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CRB Analyse Service GmbH

RFA Ringversuch GeoPT 42, England - QS-1, Queenstone Shale

Veranstalter des Ringversuchs:	International Association of Geoanalysts and Geostandards Newsletter - GeoPT42
Ringversuchsmaterial:	QS-1, Queenstone Shale
RV geschlossen:	2018 – 2
Literatur:	Report - GeoPT42 Proficiency Testing Round 42 (Laborcode CRB = A20)

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
Na_2O	0,110			
MgO	3,620	3,630	0,099	-0,080
Al_2O_3	14,350	14,280	0,280	0,180
SiO_2	51,140	50,920	0,669	0,200
P_2O5	0,151	0,151	0,011	-0,020
K_2O	4,410	4,414	0,109	-0,020
CaO	8,140	8,068	0,206	0,310
TiO_2	0,765	0,758	0,023	0,210
Fe_2O_3tot	6,440	6,486	0,162	-0,240
MnO	0,101	0,100	0,004	0,180
L.O.I.	10,680	10,770	0,320	-0,310

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
As	5,00	6,90	2,20	-2,26
Ba	360,00	362,10	16,10	-0,09
Ce	81,00	81,10	5,60	-0,01
Co	12,00	16,00	2,40	-2,37
Cr	69,00	70,50	9,10	-0,26
Cu	13,00	11,40	2,90	1,27
Ga	20,00	19,70	1,70	0,15
Hf	4,40	4,24	0,60	0,29
La	31,00	39,40	3,70	-2,32
Nb	15,00	14,50	1,20	0,34
Nd	34,00	36,60	2,70	-0,76
Ni	34,00	38,40	4,30	-1,24
Pb	17,00	9,30	1,60	7,21
Pr	7,00	9,60	0,60	-2,38
Rb	135,00	135,50	7,40	-0,05
Sc	15,00	14,20	2,20	0,50
Sm	6,00	7,10	0,60	-1,28
Sr	108,00	113,00	5,40	-0,56

Tl	0,50	0,70	0,10	-1,39
V	112,00	112,00	8,20	0,00
Y	32,00	29,20	2,50	1,00
Zn	75,00	75,00	6,90	0,00
Zr	156,00	159,30	12,50	-0,28

Legende

CRB: Ergebnisse CRB – **RV:** Ergebnisse Ringversuch -- **1s-RV:** Standardabweichung Ringversuch
Z-Score: Differenz des Messwertes vom Mittelwert des Ringversuchs -- ***** Wert nicht zertifiziert

Geo*PT*42 — AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES — REPORT ON ROUND 42 (Queenston shale, QS-1) / January 2018

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*Keywords: proficiency testing, quality assurance, Geo*PT*, Geo*PT*42, Round 42, QS-1, Queenston shale*

Abstract

Results are presented for Round 42 of the International Association of Geoanalysts' Proficiency Testing programme for analytical geochemistry laboratories. The test material distributed in this round of Geo*PT* was Queenston shale, QS-1, supplied by Dr Marcus Burnham of the Ontario Geological Survey. In this report, the data contributed by 105 laboratories are listed, together with an assessment of consensus values, consequent *z*-scores and charts to show the distribution of contributed results and the overall performance of participating laboratories.

Introduction

This forty-second round of the international proficiency testing programme, Geo*PT*, was conducted in a similar manner to earlier rounds. The programme is designed to be part of the routine quality assurance procedures employed by analytical geochemistry laboratories. The programme is organised by the International Association of Geoanalysts and is conducted in accordance with a published protocol available at (*http://www.geoanalyst.org/documents/GeoPT-protocol.pdf*). The overall aim of the programme is to provide participating laboratories with *z*-score information for reported elemental determinations from which the laboratory can decide whether the quality of their data is satisfactory in relation both to their chosen fitness-for-purpose criteria 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 this appears justified.

Steering Committee for Round 42: P.C. Webb (results coordinator), M. Thompson (statistical advisor), P.J. Potts and C.J.B. Gowing (analytical advisors), M. Burnham (provision of QS-1).

