G-Probe 23 — an International Proficiency Test for Microanalytical Laboratories — Report on Round 23 (Norite glass, NoSM-1G) / February 2020

Stephen Wilson[1], Peter Webb[2]*, Dieter Garbe-Schönberg[3], Philip Potts[2] and Leonid Danyushevsky[4]

[1]U.S. Geological Survey, Box 25046, MS 964D, Denver Federal Centre, Denver, CO 80225, USA.
[2] Faculty of Science, Technology, Engineering and Mathematics, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
[3]CAU Kiel University, Institute of Geosciences, Ludewig-Meyn-Strasse 10, D 24098 Kiel, Germany.
[4]University of Tasmania, School of Earth Sciences, Private Bag 79, Hobart 7001, Tasmania.
*Corresponding author, Peter Webb: e-mail gprobe.iag@gmail.com

Keywords: proficiency testing, quality assurance, G-Probe, G-Probe 23, Round 23, NoSM-1G, Norite glass, USGS

Abstract

Results are presented for Round 23 of the International Association of Geoanalysts' (IAG's) Proficiency Testing programme for microanalytical geochemistry laboratories. The test material distributed in this round of G-Probe is identified as Norite glass, NoSM-1G, prepared at the United States Geological Survey (USGS). In this report, the data contributed by 40 laboratories are listed, together with an assessment of consensus values as composition location estimators, consequent *z*-scores and charts to show the distribution of contributed results and the overall performance of participating laboratories. In this round the IAG's online system was the primary means for submission of data and this report was produced using the online system.

Introduction

This twenty-third round of the international proficiency testing programme, G-Probe, was conducted in a similar manner to earlier rounds, but participants were required to report their data online. To facilitate and maximise the benefits of the new online facility, the initial deadline for data submission was extended by 14 days. All data submitted were processed and this report generated using the online system provided through the G-Probe website (www.gprobe.info).

The programme is organised by the IAG in conjunction with the USGS and is conducted in a manner that follows procedures established during the operation of G-Probe since 2008 and at the same time conforms largely to the evolving G-Probe Protocol (IAG, in prep.) due to be published in the near future and modelled in large part on the Geo*PT* operating protocol (IAG, 2018).

The overall aim of the programme is to provide participating laboratories with *z*-score information for their reported measurement results so that each laboratory can decide whether the quality of their data is satisfactory in relation both to the G-Probe fitness-for-purpose criterion and to the results submitted by other laboratories contributing to the round. In circumstances where *z*-scores are unsatisfactory, a participating laboratory is encouraged to investigate for unsuspected analytical bias and to take corrective action if it appears justified. The programme is designed to be part of the routine quality assurance procedures employed by microanalytical geochemistry laboratories.

G-Probe Steering Committee:

S.A. Wilson (principal organiser), P.C. Webb (results coordinator and website administrator), D. Garbe-Schönberg, P.J. Potts, and L. Danushevsky (analytical advisors).

Timetable for Round 23 of G-Probe:

Distribution of test material: September 2019
Results submission deadline: 14th November 2019
Release of report: February/March 2020

Test Material details

G-Probe 23: The norite starting material for this test sample was collected from a site next to the Stillwater Mine, Nye, Montana, USA. The material was first crushed to powder and subsequently converted to glass at the USGS by fusing the material in a platinum bowl at 1500°C for six hours and quenching in water. Fragments of the test material were evaluated for homogeneity by the originator, and were considered suitable for use in this proficiency test. Participants were provided with two randomly selected glass fragments, either mounted in a polished, colour-coded, half-inch epoxy plug or as loose fragments.

Submission of results

For G-Probe 23, participants were instructed to apply their routine measurement procedure to each fragment of Norite glass (NoSM-1G) and provide a separate measurement result, Result A and Result B, for each. A total of 2899 measurement results submitted by 40 laboratories are listed in Table 1. Where both A and B results were provided, the average was used for the data assessment. Of the 1498 values available for evaluation, 1318 values were by LA-ICP-MS from 29 laboratories, 105 by EPMA from 11 laboratories, 26 by SEM from five laboratories, 18 by μ-XRF from two laboratories and one laboratory provided 30 values by another, undefined method.

Target values and results summary

Robust statistical procedures were used to derive a consensus value from contributed data for each elemental component in the test material. These procedures included the evaluation of the Huber robust mean, the median or a mode derived from a kernel density distribution as detailed by Thompson (2017). Note that, as in recent rounds, medians were preferentially selected as consensus location estimators where differences between median and robust means were negligible. These assessments involved a critical assessment of distributions of results from ordered sequential charts for each analyte. Data distributions for those analytes given 'assigned' or 'provisional' status are presented in Figure 1, and those for which no status could be conferred, in Figure 2, 'for information'.

The resulting consensus values were those judged to be the best available estimates of the true composition of the test material and therefore suitable for use as target values for proficiency testing. It should be noted, however, that in many cases, these estimates are derived from a single analytical method. It is, therefore, appropriate to consider whether such consensus values could be influenced by procedural bias that would degrade the effectiveness of this proficiency test in assessing the performance of participating laboratories. Whereas it is not possible to exclude this possibility with total confidence, experience in the assessment of data distributions in the related Geo*PT* programme (on which G-Probe data assessment procedures are now based) indicates that such bias, if present, can usually be detected by a significant broadening of contributed data distributions, the standard deviation of which significantly exceeds the standard deviation for proficiency testing (as defined in the G-Probe protocol and defined in the *z*-score section below). This distribution broadening was not observed for any of the data distributions which were given the status of assigned values and hence it is considered that such values are fit for purpose as target values for G-Probe proficiency testing based on the current state of knowledge.

The data distributions in Figures 1 and 2 are ordered sequential plots where measurement results are presented in order of increasing magnitude and identified according to laboratory code. Data symbols are coded by colour and shape according to the method of measurement. For major elements, where results were obtained principally by EPMA and LA-ICP-MS, there are strong indications of method bias, especially for SiO_2, Al_2O_3, Fe_2O_3T, CaO and Na_2O. Consensus values considered most appropriate for the major elements were judged to be in accord with the combined distributions of EPMA and LA-ICP-MS results. Often, but not always, this corresponded to the focus of the EPMA data which might be regarded as the more mature and possibly the more reliable of the two methods. However, as there was a question regarding the coherence of the data, consensus values for SiO_2, Al_2O_3, Fe_2O_3T, CaO, and Na_2O were credited only with provisional status. For TiO_2 and Mn there was no clear evidence of bias and for

MgO there was considerable overlap in distributions allowing the designation of assigned status.

For most trace elements there is no option other than to make assessments based on LA-ICP-MS data, and therefore concerns about the possibility of single method bias, referred to above, must be kept in mind and the outcomes should be regarded with caution in terms of true values. Nevertheless, the derived consensus values represent the best that currently can be obtained and therefore are considered appropriate for proficiency testing purposes.

Consensus values were credited with assigned status on the basis that:

(i) sufficient laboratories had contributed data for estimating a measurand (usually a minimum of 15);
(ii) visual assessment gave confidence that a substantial proportion of the results distribution was symmetrically disposed about the consensus;
(iii) the ratio of the uncertainty in the location estimate to the target precision (as defined below) was an acceptably small value; and
(iv) where possible, an evaluation of measurement results by procedure was judged to provide no clear evidence of procedural bias among the measurement results from which the consensus was derived.

Where these criteria were nearly, but not fully met, measurands were credited with 'provisional' rather than 'assigned' status. Instances of provisional status were identified because either:

(i) a smaller number of results (less than 15 but more than 8) contributed to the consensus, or
(ii) the results were unduly dispersed in relation to the target precision (H_a, see below), or
(iii) the distribution of results was significantly skewed (but not sufficiently to preclude the recognition of a clear consensus).
(iv) procedural bias was identified but a target value could nevertheless be recognised based on the most coherent part of the overall data distribution conforming approximately to a normal distribution.

Table 2 lists assigned and provisional values for 7 major components and 38 trace elements in G-Probe 23 (NoSM-1G). Sequential charts for the 44 measurands that were judged to have satisfactory distributions for consensus values to be designated as assigned or provisional values are shown in Figure 1. These are: SiO_2*, TiO_2, Al_2O_3*, Fe_2O_3T*, MgO, CaO*, Na_2O*, Ba, Ce, Co, Cr*, Cs*, Cu*, Dy, Er, Eu, Ga, Gd, Hf, Ho, In*, La, Li, Lu, Mn, Nb, Nd, Ni*, Pb, Pr, Rb, Sb*, Sc*, Sm*, Sr, Tb, Th, Tm, U, V, Y, Yb, Zn* and Zr. Of these, values of the 14 analytes marked with a '*' were credited with provisional status.

Bar charts for the 16 analytes: K_2O, P_2O_5, Ag, As, Au, B, Be, Bi, Cd, Ge, Mo, Pt, Sn, Ta, Tl and W are plotted in Figure 2 for information only, as the data were either insufficient in number, or the distribution was too variable or too highly skewed for the confident estimation of a consensus to provide *z*-scores.

Z-score analysis

Assessment of submitted results followed the strategy adopted for G-Probe 22 (Wilson et al. 2019). Based on an assessment of the variation of measurement results in recent rounds, and in order to provide sufficient discrimination for the proficiency test to be helpful to participating laboratories, the fitness for purpose criterion applied throughout was provided by the modified Horwitz function:

$$H_a = \mathrm{k}.X_a^{0.8495}$$

where H_a is the standard deviation for proficiency, also referred to as the target precision, for each measurand, X_a is the corresponding target value mass fraction (that may be credited with assigned or provisional status). The factor k = 0.01, which is appropriate 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, is applied throughout (see also the ***Note to Participants*** below).

Z-scores were calculated for each set of measurement results submitted by each laboratory from:

$$z = [X - X_a] / H_a$$

where X is the contributed (average) measurement result, X_a is the target value (assigned and provisional) and H_a is the target precision (all as mass fractions).

Z-score values for results contributed to G-Probe 23 are listed in Table 3. *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 participant). If the *z*-score for any element falls outside this range, especially if it is outside the range $-3<z<3$, laboratories are advised to examine their procedures and, if necessary, take action to ensure that their determinations are not subject to unsuspected analytical bias.

Note to Participants: Please note that the calculation of *z*-scores in this round, as in the previous round of G-Probe (i.e. G-Probe 22), was carried out differently from earlier rounds of G-Probe. In the modified Horwitz relationship used in the calculation of *z*-scores, the factor k = 0.01, commonly referred to as quality 1, is now applied throughout, whereas it had been customary for the factor k = 0.02, referred to as quality 2, to be used. This change is in part a consequence of the target value now being derived from contributed data, rather than from an analysis of bulk material as was customary in previous rounds. The use of k = 0.01 provides much better discrimination of measurement results, providing a more effective assessment of performance. It is anticipated that this criterion will continue to be used in the future, as detailed in the forthcoming G-Probe Protocol (IAG, in prep.).

Should a participating laboratory decide that this performance standard is not appropriate for assessment of their measurement results, they are invited to recalculate their *z*-scores by substituting the appropriate value of the standard deviation for proficiency testing, H_a, into the equation for the calculation of *z*-scores ($z = [X - X_a] / H_a$). Adoption of this approach should include a justification as to why an amended value of H_a is more appropriate for assessment of their data.

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 measurements 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 test. Note, however, that 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 24 of G-Probe, the test samples for which will be distributed during April 2020.

Acknowledgements

The authors wish to thank Thomas Meisel for development of procedures involving the Shiny App to facilitate the visualisation and analysis of proficiency testing datasets to enable the derivation of modes according to Thompson (2017). We also thank Mike Thompson and Charles Gowing for participating in discussions relating to the status of consensus values.

References

IAG (in prep.) Protocol for the Operation of the G-Probe Proficiency Testing Scheme. International Association of Geoanalysts (Keyworth, UK).

IAG (2018) Protocol for the operation of the Geo*PT* Proficiency testing scheme. International Association of Geoanalysts (Keyworth, UK), 18pp. *http://www.geoanalyst.org/wp-content/uploads/2018/06/GeoPT-revised-protocol-2018.pdf*.

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.

Wilson S., Webb P.C. and Garbe-Schönberg D. (2019) G-Probe 22 – an International Proficiency Test for Microanalytical Laboratories – Report on Round 22 (Synthetic basalt, SynB-1G(GSC-2G)) / October 2019. 30pp. International Association of Geoanalysts: Unpublished report.

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B1A	B1B	B2A	B2B	B3A	B3B	B4A	B4B	B5A	B5B	B6A	B6B
SiO2	g 100g^{-1}	48.84	48.74	49.27	48.72	48.3	48.3	48.64		48.466	48.537		
TiO2	g 100g^{-1}	0.062	0.061	0.06	0.059	0.06	0.06	0.08		0.109	0.112	0.06	0.06
Al2O3	g 100g^{-1}	25.46	25.55	25.53	25.41	26.2	26.1	27.28		25.545	25.585	24.3	26.1
Fe2O3T	g 100g^{-1}	3.27	3.248	3.218	3.205	3.08	3.09	3.63		3.449	3.437	3.2	3.16
MgO	g 100g^{-1}	6.602	6.593	6.286	6.289	6.09	6.08	5.78		7.253	7.268	6.48	6.52
CaO	g 100g^{-1}	14.303	14.335	14.6	14.6	14.8	14.8	16.64		14.897	14.9	13.89	14.77
Na2O	g 100g^{-1}	1.215	1.222	1.19	1.185	1.25	1.25	1.45		1.603	1.616	1.3	1.3
K2O	g 100g^{-1}	0.042	0.043	0.046	0.046	0.05	0.05	0.02		0.04	0.039	0.05	0.05
P2O5	g 100g^{-1}	0.007	0.007	0.012	0.013	0.01	0.01					0.03	0.04
Ag	mg kg^{-1}	28.76	29.13	40.73	43.27				39.673	69.776	48.806	42.529	46.44
As	mg kg^{-1}	0.409	0.361						0.119	0.118	0.113		
Au	mg kg^{-1}	0.089	0.087							0.073	0.048		
B	mg kg^{-1}												
Ba	mg kg^{-1}	16.73	17.09	14.91	15.43				14.8	15.716	15.456	15.367	15.078
Be	mg kg^{-1}									0.046	0.039		
Bi	mg kg^{-1}	0.024	0.026							0.029	0.026		
Br	mg kg^{-1}												
Cd	mg kg^{-1}	0.325	0.33	0.89	0.83				0.322	0.27	0.216	0.412	0.564
Ce	mg kg^{-1}	0.914	0.924	0.88	0.87				0.819	0.853	0.878	0.885	0.881
Cl	mg kg^{-1}												
Co	mg kg^{-1}	21.72	21.94	20.71	20.36				21.83	24.518	24.652	24.328	24.023
Cr	mg kg^{-1}	570.4	567.3	583.910	581.380				582.7	628.215	625.609	550.206	538.247
Cs	mg kg^{-1}			0.09	0.11				0.065	0.084	0.081		
Cu	mg kg^{-1}	19.11	19.29	16.07	16.38				18.04	24.92	21.063	20.583	20.149
Dy	mg kg^{-1}	0.21	0.225	0.21	0.2				0.194	0.206	0.222	0.213	0.245
Er	mg kg^{-1}	0.159	0.152	0.18	0.16				0.134	0.16	0.165	0.13	0.179
Eu	mg kg^{-1}	0.135	0.135	0.13	0.16				0.115	0.121	0.119	0.116	0.129
F	mg kg^{-1}												
Ga	mg kg^{-1}	13.25	13.18	10.84	10.7				12.07			12.69	12.988
Gd	mg kg^{-1}	0.16	0.149	0.24	0.23				0.146	0.149	0.159	0.117	0.161
Ge	mg kg^{-1}								0.859			3.027	2.101
Hf	mg kg^{-1}	0.071	0.081						0.059	0.065	0.059	0.08	0.081
Ho	mg kg^{-1}	0.048	0.048	0.05	0.05				0.043	0.049	0.049	0.04	0.048
In	mg kg^{-1}	0.084	0.077	0.08	0.09				0.112			0.11	0.104
Ir	mg kg^{-1}												
La	mg kg^{-1}	0.411	0.424	0.42	0.4				0.383	0.424	0.431	0.402	0.452
Li	mg kg^{-1}								1.708	1.891	1.875	1.696	1.675
Lu	mg kg^{-1}	0.026	0.021	0.03	0.03				0.022	0.025	0.022	0.02	0.021
Mn	mg kg^{-1}	460.1	455.2	436.4	437.250	400	400		443.3	487.578	488.774	436.932	438.689
Mo	mg kg^{-1}			0.08	0.07				0.057	0.054	0.049		
Nb	mg kg^{-1}	0.094	0.098	0.09	0.08				0.082	0.081	0.077	0.077	0.077
Nd	mg kg^{-1}	0.465	0.477	0.48	0.5				0.412	0.42	0.455	0.396	0.407
Ni	mg kg^{-1}	176	177	150.520	148.030				162.6	189.896	187.595	164.805	164.090
Pb	mg kg^{-1}	0.966	1.042	1.04	1.1				0.985	1.202	1.106	0.994	1.341
Pd	mg kg^{-1}								0.094				
Pr	mg kg^{-1}	0.103	0.109	0.1	0.11					0.099	0.104	0.099	0.106
Pt	mg kg^{-1}			1.51	1.25				0.801	1.733	1.358		
Rb	mg kg^{-1}	0.902	0.927	0.76	0.76					0.9	0.909	0.924	0.93
Re	mg kg^{-1}			0.02	0.02								
Rh	mg kg^{-1}												
S	mg kg^{-1}											499.322	577.309
Sb	mg kg^{-1}	0.905	0.906	1.2	1.22				0.817	1.168	1.139	1.399	1.332
Sc	mg kg^{-1}	10.34	10.47	11.53	11.5				10.93	11.852	11.777	16.887	17.673
Se	mg kg^{-1}												
Sm	mg kg^{-1}	0.137	0.147	0.12	0.12				0.115	0.117	0.117	0.159	0.162
Sn	mg kg^{-1}	0.13	0.14	1.62	2.33					0.672	0.624	1.179	1.236
Sr	mg kg^{-1}	100.4	99.6	97.56	97.7				90.84	100.199	100.353	95.092	100.593
Ta	mg kg^{-1}			0.01	0.01				0.005	0.003	0.005		
Tb	mg kg^{-1}	0.029	0.029	0.03	0.03				0.027	0.03	0.029	0.028	0.031
Te	mg kg^{-1}												
Th	mg kg^{-1}	0.060	0.063	0.08	0.06				0.053	0.062	0.059	0.055	0.056
Tl	mg kg^{-1}	0.027	0.031						0.026			0.045	0.057
Tm	mg kg^{-1}	0.022	0.024	0.02	0.02				0.020	0.021	0.024	0.022	0.02
U	mg kg^{-1}	0.024	0.027	0.03	0.02				0.022	0.021	0.022	0.018	0.036
V	mg kg^{-1}	43.15	42.55	47.35	46.97				44.6	49.378	49.499	54.633	55.956
W	mg kg^{-1}			0.03	0.02				0.012	0.013	0.012		
Y	mg kg^{-1}	1.279	1.314	1.3	1.39				1.158	1.409	1.369	1.292	1.604
Yb	mg kg^{-1}	0.163	0.166	0.19	0.19				0.149	0.152	0.154	0.152	0.176
Zn	mg kg^{-1}	20.14	19.52	16.28	16.78				18.92	27.751	27.611	19.363	19.4
Zr	mg kg^{-1}	2.36	2.28	2.26	2.32				1.995	2.403	2.397	2.329	2.781

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B7A	B7B	B8A	B8B	B9A	B9B	B10A	B10B	B11A	B11B	B12A	B12B
SiO2	g 100g^{-1}	47.95	48.09					48.31	48.36			49.04	48.45
TiO2	g 100g^{-1}	0.06	0.07					0.071	0.071	0.068		0.06	0.06
Al2O3	g 100g^{-1}	24.96	25.05					25.39	25.47			25.77	25.58
Fe2O3T	g 100g^{-1}	3.23	3.13					3.02	3.01			3.02	3.1
MgO	g 100g^{-1}	6.46	6.02					6.21	6.24			6.13	6.21
CaO	g 100g^{-1}	14.77	14.74					14.46	14.39			14.75	14.67
Na2O	g 100g^{-1}	1.28	1.26					1.25	1.26			1.24	1.28
K2O	g 100g^{-1}	0.04	0.04					0.059	0.058			0.04	0.05
P2O5	g 100g^{-1}	0.006	0.003					0.011	0.011			0.013	0.018
Ag	mg kg^{-1}			44.6	45.6							52	53.89
As	mg kg^{-1}			0.14	0.14								0.7
Au	mg kg^{-1}			0.088	0.088							0.11	0.13
B	mg kg^{-1}			4.8	4.28			5.92	5.81			22.91	23.43
Ba	mg kg^{-1}	36	62	16.9	16.6	15.46	15.33	15	14.7	17.6		15.82	15.77
Be	mg kg^{-1}											0.05	0.02
Bi	mg kg^{-1}			0.027	0.026	0.21	0.15					0.03	0.03
Br	mg kg^{-1}												
Cd	mg kg^{-1}			0.28	0.28								0.73
Ce	mg kg^{-1}			0.87	0.85	1.04	0.99	0.847	0.831	0.943		0.82	0.82
Cl	mg kg^{-1}	16	1										
Co	mg kg^{-1}			23.1	22.9			24.5	23.9			25.29	25.08
Cr	mg kg^{-1}	677	663	590	586			685	675			528.010	612.430
Cs	mg kg^{-1}			0.074	0.068							0.09	0.09
Cu	mg kg^{-1}			19.3	19.8			21.4	20.6			22.17	22.73
Dy	mg kg^{-1}			0.25	0.25	0.29	0.23	0.197	0.204	0.252		0.25	0.21
Er	mg kg^{-1}			0.18	0.18	0.21	0.24	0.14	0.137	0.196		0.16	0.14
Eu	mg kg^{-1}			0.14	0.14	0.21	0.17	0.117	0.115	0.156		0.11	0.13
F	mg kg^{-1}												
Ga	mg kg^{-1}			14	14.1	11.47	11.9	14.7	14.5			14.83	14.66
Gd	mg kg^{-1}			0.2	0.21	0.22	0.19	0.155	0.159	0.187		0.16	0.16
Ge	mg kg^{-1}			1.02	1.04	1.13	1.29	1.18	1.17			1.23	1.14
Hf	mg kg^{-1}			0.081	0.074	0.13	0.11	0.063	0.062	0.104		0.07	0.06
Ho	mg kg^{-1}			0.059	0.06	0.1	0.06	0.044	0.044	0.062		0.05	0.05
In	mg kg^{-1}			0.084	0.091	0.16	0.15					0.11	0.11
Ir	mg kg^{-1}			0.13	0.13								
La	mg kg^{-1}			0.43	0.44	0.56	0.47	0.405	0.395	0.505		0.41	0.41
Li	mg kg^{-1}			1.88	1.87			1.93	1.88			1.9	2.01
Lu	mg kg^{-1}			0.03	0.031	0.09	0.09	0.023	0.025	0.031		0.02	0.03
Mn	mg kg^{-1}	425	438	425	424			481	479			473.890	467.860
Mo	mg kg^{-1}			0.1	0.12	0.21	0.17					0.07	0.07
Nb	mg kg^{-1}			0.1	0.1	0.4	0.14	0.087	0.085	0.112		0.09	0.09
Nd	mg kg^{-1}			0.5	0.49	0.5	0.49	0.434	0.453	0.514		0.44	0.46
Ni	mg kg^{-1}	253	205	166	167			185	182			200.970	186.820
Pb	mg kg^{-1}			0.99	0.99			1.18	1.17	2.07		1.49	1.12
Pd	mg kg^{-1}												
Pr	mg kg^{-1}			0.11	0.11	0.18	0.17	0.101	0.1	0.117		0.1	0.1
Pt	mg kg^{-1}			1.04	1.02								
Rb	mg kg^{-1}			0.87	0.86			0.959	0.91			1.02	0.96
Re	mg kg^{-1}												
Rh	mg kg^{-1}												
S	mg kg^{-1}												
Sb	mg kg^{-1}			0.98	1			1.18	1.16			1.15	1.12
Sc	mg kg^{-1}			11.9	11.9			12	12			17.6	16.19
Se	mg kg^{-1}												
Sm	mg kg^{-1}			0.16	0.15	0.2	0.14	0.129	0.128	0.178		0.11	0.11
Sn	mg kg^{-1}			0.3	0.29			3.46	3.38			0.62	0.7
Sr	mg kg^{-1}	188	117	96.2	96.3			93	92.8			98.73	96.6
Ta	mg kg^{-1}			0.008	0.008	0.05	0.07					0.01	0.01
Tb	mg kg^{-1}			0.037	0.035	0.09	0.07	0.027	0.029	0.043		0.03	0.03
Te	mg kg^{-1}												
Th	mg kg^{-1}			0.067	0.066			0.055	0.054	0.07		0.06	0.06
Tl	mg kg^{-1}			0.036	0.038							0.05	0.05
Tm	mg kg^{-1}			0.029	0.028	0.1	0.06	0.020	0.022	0.037		0.02	0.02
U	mg kg^{-1}			0.029	0.026			0.022	0.022	0.03		0.03	0.02
V	mg kg^{-1}	54	63	45	44.7			46.5	45.7			47.52	47.24
W	mg kg^{-1}			0.022	0.019	0.11	0.06					0.01	0.01
Y	mg kg^{-1}			1.4	1.43	1.46	1.42	1.18	1.21	1.55		1.29	1.31
Yb	mg kg^{-1}			0.18	0.18	0.24	0.19	0.154	0.161	0.222		0.17	0.16
Zn	mg kg^{-1}	222	112					22.7	22.3			24.93	23.4
Zr	mg kg^{-1}	72		2.49	2.52	2.77	2.72	1.99	2.02	3.2		2.25	2.29

