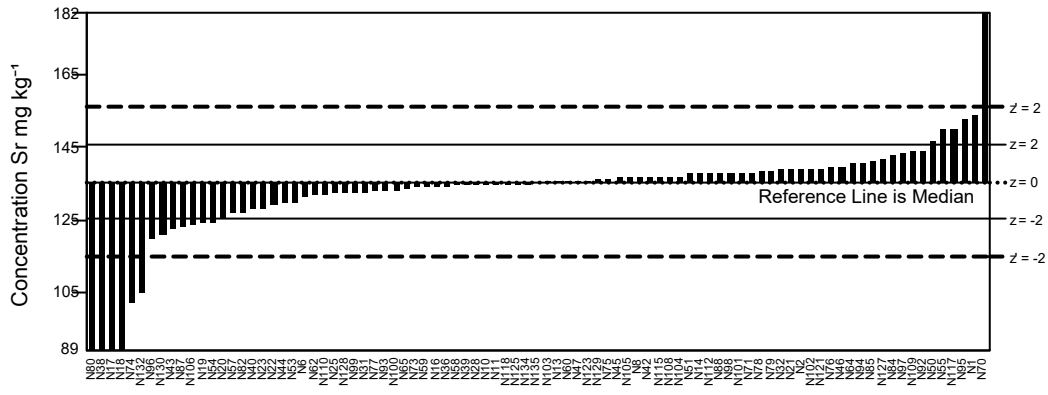
GeoPT51 - Barchart for Sm



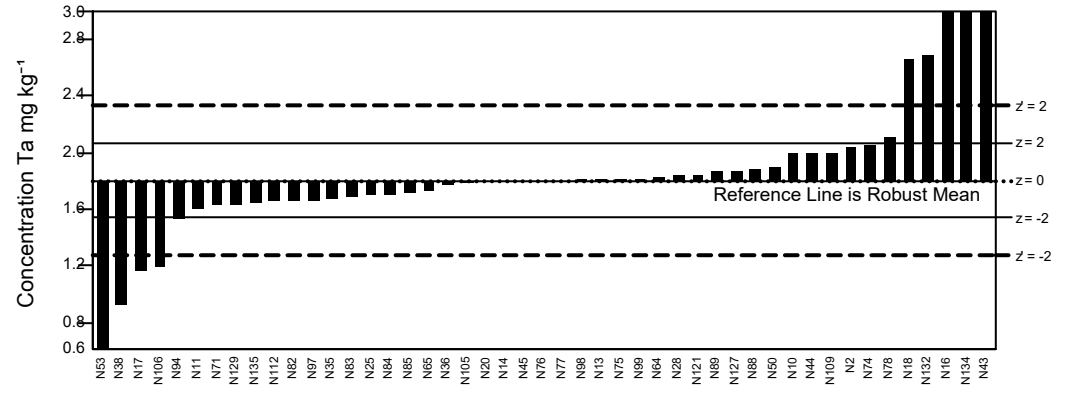
GeoPT51 - Barchart for Sn



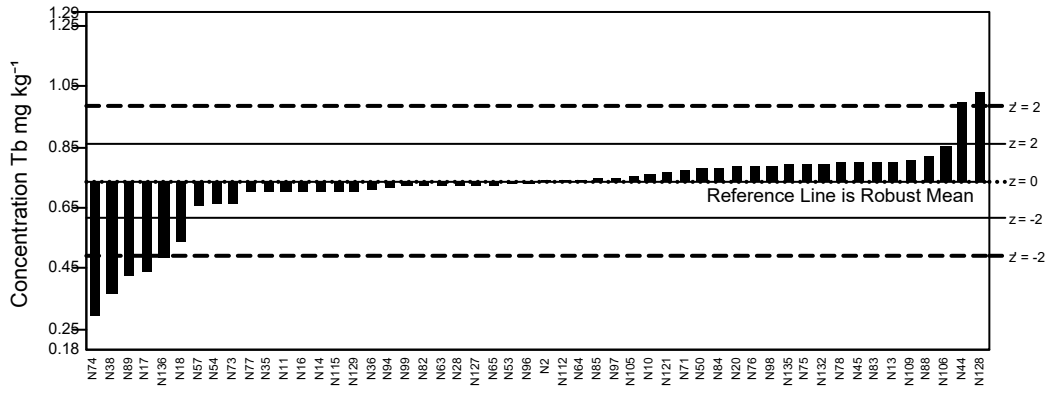
GeoPT51 - Barchart for Sr



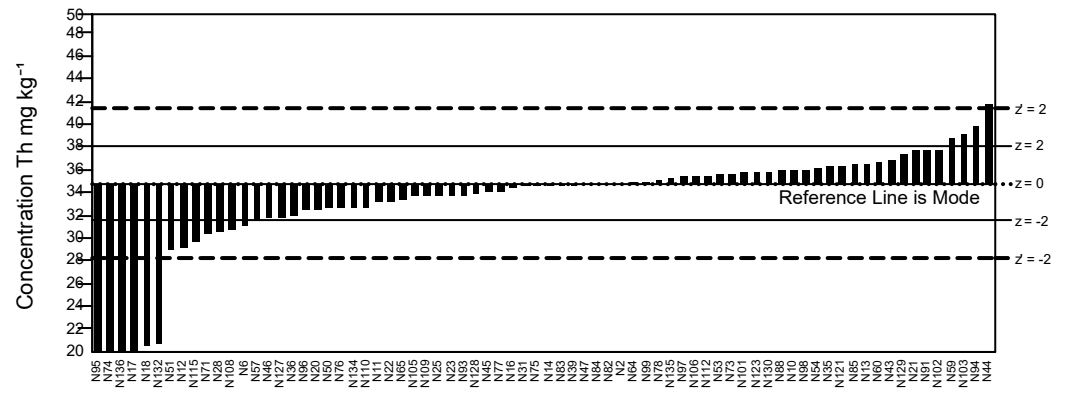
GeoPT51 - Barchart for Ta



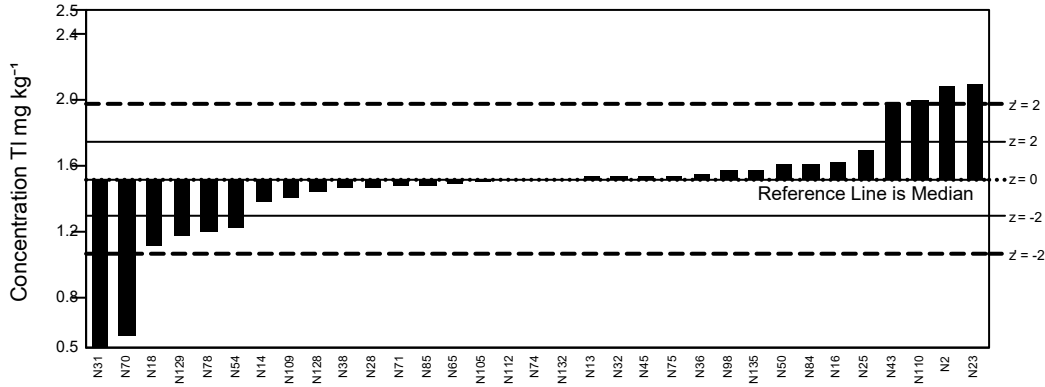
GeoPT51 - Barchart for Tb



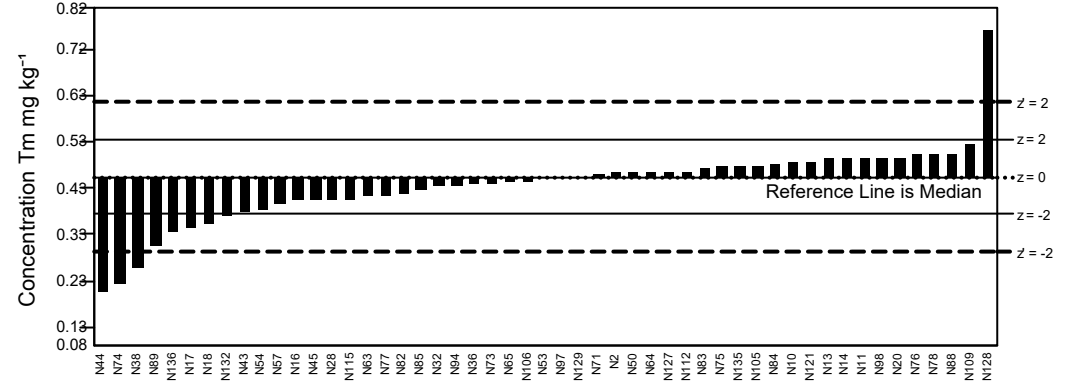