Timetable for Round 42:

Distribution of sample: September 2017
Results submission deadline: 13th December 2017
Release of report: January 2018

Test Material details

Geo*PT*42: The Queenston shale test material, QS-1, was supplied by Dr Marcus Burnham. The test material was evaluated for homogeneity by the originator, and as a result, the sample was considered suitable for use in this proficiency test.

Submission of results

A total of 3794 results were submitted for Geo*PT*42 (QS-1) by 105 laboratories as listed in Table 1. Results that were designated by the participating laboratory as data quality 1 (see ***Z*-score analysis** section below for explanation) are shown in bold and results of data

quality 2 are shown underlined. Results from all laboratories submitting data were used to assess respective assigned values. Regrettably there were four laboratories reporting in total 7 values of '0' (i.e. zero) for this round. We should emphasise that as stated in the ***Instructions to Analysts*****,** values of zero for measurands other than LOI should not be reported. These 7 values were excluded from consideration in the data assessment process.

Assigned values

Following procedures described in earlier rounds, robust statistical procedures were used to derive assigned mass fraction values [X_a] for measurands in this test sample, these consensus values being judged to be the best available estimates of the true composition. Values were assigned on the basis that: i) sufficient laboratories had contributed data for a measurand, and ii) visual assessment gave confidence that a substantial proportion of the results distribution was symmetrically disposed. Part of this assessment involved examining the distribution of results from bar charts of contributed data for each measurand (presented in Figures 1 and 2). Using the Shiny App (https://www.shinyapps.io) linked to the statistical package 'R', as developed by Thomas Meisel, it has also been possible to view data distributions according to analytical procedure and visually assess the comparative quality of data obtained using different procedures.

Some datasets were normally disposed, and showing remarkable symmetry with relatively little dispersion of data. Consequently, in 8 cases, the robust mean was used to define an appropriate consensus value. However, many other datasets were very slightly skewed and some, more severely skewed. In 32 cases medians provided a satisfactory estimator for defining consensus values. Where the median did not provide a symmetrical distribution of data about the consensus, the mode was preferred, and was used in 17 cases for defining the consensus.

In most cases, a mode was used as a consequence of an asymmetric distribution of results often involving tails of somewhat variable data. Sometimes, but not always, the main reason for a high tail was because XRF data had been reported for mass fractions close to the detection limit for the technique (e.g. for Mo, Sb, Sc, Sn, U and W) and measured values consequently had poor precision and accuracy. In the case of Bi the high tail was largely due to both ICP-AES/OES and XRF results. Low tails for some REEs and Zr were due to acid digestion procedures, where dissolution was most likely incomplete, although most laboratories using this procedure reported satisfactory results by these methods. Some XRF powder pellet data for Sm produced a low tail and for La, XRF powder pellet data were bimodally disposed to both high and low values. For most major elements, Cu and Pb, XRF powder pellet values were more variable than data reported by other procedures and result in greater dispersion of these datasets. For Zn, the low tail was largely due to some ICP-MS and ICP-AES/OES acid digestion results, the high tail to a wide range of procedures. The distribution of data for C(tot) would have been much more consistent had 2 or 3 laboratories not reported their results in the wrong units.

Use of modes as location estimators helped to avoid bias due to asymmetric tailing in many of these datasets. In 15 cases, modes were sufficiently well defined by appropriate techniques to justify their designation as assigned values. Procedures used to determine the mode include the estimation of the mass fraction corresponding to the maximum value of the kernel density distribution for the dataset as described by Thompson (2017) and the estimation of the Lientz mode (Lientz, 1969) as provided by the "modeest" package which runs in 'R' (https://cran.r-project.org/web/packages/modeest/modeest.pdf). Modes are suitably robust location estimators that can provide consensus values to represent the most coherent part of a data distribution where data are symmetrically disposed, whereas the dataset as a whole may be asymmetric.