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B13A	B13B	B14A	B14B	B15A	B15B	B16A	B16B	B17A	B17B	B18A	B18B
SiO2	g 100g-1	50.123	50.548	47.723	47.789	48.49	48.53	50.81	50.92	48.216		48.5	48.5
TiO2	g 100g-1	0.058	0.058	0.067	0.068	0.063	0.065			0.077		0.06	0.06
Al2O3	g 100g-1	24.980	24.708	25.492	25.564	26.29	26.25	25.02	25.05	24.429		29.09	28.87
Fe2O3T	g 100g-1	3.332	3.283	3.089	3.108	3.16	3.18	3.03	2.92	3.04		4.39	4.34
MgO	g 100g-1	6.152	6.118	5.921	5.919	6.28	6.29	6.32	6.25	6.06		6.9	6.79
CaO	g 100g-1	13.907	13.857	14.66	14.671	14.98	14.96	13.9	13.91	14.526		14.6	14.6
Na2O	g 100g-1	1.409	1.394	1.261	1.247	1.23	1.23	1.23	1.24	1.275		1.56	1.55
K2O	g 100g-1	0.048	0.047	0.056	0.053	0.046	0.046			0.049		0.06	0.06
P2O5	g 100g-1	0.033	0.027									0.01	0.01
Ag	mg kg-1	47.817	44.560									49.81	50.08
As	mg kg-1											2.21	
Au	mg kg-1											0.13	0.11
B	mg kg-1											7.13	5.89
Ba	mg kg-1	14.970	14.701	15.61	15.82							16.1	15.47
Be	mg kg-1											0.33	0.25
Bi	mg kg-1											0.04	0.05
Br	mg kg-1												
Cd	mg kg-1											0.72	0.59
Ce	mg kg-1	0.806	0.794	0.811	0.838							0.87	0.87
Cl	mg kg-1											731.660	863.860
Co	mg kg-1	22.356	22.107	24.95	24.51							26.1	25.89
Cr	mg kg-1	594.252	584.903	614.4	606.6							638.340	642.170
Cs	mg kg-1	0.076	0.064	0.09	0.095							0.1	0.11
Cu	mg kg-1	21.047	20.054	22.42	21.5							20.4	22.16
Dy	mg kg-1	0.218	0.230									0.22	0.18
Er	mg kg-1	0.159	0.156									0.15	0.15
Eu	mg kg-1	0.105	0.119									0.12	0.12
F	mg kg-1												
Ga	mg kg-1	13.584	13.593	14.75	14.59							15.99	15.54
Gd	mg kg-1	0.162	0.192									0.18	0.16
Ge	mg kg-1			0.863	0.983							2.04	0.56
Hf	mg kg-1	0.071	0.067									0.07	0.08
Ho	mg kg-1	0.053	0.045									0.05	0.05
In	mg kg-1											0.15	0.16
Ir	mg kg-1												
La	mg kg-1	0.382	0.382	0.387	0.402							0.43	0.45
Li	mg kg-1	1.717	1.647	1.7	1.716							2.17	2.02
Lu	mg kg-1	0.021	0.026									0.03	0.02
Mn	mg kg-1			470.2	462.7	431	428					485.970	
Mo	mg kg-1											0.06	0.08
Nb	mg kg-1	0.084	0.085									0.07	0.07
Nd	mg kg-1	0.458	0.456	0.439	0.439							0.45	0.45
Ni	mg kg-1	171.315	170.785	192.1	187.3							198.110	199.5
Pb	mg kg-1	1.052	1.022	1.128	1.106							1.09	1.02
Pd	mg kg-1												
Pr	mg kg-1	0.102	0.097	0.085	0.077							0.1	0.11
Pt	mg kg-1												
Rb	mg kg-1	0.896	0.847	0.946	0.967							1.05	1.05
Re	mg kg-1											0.02	
Rh	mg kg-1												
S	mg kg-1												
Sb	mg kg-1											0.9	1.03
Sc	mg kg-1	10.878	10.855	16.13	15.14							11.47	11.31
Se	mg kg-1											1	1.94
Sm	mg kg-1	0.115	0.124									0.14	0.14
Sn	mg kg-1											5.21	4.88
Sr	mg kg-1	93.494	92.251	97.42	98.71							96.47	96.78
Ta	mg kg-1	0.005	0.008										0.01
Tb	mg kg-1	0.033	0.030									0.03	0.03
Te	mg kg-1												
Th	mg kg-1	0.058	0.053									0.06	0.06
Tl	mg kg-1											0.05	0.05
Tm	mg kg-1	0.025	0.021									0.03	0.02
U	mg kg-1	0.016	0.019									0.03	0.03
V	mg kg-1	43.178	42.489	45.65	45.67							48.4	48.45
W	mg kg-1	0.021	0.019									0.02	0.03
Y	mg kg-1	1.308	1.278	1.276	1.359							1.36	1.31
Yb	mg kg-1	0.179	0.175									0.18	0.15
Zn	mg kg-1	16.434	17.072	24.19	23.29							22.92	21.13
Zr	mg kg-1	2.438	2.356	2.217	2.29							2.2	2.2

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B19A	B19B	B20A	B20B	B23A	B23B	B24A	B24B	B25A	B25B	B26A	B26B
SiO2	g 100g^{-1}	48.8	48.63	73.6	73.2	48.7	48.6	50.148	50.151			49.88	49.36
TiO2	g 100g^{-1}	0.059	0.059	0.057	0.059	0.06	0.06	0.061	0.062			0.061	0.06
Al2O3	g 100g^{-1}	26.26	26.29	9.07	8.63	26.2	26	24.781	24.772			25.81	25.9
Fe2O3T	g 100g^{-1}	3.15	3.13	0.09	0.088	3.08	3.1	2.901	2.911			3.09	2.98
MgO	g 100g^{-1}	6.3	6.32	6.22	6.58	6.37	6.38	6.301	6.338			5.84	6.02
CaO	g 100g^{-1}	14.63	14.63	7.76	7.76	14.36	14.38	14.136	14.094			14.63	14.35
Na2O	g 100g^{-1}	1.28	1.29	1.66	1.6	1.26	1.26	1.344	1.348				
K2O	g 100g^{-1}	0.051	0.051	0.005	0.005	0.053	0.051	0.048	0.048				
P2O5	g 100g^{-1}	0.006	0.006	0.006	0.007	0.01	0.012	0.005	0.006				
Ag	mg kg^{-1}			25.1	28.7			48.825	50.224				
As	mg kg^{-1}							1.254	0.943				
Au	mg kg^{-1}			0.78	0.96			0.054	0.062				
B	mg kg^{-1}							2.101	14.827			1.766	1.864
Ba	mg kg^{-1}	15.14	15.31	10.56	10.15			14.978	14.827	16.41	15.41	14.07	17.22
Be	mg kg^{-1}			21.6	27.1			0.104	0.137				
Bi	mg kg^{-1}	0.027	0.026	0.41	0.45			0.026	0.024			0.022	0.021
Br	mg kg^{-1}												
Cd	mg kg^{-1}	0.359	0.347	5.46	7.09							0.344	0.313
Ce	mg kg^{-1}	0.835	0.856	0.89	1.04			0.810	0.817	0.88	0.85	0.782	0.751
Cl	mg kg^{-1}												
Co	mg kg^{-1}	25.5	25.6	14.72	15.54			22.815	23.022	22.15	24.25	18.41	20.84
Cr	mg kg^{-1}	621.2	619.4	174.5	174.6	526	594	577.029	587.161	603	704	424.6	427.2
Cs	mg kg^{-1}	0.078	0.08	0.37	0.36			0.079	0.070	0.066	0.066	0.061	0.076
Cu	mg kg^{-1}	21.93	22.04	12.01	11.59			20.258	20.619	21.26	22.22	14.45	17.93
Dy	mg kg^{-1}	0.226	0.221	1.26	1.04			0.204	0.201	0.2	0.22	0.209	0.218
Er	mg kg^{-1}	0.163	0.169	0.99	1.44			0.152	0.145	0.14	0.13	0.148	0.151
Eu	mg kg^{-1}	0.127	0.125	0.78	0.84			0.118	0.122	0.12	0.11	0.133	0.127
F	mg kg^{-1}												
Ga	mg kg^{-1}	14.6	14.67	10.36	9.93			12.989	12.986	11.39	11.81		
Gd	mg kg^{-1}	0.183	0.177	1.49	1.53			0.159	0.161	0.14	0.16	0.206	0.198
Ge	mg kg^{-1}	0.855	0.907	4.73	4.8			0.787	0.789				
Hf	mg kg^{-1}	0.068	0.071	0.9	1.13			0.068	0.064	0.054	0.068		
Ho	mg kg^{-1}	0.05	0.051	0.36	0.39			0.047	0.045	0.045	0.045	0.048	0.046
In	mg kg^{-1}	0.092	0.091	0.39	0.6							0.084	0.091
Ir	mg kg^{-1}												
La	mg kg^{-1}	0.42	0.425	0.78	0.69			0.390	0.383	0.41	0.42	0.414	0.421
Li	mg kg^{-1}	1.867	1.84					1.697	1.738	1.54	1.74	1.294	1.369
Lu	mg kg^{-1}	0.026	0.027	0.36	0.37			0.025	0.023	0.024	0.023	0.025	0.025
Mn	mg kg^{-1}	488.7	491.2	249	237	442	438	447.140	448.369	445	454	363.3	519.4
Mo	mg kg^{-1}	0.058	0.066	3.6	4.28			0.061	0.067				
Nb	mg kg^{-1}	0.084	0.089	0.75	0.82			0.082	0.086	0.11	0.1	0.102	0.096
Nd	mg kg^{-1}	0.453	0.473	1.22	1.44			0.422	0.431	0.48	0.45	0.497	0.475
Ni	mg kg^{-1}	189.4	190.2	79.1	86.4			173.429	174.375	162	166	139.7	138.4
Pb	mg kg^{-1}	1.11	1.148	1.49	1.24			1.036	1.023	0.99	1.02	0.778	0.97
Pd	mg kg^{-1}												
Pr	mg kg^{-1}	0.103	0.104	0.38	0.39			0.096	0.097	0.11	0.11	0.102	0.094
Pt	mg kg^{-1}							1.726	1.817				
Rb	mg kg^{-1}	0.935	0.936	1.41	0.86			0.874	0.861	0.87	0.88	0.748	0.701
Re	mg kg^{-1}			2.34	2.52								
Rh	mg kg^{-1}												
S	mg kg^{-1}												
Sb	mg kg^{-1}	1.148	1.177	2.01	1.93			1.050	1.027			0.733	0.852
Sc	mg kg^{-1}	11.81	11.92	18.6	20			10.749	10.687	16.1	14	11.53	11.8
Se	mg kg^{-1}			11.35	14.59								
Sm	mg kg^{-1}	0.134	0.136	1.2	1.18			0.120	0.119	0.15	0.13	0.161	0.158
Sn	mg kg^{-1}	0.145	0.132	1.53	1.64			1.607	1.446			0.296	0.298
Sr	mg kg^{-1}	98.03	98.8	73.3	69.9			93.987	93.924	98.4	102.4	98	97.9
Ta	mg kg^{-1}	0.005	0.005	0.33	0.41			0.006	0.005				
Tb	mg kg^{-1}	0.032	0.031	0.39	0.3			0.028	0.028	0.029	0.03	0.036	0.036
Te	mg kg^{-1}	0.366	0.358	5.06	5.31								
Th	mg kg^{-1}	0.062	0.062	0.36	0.44			0.057	0.058	0.06	0.06	0.063	0.059
Tl	mg kg^{-1}	0.043	0.043	0.5	0.47							0.03	0.028
Tm	mg kg^{-1}	0.023	0.024	0.37	0.45			0.022	0.020	0.023	0.02	0.023	0.023
U	mg kg^{-1}	0.023	0.022	0.52	0.51			0.022	0.021	0.024	0.027	0.02	0.02
V	mg kg^{-1}	47.64	47.9	29.3	30.7			44.816	44.894	46.75	46.95	33.3	42.5
W	mg kg^{-1}	0.015	0.015	0.89	1.12			0.016	0.016				
Y	mg kg^{-1}	1.405	1.423	1.92	1.74			1.281	1.291	1.32	1.29	1.124	1.186
Yb	mg kg^{-1}	0.168	0.172	1.1	1.33			0.167	0.162	0.15	0.16	0.166	0.189
Zn	mg kg^{-1}	21.83	21.92	17	20.5			16.437	16.568	17.56	19.54	17.8	18.3
Zr	mg kg^{-1}	2.399	2.419	2.12	3.15			2.220	2.196	2.43	2.16	2.155	2.227

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B27A	B27B	B28A	B28B	B29A	B29B	B30A	B30B	B31A	B31B	B32A	B32B
SiO2	g 100g^{-1}			48.5	48.5	48.661	48.53	53.458	51.404	50.1	49.4	3.983	3.987
TiO2	g 100g^{-1}	0.066	0.065	0.06	0.06	0.057	0.056	0.058	0.062	0.056	0.058	0.005	0.005
Al2O3	g 100g^{-1}			25.2	26.2	26.16	26.07	22.34	24.128	23.2	24.4	2.284	2.29
Fe2O3T	g 100g^{-1}			3.15	3.29	3.177	3.173	3.48	3.259	3.32	3.35	0.263	0.265
MgO	g 100g^{-1}			6.06	6.33	6.278	6.288	6.533	6.5	6.4	6.4	0.523	0.510
CaO	g 100g^{-1}			14.6	14.6	14.834	14.812	13.016	14.015			1.165	1.170
Na2O	g 100g^{-1}			1.34	1.35	1.261	1.251	1.446	1.327	1.33	1.33		
K2O	g 100g^{-1}			0.04	0.04	0.04	0.040	0.053	0.05	0.046	0.047		
P2O5	g 100g^{-1}							0.006	0.005				
Ag	mg kg^{-1}	55.88	59.757	33.2	38								
As	mg kg^{-1}												
Au	mg kg^{-1}	0.371	0.339										
B	mg kg^{-1}							1.159	1.307				
Ba	mg kg^{-1}	15.544	15.426	14.9	15.5	15.143	15.115	15.826	16.271	14.9	15.6		
Be	mg kg^{-1}							0.046	0.049				
Bi	mg kg^{-1}	0.038	0.041										
Br	mg kg^{-1}												
Cd	mg kg^{-1}	0.873	0.861	0.28	0.31			0.334	0.349				
Ce	mg kg^{-1}	0.810	0.841	0.84	0.86			0.858	0.876	0.756	0.781		
Cl	mg kg^{-1}												
Co	mg kg^{-1}	23.163	23.317	22.6	22.5	21.872	21.939	24.408	22.342	23.5	23.8		
Cr	mg kg^{-1}	666.967	625.8	563	573	570.474	577.489	638.584	595.403	583	585	469	481.5
Cs	mg kg^{-1}			0.07	0.07			0.068	0.073				
Cu	mg kg^{-1}	17.372	17.424	19.4	19.3	18.368	17.793	22.442	20.275	24.6	24.4		
Dy	mg kg^{-1}	0.230	0.216	0.25	0.23	0.182	0.173	0.167	0.176	0.198	0.202		
Er	mg kg^{-1}	0.155	0.153	0.19	0.19	0.125	0.112	0.113	0.117	0.162	0.154		
Eu	mg kg^{-1}	0.123	0.130	0.12	0.12	0.117	0.118	0.113	0.12	0.12	0.129		
F	mg kg^{-1}												
Ga	mg kg^{-1}	13.325	13.522					14.108	13.327	13.1	13.3		
Gd	mg kg^{-1}	0.148	0.166	0.17	0.17			0.125	0.139	0.164	0.168		
Ge	mg kg^{-1}	1.144	1.061	0.74	0.79								
Hf	mg kg^{-1}	0.071	0.067	0.08	0.08			0.046	0.05				
Ho	mg kg^{-1}	0.047	0.050	0.05	0.05			0.035	0.037	0.045	0.052		
In	mg kg^{-1}	0.109	0.127	0.08	0.1			0.094	0.108				
Ir	mg kg^{-1}												
La	mg kg^{-1}	0.409	0.416	0.42	0.44	0.375	0.361	0.346	0.401	0.405	0.418		
Li	mg kg^{-1}	1.856	1.768	1.6	1.6			1.953	1.793	1.62	1.68		
Lu	mg kg^{-1}	0.024	0.027	0.03	0.03			0.018	0.02	0.022	0.023		
Mn	mg kg^{-1}	449.007	449.663	409	405	428.173	432.015	488.6	464.7	461	459	332.7	336
Mo	mg kg^{-1}	0.112	0.123	0.12	0.11			0.092	0.089				
Nb	mg kg^{-1}	0.082	0.089	0.09	0.07			0.086	0.09				
Nd	mg kg^{-1}	0.453	0.432	0.45	0.48	0.418	0.419	0.384	0.445	0.469	0.466		
Ni	mg kg^{-1}	177.677	176.207	163	164	164.884	166.899	185.150	169.272	186	193	108.3	105.5
Pb	mg kg^{-1}	1.29	1.361	0.84	0.88	0.975	1.051	1.111	1.087				
Pd	mg kg^{-1}												
Pr	mg kg^{-1}	0.103	0.104	0.11	0.11			0.099	0.103	0.102	0.095		
Pt	mg kg^{-1}	0.082	0.166										
Rb	mg kg^{-1}	0.902	0.906	0.82	0.86	0.792	0.807	0.94	0.86	0.884	0.854		
Re	mg kg^{-1}												
Rh	mg kg^{-1}	0.026	0.026										
S	mg kg^{-1}												
Sb	mg kg^{-1}	1.120	1.397					1.01	1.256	1.18	1.05		
Sc	mg kg^{-1}	12.268	12.172	12.6	12.8	10.602	10.025	15.446	14.871	17	16.7		
Se	mg kg^{-1}												
Sm	mg kg^{-1}	0.140	0.148	0.14	0.15	0.117	0.113	0.117	0.132	0.135	0.135		
Sn	mg kg^{-1}			0.16	0.15			0.175	0.189				
Sr	mg kg^{-1}	97.323	96.94	95.3	98.5	93.011	91.191	88.785	95.18	95.7	95.8	73.7	84
Ta	mg kg^{-1}			0.006	0.007			0.005	0.005				
Tb	mg kg^{-1}	0.029	0.030	0.03	0.03			0.023	0.025	0.028	0.031		
Te	mg kg^{-1}												
Th	mg kg^{-1}	0.057	0.059	0.06	0.06			0.049	0.052				
Tl	mg kg^{-1}	0.161	0.163										
Tm	mg kg^{-1}	0.021	0.023	0.03	0.03			0.016	0.017	0.023	0.023		
U	mg kg^{-1}	0.022	0.025	0.02	0.02			0.024	0.025				
V	mg kg^{-1}	45.403	45.6	42.4	42.1			47.332	44.104	43.8	45.4		
W	mg kg^{-1}	0.023	0.015					0.013	0.014				
Y	mg kg^{-1}	1.327	1.344	1.48	1.46	1.074	0.995	0.92	0.969	1.36	1.35		
Yb	mg kg^{-1}	0.160	0.174	0.21	0.22	0.143	0.133	0.129	0.138	0.149	0.159		
Zn	mg kg^{-1}	20.843	20.803	17.5	17.1	17.951	18.628	20.41	18.518	21.7	22		
Zr	mg kg^{-1}	2.295	2.311	2.46	2.54	1.909	1.872	1.656	1.799	2.37	2.33		