GeoPT51 - Barchart for Th



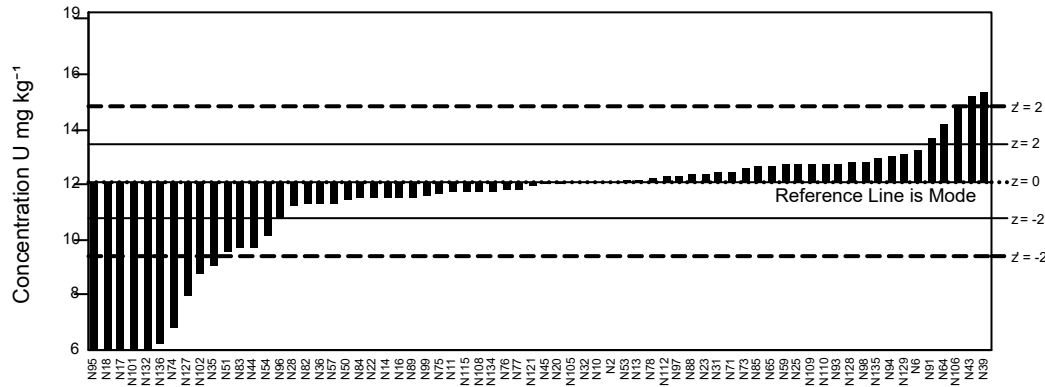
GeoPT51 - Barchart for TI



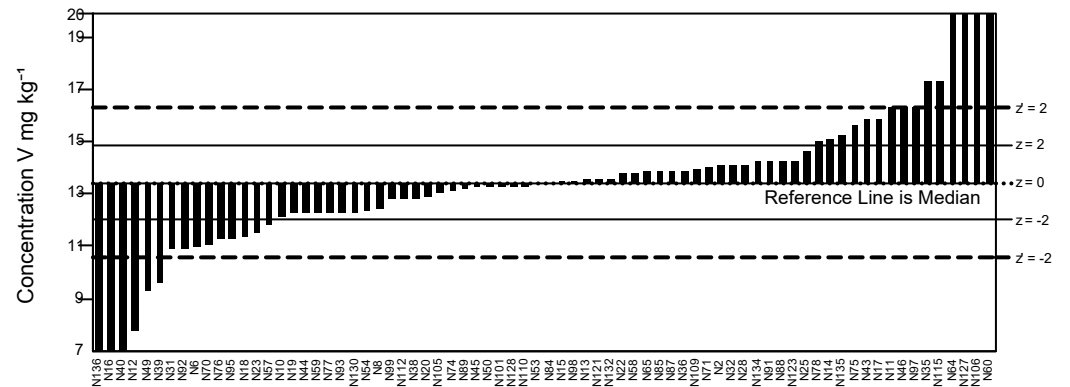
GeoPT51 - Barchart for Tm



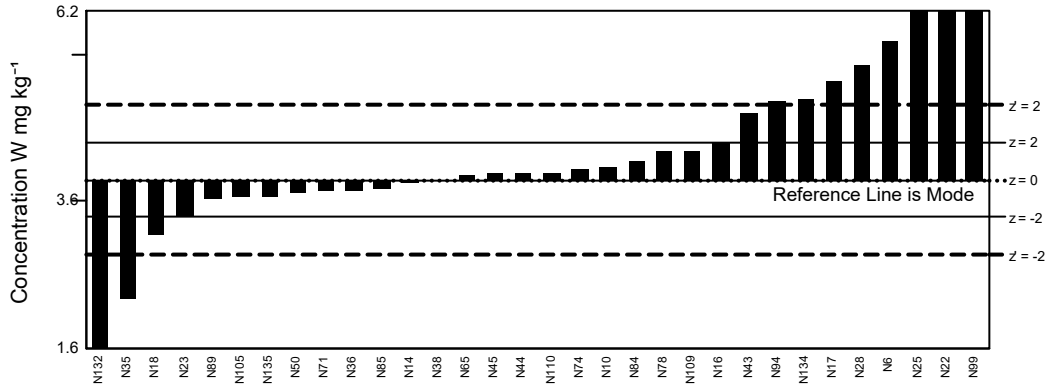
GeoPT51 - Barchart for U



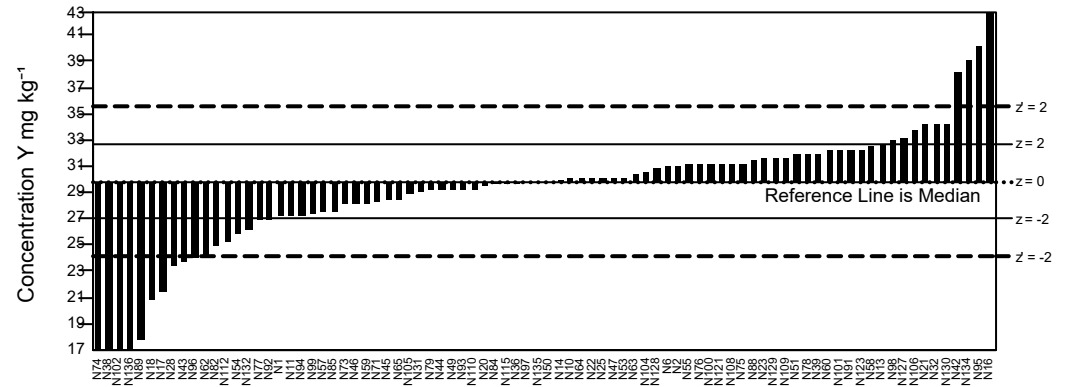
GeoPT51 - Barchart for V



GeoPT51 - Barchart for W



GeoPT51 - Barchart for Y