Table 2 lists assigned and provisional values for 10 major components and 47 trace elements in Geo*PT*42 (QS-1). Bar charts for the 57 measurands of Geo*PT*42 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, MnO, MgO, CaO, K_2O, P_2O_5, LOI, As*, Ba, Be, Bi, C(tot), Ce, Co, Cr, Cs, Cu*, Dy, Er, Eu, F*, 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, provisional values were given to the 5 measurands marked '*'. Instances of provisional status were recorded because either: i) a relatively small number of results (<15) contributed to the consensus, or ii) the results were unduly dispersed in relation to the target value, or iii) the distribution of values was severely skewed.

Bar charts for the 11 measurands: Fe(II)O, Na_2O, H_2O^+, CO_2, Ag, B, Cd, Cl, S, Se and Te 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 variable for the reliable determination of a consensus for the estimation of *z*-scores.

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. For Geo*PT*42, 1737 results of data quality 1 were submitted.

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. For Geo*PT*42, 2057 results of data quality 2 were submitted.

The target standard deviation (H_a) for each measurand assessed was calculated from a modified form of the Horwitz function as follows:

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

Where X_a is the mass fraction of the element; the factor k = 0.01 for pure geochemistry laboratories and k = 0.02 for applied geochemistry laboratories.

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

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

Where X is the contributed measurement, X_a is the assigned value and H_a is the target standard deviation (all as mass fractions). *Z*-score values for results contributed to Geo*PT*42 are listed in Table 3. Results designated as data quality 1 are shown in bold: results of data quality 2 are shown underlined. *Z*-scores derived from provisional values 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 $-3<z<3$, contributing laboratories are advised to examine their procedures, and if necessary, take action to ensure that 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 simple to identify whether the results were satisfactory or gave *z*-scores that exceeded the action limits. This chart is designed to help individual laboratories to judge their overall performance in this proficiency testing round. Participants should always review their *z*-scores in accord 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 43, the test sample for which will be distributed during March 2018.

Acknowledgements

The authors thank Cynthia Turner for much-valued assistance in distributing this sample and Thomas Meisel for development of software which has greatly assisted the investigation of data according to analytical procedure and facilitated analysis of datasets involving alternative modes as provided in the package "modeest", which is available as an "R" package (*https://cran.r-project.org/web/packages/modeest/modeest.pdf*).

References

Lientz (1969) On estimating points of local maxima and minima of density functions. Nonparametric Techniques in Statistical Inference (ed. M.L. Puri, Cambridge University Press, p.275-282.

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.

Addendum — NOTICE TO ANALYSTS

Repeat warning to analysts regarding reporting of Loss on Ignition Procedures:

For the second time in the **Instructions for Analysts** accompanying your samples, there was a "***specific request*** *for* ***procedures involving ignition or fusion,*** *to ensure that you provide* ***additional details*** *where appropriate*" and further details were provided in the notes, viz. "***For procedures involving fusion, sintering or ignition, particularly LOI determinations: Please ensure*** *that you have specified the* ***temperature used*** *and where appropriate, the* ***end-point criterion****, e.g. duration of ignition, as* ***Additional Details****, in your descriptions of all relevant procedures.*"

Our thanks to those who have complied with this request, but it appears that in many cases it was still ignored. Please ensure that these details are provided for future rounds, as it will assist in assessing data variations. Also, over 20% of laboratories are listing their LOI procedure as the same technique that is used for major elements, rather than separately. We would appreciate the provision of appropriate details.

In addition, it would help if details of gravimetric procedures were 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.

Appendix 1

Publication status of proficiency testing reports. Previous reports are available for download from the IAG website (*http://www.geoanalyst.org/*).

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

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

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

Geo*PT*4
Thompson M., Potts P.J., Kane J.S., Webb P.C. and Watson J.S. (1999b)
Geo*PT*4. 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).

Geo*PT*5
Thompson M., Potts P.J., Kane J.S., and Wilson S. (1999c)
Geo*PT*5. 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).

Geo*PT*6
Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GEO*PT*6 - 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: Unpublished report.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Geo*PT*23
Webb, P.C., Thompson, M., Potts, P.J., Watson, J.S. and Kriete, C. (2008)
Geo*PT*23 - 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: Unpublished report.