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B33A	B33B	B35A	B35B	B37A	B37B	B38A	B38B	B39A	B39B	B40A	B40B
SiO2	g 100g^{-1}	48.74	48.69	50.226	50.065	51.35	51.13	48.62	48.35			49.9	50.1
TiO2	g 100g^{-1}			0.056	0.056	0.06	0.06	0.06	0.06			0.06	0.06
Al2O3	g 100g^{-1}	26.64	26.67	25.515	25.649	25.91	26.07	26.02	26.1			25.1	24.9
Fe2O3T	g 100g^{-1}	3.19	3.23	3.09	3.001	3.35	3.32	3.06	3.06			3.32	3.31
MgO	g 100g^{-1}	6.23	6.3	6.182	6.182	6.62	6.63	6.36	6.19			6.36	6.37
CaO	g 100g^{-1}	14.44	14.52	13.939	14.072			14.69	14.9			13.9	13.8
Na2O	g 100g^{-1}	1.15	1.15	1.314	1.301	1.35	1.33	1.19	1.19			1.34	1.34
K2O	g 100g^{-1}			0.050	0.049	0.05	0.05	0.05	0.06			0.05	0.05
P2O5	g 100g^{-1}			0.007	0.002			0.01	0.01			0.05	0.04
Ag	mg kg^{-1}					48.6	46.7			42.8	44		
As	mg kg^{-1}			0.625	0.810								
Au	mg kg^{-1}									0.071	0.076		
B	mg kg^{-1}			10.34	30.12					1.74	1.56	5.8	5.4
Ba	mg kg^{-1}			14.7	15.14	16.1	15.9			14	14.3	15.1	14.9
Be	mg kg^{-1}												
Bi	mg kg^{-1}			0.028	0.109					0.022	0.026		
Br	mg kg^{-1}												
Cd	mg kg^{-1}					0.51	0.47			0.302	0.311		
Ce	mg kg^{-1}			0.797	0.803	0.868	0.866			0.725	0.755	0.81	0.79
Cl	mg kg^{-1}												
Co	mg kg^{-1}			22.38	22.12	22.2	21.9			21.4	21.5	22.4	22.4
Cr	mg kg^{-1}			570.4	533.2	559	555			543	549	622	613
Cs	mg kg^{-1}			0.097	0.266	0.076	0.074			0.064	0.062		
Cu	mg kg^{-1}			19.45	18.19	19.9	19.5			17.2	18.1	19.8	19.3
Dy	mg kg^{-1}			0.193	0.211	0.215	0.22			0.172	0.182	0.21	0.2
Er	mg kg^{-1}			0.164	0.139	0.153	0.16			0.127	0.126	0.15	0.14
Eu	mg kg^{-1}			0.102	0.105	0.125	0.132			0.103	0.106	0.12	0.12
F	mg kg^{-1}			0.105	0.140								
Ga	mg kg^{-1}					13.4	13.2			12.4	12.3	14.1	13.8
Gd	mg kg^{-1}					0.185	0.166			0.131	0.131	0.17	0.15
Ge	mg kg^{-1}									0.87	0.87		
Hf	mg kg^{-1}			0.067	0.078	0.081	0.082			0.056	0.053	0.06	0.06
Ho	mg kg^{-1}			0.045	0.042	0.047	0.051			0.041	0.043	0.04	0.05
In	mg kg^{-1}					0.09	0.09			0.081	0.083		
Ir	mg kg^{-1}									0.01	0.013		
La	mg kg^{-1}			0.385	0.399	0.412	0.415			0.348	0.357	0.38	0.38
Li	mg kg^{-1}			1.811	1.803	1.84	1.8			1.59	1.62	1.95	1.64
Lu	mg kg^{-1}			0.022	0.022	0.027	0.025			0.021	0.02	0.02	0.02
Mn	mg kg^{-1}			431	427	479	475	464	464	417	416	444	443
Mo	mg kg^{-1}					0.13	0.13			0.056	0.052		
Nb	mg kg^{-1}					0.1	0.11			0.073	0.074	0.09	0.09
Nd	mg kg^{-1}			0.369	0.401	0.48	0.471			0.361	0.371	0.42	0.42
Ni	mg kg^{-1}			171.9	170.8	167	165			164	163	163	163
Pb	mg kg^{-1}			1.112	3.276	1.11	1.03			0.916	0.933	1.05	1.06
Pd	mg kg^{-1}									0.138	0.134		
Pr	mg kg^{-1}			0.093	0.098	0.105	0.108			0.08	0.088	0.09	0.1
Pt	mg kg^{-1}									1.17	1.28		
Rb	mg kg^{-1}			0.917	0.929	0.95	0.93			0.84	0.83	0.92	0.86
Re	mg kg^{-1}												
Rh	mg kg^{-1}									0.007	0.009		
S	mg kg^{-1}												
Sb	mg kg^{-1}			1	3.419	1.07	1.05			0.871	0.837		
Sc	mg kg^{-1}					12.4	12.5			10.2	10.3	11.2	10.7
Se	mg kg^{-1}			11.84	12.37								
Sm	mg kg^{-1}					0.146	0.145			0.097	0.098	0.13	0.11
Sn	mg kg^{-1}					0.75	0.79			0.21	0.168		
Sr	mg kg^{-1}			93.75	93.55	106.8	106.6			86.6	87.9	93.3	92.7
Ta	mg kg^{-1}					0.017	0.012			0.004	0.004	0.005	0.007
Tb	mg kg^{-1}			0.027	0.025	0.032	0.031			0.022	0.023	0.03	0.03
Te	mg kg^{-1}												
Th	mg kg^{-1}			0.059	0.049	0.059	0.055			0.047	0.05	0.06	0.05
Tl	mg kg^{-1}			0.046	0.244	0.046	0.039			0.025	0.032		
Tm	mg kg^{-1}			0.021	0.019	0.025	0.025			0.018	0.017	0.02	0.02
U	mg kg^{-1}			0.019	0.116	0.033	0.028			0.018	0.017	0.02	0.02
V	mg kg^{-1}			44.11	44.13	45.1	45			42.4	42.7	44	43.7
W	mg kg^{-1}									0.016	0.016		
Y	mg kg^{-1}			1.312	1.305	1.41	1.43			1.14	1.18	1.25	1.19
Yb	mg kg^{-1}			0.143	0.127	0.169	0.168			0.126	0.139	0.16	0.16
Zn	mg kg^{-1}			21.27	21.21	21.6	21.2			20.6	20.4	18.3	18.3
Zr	mg kg^{-1}			2.279	2.246	2.46	2.5			1.95	2.03	2.19	2.19

Table 1 - G-Probe 23 Contributed data for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code		B41A	B41B	B43A	B43B	B44A	B44B	B45A	B45B	-	-	-	-
SiO2	g 100g-1	49.62	49.2			48.14	48.195						
TiO2	g 100g-1	0.065	0.063	0.061	0.061								
Al2O3	g 100g-1	24.52	24.78			25.538	25.513						
Fe2O3T	g 100g-1	3.43	3.52			3.131	3.143						
MgO	g 100g-1	6.54	6.55			6.267	6.281						
CaO	g 100g-1	14.36	14.37			14.624	14.62						
Na2O	g 100g-1	1.23	1.29			1.285	1.289						
K2O	g 100g-1	0.046	0.038	0.054	0.055								
P2O5	g 100g-1	0.013	0.017	0.165	0.157								
Ag	mg kg-1	38.05	39.66	50.6	50			42.4	43				
As	mg kg-1	0.62	0.1										
Au	mg kg-1	0.057	0.064	0.106	0.103								
B	mg kg-1	3.85	2.4	6.33	5.58								
Ba	mg kg-1	15.95	16.18	15.3	15.5			16.5					
Be	mg kg-1												
Bi	mg kg-1	0.035	0.046	0.034	0.041								
Br	mg kg-1			31.3	49.7								
Cd	mg kg-1	0.2	0.24	0.352	0.307								
Ce	mg kg-1	0.92	1.01	0.835	0.833			0.92	0.95				
Cl	mg kg-1			318	335								
Co	mg kg-1	21.9	21.66	23.1	22.6			22	22.6				
Cr	mg kg-1	648.020	633.920	580	586			574	581				
Cs	mg kg-1	0.13	0.16	0.081	0.075								
Cu	mg kg-1	17.37	18.36	22.6	21.5			18.9	19.2				
Dy	mg kg-1	0.21	0.25	0.247	0.252			0.25	0.3				
Er	mg kg-1	0.16	0.16	0.162	0.145								
Eu	mg kg-1	0.12	0.15	0.109	0.114			0.15	0.17				
F	mg kg-1												
Ga	mg kg-1	10.68	10.69	13	12.8			13	13.2				
Gd	mg kg-1	0.18	0.16	0.154	0.218				0.21				
Ge	mg kg-1	0.85	0.68	2.348	2.411								
Hf	mg kg-1	0.062	0.06	0.051	0.054				0.086				
Ho	mg kg-1	0.065	0.054	0.052	0.047			0.058	0.07				
In	mg kg-1	0.09	0.07	0.107	0.119			0.088	0.11				
Ir	mg kg-1	0.34	0.33										
La	mg kg-1	0.49	0.46	0.411	0.42			0.46	0.49				
Li	mg kg-1	1.9	1.56	2.25	1.97			1.86	1.91				
Lu	mg kg-1	0.026	0.027	0.036	0.036				0.032				
Mn	mg kg-1	476.920	489.990	466	460			434	436				
Mo	mg kg-1	0.06	0.08										
Nb	mg kg-1	0.09	0.09	0.084	0.089				0.11				
Nd	mg kg-1	0.48	0.49	0.514	0.51								
Ni	mg kg-1	166.060	176.190	172	175			155	162				
Pb	mg kg-1	1.84	1.15	0.978	0.987			1.21	1.27				
Pd	mg kg-1												
Pr	mg kg-1	0.11	0.13	0.113	0.109			0.12	0.13				
Pt	mg kg-1	2.33	2.35	1.5	1.46								
Rb	mg kg-1	0.87	0.87	0.92	0.878			0.83	0.84				
Re	mg kg-1												
Rh	mg kg-1												
S	mg kg-1												
Sb	mg kg-1	1.06	0.94	0.942	0.773			1.11	1.15				
Sc	mg kg-1	17.92	17.71	11.2	11.2			11.2	11.3				
Se	mg kg-1												
Sm	mg kg-1	0.13	0.11	0.207	0.169								
Sn	mg kg-1	1.47	0.66	0.516	0.521								
Sr	mg kg-1	95.68	96.35	97.4	96.9			102	103				
Ta	mg kg-1	0.009	0.009	0.006	0.005								
Tb	mg kg-1	0.03	0.04	0.036	0.039				0.044				
Te	mg kg-1												
Th	mg kg-1	0.063	0.068	0.059	0.059			0.075	0.088				
Tl	mg kg-1	0.026	0.023	0.069	0.066								
Tm	mg kg-1	0.028	0.028	0.029	0.024								
U	mg kg-1	0.031	0.037	0.024	0.021								
V	mg kg-1	46.89	47.11	46.2	45.7			46.6	47.1				
W	mg kg-1	0.036	0.049										
Y	mg kg-1	1.34	1.38	1.23	1.24			1.28	1.3				
Yb	mg kg-1	0.19	0.19	0.251	0.202								
Zn	mg kg-1	16.08	16.68	21	20.6								
Zr	mg kg-1	2.71	2.69	2.22	2.2			2.34	2.47				

Table 2 - G-Probe 23 Designated values and statistical summary for Stillwater Norite, NoSM-1G Glass.

	Designated Value	Uncertainty of designated value	Horwitz Quality	Horwitz Target Value	Uncertainty/ Target	Number of reported results	Robust Mean of results	Robust SD of results	Median of results	Status of designated value	Type of designated value
	X_a	*sdm*	*k x 0.01*	H_a	*sdm / H_a*	*n*					
	g 100g^{-1}	g 100g^{-1}		g 100g^{-1}			g 100g^{-1}	g 100g^{-1}	g 100g^{-1}		
SiO2	48.51	0.0697	1	0.5409	0.1289	31	49.05	1.028	48.72	Provisional	Mode
TiO2	0.06	0.0004538	1	0.001833	0.2476	32	0.06154	0.004274	0.06	Assigned	Median
Al2O3	25.53	0.145	1	0.3135	0.4625	32	25.46	0.8514	25.53	Provisional	Median
Fe2O3T	3.137	0.0577	1	0.05282	1.092	32	3.173	0.182	3.172	Provisional	Mode
MgO	6.284	0.03014	1	0.09531	0.3162	32	6.29	0.2233	6.284	Assigned	Median
CaO	14.6	0.0771	1	0.1951	0.3953	30	14.43	0.4232	14.51	Provisional	Mode
Na2O	1.26	0.0157	1	0.02434	0.6451	30	1.297	0.08127	1.28	Provisional	Mode
	mg kg^{-1}	mg kg^{-1}		mg kg^{-1}			mg kg^{-1}	mg kg^{-1}	mg kg^{-1}		
Ba	15.4	0.1278	1	0.8162	0.1566	31	15.52	0.701	15.4	Assigned	Median
Ce	0.85	0.008535	1	0.06967	0.1225	29	0.8536	0.06121	0.85	Assigned	Median
Co	22.48	0.579	1	1.125	0.5145	28	22.84	1.518	22.7	Assigned	Mode
Cr	582.7	8.228	1	17.87	0.4603	31	589.1	45.06	582.7	Provisional	Median
Cs	0.0705	0.00307	1	0.008405	0.3653	20	0.08244	0.01801	0.0765	Provisional	Mode
Cu	19.63	0.4747	1	1.003	0.4733	28	19.82	2.255	19.63	Provisional	Median
Dy	0.21	0.00751	1	0.02124	0.3535	29	0.2188	0.02689	0.2175	Assigned	Mode
Er	0.1542	0.002452	1	0.01634	0.15	28	0.1552	0.01986	0.1542	Assigned	Median
Eu	0.12	0.001799	1	0.01321	0.1362	29	0.1252	0.01403	0.12	Assigned	Median
Ga	13.26	0.406	1	0.7187	0.5649	24	13.13	1.363	13.21	Assigned	Mode
Gd	0.16	0.00787	1	0.01686	0.4667	27	0.1714	0.027	0.17	Assigned	Mode
Hf	0.06908	0.002496	1	0.008261	0.3021	25	0.07046	0.01329	0.06908	Assigned	Median
Ho	0.049	0.001005	1	0.006171	0.1629	28	0.04956	0.006685	0.049	Assigned	Median
In	0.08875	0.00374	1	0.01022	0.3659	19	0.1012	0.019	0.099	Provisional	Mode
La	0.4143	0.005481	1	0.03783	0.1449	30	0.4152	0.03356	0.4143	Assigned	Median
Li	1.801	0.02815	1	0.1318	0.2135	24	1.781	0.1389	1.801	Assigned	Median
Lu	0.02374	0.00156	1	0.003334	0.4679	28	0.02565	0.004684	0.025	Assigned	Mode
Mn	441.4	6.78	1	14.12	0.4803	33	447.6	28.65	443.5	Assigned	Mode
Nb	0.08725	0.002253	1	0.01007	0.2237	26	0.09101	0.01337	0.08725	Assigned	Median
Nd	0.457	0.007983	1	0.04112	0.1941	29	0.4553	0.03953	0.457	Assigned	Median
Ni	168.8	3.24	1	6.239	0.5193	30	171.6	16.17	171.1	Provisional	Mode
Pb	1.046	0.0338	1	0.0831	0.4067	28	1.112	0.1693	1.07	Assigned	Mode
Pr	0.1015	0.00274	1	0.01145	0.2392	28	0.1047	0.009297	0.1036	Assigned	Mode
Rb	0.899	0.009701	1	0.07307	0.1328	27	0.8932	0.05811	0.899	Assigned	Median
Sb	1.085	0.04151	1	0.08571	0.4843	22	1.085	0.1947	1.123	Provisional	Robust Mean
Sc	11.45	0.412	1	0.6346	0.6492	27	12.81	2.603	11.87	Provisional	Mode
Sm	0.1245	0.00726	1	0.01363	0.5328	27	0.137	0.02328	0.135	Provisional	Mode
Sr	96.76	0.8594	1	3.889	0.221	30	96.06	4.253	96.76	Assigned	Median
Tb	0.02959	0.000149	1	0.00402	0.03706	28	0.03134	0.004866	0.03	Assigned	Mode
Th	0.06	0.0015	1	0.007329	0.2047	26	0.05974	0.006335	0.06	Assigned	Mode
Tm	0.02172	0.000862	1	0.003091	0.2789	27	0.02341	0.004277	0.02295	Assigned	Mode
U	0.0225	0.0015	1	0.003186	0.4709	25	0.02468	0.005027	0.0245	Assigned	Mode
V	45.11	0.702	1	2.034	0.3451	28	45.5	2.527	45.58	Assigned	Mode
Y	1.313	0.02314	1	0.1008	0.2296	30	1.317	0.1199	1.313	Assigned	Median
Yb	0.165	0.003432	1	0.01731	0.1983	28	0.1701	0.02694	0.165	Assigned	Median
Zn	19.83	0.5079	1	1.012	0.502	27	20.09	2.756	19.83	Provisional	Median
Zr	2.28	0.0308	1	0.1611	0.1912	31	2.335	0.253	2.303	Assigned	Mode

Table 3 - G-Probe 23 Z-scores for Stillwater Norite, NoSM-1G Glass. 14/11/2019

Lab Code	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
SiO2: 1	*0.53*	*0.90*	*-0.38*	*0.25*	*-0.01*	*	*-0.90*	*	*	*-0.32*	*	*0.44*	*3.38*
TiO2: 1	0.65	-0.27	0.00	10.91	27.56	0.00	2.73	*	*	5.98	4.37	0.00	-1.17
Al2O3: 1	*-0.07*	*-0.18*	*1.99*	*5.59*	*0.12*	*-1.04*	*-1.66*	*	*	*-0.31*	*	*0.47*	*-2.18*
Fe2O3T: 1	*2.31*	*1.41*	*-0.98*	*9.33*	*5.79*	*0.81*	*0.81*	*	*	*-2.31*	*	*-1.46*	*3.22*
MgO: 1	3.29	0.04	-2.09	-5.29	10.25	2.27	-0.46	*	*	-0.62	*	-1.20	-1.56
CaO: 1	*-1.44*	*0.00*	*1.03*	*10.46*	*1.53*	*-1.38*	*0.79*	*	*	*-0.90*	*	*0.56*	*-3.68*
Na2O: 1	*-1.71*	*-2.98*	*-0.41*	*7.81*	*14.36*	*1.64*	*0.41*	*	*	*-0.21*	*	*0.00*	*5.81*
Ba: 1	1.85	-0.28	*	-0.74	0.23	-0.22	41.17	1.65	-0.01	-0.67	2.70	0.48	-0.69
Ce: 1	0.99	0.36	*	-0.44	0.22	0.47	*	0.14	2.37	-0.16	1.33	-0.43	-0.71
Co: 1	-0.57	-1.72	*	-0.57	1.88	1.51	*	0.47	*	1.53	*	2.41	-0.22
Cr: 1	*-0.77*	*-0.00*	*	*0.00*	*2.47*	*-2.15*	*4.88*	*0.30*	*	*5.44*	*	*-0.70*	*0.38*
Cs: 1	*	*3.51*	*	*-0.65*	*1.43*	*	*	*0.06*	*	*	*	*2.32*	*-0.06*
Cu: 1	*-0.42*	*-3.39*	*	*-1.58*	*3.36*	*0.74*	*	*-0.07*	*	*1.37*	*	*2.82*	*0.92*
Dy: 1	0.35	-0.24	*	-0.75	0.19	0.89	*	1.88	2.35	-0.45	1.98	0.94	0.65
Er: 1	0.08	0.97	*	-1.24	0.51	0.02	*	1.58	4.33	-0.96	2.56	-0.26	0.17
Eu: 1	1.14	1.89	*	-0.38	0.00	0.19	*	1.51	5.30	-0.30	2.73	0.00	-0.60
Ga: 1	-0.06	-3.46	*	-1.65	*	-0.58	*	1.10	-2.19	1.87	*	2.07	0.46
Gd: 1	-0.33	4.45	*	-0.83	-0.36	-1.25	*	2.67	2.67	-0.18	1.60	0.00	0.99
Hf: 1	0.84	*	*	-1.21	-0.86	1.38	*	1.02	6.16	-0.78	4.23	-0.49	-0.05
Ho: 1	-0.15	0.16	*	-1.02	0.00	-0.81	*	1.70	5.02	-0.76	2.11	0.16	0.01
In: 1	*-0.81*	*-0.37*	*	*2.28*	*	*1.79*	*	*-0.12*	*6.48*	*	*	*2.08*	*
La: 1	0.09	-0.11	*	-0.83	0.35	0.34	*	0.55	2.66	-0.38	2.40	-0.11	-0.86
Li: 1	*	*	*	-0.71	0.62	-0.88	*	0.56	*	0.79	*	1.17	-0.90
Lu: 1	-0.12	1.88	*	-0.52	-0.07	-0.97	*	2.03	19.87	-0.01	2.18	0.38	-0.14
Mn: 1	1.15	-0.32	-2.93	0.14	3.32	-0.25	-0.70	-1.19	*	2.74	*	2.09	*
Nb: 1	0.84	-0.22	*	-0.49	-0.82	-1.02	*	1.27	18.14	-0.15	2.46	0.27	-0.27
Nd: 1	0.34	0.80	*	-1.09	-0.47	-1.35	*	0.92	0.92	-0.33	1.39	-0.17	0.00
Ni: 1	*1.24*	*-3.12*	*	*-0.99*	*3.20*	*-0.69*	*9.65*	*-0.36*	*	*2.36*	*	*4.03*	*0.37*
Pb: 1	-0.51	0.29	*	-0.73	1.30	1.46	*	-0.67	*	1.55	12.32	3.12	-0.11
Pr: 1	0.39	0.31	*	*	0.00	0.09	*	0.74	6.42	-0.09	1.35	-0.13	-0.19
Rb: 1	0.21	-1.90	*	*	0.08	0.38	*	-0.47	*	0.49	*	1.25	-0.38
Sb: 1	*-2.09*	*1.46*	*	*-3.13*	*0.80*	*3.27*	*	*-1.11*	*	*0.99*	*	*0.58*	*
Sc: 1	*-1.65*	*0.10*	*	*-0.82*	*0.57*	*9.18*	*	*0.71*	*	*0.86*	*	*8.58*	*-0.92*
Sm: 1	*1.28*	*-0.33*	*	*-0.70*	*-0.55*	*2.64*	*	*2.24*	*3.34*	*0.29*	*3.93*	*-1.06*	*-0.34*
Sr: 1	0.83	0.22	*	-1.52	0.90	0.28	14.33	-0.13	*	-0.99	*	0.23	-1.00
Tb: 1	-0.10	0.10	*	-0.68	-0.02	-0.02	*	1.59	12.54	-0.38	3.34	0.10	0.50
Th: 1	0.20	1.36	*	-0.96	0.07	-0.61	*	0.89	*	-0.76	1.36	0.00	-0.62
Tm: 1	0.51	-0.56	*	-0.59	0.25	-0.23	*	2.19	18.86	-0.28	4.94	-0.56	0.55
U: 1	0.82	0.78	*	-0.25	-0.31	1.41	*	1.57	*	-0.06	2.35	0.78	-1.57
V: 1	-1.11	1.01	*	-0.25	2.13	5.01	6.58	-0.13	*	0.49	*	1.11	-1.12
Y: 1	-0.16	0.32	*	-1.54	0.75	1.34	*	1.01	1.26	-1.17	2.35	-0.13	-0.20
Yb: 1	-0.03	1.44	*	-0.92	-0.69	-0.06	*	0.87	2.89	-0.43	3.29	0.00	0.67
Zn: 1	*0.00*	*-3.26*	*	*-0.90*	*7.76*	*-0.44*	*145.46*	*	*	*2.64*	*	*4.28*	*-3.04*
Zr: 1	0.25	0.06	*	-1.77	0.74	1.71	209.33	1.40	2.89	-1.71	5.71	-0.06	0.73