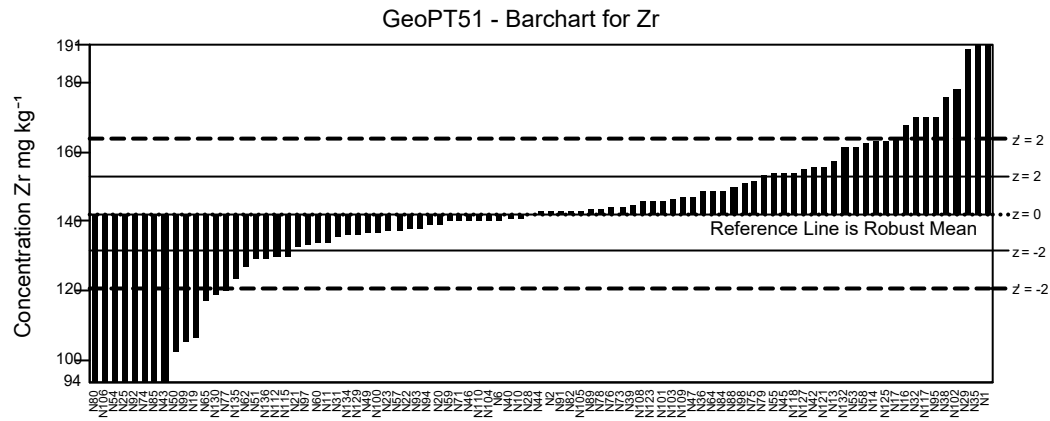
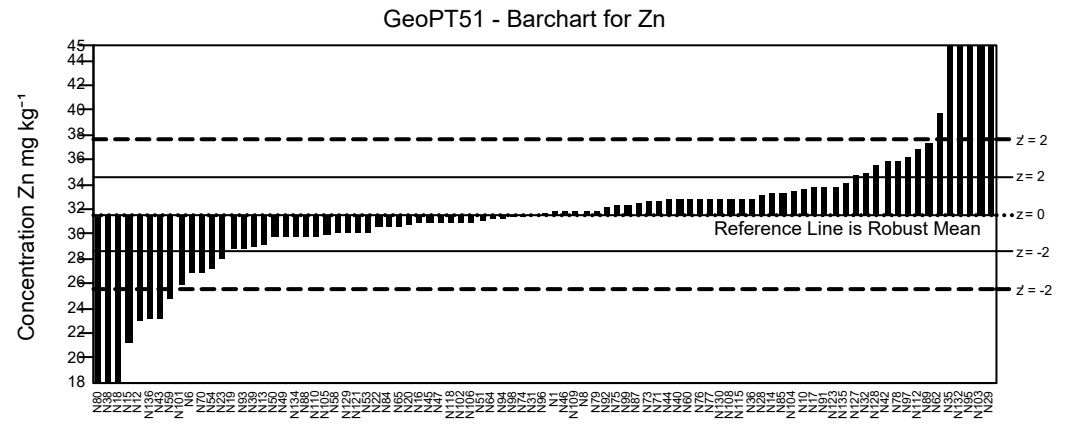
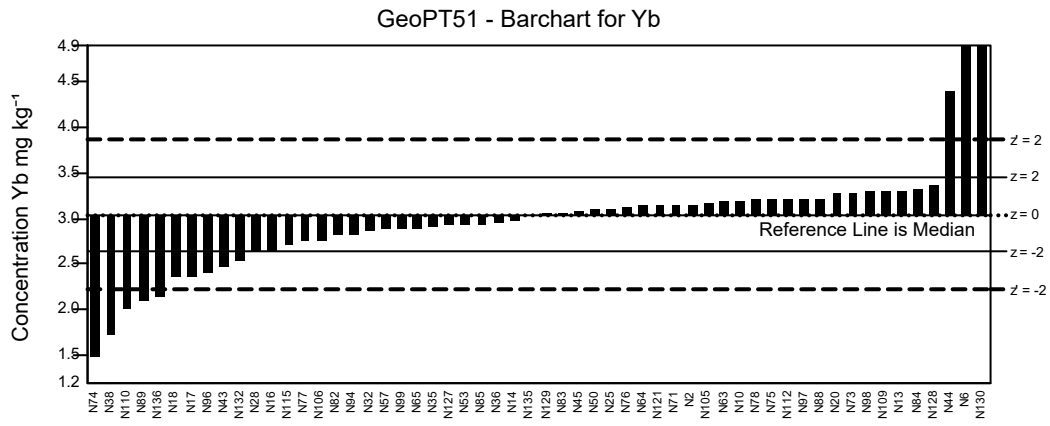
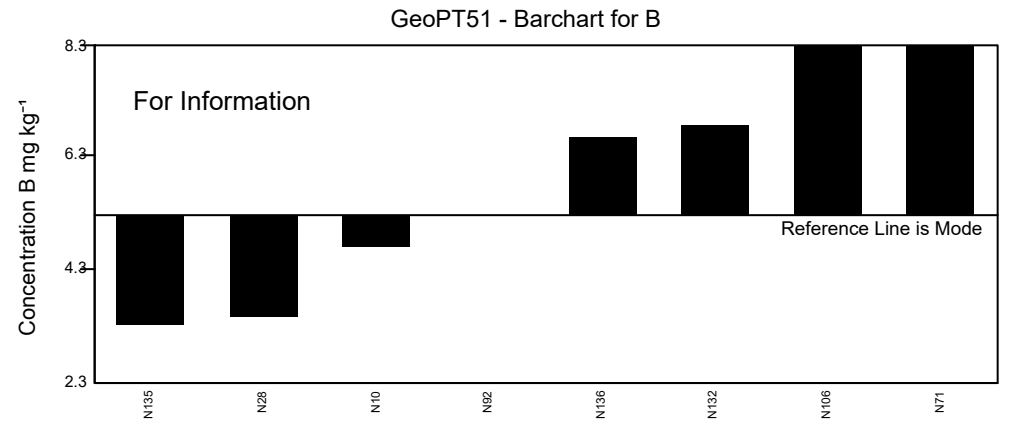
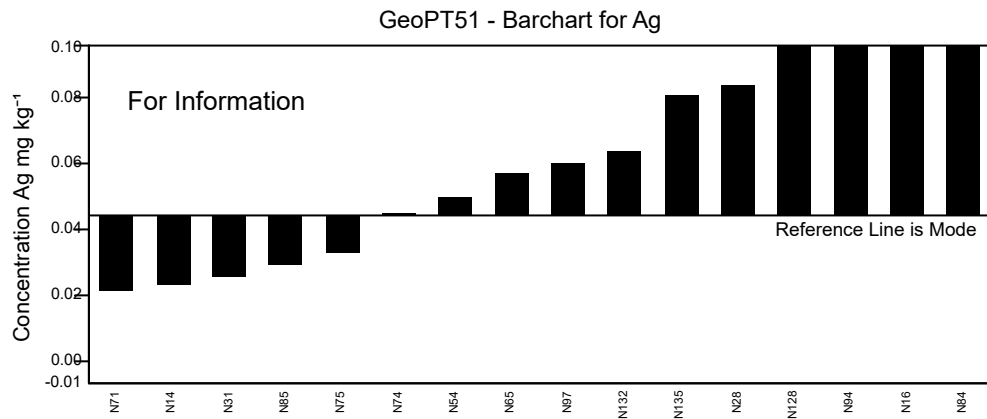
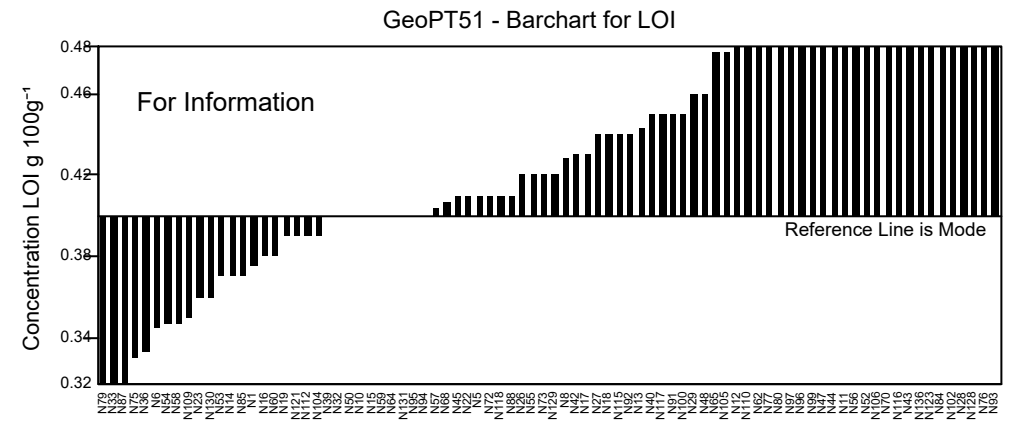
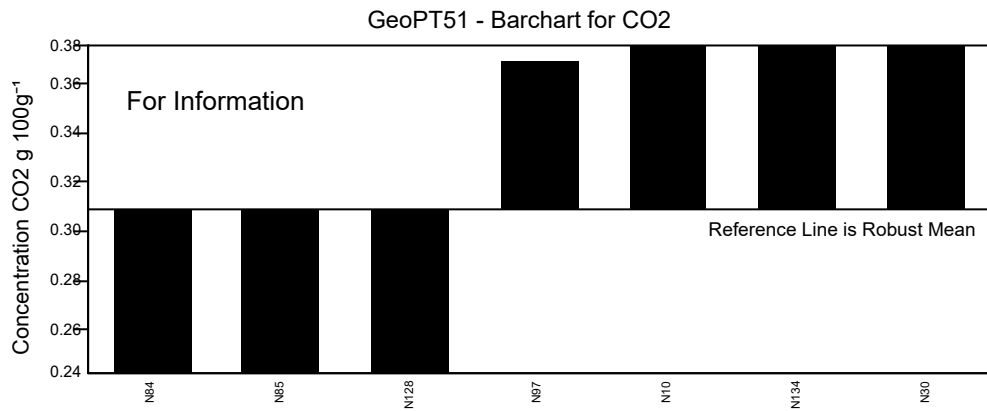
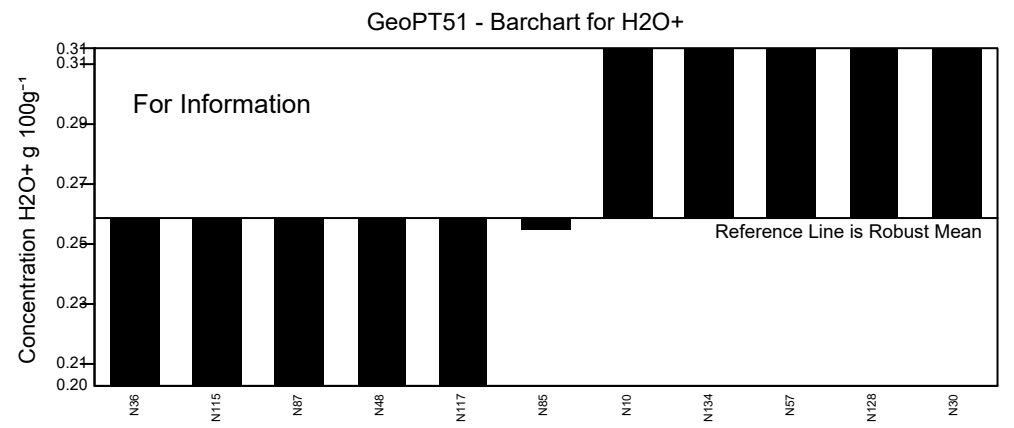
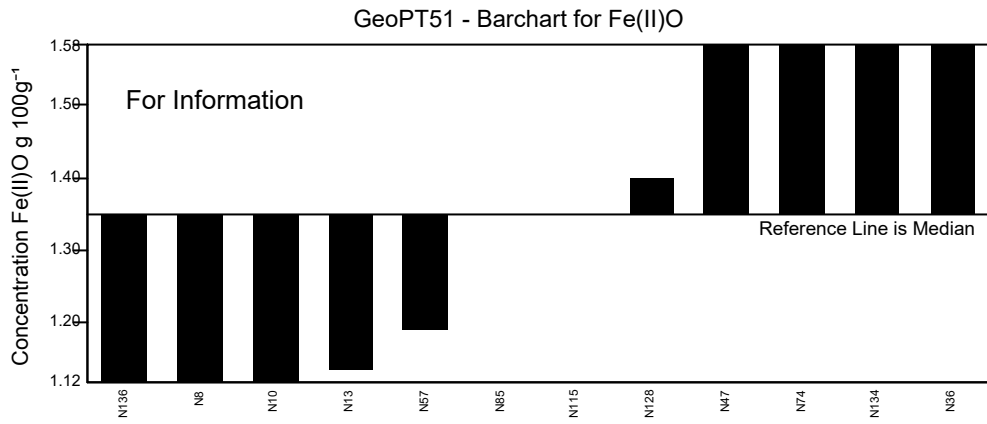