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

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

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

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

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

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

Geo*PT*30
Webb, P.C., Thompson, M., Potts, P.J., Long, D. and Batjargal, B. (2012)
Geo*PT*30 - 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: Unpublished report.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Geo*PT*40
Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
Geo*PT*40 - 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.

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

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

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

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A2	A3	A4	A6	A7	A8	A9	A11	A12	A13	A14	A15	A16
SiO2	g 100g-1	41.5	50.82	49.99	49.11		51.1	50.85	51.58	50.87	50.92	51.37	51.39	55.24
TiO2	g 100g-1	1.83	0.75	0.75	0.75		0.75	0.77	0.74	0.75	0.765	0.76	0.779	0.7
Al2O3	g 100g-1	9.8	14.23	14.06	13.48		14.39	14.24	14.42	14.4	14.204	14.3	14.04	14.78
Fe2O3T	g 100g-1	6.6	6.53	6.29	6.27	6.58	6.37	6.54	6.21	6.5	6.454	6.45	6.722	5.95
Fe(II)O	g 100g-1													
MnO	g 100g-1	0.24	0.1		0.09	0.103	0.109	0.105	0.093	0.07	0.1	0.099	0.105	0.1
MgO	g 100g-1	4.69	3.61	3.63	5.23	3.63	3.58	3.68	3.63	3.79	3.667	3.57	3.621	3.64
CaO	g 100g-1	8.76	8.12	8.09	7.78	8.09	7.88	8.174	8.02	7.8	8.091	8.02	8.118	7.26
Na2O	g 100g-1	1.99	0.1		0.09		0.13	0.11		0.08	0.055	0.116	0.121	0.02
K2O	g 100g-1	3.91	4.51	4.46	4.05		4.64	4.25	4.39	4.46	4.401	4.37	4.382	4.84
P2O5	g 100g-1	1.1	0.18		0.16		0.152	0.149	0.16	0.156	0.154	0.148	0.149	0.14
H2O+	g 100g-1			0.57										
CO2	g 100g-1													
LOI	g 100g-1	11.55	10.79	10.88	11.91		11.12	10.96	10.74	10.62	10.75	10.79		10.73
Ag	mg kg-1												0.021	
As	mg kg-1	71	7		1	7.84		6.8		8	6.3		4.53	
B	mg kg-1				2						177			
Ba	mg kg-1	0.1	382	389	307	374.5		353		388	404.3		367.3	374
Be	mg kg-1				2					2.46	2.833		2.815	
Bi	mg kg-1	23			1								0.218	
Br	mg kg-1													
C(org)	mg kg-1													
C(tot)	mg kg-1											19500		20900
Cd	mg kg-1				1								0.076	
Ce	mg kg-1		83	74	64.47	81.3		77.1		78	79.13		80.08	
Cl	mg kg-1						138							
Co	mg kg-1				1	15.74		16		15.9	16.27		16.05	39
Cr	mg kg-1	211	78	74	63	70.21		71.3		69	70.01		69.68	64
Cs	mg kg-1					6.15		6.3		6.2	8.585		6.07	
Cu	mg kg-1	116	10		8	11.9		38.5		12.5	10.75		12.75	13
Dy	mg kg-1				3.82	5.43				5.1	5.331		5.358	
Er	mg kg-1				2.2	2.96				2.8	3.035		2.859	
Eu	mg kg-1				1.15	1.412				1.38	1.441		1.388	
F	mg kg-1										1084			
Ga	mg kg-1		19			19.65		19		19	21.72		20.43	
Gd	mg kg-1				5.3	6.57				6.26	5.877		6.29	
Ge	mg kg-1												2.04	
Hf	mg kg-1					3.69				4	3.501		4.148	
Hg	mg kg-1													
Ho	mg kg-1				0.73	1.06				1.01	1.051		1.065	
I	mg kg-1							0.7						
In	mg kg-1												0.072	
La	mg kg-1		51		30.98	39.59		35.9		38	38.83		40.65	35
Li	mg kg-1				57					68	71.05		61.73	
Lu	mg kg-1				0.3	0.431				0.39	0.421		0.432	
Mo	mg kg-1	3			1					1.2			1.12	18
Nb	mg kg-1	15	15	14		15.36		14.5		14.6	15.71		14.47	11
Nd	mg kg-1				29.81	37		34.2		36	36.14		36.57	
Ni	mg kg-1	181	37	46	31	37.13		38.3		37	37.09		38.8	49
Pb	mg kg-1	8	14		4	9.03		9		9.2	8.644		11.93	7
Pd	mg kg-1													
Pr	mg kg-1				7.35	9.98				9.2	9.319		9.84	
Rb	mg kg-1	136	137	140		136.410		132		137	193.3		134.6	146
Re	mg kg-1													
S	mg kg-1	421			523		69.33							
Sb	mg kg-1				4					0.75			0.755	
Sc	mg kg-1		18		11.96	14.24				14.8	19.29		15.27	
Se	mg kg-1												2.01	
Sm	mg kg-1				5.72	7.09		6.8		6.81	7.207		6.73	
Sn	mg kg-1				2			2.1		2.48			2.54	
Sr	mg kg-1		113	113	97	114.960		111		112	121.9		113.5	104
Ta	mg kg-1					1.01				0.69	1.04		1.075	
Tb	mg kg-1				0.7	1.007				0.91	0.876		0.935	
Te	mg kg-1												0.053	
Th	mg kg-1		11		8.89	11.01		11.8		9.8	11.97		11	9
Tl	mg kg-1									0.61			0.677	
Tm	mg kg-1				0.31	0.463				0.4	0.419		0.472	
U	mg kg-1		3			2.58				2.62	2.594		2.755	36
V	mg kg-1		119	110	112	107.460		113		103	124.8		110.940	118
W	mg kg-1	92			3					1.24			1.313	
Y	mg kg-1	22	33	31	18.67	30.86				29	28.65		29.99	30
Yb	mg kg-1				2.14	2.81				2.63	2.892		2.838	
Zn	mg kg-1	227	74	76	59	67.14		75		74	75.1		73.35	84
Zr	mg kg-1	181	168	165	48	132		156		164	123.4		160.950	146