Table 3 - G-Probe 23 Z-scores for Stillwater Norite, NoSM-1G Glass. 14/11/2019

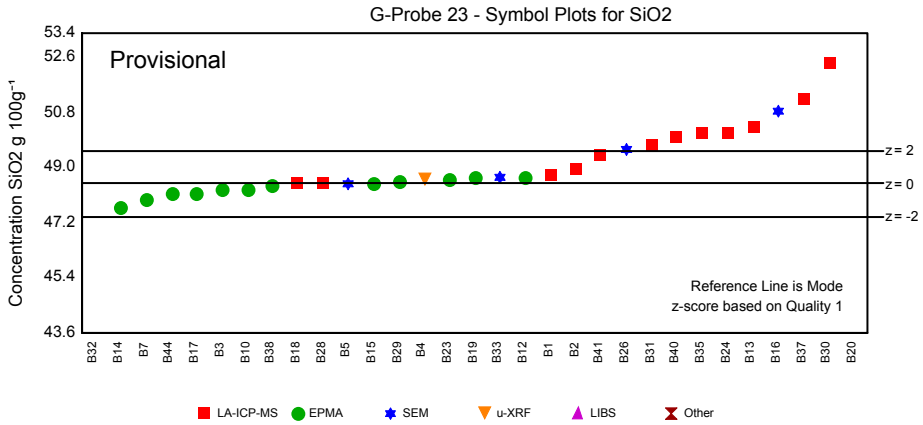
Lab Code	B14	B15	B16	B17	B18	B19	B20	B23	B24	B25	B26	B27	B28
SiO2: 1	-1.39	0.01	4.36	-0.54	-0.01	0.39	46.02	0.27	3.04	*	2.06	*	-0.01
TiO2: 1	4.09	2.18	*	9.28	0.00	-0.55	-1.09	0.00	0.80	*	0.27	2.92	0.00
Al2O3: 1	0.00	2.37	-1.57	-3.50	11.01	2.39	-53.19	1.83	-2.39	*	1.05	*	0.55
Fe2O3T: 1	-0.73	0.62	-3.07	-1.84	23.25	0.06	-57.70	-0.89	-4.37	*	-1.93	*	1.57
MgO: 1	-3.82	0.01	0.01	-2.35	5.89	0.27	1.22	0.95	0.37	*	-3.71	*	-0.93
CaO: 1	0.34	1.90	-3.56	-0.38	0.00	0.15	-35.07	-1.18	-2.48	*	-0.56	*	0.00
Na2O: 1	-0.25	-1.23	-1.03	0.62	12.12	1.03	15.20	0.00	3.53	*	*	*	3.49
Ba: 1	0.39	*	*	*	0.47	-0.21	-6.18	*	-0.61	0.62	0.30	0.10	-0.25
Ce: 1	-0.37	*	*	*	0.29	-0.06	1.65	*	-0.52	0.22	-1.20	-0.35	0.00
Co: 1	2.00	*	*	*	3.13	2.73	-6.53	*	0.39	0.64	-2.53	0.68	0.07
Cr: 1	1.56	*	*	*	3.22	2.10	-22.83	-1.27	-0.03	3.96	-8.77	3.56	-0.82
Cs: 1	2.62	*	*	*	4.10	1.01	35.04	*	0.48	-0.54	-0.24	*	-0.06
Cu: 1	2.33	*	*	*	1.65	2.35	-7.80	*	0.81	2.11	-3.43	-2.22	-0.27
Dy: 1	*	*	*	*	-0.47	0.64	44.25	*	-0.35	0.00	0.16	0.61	1.41
Er: 1	*	*	*	*	-0.26	0.72	64.92	*	-0.34	-1.17	-0.29	-0.02	2.19
Eu: 1	*	*	*	*	0.00	0.45	52.25	*	-0.02	-0.38	0.76	0.49	0.00
Ga: 1	1.96	*	*	*	3.49	1.92	-4.33	*	-0.38	-2.31	*	0.23	*
Gd: 1	*	*	*	*	0.59	1.19	80.06	*	0.00	-0.59	2.49	-0.18	0.59
Hf: 1	*	*	*	*	0.72	0.05	114.50	*	-0.37	-0.98	*	0.00	1.32
Ho: 1	*	*	*	*	0.16	0.24	52.83	*	-0.51	-0.65	-0.32	-0.12	0.16
In: 1	*	*	*	*	6.48	0.27	39.75	*	*	*	-0.12	2.88	0.12
La: 1	-0.52	*	*	*	0.68	0.22	8.48	*	-0.74	0.02	0.09	-0.05	0.42
Li: 1	-0.71	*	*	*	2.23	0.40	*	*	-0.63	-1.22	-3.56	0.08	-1.52
Lu: 1	*	*	*	*	0.38	0.83	102.36	*	0.07	-0.07	0.38	0.51	1.88
Mn: 1	1.78	-0.84	*	*	3.16	3.44	-14.05	-0.10	0.45	0.58	0.00	0.57	-2.43
Nb: 1	*	*	*	*	-1.71	-0.07	69.27	*	-0.35	1.76	1.17	-0.17	-0.72
Nd: 1	-0.44	*	*	*	-0.17	0.15	21.23	*	-0.74	0.19	0.71	-0.35	0.19
Ni: 1	3.35	*	*	*	4.81	3.37	-13.79	*	0.82	-0.76	-4.76	1.31	-0.84
Pb: 1	0.85	*	*	*	0.11	1.00	3.84	*	-0.20	-0.49	-2.07	3.37	-2.24
Pr: 1	-1.79	*	*	*	0.31	0.17	24.75	*	-0.47	0.74	-0.31	0.18	0.74
Rb: 1	0.79	*	*	*	2.07	0.50	3.23	*	-0.43	-0.33	-2.39	0.07	-0.81
Sb: 1	*	*	*	*	-1.40	0.91	10.33	*	-0.54	*	-3.41	2.03	*
Sc: 1	6.59	*	*	*	-0.10	0.65	12.37	*	-1.16	5.67	0.34	1.21	1.97
Sm: 1	*	*	*	*	1.14	0.77	78.20	*	-0.37	1.14	2.57	1.43	1.50
Sr: 1	0.33	*	*	*	-0.04	0.42	-6.47	*	-0.72	0.94	0.31	0.09	0.04
Tb: 1	*	*	*	*	0.10	0.48	78.46	*	-0.35	-0.02	1.59	-0.00	0.10
Th: 1	*	*	*	*	0.00	0.27	46.39	*	-0.38	0.00	0.14	-0.25	0.00
Tm: 1	*	*	*	*	1.06	0.58	125.62	*	-0.27	-0.07	0.42	0.15	2.68
U: 1	*	*	*	*	2.35	0.00	154.61	*	-0.37	0.94	-0.78	0.29	-0.78
V: 1	0.27	*	*	*	1.63	1.31	-7.43	*	-0.13	0.85	-3.55	0.19	-1.41
Y: 1	0.04	*	*	*	0.22	1.00	5.13	*	-0.27	-0.08	-1.57	0.22	1.56
Yb: 1	*	*	*	*	-0.00	0.29	60.66	*	-0.03	-0.58	0.72	0.11	2.89
Zn: 1	3.86	*	*	*	2.17	2.02	-1.07	*	-3.29	-1.27	-1.76	0.98	-2.50
Zr: 1	-0.16	*	*	*	-0.50	0.80	2.20	*	-0.45	0.09	-0.55	0.14	1.37

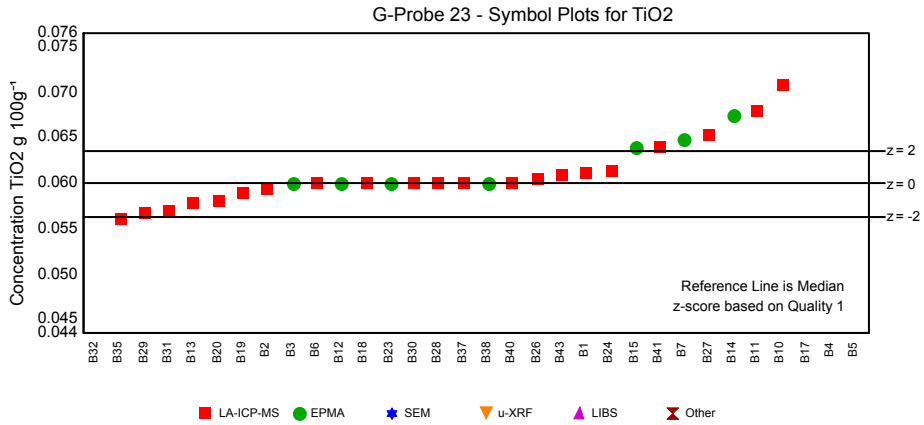
Table 3 - G-Probe 23 Z-scores for Stillwater Norite, NoSM-1G Glass. 14/11/2019

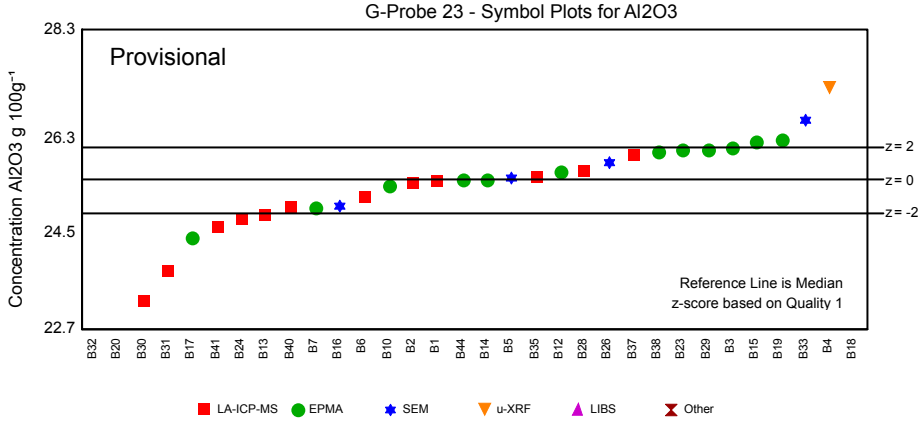
Lab Code	B29	B30	B31	B32	B33	B35	B37	B38	B39	B40	B41	B43	B44
SiO2: 1	*0.17*	*7.26*	*2.30*	*-82.31*	*0.39*	*3.03*	*5.05*	*-0.04*	*	*2.76*	*1.67*	*	*-0.63*
TiO2: 1	-1.80	0.00	-1.61	-30.15	*	-2.07	0.00	0.00	*	0.00	2.18	0.55	*
Al2O3: 1	*1.88*	*-7.31*	*-5.51*	*-74.12*	*3.60*	*0.18*	*1.48*	*1.70*	*	*-1.68*	*-2.80*	*	*-0.00*
Fe2O3T: 1	*0.72*	*4.40*	*3.75*	*-54.38*	*1.38*	*-1.73*	*3.75*	*-1.46*	*	*3.37*	*6.40*	*	*-0.00*
MgO: 1	-0.01	2.44	1.22	-60.52	-0.20	-1.07	3.58	-0.09	*	0.85	2.74	*	-0.10
CaO: 1	*1.14*	*-5.56*	*	*-68.87*	*-0.62*	*-3.05*	*	*1.00*	*	*-3.85*	*-1.20*	*	*0.11*
Na2O: 1	*-0.16*	*5.20*	*2.88*	*	*-4.52*	*1.95*	*3.29*	*-2.88*	*	*3.29*	*0.00*	*	*1.11*
Ba: 1	-0.33	0.79	-0.18	*	*	-0.59	0.74	*	-1.53	-0.49	0.81	0.00	*
Ce: 1	*	0.24	-1.17	*	*	-0.71	0.24	*	-1.58	-0.72	1.65	-0.23	*
Co: 1	-0.51	0.80	1.04	*	*	-0.20	-0.38	*	-0.91	-0.07	-0.62	0.33	*
Cr: 1	*-0.49*	*1.92*	*0.07*	*-6.01*	*	*-1.73*	*-1.44*	*	*-2.05*	*1.95*	*3.26*	*0.02*	*
Cs: 1	*	*0.00*	*	*	*	*13.19*	*0.54*	*	*-0.89*	*	*8.86*	*0.89*	*
Cu: 1	*-1.54*	*1.73*	*4.86*	*	*	*-0.80*	*0.07*	*	*-1.97*	*-0.07*	*-1.75*	*2.42*	*
Dy: 1	-1.53	-1.81	-0.47	*	*	-0.37	0.35	*	-1.55	-0.24	0.94	1.86	*
Er: 1	-2.18	-2.40	0.23	*	*	-0.16	0.14	*	-1.69	-0.56	0.36	-0.04	*
Eu: 1	-0.19	-0.27	0.34	*	*	-1.22	0.64	*	-1.17	0.00	1.14	-0.64	*
Ga: 1	*	0.64	-0.08	*	*	*	0.06	*	-1.26	0.96	-3.58	-0.50	*
Gd: 1	*	-1.66	0.36	*	*	*	0.92	*	-1.72	0.00	0.59	1.54	*
Hf: 1	*	-2.55	*	*	*	0.40	1.50	*	-1.77	-1.10	-0.98	-2.01	*
Ho: 1	*	-2.11	-0.11	*	*	-0.93	0.00	*	-1.13	-0.65	1.70	0.08	*
In: 1	*	*1.20*	*	*	*	*	*0.12*	*	*-0.66*	*	*-0.86*	*2.37*	*
La: 1	-1.22	-1.08	-0.07	*	*	-0.59	-0.02	*	-1.63	-0.91	1.61	0.03	*
Li: 1	*	0.55	-1.15	*	*	0.05	0.14	*	-1.49	-0.05	-0.54	2.34	*
Lu: 1	*	-1.42	-0.51	*	*	-0.55	0.68	*	-0.97	-1.12	0.83	3.68	*
Mn: 1	-0.80	2.50	1.32	-7.58	*	-0.87	2.53	1.60	-1.76	0.15	2.98	1.53	*
Nb: 1	*	0.07	*	*	*	*	1.76	*	-1.36	0.27	0.27	-0.07	*
Nd: 1	-0.94	-1.03	0.26	*	*	-1.75	0.45	*	-2.21	-0.90	0.68	1.34	*
Ni: 1	*-0.46*	*1.35*	*3.32*	*-9.92*	*	*0.41*	*-0.44*	*	*-0.84*	*-0.92*	*0.38*	*0.76*	*
Pb: 1	-0.40	0.64	*	*	*	13.81	0.29	*	-1.46	0.11	5.40	-0.76	*
Pr: 1	*	-0.04	-0.27	*	*	-0.51	0.44	*	-1.53	-0.57	1.62	0.83	*
Rb: 1	-1.36	0.01	-0.41	*	*	0.33	0.56	*	-0.88	-0.12	-0.40	0.00	*
Sb: 1	*	*0.56*	*0.35*	*	*	*13.12*	*-0.29*	*	*-2.69*	*	*-0.99*	*-2.65*	*
Sc: 1	*-1.79*	*5.84*	*8.51*	*	*	*	*1.57*	*	*-1.89*	*-0.79*	*10.03*	*-0.40*	*
Sm: 1	*-0.70*	*0.00*	*0.77*	*	*	*	*1.54*	*	*-1.98*	*-0.33*	*-0.33*	*4.66*	*
Sr: 1	-1.20	-1.23	-0.26	-4.61	*	-0.80	2.56	*	-2.45	-0.97	-0.19	0.10	*
Tb: 1	*	-1.39	0.00	*	*	-0.93	0.48	*	-1.76	0.10	1.35	1.97	*
Th: 1	*	-1.30	*	*	*	-0.85	-0.41	*	-1.57	-0.68	0.75	-0.14	*
Tm: 1	*	-1.69	0.40	*	*	-0.44	1.06	*	-1.36	-0.56	2.03	1.55	*
U: 1	*	0.63	*	*	*	14.11	2.51	*	-1.57	-0.78	3.61	0.00	*
V: 1	*	0.30	-0.25	*	*	-0.49	-0.03	*	-1.26	-0.62	0.93	0.41	*
Y: 1	-2.76	-3.66	0.42	*	*	-0.04	1.06	*	-1.52	-0.92	0.47	-0.77	*
Yb: 1	-1.56	-1.82	-0.64	*	*	-1.72	0.20	*	-1.88	-0.29	1.44	3.55	*
Zn: 1	*-1.52*	*-0.36*	*2.00*	*	*	*1.39*	*1.55*	*	*0.66*	*-1.51*	*-3.41*	*0.96*	*
Zr: 1	-2.42	-3.43	0.43	*	*	-0.11	1.24	*	-1.80	-0.56	2.61	-0.43	*

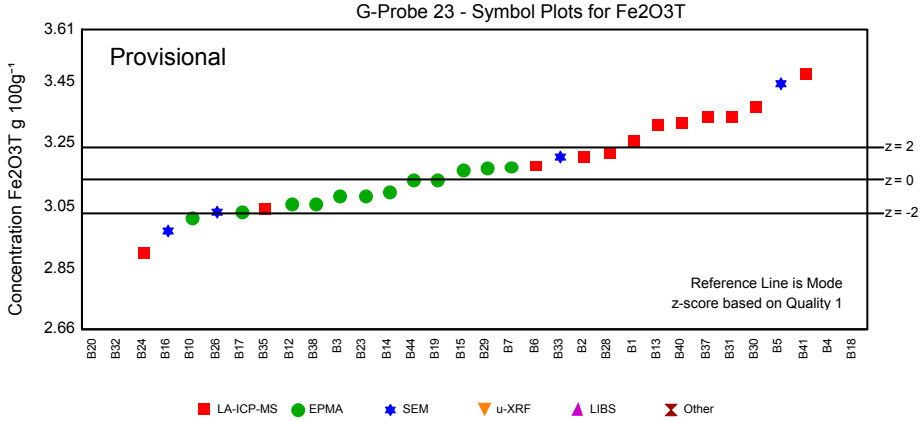
Table 3 - G-Probe 23 Z-scores for Stillwater Norite, NoSM-1G Glass. 14/11/2019

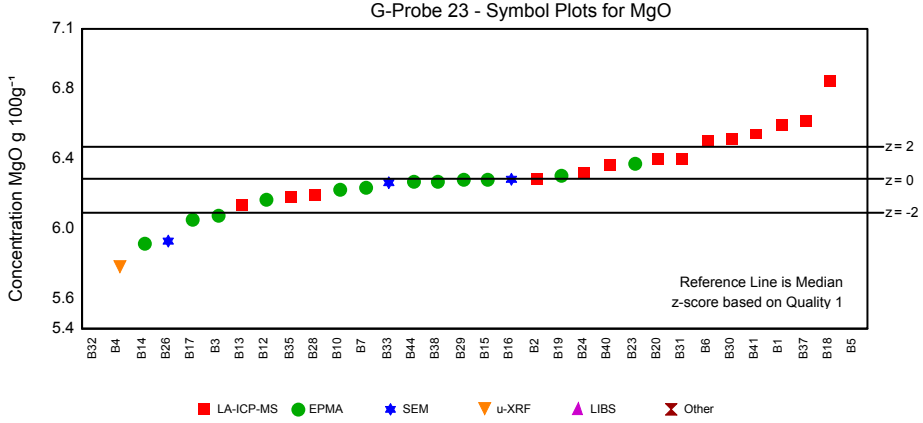
Lab Code	B45
SiO2: 1	*
TiO2: 1	*
Al2O3: 1	*
Fe2O3T: 1	*
MgO: 1	*
CaO: 1	*
Na2O: 1	*
Ba: 1	1.35
Ce: 1	1.22
Co: 1	-0.16
Cr: 1	*-0.29*
Cs: 1	*
Cu: 1	*-0.57*
Dy: 1	3.06
Er: 1	*
Eu: 1	3.03
Ga: 1	-0.22
Gd: 1	2.97
Hf: 1	2.05
Ho: 1	2.43
In: 1	*1.00*
La: 1	1.61
Li: 1	0.64
Lu: 1	2.48
Mn: 1	-0.45
Nb: 1	2.26
Nd: 1	*
Ni: 1	*-1.65*
Pb: 1	2.33
Pr: 1	2.05
Rb: 1	-0.88
Sb: 1	*0.53*
Sc: 1	*-0.32*
Sm: 1	*
Sr: 1	1.48
Tb: 1	3.58
Th: 1	2.93
Tm: 1	*
U: 1	*
V: 1	0.85
Y: 1	-0.23
Yb: 1	*
Zn: 1	*
Zr: 1	0.78

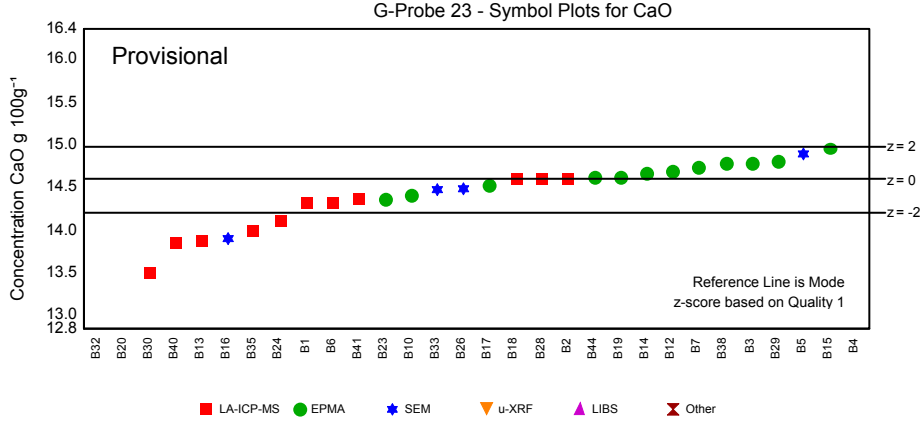

G-Probe 23 - Symbol Plots for SiO2
Provisional
Concentration SiO2 g 100g⁻¹
53.4
52.6
50.8
49.0
47.2
45.4
43.6
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B32 B14 B7 B44 B17 B3 B10 B38 B18 B28 B5 B15 B29 B4 B23 B19 B33 B12 B1 B2 B41 B26 B31 B40 B35 B24 B13 B16 B37 B30 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

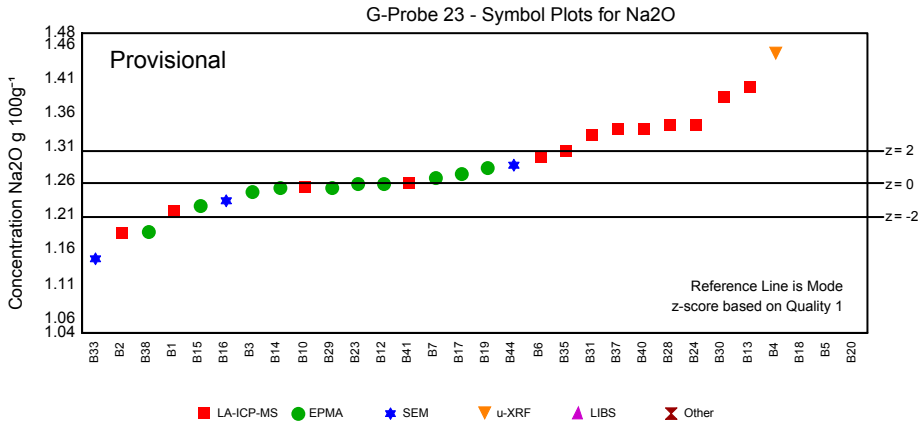

G-Probe 23 - Symbol Plots for TiO2
Concentration TiO2 g 100g⁻¹
0.076
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.044
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B32 B35 B29 B31 B13 B20 B19 B2 B3 B6 B12 B18 B23 B30 B28 B37 B38 B40 B26 B43 B1 B24 B15 B41 B7 B27 B14 B11 B10 B17 B4 B5
LA-ICP-MS EPMA SEM u-XRF LIBS Other