Figure 1: GeoPT51 - Leucomonzogranite, GMN-1. Data distribution charts for elements for which values were assigned or provisional values given for guidance. Horizontal lines show the limits for $-2 < z < 2$ for pure geochemistry labs (solid lines) and $-2 < z < 2$ for applied geochemistry labs (pecked lines).



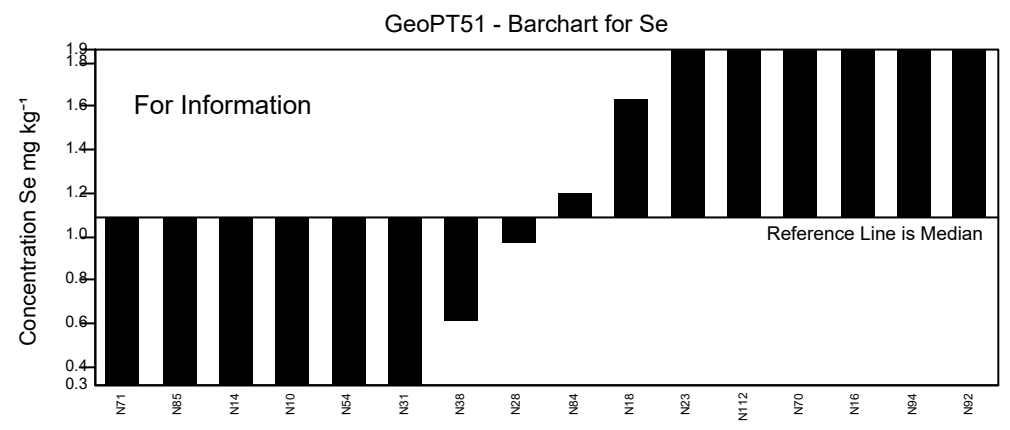
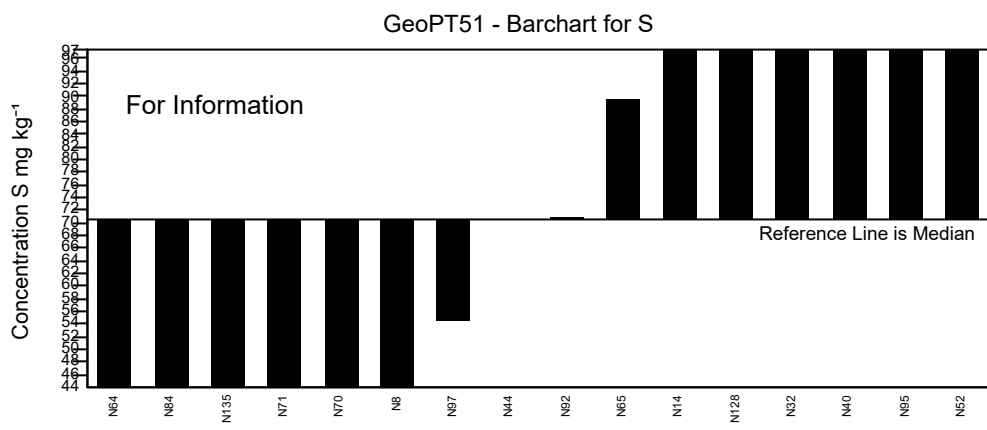
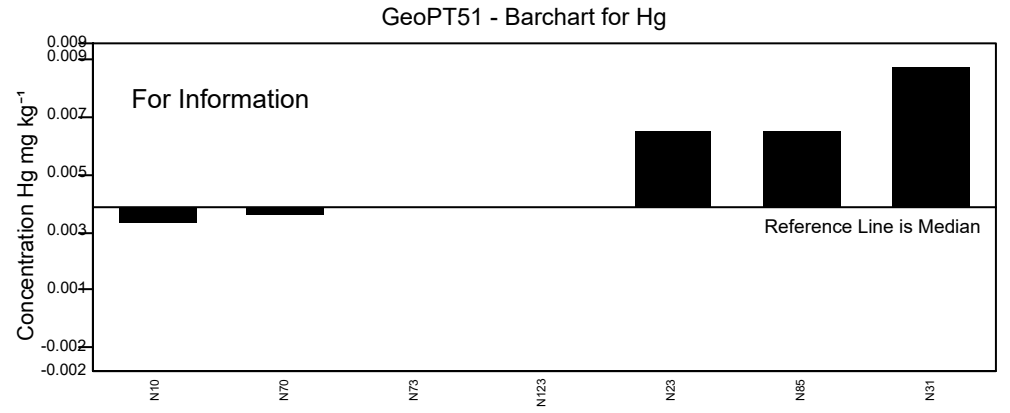
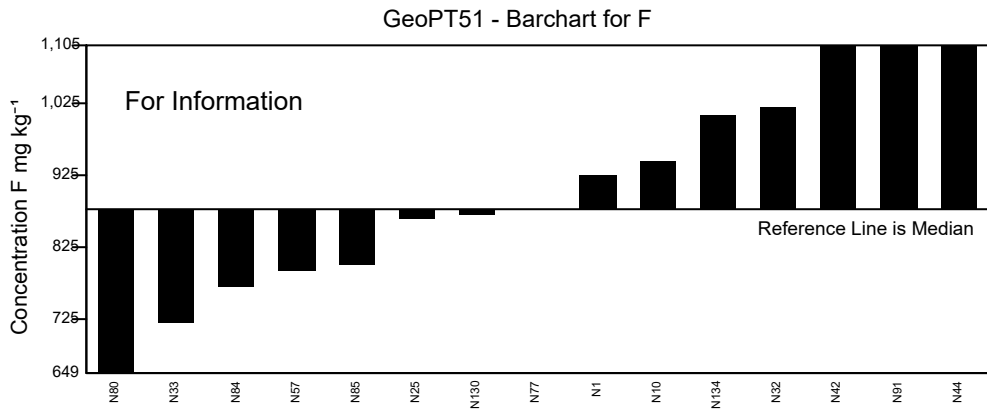
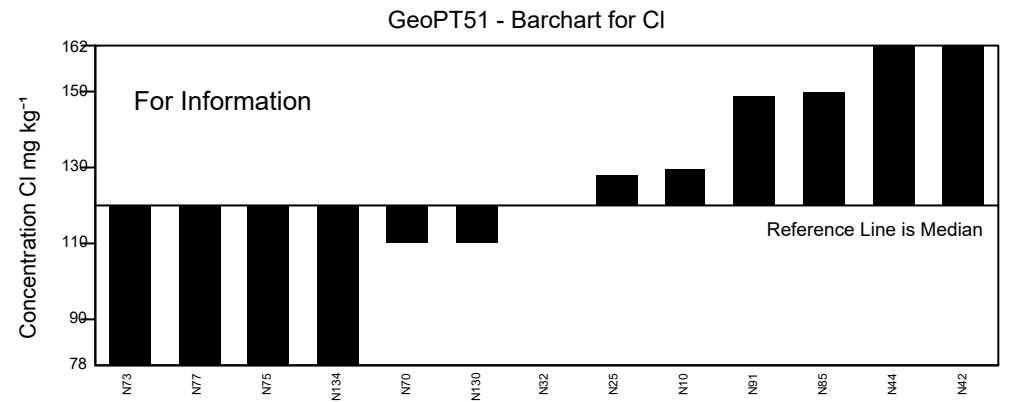
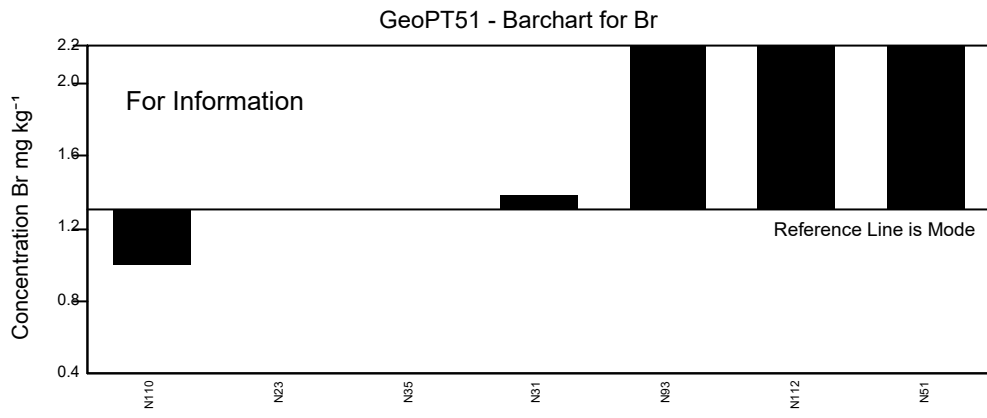
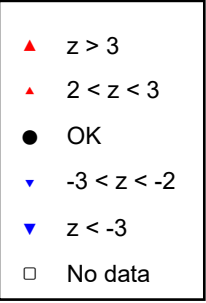
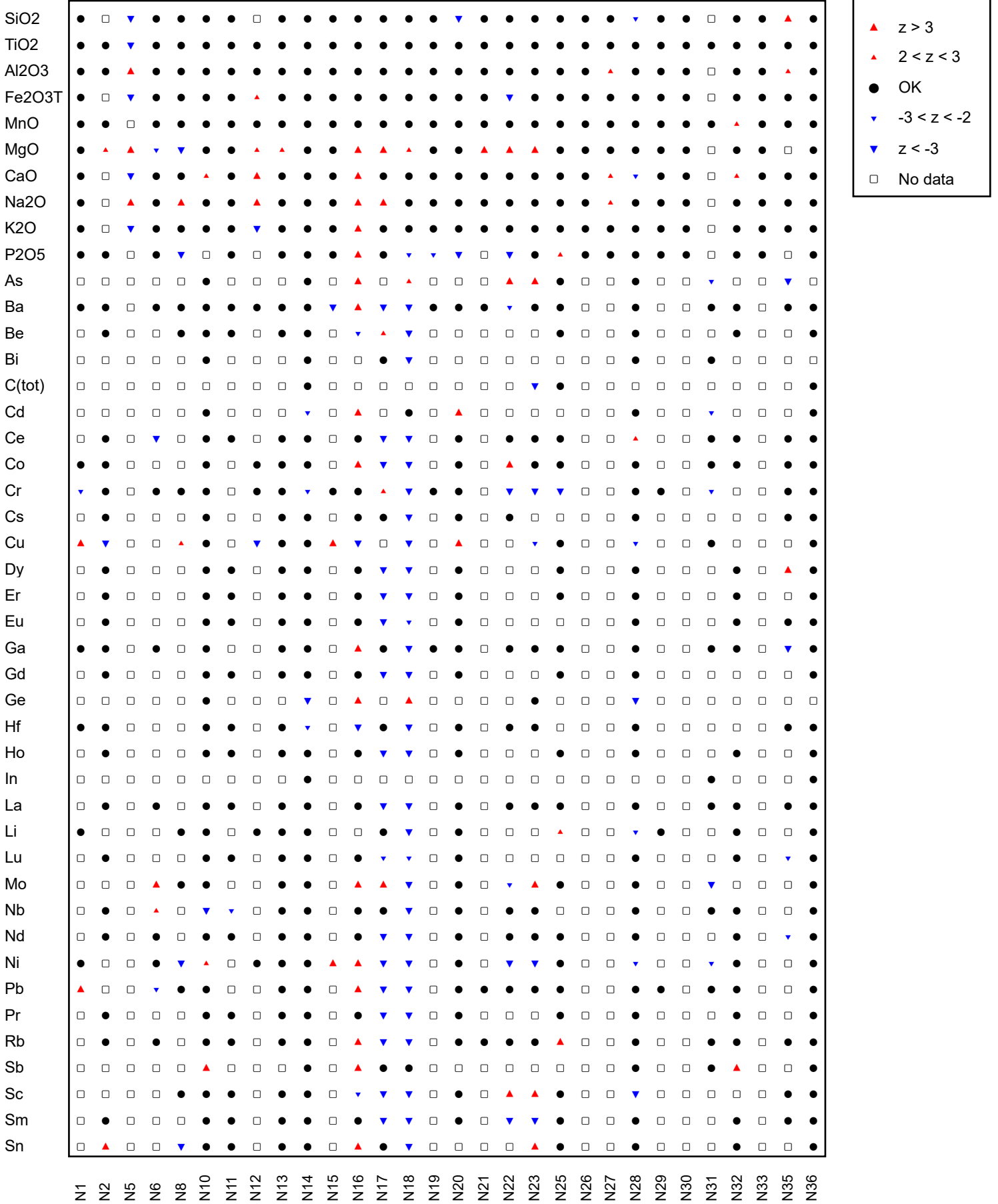