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A18	A19	A20	A24	A25	A26	A27	A28	A29	A30	A32	A33	A36
SiO2	g 100g-1		50.84	51.14	51.06	51.03	51.05	50.62		50.4	50.8	50.9	50.08	
TiO2	g 100g-1	0.781	0.759	0.765	0.769	0.76	0.76	0.759		0.766	0.63	0.75	0.771	
Al2O3	g 100g-1		14.178	14.35	14.28	14.08	14.15	14.54		14.2	13.99	14.2	14.56	
Fe2O3T	g 100g-1		6.536	6.44	6.469	6.65	6.46	6.49		6.49	6.18	6.48	6.49	
Fe(II)O	g 100g-1		2			1.93					2.26	1.88		
MnO	g 100g-1		0.102	0.101	0.099	0.099	0.099	0.11		0.102	0.1	0.101	0.099	
MgO	g 100g-1		3.633	3.62	3.52	3.66	3.72	3.62		3.6	3.85	3.6	3.72	
CaO	g 100g-1		8.164	8.14	7.95	7.76	8.29	8.03		8.02	7.97	8.16	7.91	
Na2O	g 100g-1		0.127	0.11	0.1		0.12			0.142	0.35	0.14	0.19	
K2O	g 100g-1		4.417	4.41	4.46	4.61	4.47	4.41		4.37	4.07	4.41	4.46	
P2O5	g 100g-1		0.16	0.151	0.14	0.153	0.147	0.156		0.156	0.14	0.16	0.159	
H2O+	g 100g-1		3.57											
CO2	g 100g-1													
LOI	g 100g-1		11.04	10.68	11.5	10.47	10.74	11.13		10.65	11.18	10.94	11.5	
Ag	mg kg-1					0.022					0.73			
As	mg kg-1	8.976	6.474	5	4		7.3			10.5	3.64	7	8	
B	mg kg-1		190											
Ba	mg kg-1	297.660	361.348	360	359		351.1	354	368	388	376	340	348	370
Be	mg kg-1	2.305	2.232					2.59			2.53			
Bi	mg kg-1		0.226			0.18	0.7				0.19			
Br	mg kg-1						0.6						3	
C(org)	mg kg-1		286											
C(tot)	mg kg-1		19886			1974				20100				
Cd	mg kg-1	0.096	0.093	0.1		0.059	3.7				0.08			
Ce	mg kg-1	68.107	79.627	81	91	88.95	77	73	83.23	84.8	81.2	97	92	81.8
Cl	mg kg-1		110		230									
Co	mg kg-1	15.855	16.276	12	26	13.27	18.9	22		18.6	16.56	14	14	
Cr	mg kg-1	69.796	75.868	69	71	65.9	65.7			81.6	75.1	68	56	
Cs	mg kg-1	4.687	6.010		4	5.62	10.9	6.07	6.074					6.24
Cu	mg kg-1	10.431	11.851	13	16	6.25	12.4		10.17	10.7	5.84	16	13	
Dy	mg kg-1	5.403	5.487			4.74		4.91	5.62		5.75			5.4
Er	mg kg-1	3.088	3.072			2.86		2.77	3.163		3.16			3.08
Eu	mg kg-1	1.261	1.424			1.66		1.44	1.428		1.42			1.41
F	mg kg-1		1106											
Ga	mg kg-1	18.703	20.713	20	19	24.11	18.3	19.62		20.6	21.72	21	17	20.3