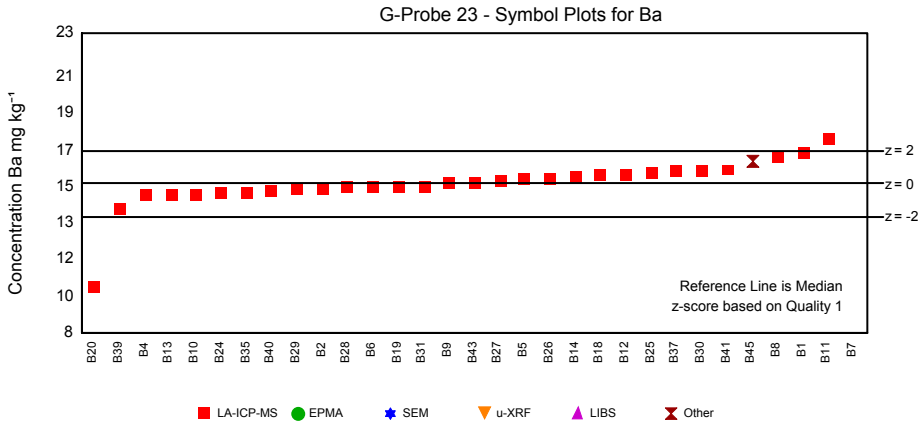

G-Probe 23 - Symbol Plots for Al2O3
Provisional
Concentration Al2O3 g 100g⁻¹
28.3
26.3
24.5
22.7
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B32 B20 B30 B31 B17 B41 B24 B13 B40 B7 B16 B6 B10 B2 B1 B44 B14 B5 B35 B12 B28 B26 B37 B38 B23 B29 B3 B15 B19 B33 B4 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

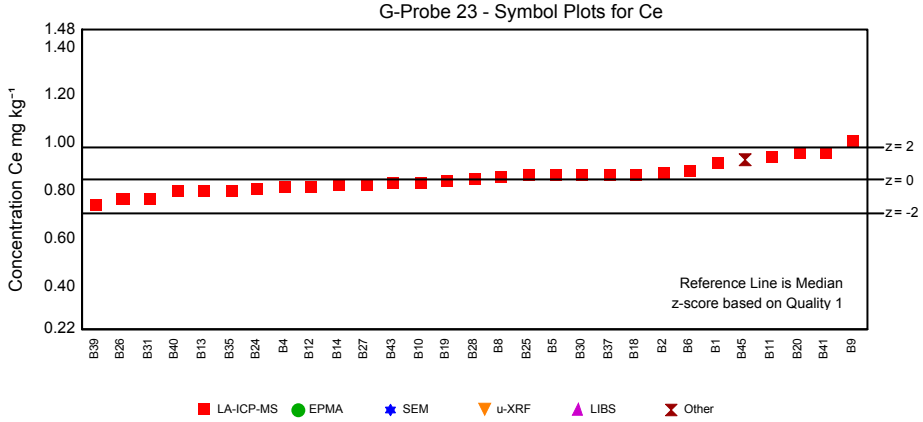

G-Probe 23 - Symbol Plots for Fe2O3T
Provisional
Concentration Fe2O3T g 100g⁻¹
3.61
3.45
3.25
3.05
2.85
2.66
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B32 B24 B16 B10 B26 B17 B35 B12 B38 B3 B23 B14 B44 B19 B15 B29 B7 B6 B33 B2 B28 B1 B13 B40 B37 B31 B30 B5 B41 B4 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

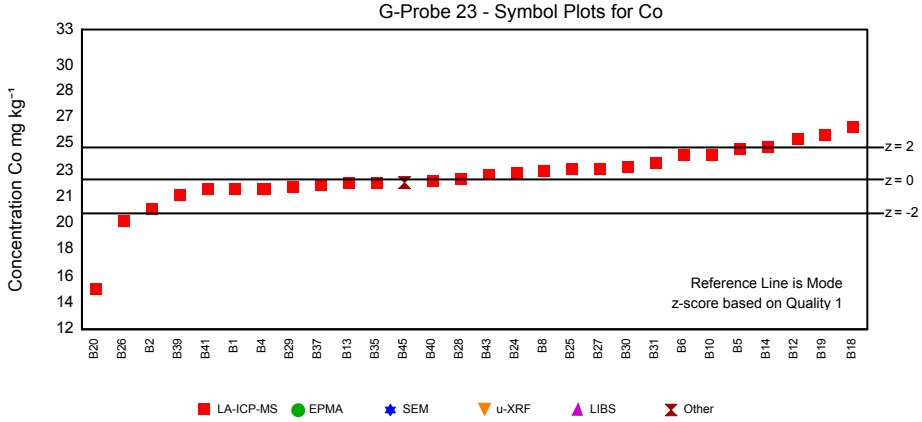

G-Probe 23 - Symbol Plots for MgO
Concentration MgO g 100g⁻¹
7.1
6.8
6.4
6.0
5.6
5.4
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B32 B4 B14 B26 B17 B3 B13 B12 B35 B28 B10 B7 B33 B44 B38 B29 B15 B16 B2 B19 B24 B40 B23 B20 B31 B6 B30 B41 B1 B37 B18 B5
LA-ICP-MS EPMA SEM u-XRF LIBS Other

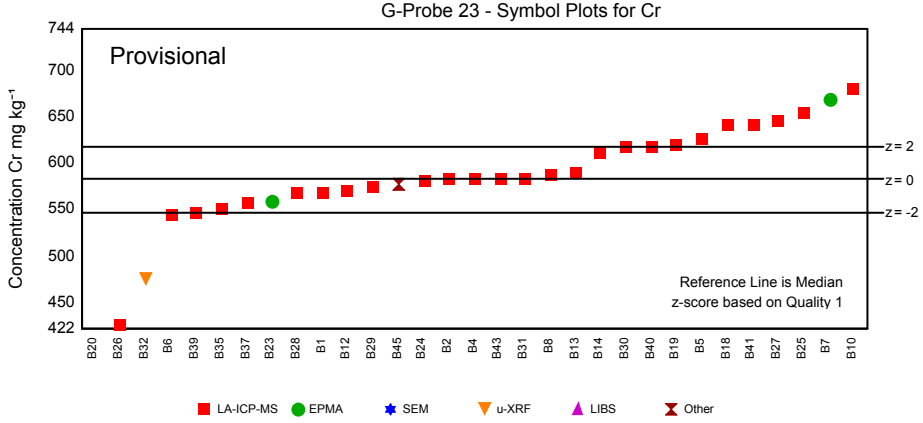

G-Probe 23 - Symbol Plots for CaO
Provisional
Concentration CaO g 100g⁻¹
16.4
16.0
15.5
15.0
14.5
14.0
13.5
13.0
12.8
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B32 B20 B30 B40 B13 B16 B35 B24 B1 B6 B41 B23 B10 B33 B26 B17 B18 B28 B2 B44 B19 B14 B12 B7 B38 B3 B29 B5 B15 B4
LA-ICP-MS EPMA SEM u-XRF LIBS Other

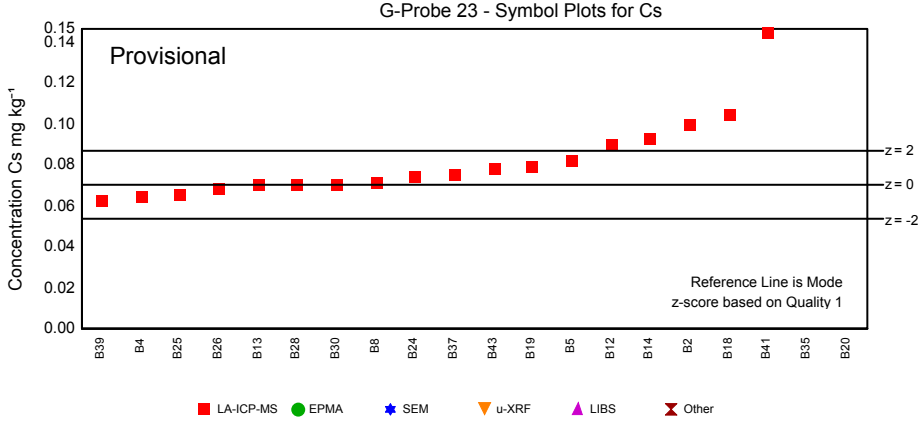

G-Probe 23 - Symbol Plots for Na2O
Provisional
Concentration Na2O g 100g⁻¹
1.48
1.46
1.41
1.36
1.31
1.26
1.21
1.16
1.11
1.06
1.04
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B33 B2 B38 B1 B15 B16 B3 B14 B10 B29 B23 B12 B41 B7 B17 B19 B44 B6 B35 B31 B37 B40 B28 B24 B30 B13 B4 B18 B5 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

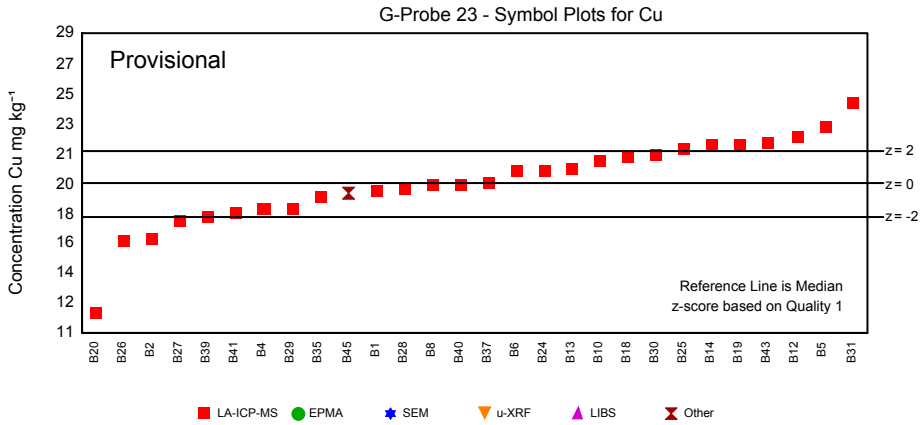

G-Probe 23 - Symbol Plots for Ba
Concentration Ba mg kg⁻¹
23
21
19
17
15
13
12
10
8
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B20 B39 B4 B13 B10 B24 B35 B40 B29 B2 B28 B6 B19 B31 B9 B43 B27 B5 B26 B14 B18 B12 B25 B37 B30 B41 B45 B8 B1 B11 B7
LA-ICP-MS EPMA SEM u-XRF LIBS Other

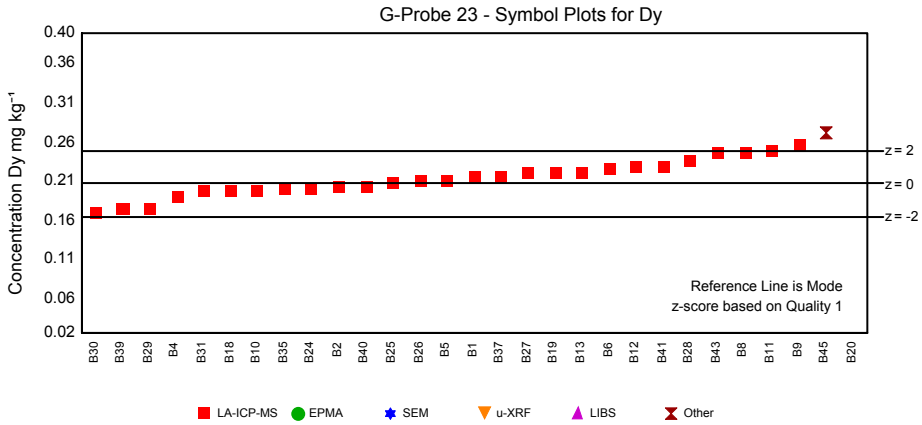

G-Probe 23 - Symbol Plots for Ce
Concentration Ce mg kg⁻¹
1.48
1.40
1.20
1.00
0.80
0.60
0.40
0.22
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B39 B26 B31 B40 B13 B35 B24 B4 B12 B14 B27 B43 B10 B19 B28 B8 B25 B5 B30 B37 B18 B2 B6 B1 B45 B11 B20 B41 B9
LA-ICP-MS EPMA SEM u-XRF LIBS Other

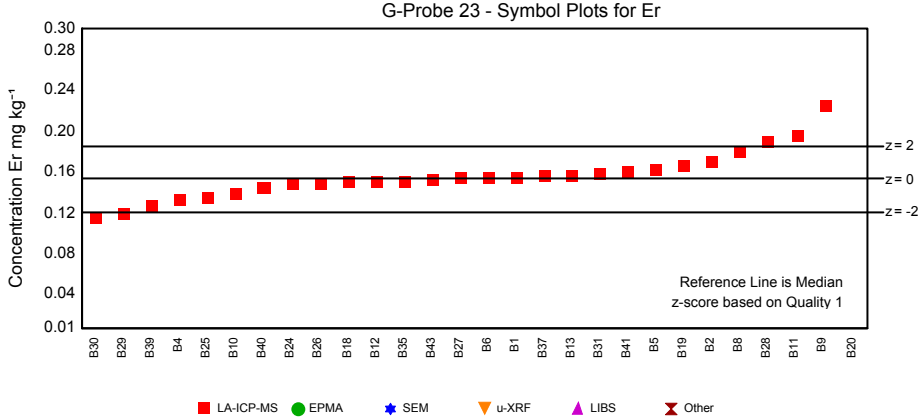

G-Probe 23 - Symbol Plots for Co
Concentration Co mg kg⁻¹
33
30
28
27
25
23
21
20
18
16
14
12
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B26 B2 B39 B41 B1 B4 B29 B37 B13 B35 B45 B40 B28 B43 B24 B8 B25 B27 B30 B31 B6 B10 B5 B14 B12 B19 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

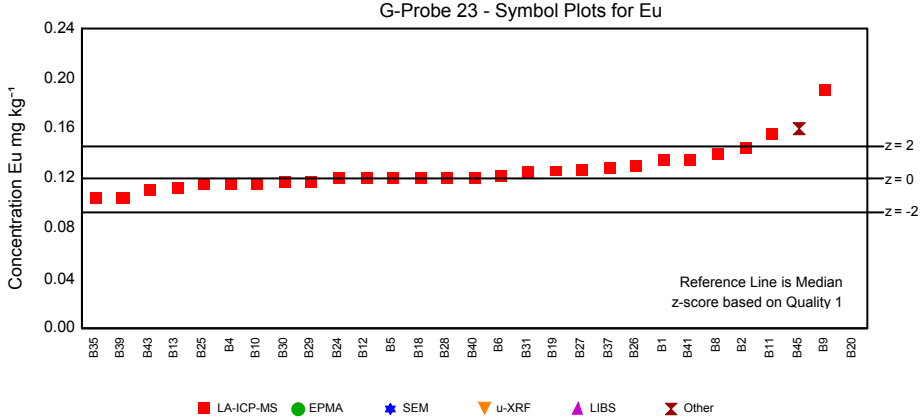

G-Probe 23 - Symbol Plots for Cr
Provisional
Concentration Cr mg kg⁻¹
744
700
650
600
550
500
450
422
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B20 B26 B32 B6 B39 B35 B37 B23 B28 B1 B12 B29 B45 B24 B2 B4 B43 B31 B8 B13 B14 B30 B40 B19 B5 B18 B41 B27 B25 B7 B10
LA-ICP-MS EPMA SEM u-XRF LIBS Other

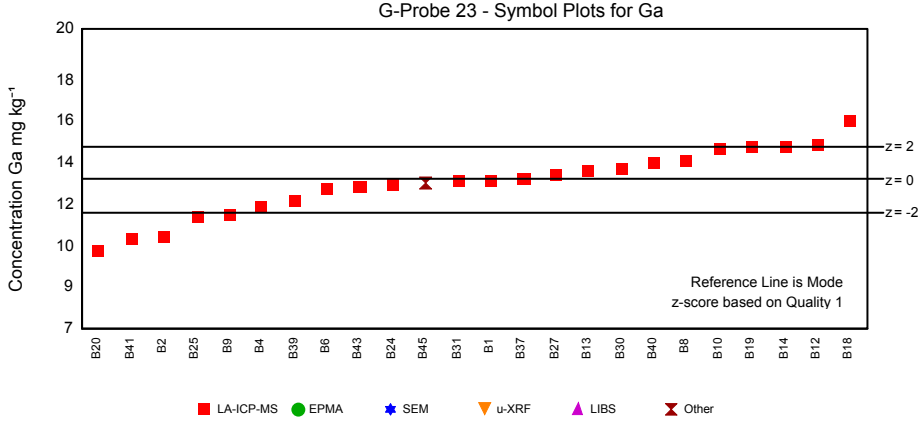

G-Probe 23 - Symbol Plots for Cs
Provisional
Concentration Cs mg kg⁻¹
0.15
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B4 B25 B26 B13 B28 B30 B8 B24 B37 B43 B19 B5 B12 B14 B2 B18 B41 B35 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

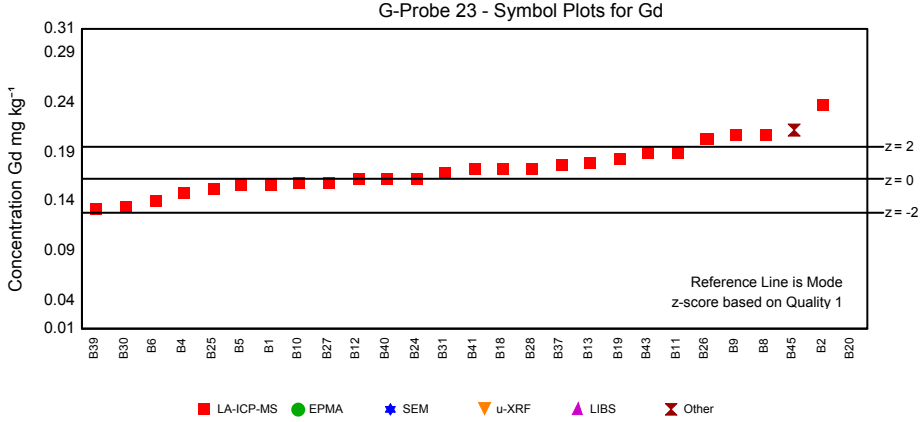

G-Probe 23 - Symbol Plots for Cu
Provisional
Concentration Cu mg kg⁻¹
29
27
25
23
21
20
18
16
14
12
11
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B20 B26 B2 B27 B39 B41 B4 B29 B35 B45 B1 B28 B8 B40 B37 B6 B24 B13 B10 B18 B30 B25 B14 B19 B43 B12 B5 B31
LA-ICP-MS EPMA SEM u-XRF LIBS Other

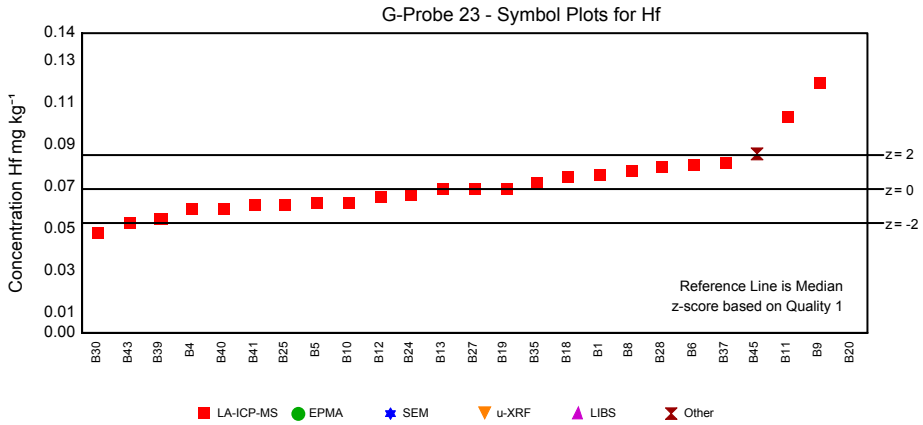

G-Probe 23 - Symbol Plots for Dy
Concentration Dy mg kg⁻¹
0.40
0.36
0.31
0.26
0.21
0.16
0.11
0.06
0.02
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B30 B39 B29 B4 B31 B18 B10 B35 B24 B2 B40 B25 B26 B5 B1 B37 B27 B19 B13 B6 B12 B41 B28 B43 B8 B11 B9 B45 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

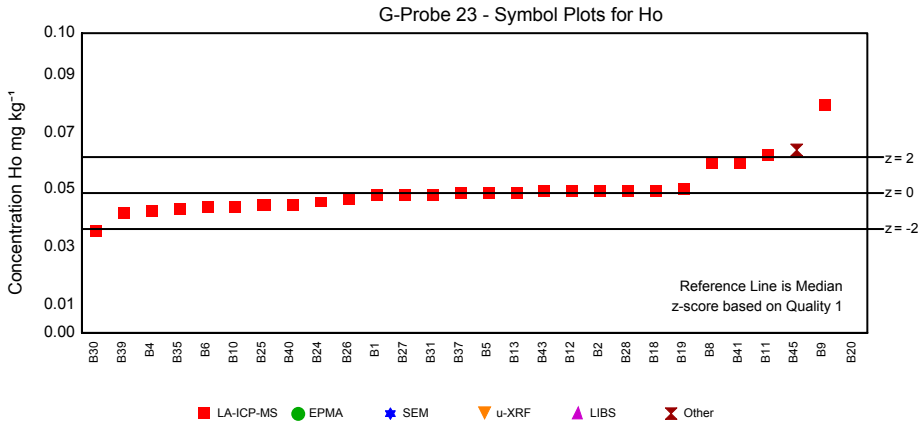

G-Probe 23 - Symbol Plots for Er
Concentration Er mg kg⁻¹
0.30
0.28
0.24
0.20
0.16
0.12
0.08
0.04
0.01
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B30 B29 B39 B4 B25 B10 B40 B24 B26 B18 B12 B35 B43 B27 B6 B1 B37 B13 B31 B41 B5 B19 B2 B8 B28 B11 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

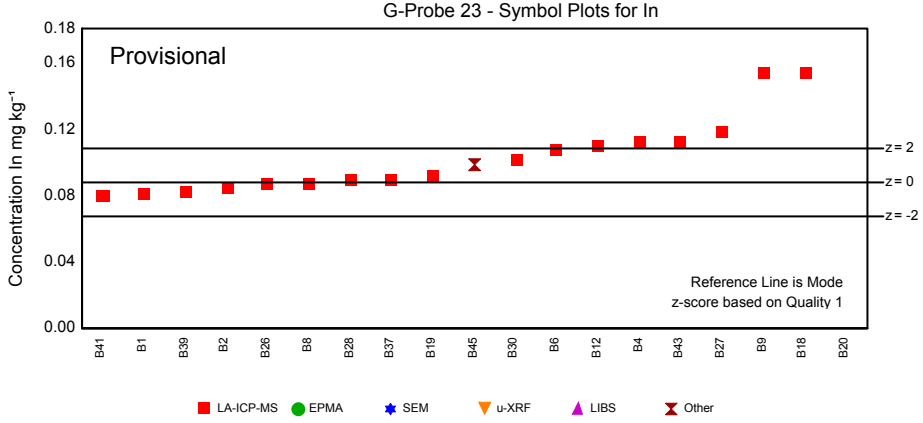

G-Probe 23 - Symbol Plots for Eu
Concentration Eu mg kg⁻¹
0.24
0.20
0.16
0.12
0.08
0.04
0.00
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B35 B39 B43 B13 B25 B4 B10 B30 B29 B24 B12 B5 B18 B28 B40 B6 B31 B19 B27 B37 B26 B1 B41 B8 B2 B11 B45 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