Figure 2: GeoPT51 - Leucomonzogranite, GMN-1. Data distribution charts provided for information only for elements for which values could not be assigned.

Multiple Z-Score Chart for GeoPT51



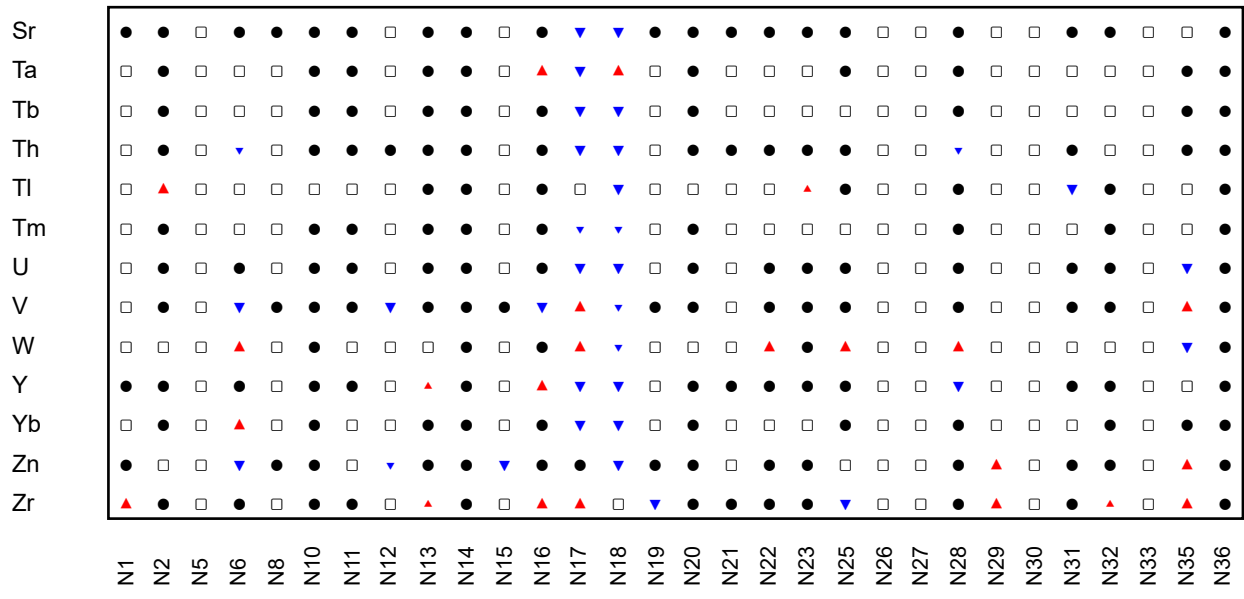


Figure 3: GeoPT51 - Leucomonzogranite, GMN-1. Multiple z-score charts for laboratories participating in the GeoPT51 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