Gd	mg kg-1	5.890	5.954			6.91		7.37	6.35		5.61			6.29
Ge	mg kg-1		1.782					2.26						
Hf	mg kg-1	4.174	4.375	4.4			3.9	3.19			4.76		4	4.21
Hg	mg kg-1													
Ho	mg kg-1	1.115	1.113			0.954		0.83	1.124		1.03			1.08
I	mg kg-1						2.6							
In	mg kg-1		0.057			0.063								
La	mg kg-1	30.691	38.921	31	45	37.8	42.8	38.97	40.64	44.2	39.7	46	43	40.2
Li	mg kg-1	58.91	58.4					64.83						
Lu	mg kg-1	0.419	0.433			0.369		0.3	0.435		0.37			0.45
Mo	mg kg-1	1.116	1.006		2		1.5				1.09			
Nb	mg kg-1	14.769	12.368	15	15	12	13.3	13.05	15.48	15	13.53	14	16	14.6
Nd	mg kg-1	30.941	35.806	34		43.63	33.6	32.53	36.4	32.8	36.69	39		36.9
Ni	mg kg-1	37.646	42.992	34	39	37.09	33.6	41.48		42.4	39.77	29	38	
Pb	mg kg-1	7.85	9.019	17	8	7.92	7.9		9.189	9.35	8.39	10	8	
Pd	mg kg-1													
Pr	mg kg-1	8.283	9.570	7		9.94			9.703		9.48			9.82
Rb	mg kg-1	71.901	135.547	135	136	127.5	124.7	123	162.3	144	141.6	142	128	137
Re	mg kg-1													
S	mg kg-1		116			95					282			
Sb	mg kg-1	0.729	0.712		2		3.8				0.85			
Sc	mg kg-1	10.691	15.06	15	16		13.5	13.53	16.29	21.8	13.59			12.6
Se	mg kg-1		0.016				0.1				0.94			
Sm	mg kg-1	6.163	7.169	6		8.13	3.7	7.14	6.814		7.33			7.18
Sn	mg kg-1	2.849	2.593		4		4				2.72			2.33
Sr	mg kg-1	106.770	111.378	108	112	130.7	104.1	113	114.2	115	117.7	116	114	112
Ta	mg kg-1	0.974	1.093						1.074		0.96			1.04
Tb	mg kg-1	0.922	0.910			0.955		0.86	0.942		0.88			0.98
Te	mg kg-1						4.7				0.07			
Th	mg kg-1	8.222	10.645		12	8.57	9.7	11.02	13.2	11.2	11.67	14	12	11.1
Tl	mg kg-1	0.667		0.5		0.532	0.2	0.8			0.07			
Tm	mg kg-1	0.466	0.435			0.384		0.28	0.449		0.33			0.47
U	mg kg-1	2.551	2.598		5	2.08	3.2		2.564		2.6	5	3	2.76
V	mg kg-1	105.420	109.960	112	121	108.5	94.5			122	109.7	110	102	
W	mg kg-1	1.161	1.411				0.7				1.14			1.32
Y	mg kg-1	25.436	29.022	32	30	28.1	27	30	28.64	31.8	28.9	34	29	28.3
Yb	mg kg-1	2.882	2.958			2.5	2.8		2.945		2.89			2.84
Zn	mg kg-1	72.837	77.831	75	69	68.55	70.3	75		81.1	81.2	72	74	
Zr	mg kg-1	154.560	161.561	156	161	149.1	152.6	171		171		151	147	152