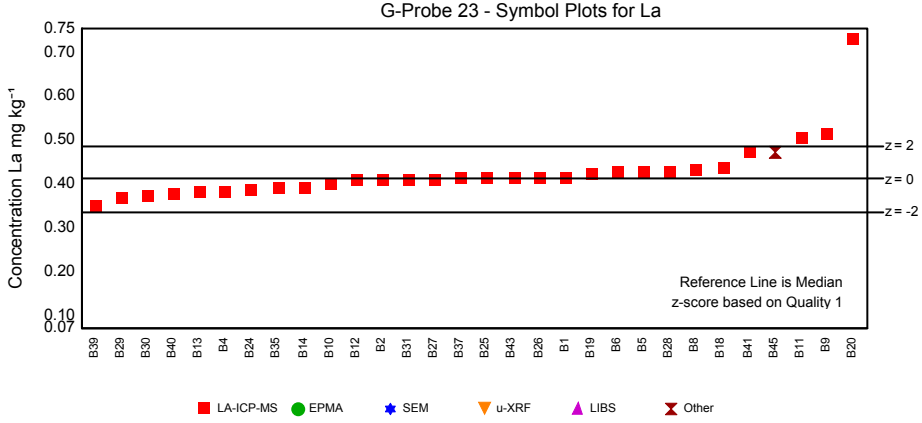

G-Probe 23 - Symbol Plots for Ga
Concentration Ga mg kg⁻¹
20
18
16
14
12
10
9
7
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B41 B2 B25 B9 B4 B39 B6 B43 B24 B45 B31 B1 B37 B27 B13 B30 B40 B8 B10 B19 B14 B12 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

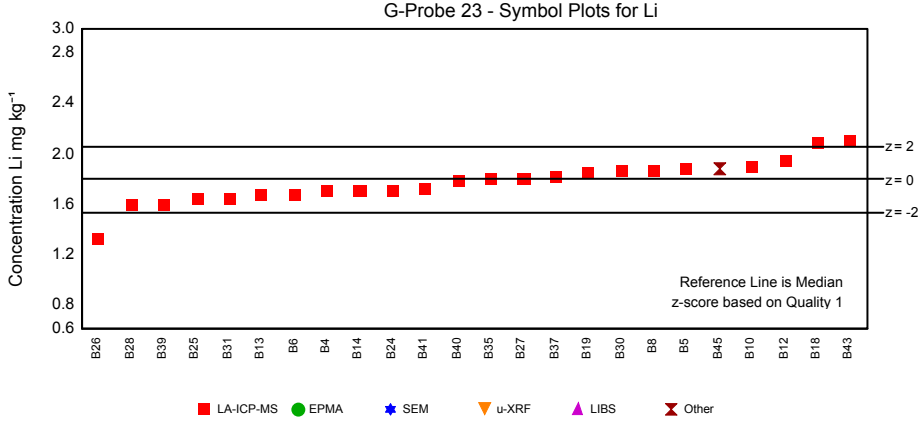

G-Probe 23 - Symbol Plots for Gd
Concentration Gd mg kg⁻¹
0.31
0.29
0.24
0.19
0.14
0.09
0.04
0.01
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B30 B6 B4 B25 B5 B1 B10 B27 B12 B40 B24 B31 B41 B18 B28 B37 B13 B19 B43 B11 B26 B9 B8 B45 B2 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

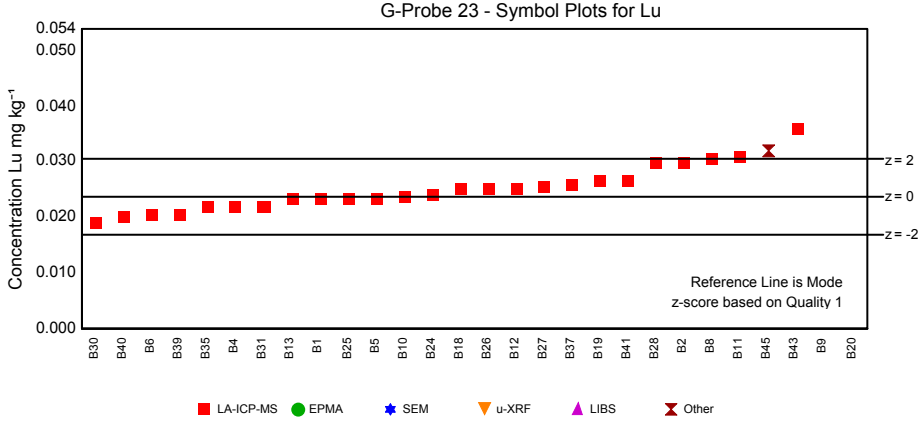

G-Probe 23 - Symbol Plots for Hf
Concentration Hf mg kg⁻¹
0.14
0.13
0.11
0.09
0.07
0.05
0.03
0.01
0.00
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B30 B43 B39 B4 B40 B41 B25 B5 B10 B12 B24 B13 B27 B19 B35 B18 B1 B8 B28 B6 B37 B45 B11 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

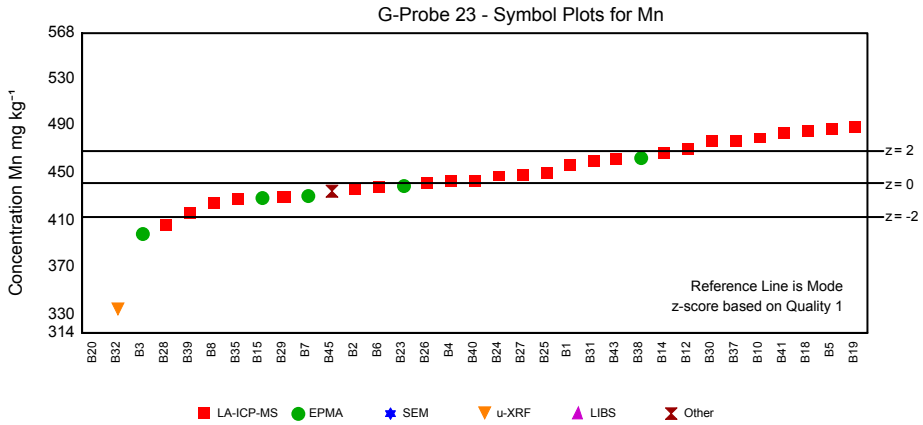

G-Probe 23 - Symbol Plots for Ho
Concentration Ho mg kg⁻¹
0.10
0.09
0.07
0.05
0.03
0.01
0.00
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B30 B39 B4 B35 B6 B10 B25 B40 B24 B26 B1 B27 B31 B37 B5 B13 B43 B12 B2 B28 B18 B19 B8 B41 B11 B45 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

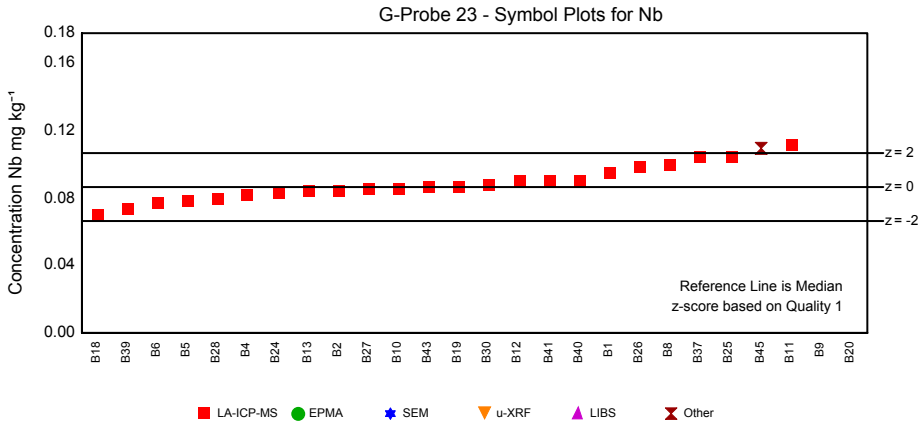

G-Probe 23 - Symbol Plots for In
Provisional
Concentration In mg kg⁻¹
0.18
0.16
0.12
0.08
0.04
0.00
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B41 B1 B39 B2 B26 B8 B28 B37 B19 B45 B30 B6 B12 B4 B43 B27 B9 B18 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

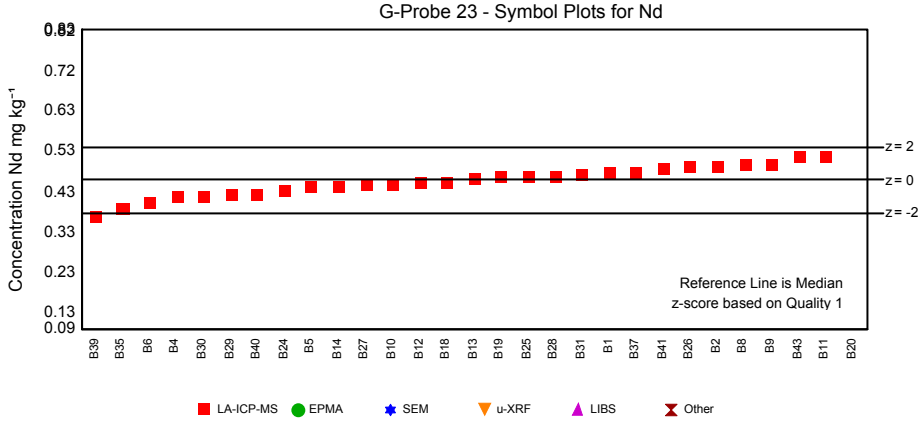

G-Probe 23 - Symbol Plots for La
Concentration La mg kg⁻¹
0.75
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.07
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B39 B29 B30 B40 B13 B4 B24 B35 B14 B10 B12 B2 B31 B27 B37 B25 B43 B26 B1 B19 B6 B5 B28 B8 B18 B41 B45 B11 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

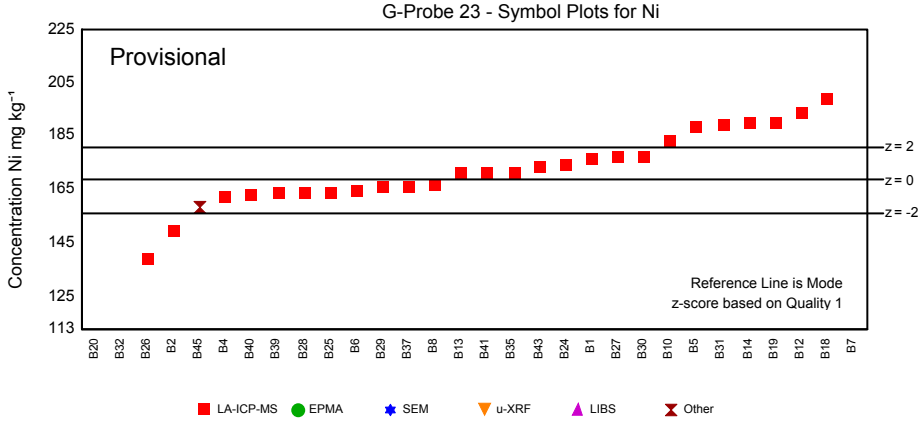

G-Probe 23 - Symbol Plots for Li
Concentration Li mg kg⁻¹
3.0
2.8
2.4
2.0
1.6
1.2
0.8
0.6
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B26 B28 B39 B25 B31 B13 B6 B4 B14 B24 B41 B40 B35 B27 B37 B19 B30 B8 B5 B45 B10 B12 B18 B43
LA-ICP-MS EPMA SEM u-XRF LIBS Other

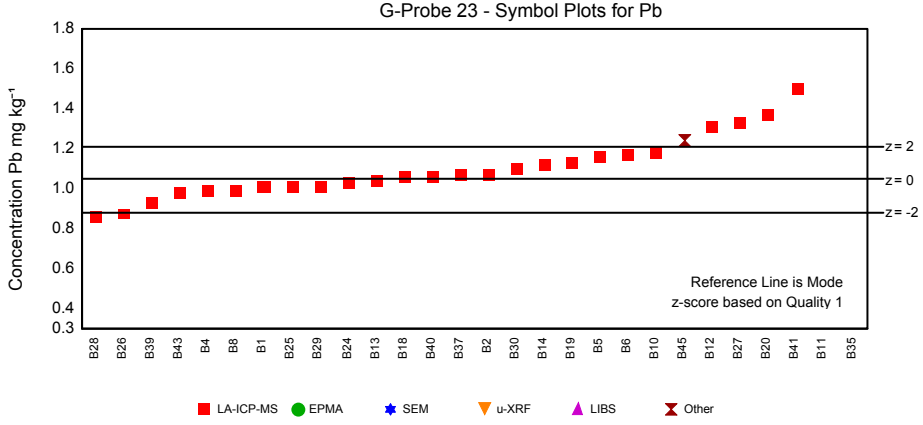

G-Probe 23 - Symbol Plots for Lu
Concentration Lu mg kg⁻¹
0.054
0.050
0.040
0.030
0.020
0.010
0.000
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B30 B40 B6 B39 B35 B4 B31 B13 B1 B25 B5 B10 B24 B18 B26 B12 B27 B37 B19 B41 B28 B2 B8 B11 B45 B43 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

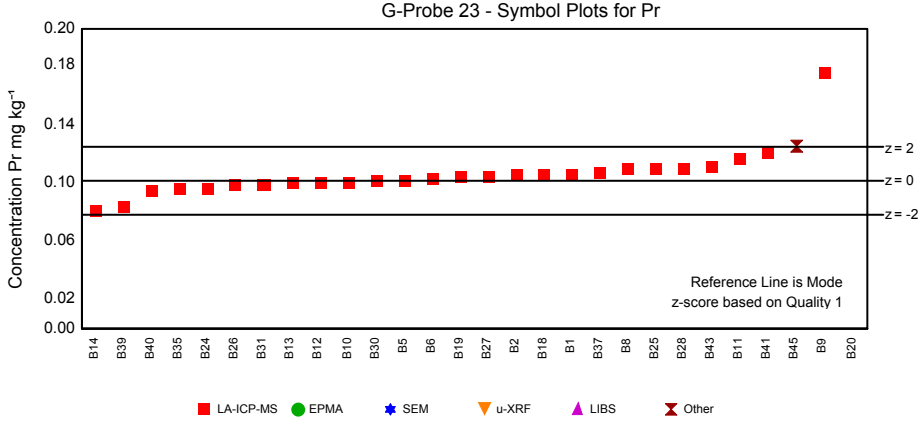

G-Probe 23 - Symbol Plots for Mn
Concentration Mn mg kg⁻¹
568
530
490
450
410
370
330
314
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B32 B3 B28 B39 B8 B35 B15 B29 B7 B45 B2 B6 B23 B26 B4 B40 B24 B27 B25 B1 B31 B43 B38 B14 B12 B30 B37 B10 B41 B18 B5 B19
LA-ICP-MS EPMA SEM u-XRF LIBS Other

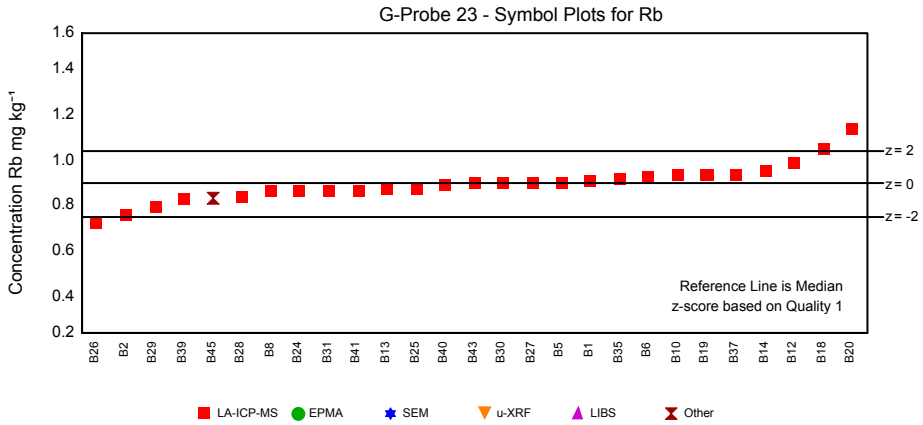

G-Probe 23 - Symbol Plots for Nb
Concentration Nb mg kg⁻¹
0.18
0.16
0.12
0.08
0.04
0.00
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B18 B39 B6 B5 B28 B4 B24 B13 B2 B27 B10 B43 B19 B30 B12 B41 B40 B1 B26 B8 B37 B25 B45 B11 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

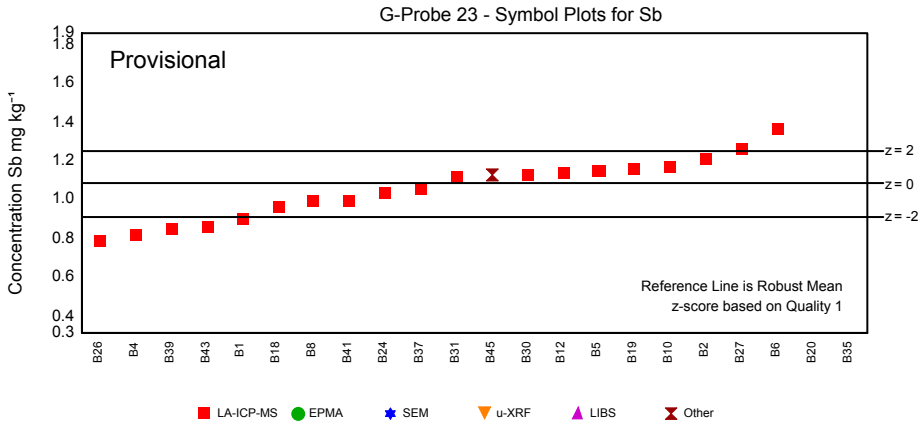

G-Probe 23 - Symbol Plots for Nd
Concentration Nd mg kg⁻¹
0.72
0.63
0.53
0.43
0.33
0.23
0.13
0.09
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B39 B35 B6 B4 B30 B29 B40 B24 B5 B14 B27 B10 B12 B18 B13 B19 B25 B28 B31 B1 B37 B41 B26 B2 B8 B9 B43 B11 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

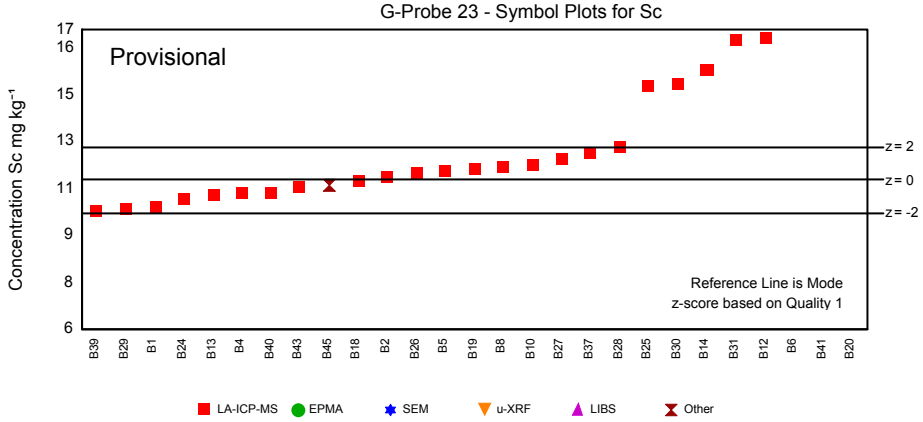

G-Probe 23 - Symbol Plots for Ni
Provisional
Concentration Ni mg kg⁻¹
225
205
185
165
145
125
113
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B32 B26 B2 B45 B4 B40 B39 B28 B25 B6 B29 B37 B8 B13 B41 B35 B43 B24 B1 B27 B30 B10 B5 B31 B14 B19 B12 B18 B7
LA-ICP-MS EPMA SEM u-XRF LIBS Other

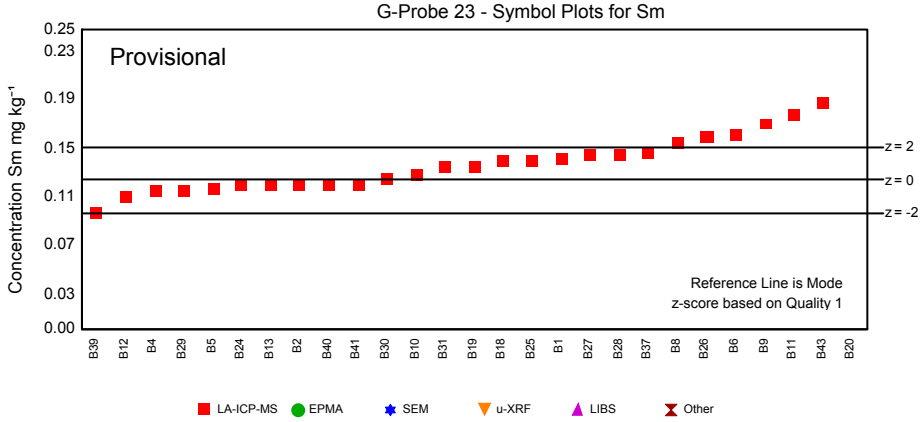

G-Probe 23 - Symbol Plots for Pb
Concentration Pb mg kg⁻¹
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.3
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B28 B26 B39 B43 B4 B8 B1 B25 B29 B24 B13 B18 B40 B37 B2 B30 B14 B19 B5 B6 B10 B45 B12 B27 B20 B41 B11 B35
LA-ICP-MS EPMA SEM u-XRF LIBS Other

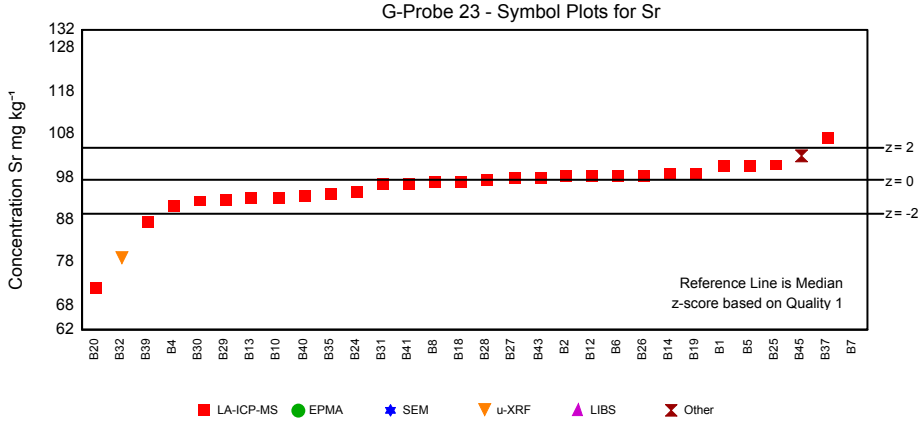

G-Probe 23 - Symbol Plots for Pr
Concentration Pr mg kg⁻¹
0.20
0.18
0.14
0.10
0.06
0.02
0.00
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B14 B39 B40 B35 B24 B26 B31 B13 B12 B10 B30 B5 B6 B19 B27 B2 B18 B1 B37 B8 B25 B28 B43 B11 B41 B45 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