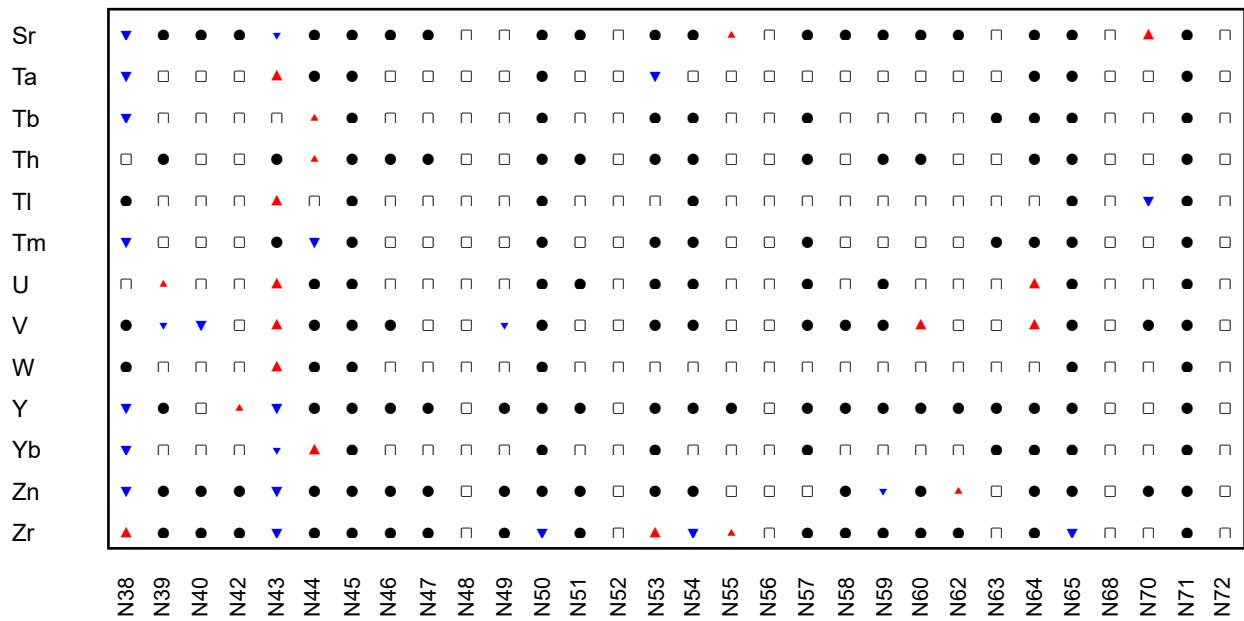
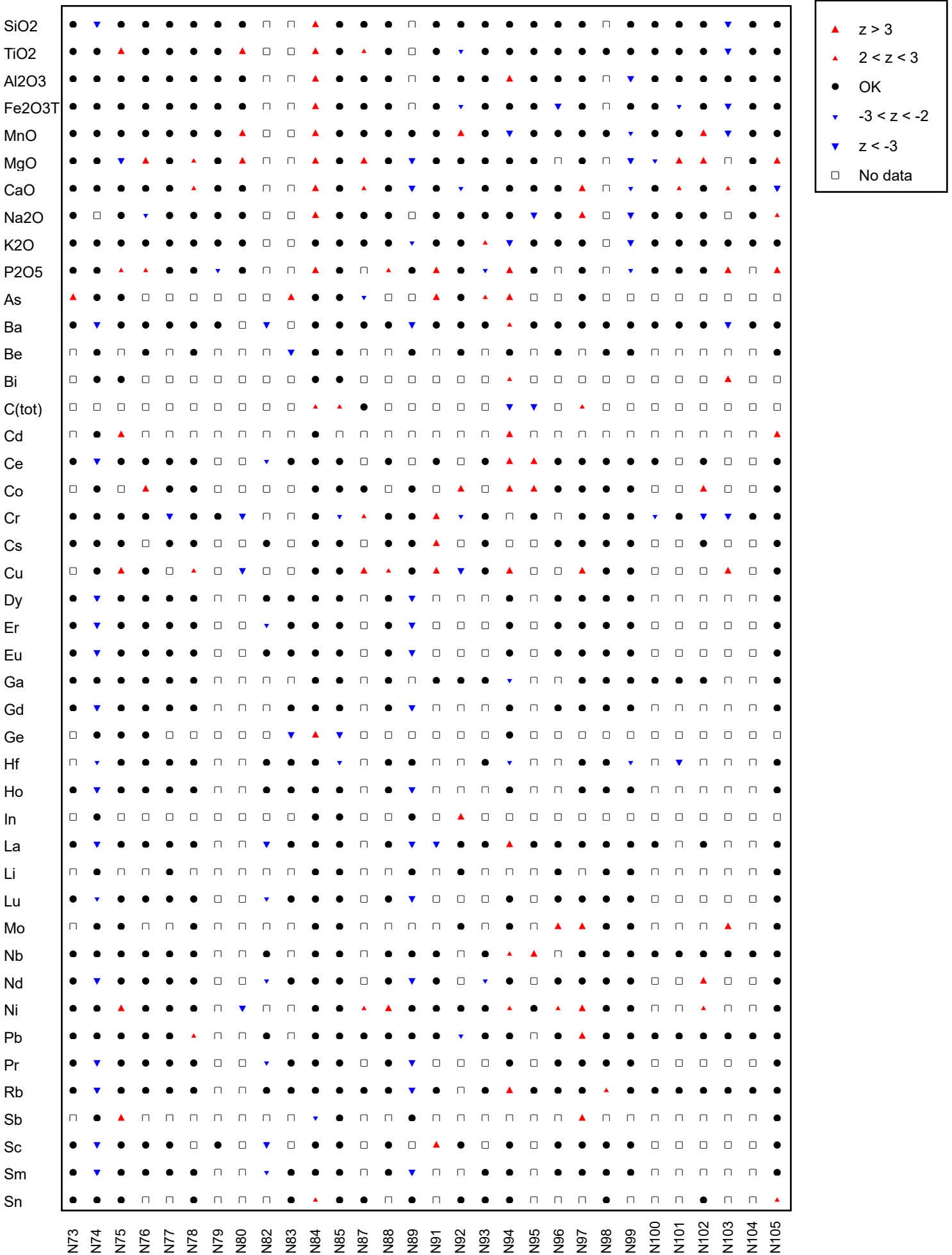


Figure 3: GeoPT51 - Leucomonzogranite, GMN-1. Multiple z-score charts for laboratories participating in the GeoPT51 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