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A37	A38	A39	A41	A42	A44	A45	A46	A48	A50	A51	A52	A53
SiO2	g 100g-1	50.54	50.91	49.4	50.981	48.4	52.5	51.634	51.09	51.03	50.843	53.06	50.73	51.01
TiO2	g 100g-1	0.77	0.72	0.842	0.763	0.853	0.759	0.681	0.755	0.75	0.741	0.75	0.73	0.925
Al2O3	g 100g-1	14.51	14.09	16.5	14.134	14.7	13.8	14.368	14.36	14.17	14.155	12.99	14.32	13.48
Fe2O3T	g 100g-1	6.53	6.48	6.42	6.515	7.82	6.77	6.823	6.47	6.42	6.428	6.36	6.49	7.76
Fe(II)O	g 100g-1													
MnO	g 100g-1	0.098	0.1	0.104	0.099	676.5	0.102	0.102	0.099	0.1	0.098	0.1	0.1	0.13
MgO	g 100g-1	3.66	3.63	1.47	3.66	3.16	3.44	3.665	3.48	3.62	3.677	3.24	3.71	3.34
CaO	g 100g-1	8.26	7.81	8.14	8.11	8.94	7.17	7.982	8.16	7.96	8.048	8.06	7.88	10.03
Na2O	g 100g-1	0.07	0.11		0.149		0.14	0.133	0.102	0.12	0.097	0.12		0.083
K2O	g 100g-1	4.35	4.43	4.9	4.331	4.93	4.33	4.463	4.45	4.33	4.366	4.42	4.47	4.34
P2O5	g 100g-1	0.171	0.15		0.156	0.184	0.14	0.166	0.152	0.132	0.153	0.14	0.14	0.106
H2O+	g 100g-1													
CO2	g 100g-1			6.4										
LOI	g 100g-1	10.97	10.66		10.881	10.76	10.8	10.262	10.66	10.65	11.114	9.94	11.11	10.834
Ag	mg kg-1													
As	mg kg-1	4.6		9.8			5.7		6.76					
B	mg kg-1													
Ba	mg kg-1	377	378		343.050		364	530	362.890		357.4	400	352	375
Be	mg kg-1				2.32		2.3		2.61		2.3	1.78		
Bi	mg kg-1				0.23				0.23			0.25		
Br	mg kg-1		5						0.71					
C(org)	mg kg-1													
C(tot)	mg kg-1									20552.110				
Cd	mg kg-1				0.15	1.16	0.06		0.06					
Ce	mg kg-1	73	78		80.66		81		79.38		80.4	83.49		
Cl	mg kg-1					0.018								
Co	mg kg-1	15	15		14.81		16	16			15.2	12	16	
Cr	mg kg-1	73	85	131	69.82	101.1	56	75	86.68		67.8	97	68	
Cs	mg kg-1	4.3			6.26		6.24		5.77		6	6.61		
Cu	mg kg-1	9.6	15	36.9	10.05	26.48	11.4	18	10.74		10.6	12	12	106
Dy	mg kg-1				5.61		4.93		5.57		5.5	5.89		
Er	mg kg-1				3.17		2.76		3.15		3	3.2		
Eu	mg kg-1				1.45		1.41		1.45		1.4	1.58		
F	mg kg-1		1050				1100	888	0.118					
Ga	mg kg-1	19	17	21.9	18.41		20.7	15	19.79		20.2	17	17	22
Gd	mg kg-1		5		6.15		6.18		6.19		5.9	6.19		
Ge	mg kg-1											1.4		