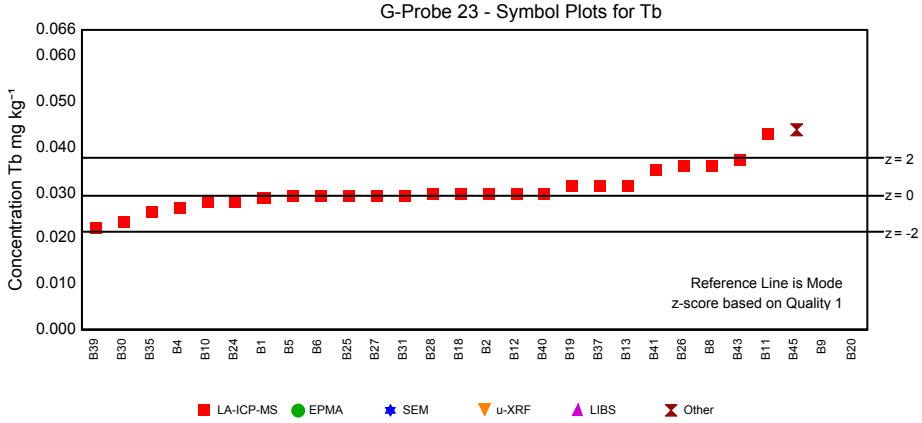

G-Probe 23 - Symbol Plots for Rb
Concentration Rb mg kg⁻¹
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B26 B2 B29 B39 B45 B28 B8 B24 B31 B41 B13 B25 B40 B43 B30 B27 B5 B1 B35 B6 B10 B19 B37 B14 B12 B18 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

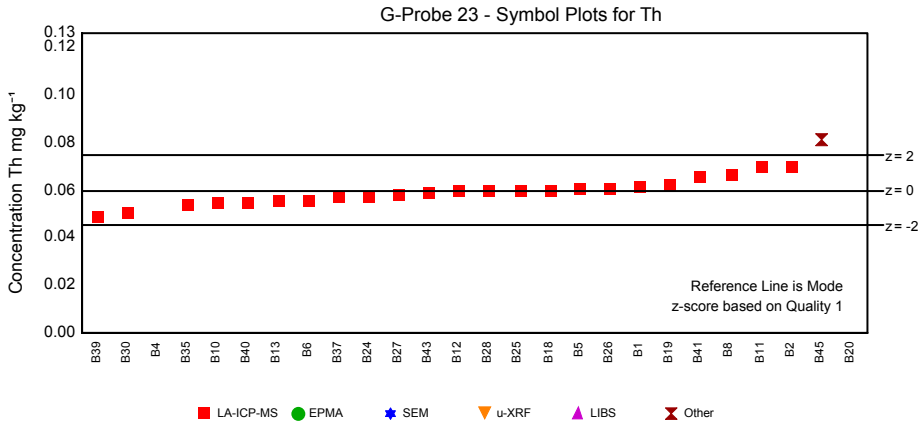

G-Probe 23 - Symbol Plots for Sb
Provisional
Concentration Sb mg kg⁻¹
1.9
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.3
z = 2
z = 0
z = -2
Reference Line is Robust Mean
z-score based on Quality 1
B26 B4 B39 B43 B1 B18 B8 B41 B24 B37 B31 B45 B30 B12 B5 B19 B10 B2 B27 B6 B20 B35
LA-ICP-MS EPMA SEM u-XRF LIBS Other

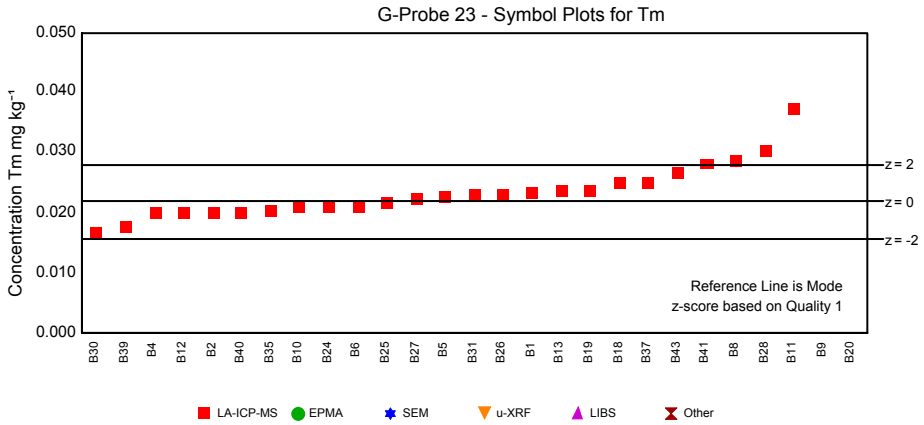

G-Probe 23 - Symbol Plots for Sc
Provisional
Concentration Sc mg kg⁻¹
17
16
15
13
11
9
8
6
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B29 B1 B24 B13 B4 B40 B43 B45 B18 B2 B26 B5 B19 B8 B10 B27 B37 B28 B25 B30 B14 B31 B12 B6 B41 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

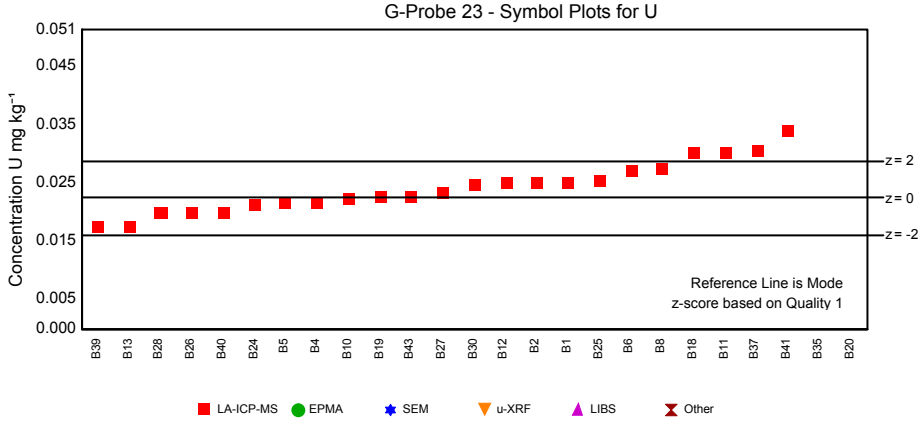

G-Probe 23 - Symbol Plots for Sm
Provisional
Concentration Sm mg kg⁻¹
0.25
0.23
0.19
0.15
0.11
0.07
0.03
0.00
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B12 B4 B29 B5 B24 B13 B2 B40 B41 B30 B10 B31 B19 B18 B25 B1 B27 B28 B37 B8 B26 B6 B9 B11 B43 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

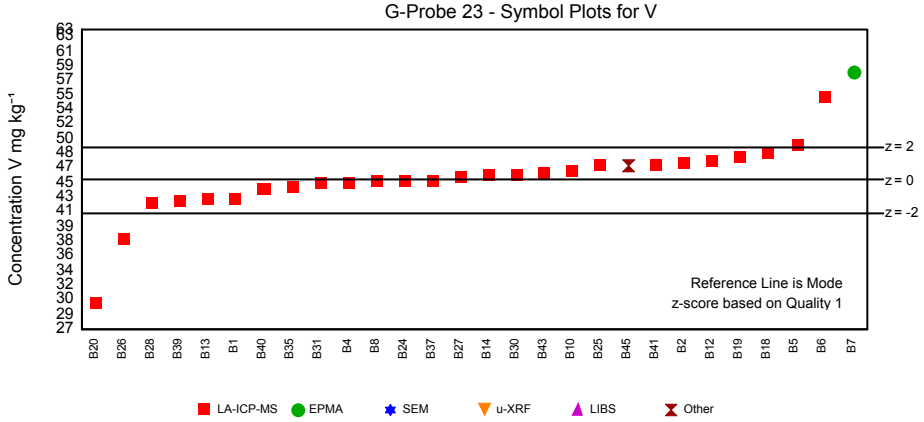

G-Probe 23 - Symbol Plots for Sr
Concentration Sr mg kg⁻¹
132
128
118
108
98
88
78
68
62
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B20 B32 B39 B4 B30 B29 B13 B10 B40 B35 B24 B31 B41 B8 B18 B28 B27 B43 B2 B12 B6 B26 B14 B19 B1 B5 B25 B45 B37 B7
LA-ICP-MS EPMA SEM u-XRF LIBS Other

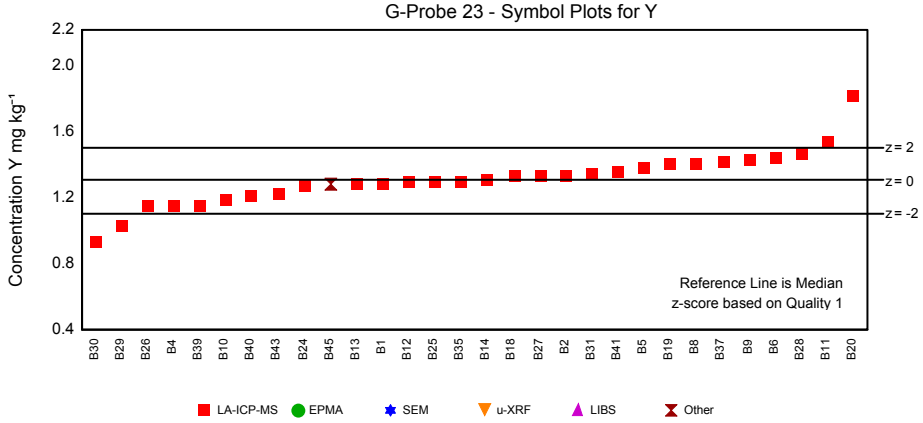

G-Probe 23 - Symbol Plots for Tb
Concentration Tb mg kg⁻¹
0.066
0.060
0.050
0.040
0.030
0.020
0.010
0.000
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B30 B35 B4 B10 B24 B1 B5 B6 B25 B27 B31 B28 B18 B2 B12 B40 B19 B37 B13 B41 B26 B8 B43 B11 B45 B9 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

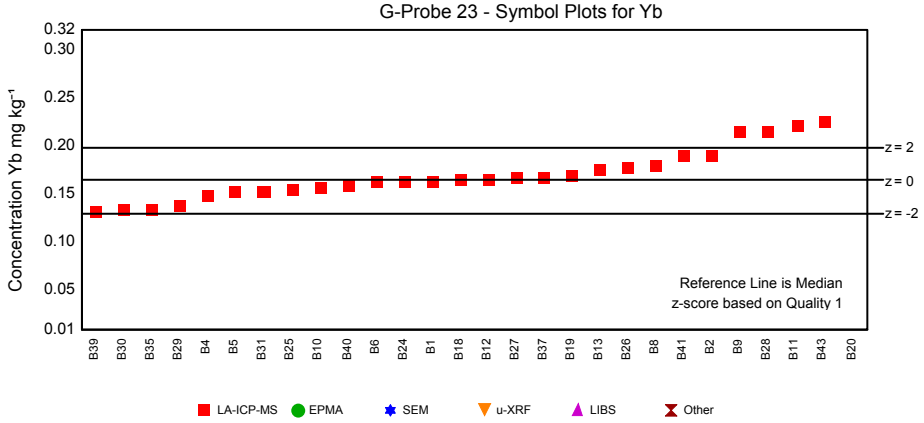

G-Probe 23 - Symbol Plots for Th
Concentration Th mg kg⁻¹
0.13
0.12
0.10
0.08
0.06
0.04
0.02
0.00
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B30 B4 B35 B10 B40 B13 B6 B37 B24 B27 B43 B12 B28 B25 B18 B5 B26 B1 B19 B41 B8 B11 B2 B45 B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other

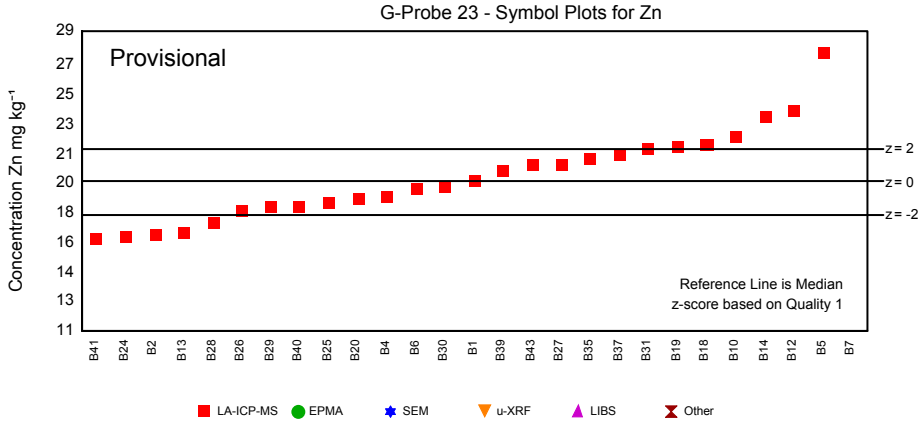

G-Probe 23 - Symbol Plots for Tm
Concentration Tm mg kg⁻¹
0.050
0.040
0.030
0.020
0.010
0.000
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B30 B39 B4 B12 B2 B40 B35 B10 B24 B6 B25 B27 B5 B31 B26 B1 B13 B19 B18 B37 B43 B41 B8 B28 B11 B9 B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for U
Concentration U mg kg⁻¹
0.051
0.045
0.035
0.025
0.015
0.005
0.000
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B39 B13 B28 B26 B40 B24 B5 B4 B10 B19 B43 B27 B30 B12 B2 B1 B25 B6 B8 B18 B11 B37 B41 B35 B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for V
Concentration V mg kg⁻¹
z = 2
z = 0
z = -2
Reference Line is Mode
z-score based on Quality 1
B20 B26 B28 B39 B13 B1 B40 B35 B31 B4 B8 B24 B37 B27 B14 B30 B43 B10 B25 B45 B41 B2 B12 B19 B18 B5 B6 B7
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for Y
Concentration Y mg kg⁻¹
2.2
2.0
1.6
1.2
0.8
0.4
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B30 B29 B26 B4 B39 B10 B40 B43 B24 B45 B13 B1 B12 B25 B35 B14 B18 B27 B2 B31 B41 B5 B19 B8 B37 B9 B6 B28 B11 B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for Yb
Concentration Yb mg kg⁻¹
0.32
0.30
0.25
0.20
0.15
0.10
0.05
0.01
z = 2
z = 0
z = -2
Reference Line is Median
z-score based on Quality 1
B39 B30 B35 B29 B4 B5 B31 B25 B10 B40 B6 B24 B1 B18 B12 B27 B37 B19 B13 B26 B8 B41 B2 B9 B28 B11 B43 B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other



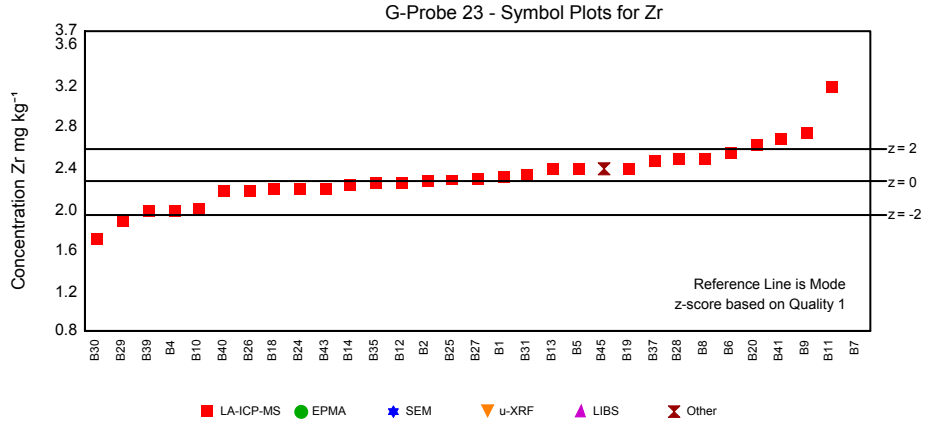
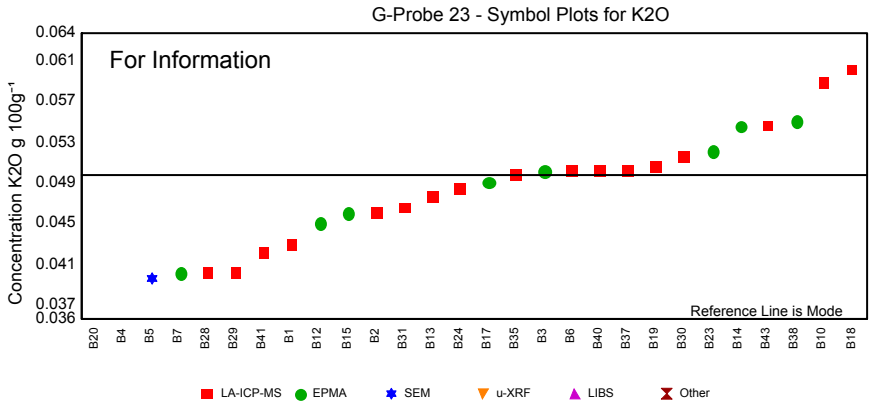
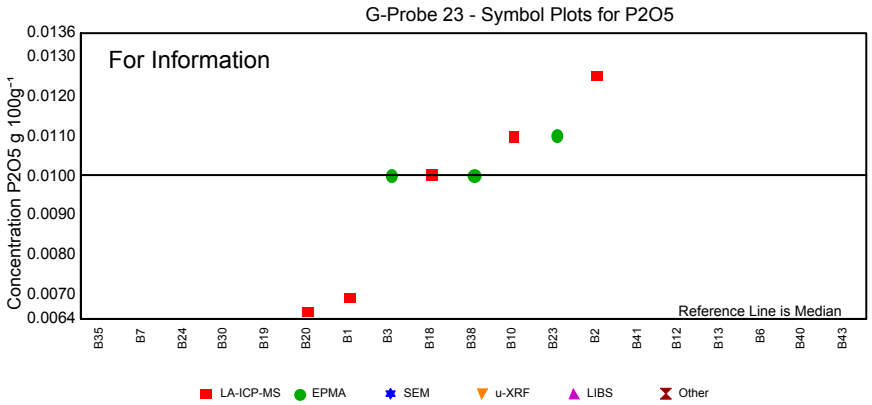
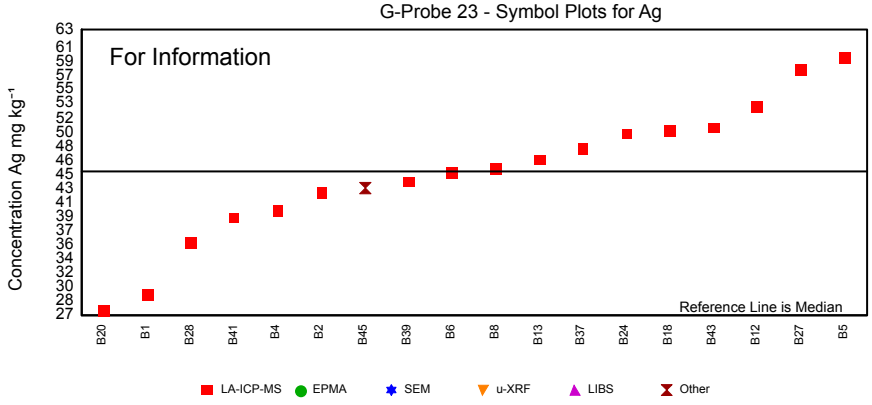
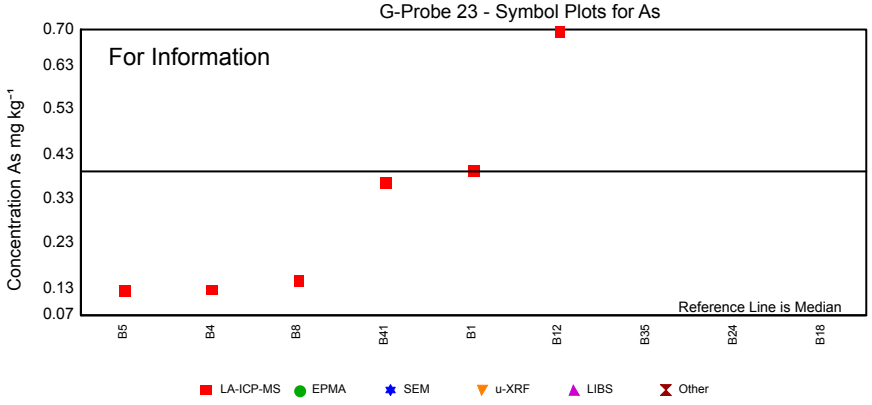


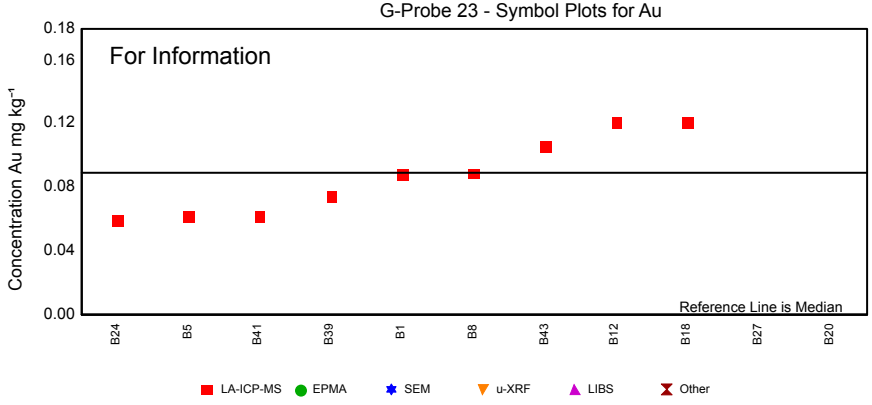
Figure 1: G-Probe 23 - Stillwater Norite, NoSM-1G Glass. Data distribution charts for elements for which values were assigned or provisional values given for guidance. Horizontal lines show the limits for -2<z<2 where the z-score is derived according to the Quality specified.