Multiple Z-Score Chart for GeoPT51



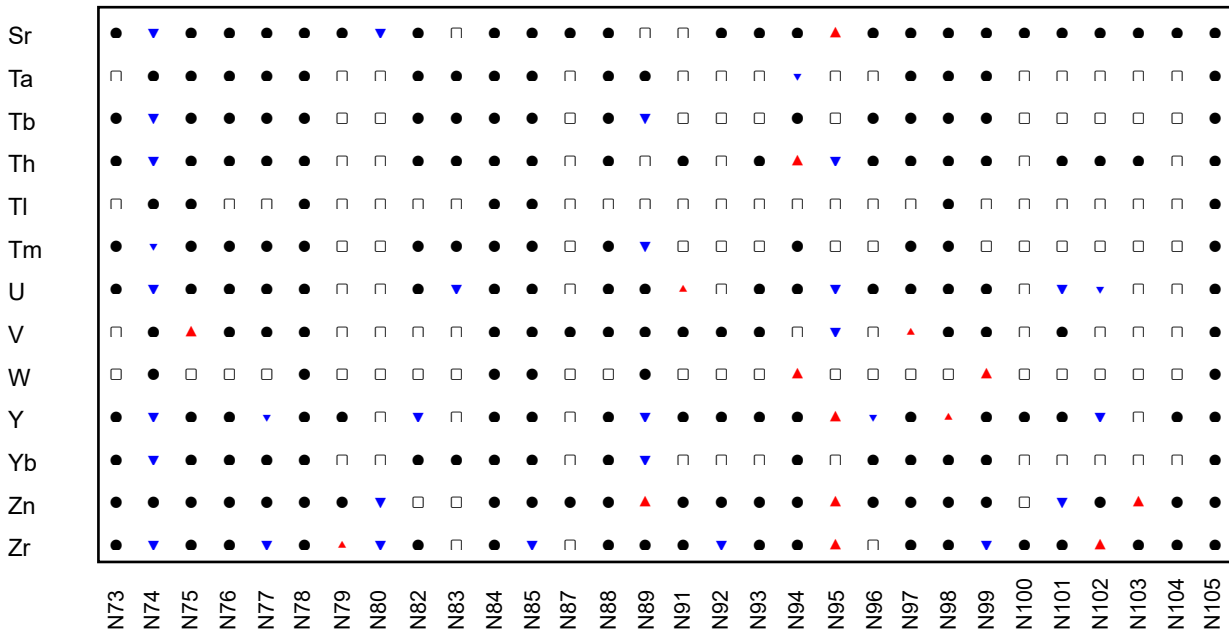
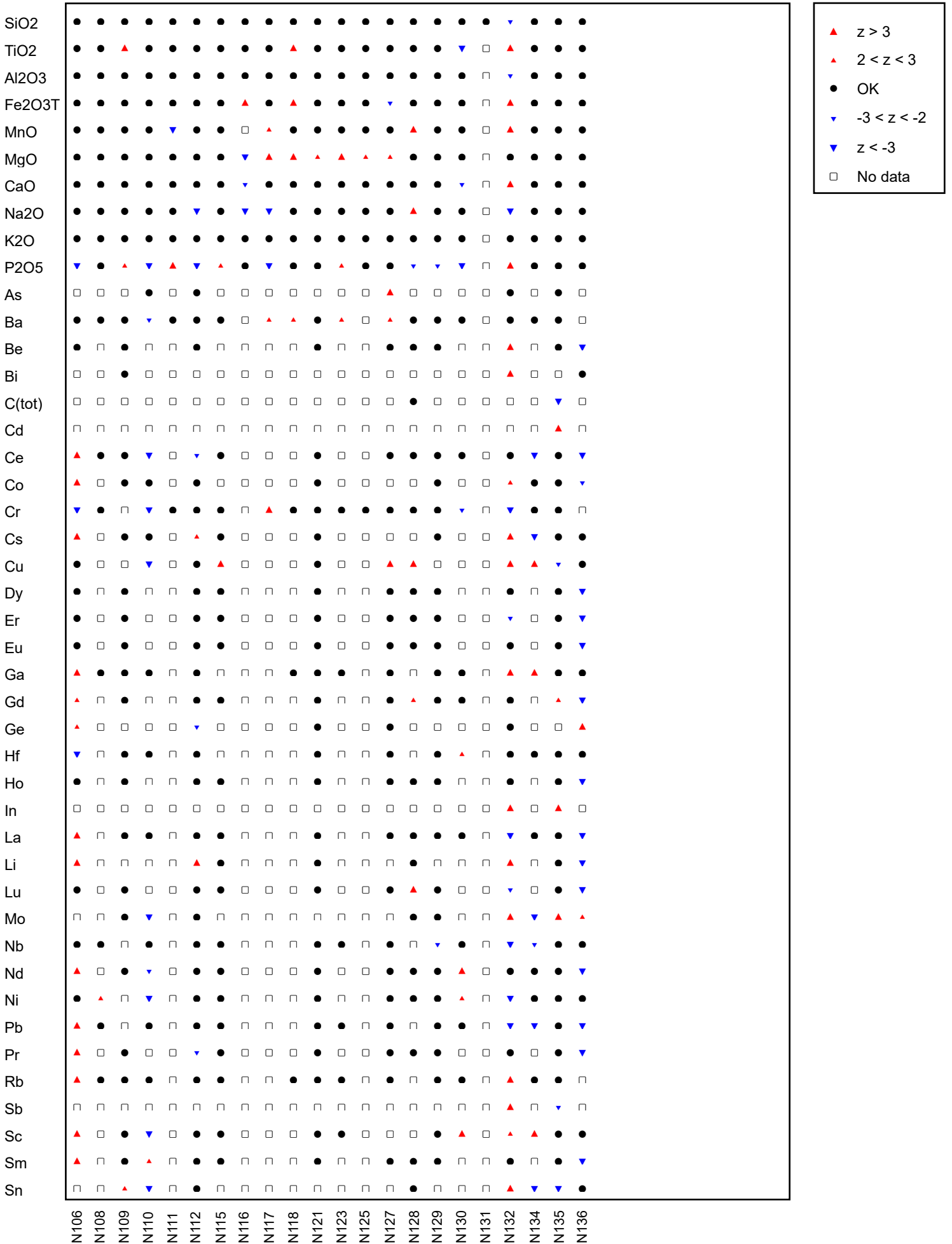


Figure 3: GeoPT51 - Leucomonzogranite, GMN-1. Multiple z-score charts for laboratories participating in the GeoPT51 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

Multiple Z-Score Chart for GeoPT51



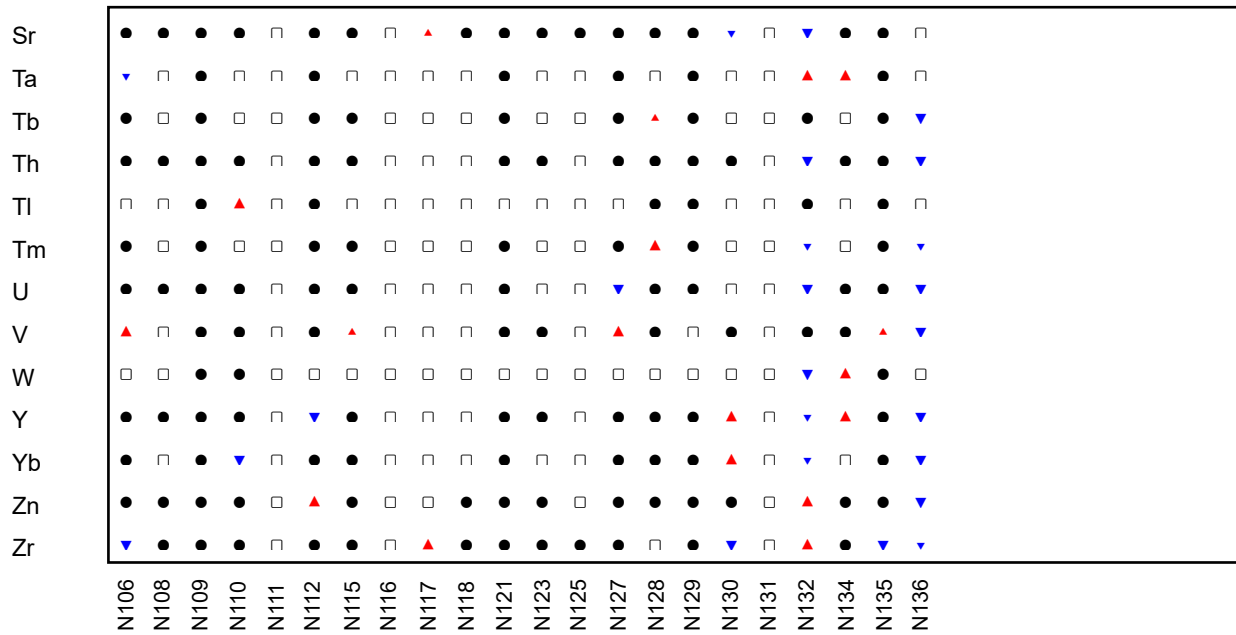


Figure 3: GeoPT51 - Leucomonzogranite, GMN-1. Multiple z-score charts for laboratories participating in the GeoPT51 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).