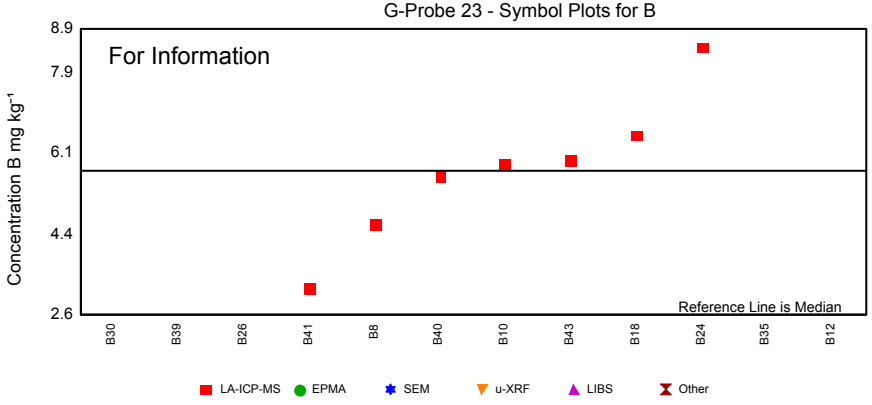

G-Probe 23 - Symbol Plots for K2O
For Information
Concentration K2O g 100g⁻¹
0.064
0.061
0.057
0.053
0.049
0.045
0.041
0.037
0.036
Reference Line is Mode
B20 B4 B5 B7 B28 B29 B41 B1 B12 B15 B2 B31 B13 B24 B17 B35 B3 B6 B40 B37 B19 B30 B23 B14 B43 B38 B10 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

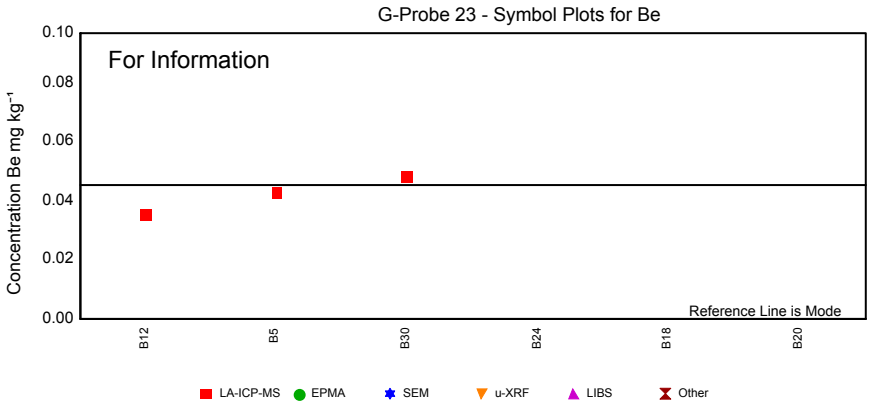

G-Probe 23 - Symbol Plots for P2O5
For Information
Concentration P2O5 g 100g⁻¹
0.0136
0.0130
0.0120
0.0110
0.0100
0.0090
0.0080
0.0070
0.0064
Reference Line is Median
B35 B7 B24 B30 B19 B20 B1 B3 B18 B38 B10 B23 B2 B41 B12 B13 B6 B40 B43
LA-ICP-MS EPMA SEM u-XRF LIBS Other

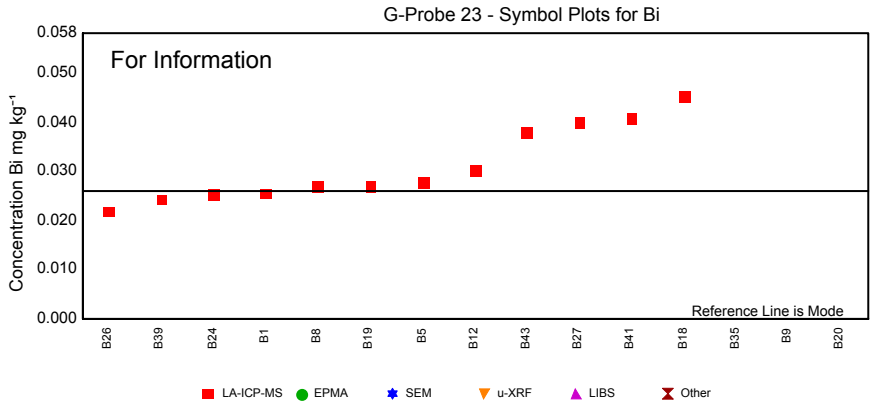

G-Probe 23 - Symbol Plots for Ag
For Information
Concentration Ag mg kg⁻¹
63
61
59
57
55
53
52
50
48
46
45
43
41
39
37
36
34
32
30
28
27
Reference Line is Median
B20 B1 B28 B41 B4 B2 B45 B39 B6 B8 B13 B37 B24 B18 B43 B12 B27 B5
LA-ICP-MS EPMA SEM u-XRF LIBS Other

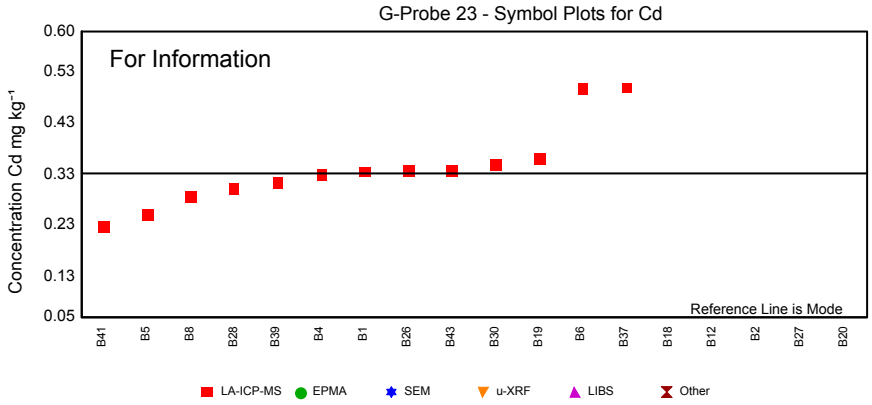

G-Probe 23 - Symbol Plots for As
For Information
Concentration As mg kg⁻¹
0.70
0.63
0.53
0.43
0.33
0.23
0.13
0.07
Reference Line is Median
B5 B4 B8 B41 B1 B12 B35 B24 B18
LA-ICP-MS EPMA SEM u-XRF LIBS Other

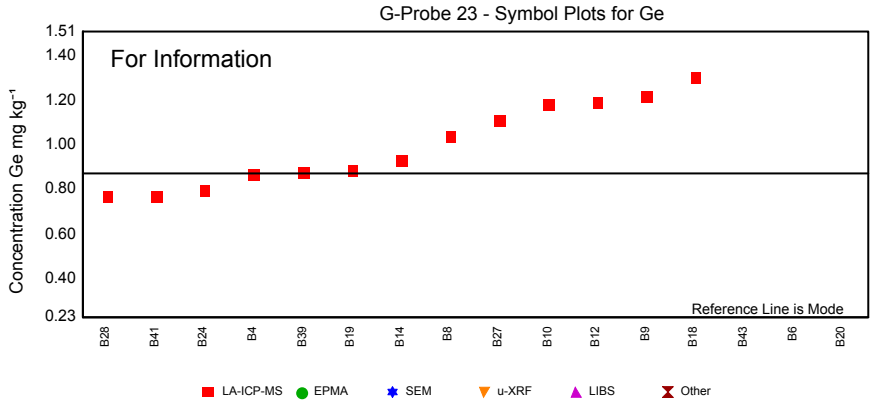

G-Probe 23 - Symbol Plots for Au
For Information
Concentration Au mg kg⁻¹
0.18
0.16
0.12
0.08
0.04
0.00
Reference Line is Median
B24 B5 B41 B39 B1 B8 B43 B12 B18 B27 B20
LA-ICP-MS EPMA SEM u-XRF LIBS Other

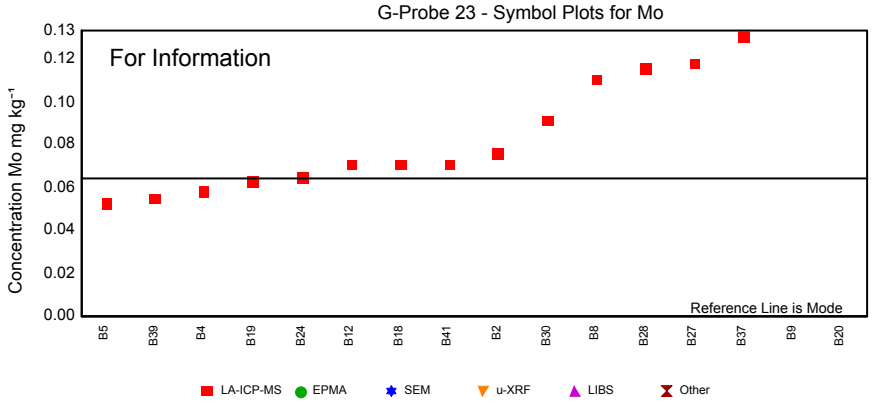

G-Probe 23 - Symbol Plots for B
For Information
Concentration B mg kg⁻¹
8.9
7.9
6.1
4.4
2.6
Reference Line is Median
B30 B39 B26 B41 B8 B40 B10 B43 B18 B24 B35 B12
LA-ICP-MS EPMA SEM u-XRF LIBS Other

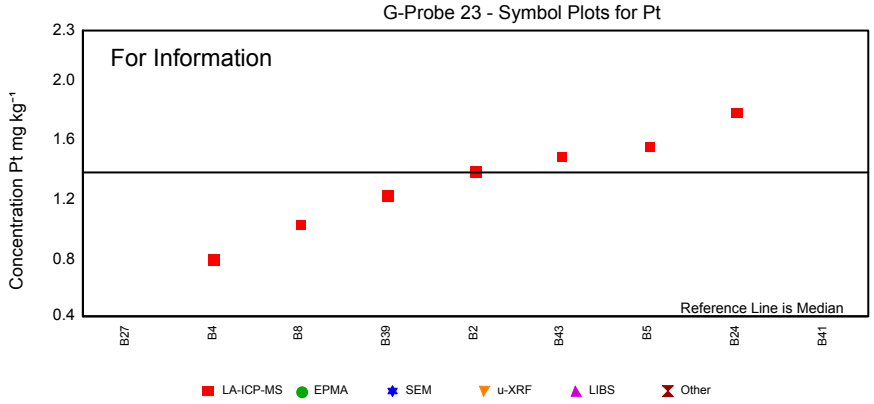

G-Probe 23 - Symbol Plots for Be
For Information
Concentration Be mg kg⁻¹
0.10
0.08
0.06
0.04
0.02
0.00
Reference Line is Mode
B12
B5
B30
B24
B18
B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other

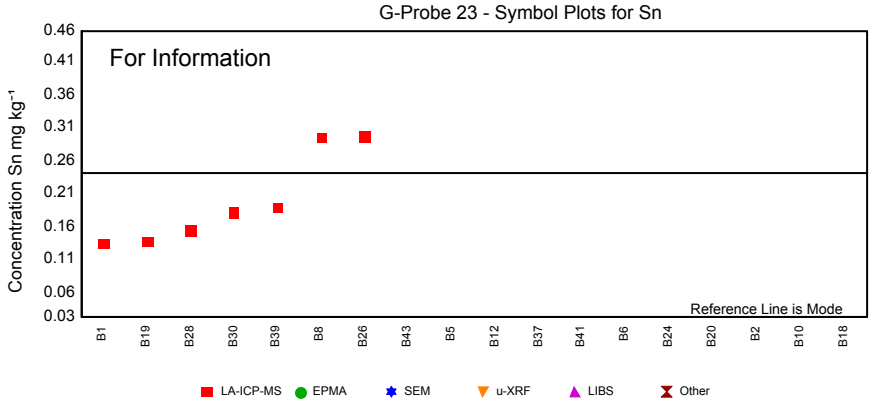

G-Probe 23 - Symbol Plots for Bi
For Information
Concentration Bi mg kg⁻¹
0.058
0.050
0.040
0.030
0.020
0.010
0.000
Reference Line is Mode
B26
B39
B24
B1
B8
B19
B5
B12
B43
B27
B41
B18
B35
B9
B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other

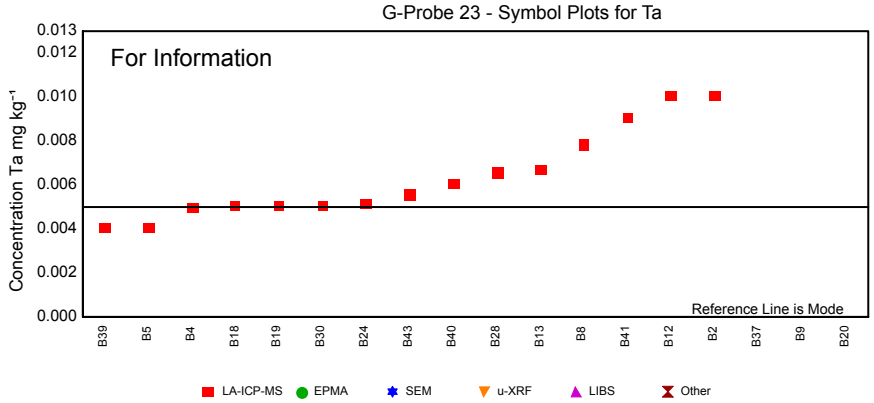

G-Probe 23 - Symbol Plots for Cd
For Information
Concentration Cd mg kg⁻¹
0.60
0.53
0.43
0.33
0.23
0.13
0.05
Reference Line is Mode
B41
B5
B8
B28
B39
B4
B1
B26
B43
B30
B19
B6
B37
B18
B12
B2
B27
B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other

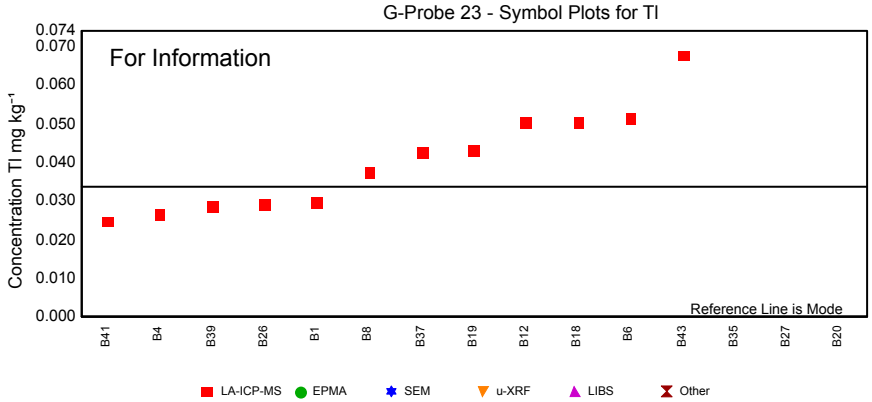

G-Probe 23 - Symbol Plots for Ge
For Information
Concentration Ge mg kg⁻¹
1.51
1.40
1.20
1.00
0.80
0.60
0.40
0.23
Reference Line is Mode
B28
B41
B24
B4
B39
B19
B14
B8
B27
B10
B12
B9
B18
B43
B6
B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for Mo
For Information
Concentration Mo mg kg⁻¹
0.13
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Reference Line is Mode
B5
B39
B4
B19
B24
B12
B18
B41
B2
B30
B8
B28
B27
B37
B9
B20
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other


G-Probe 23 - Symbol Plots for Pt
For Information
Concentration Pt mg kg⁻¹
2.3
2.0
1.6
1.2
0.8
0.4
Reference Line is Median
B27
B4
B8
B39
B2
B43
B5
B24
B41
LA-ICP-MS
EPMA
SEM
u-XRF
LIBS
Other







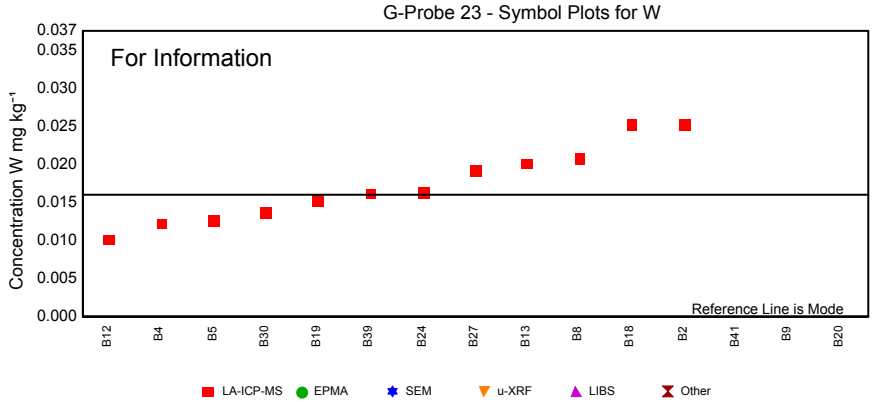


Figure 2: G-Probe 23 - Stillwater Norite, NoSM-1G Glass. Data distribution charts provided for information only for elements for which values could not be credited with assigned or provisional status.

Multiple Z-Score Chart for G-Probe 23

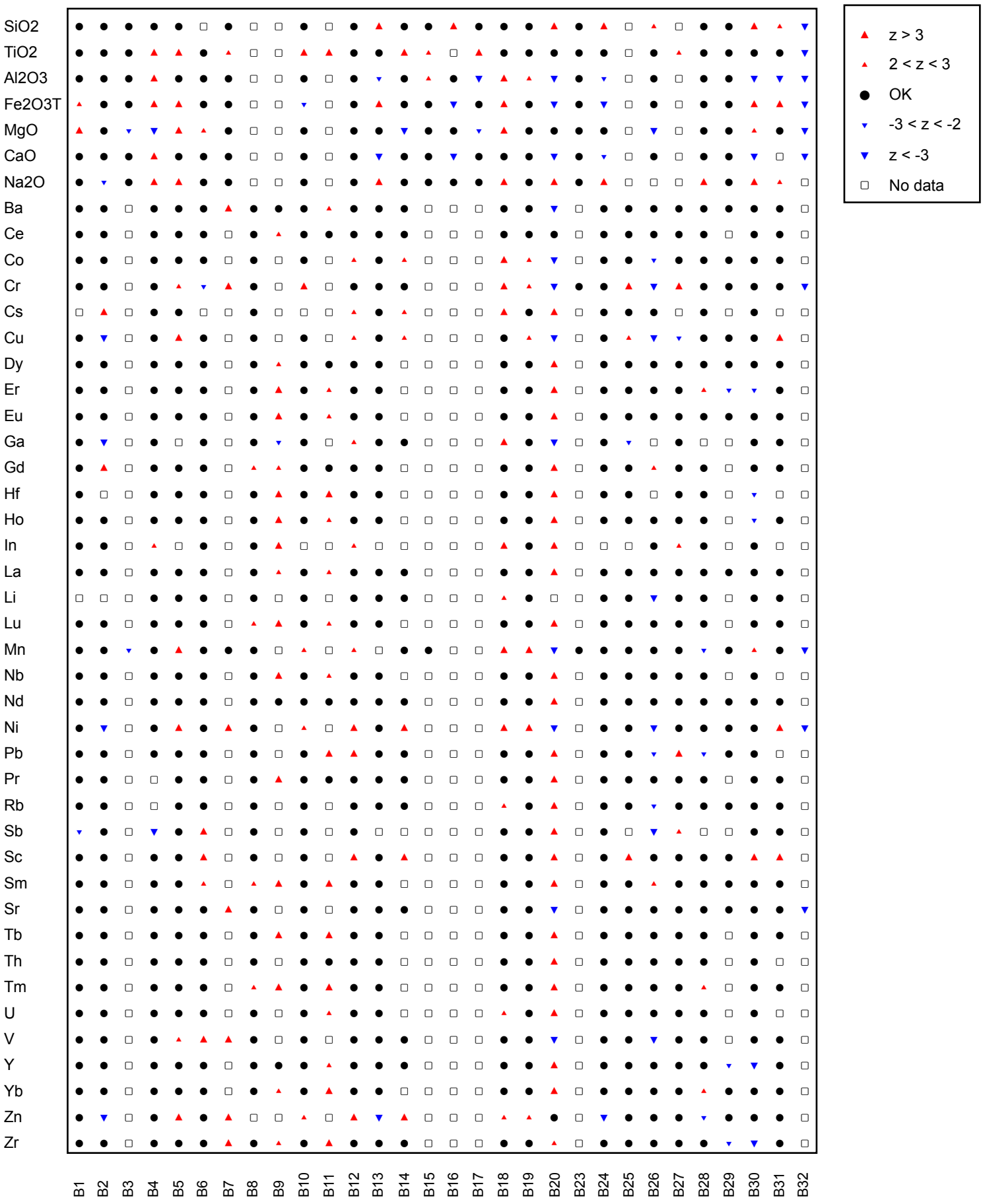


Figure 3: G-Probe 23 - Stillwater Norite, NoSM-1G Glass. Multiple z-score charts for laboratories participating in the G-Probe 23 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria (see key).

Multiple Z-Score Chart for G-Probe 23

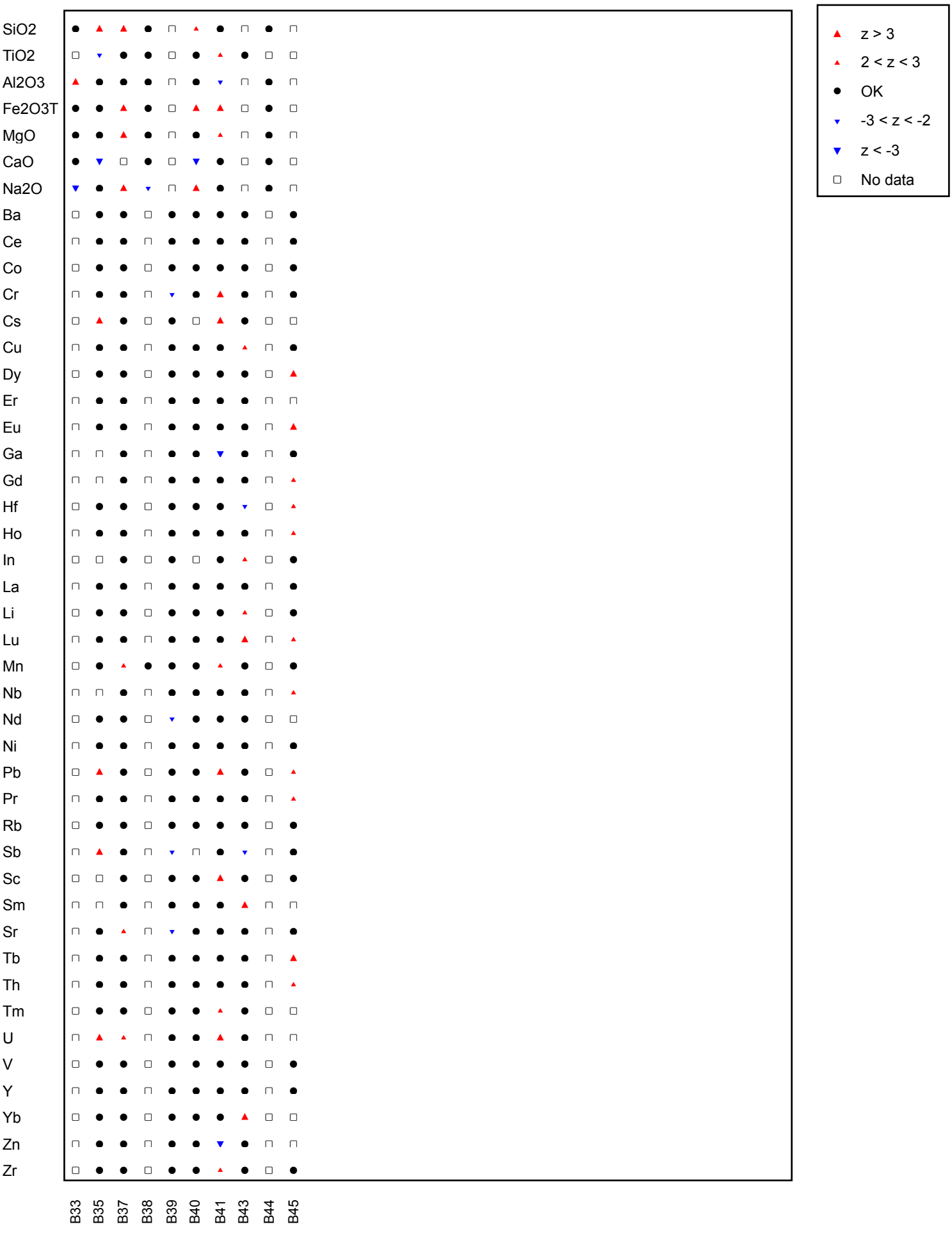


Figure 3: G-Probe 23 - Stillwater Norite, NoSM-1G Glass. Multiple z-score charts for laboratories participating in the G-Probe 23 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria (see key).