Hf	mg kg-1	8.1	5		4.77			2	4.16		4.4	4.62		
Hg	mg kg-1													
Ho	mg kg-1				1.07		0.98		1.11		1.1	1.1		
I	mg kg-1													
In	mg kg-1											0.06		
La	mg kg-1	46	44		38.98		39		39.18		38.7	41.25		
Li	mg kg-1				61.69	41.59	59.8	62	57.13		59.7			
Lu	mg kg-1				0.44		0.41		0.45		0.43	0.47		
Mo	mg kg-1				1.01		1.15		1.05			0.98		
Nb	mg kg-1	14	13	11.7	13.61		16		16.19		14.8	15	14	
Nd	mg kg-1	42	39		37.11		37.2		36.48		36.1	38.87		
Ni	mg kg-1	38	42		37.4		38.2	44	33.85		38.5	36	38	
Pb	mg kg-1	9.9	11		9.02		9.66	4	9.48		9.2	10	13	
Pd	mg kg-1													
Pr	mg kg-1				9.15		9.76		9.48		9.8	10.19		
Rb	mg kg-1	132	155	141	127.5	0.02	135		142.870		135.3	136	126	486
Re	mg kg-1													
S	mg kg-1		53				180		0.011					
Sb	mg kg-1	1.1			0.78				0.73			0.52		
Sc	mg kg-1	18	16		13.68		14		18.31		14.2	24	15	
Se	mg kg-1			12.4										
Sm	mg kg-1	11			7.21		7.08		7.37		7.3	7.16		
Sn	mg kg-1	4.8			2.57		2.52		2.12		2.4	2.28		
Sr	mg kg-1	105	130	119	106.7		115	118	110.150		112.8	111	107	119
Ta	mg kg-1				1.33				1.06		0.97	1.06		
Tb	mg kg-1				0.94		0.85		0.97		0.94	1.05		
Te	mg kg-1								0.05			0.1		
Th	mg kg-1	11	12	11.6	11.48				11.63		11.5	19	9	
Tl	mg kg-1						0.7		0.62		0.72	0.76		
Tm	mg kg-1				0.45		0.42		0.45		0.45	0.5		
U	mg kg-1	3			2.67		2.64		2.61		2.8	2.66		
V	mg kg-1	118	133		107.330		114		104.180		108.3	127	105	
W	mg kg-1				1.37				1.15			1.15		
Y	mg kg-1	27	36	28.8	27.37		26	29	29.99		30.6	30	29	
Yb	mg kg-1				3.01		2.77		2.97		2.9	3.18		
Zn	mg kg-1	69	75	75.7	68.54	0.014	89	73	82.74		68	71	71	90
Zr	mg kg-1	158	166	145	159.640	0.022	175	158	168.350		160.8	172	160	

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A54	A55	A56	A57	A59	A60	A61	A62	A63	A64	A65	A66	A67
SiO2	g 100g-1	50.81		51.03	50.7	51.22	50.95	49.4	51.1	52	51.04	50.5	52.06	50.86
TiO2	g 100g-1	0.75	0.82	0.76	0.73	0.74	0.766	0.76	0.764	0.79	0.76	0.75	0.817	0.76
Al2O3	g 100g-1	14.09		14.28	15.7	14.2	14.33	13.7	14.31	14.35	14.19	14.1	15.98	14.32
Fe2O3T	g 100g-1	6.35		6.45	6.6	6.38	6.41	6.32	6.419	6.64	6.4	6.38	6.63	6.4
Fe(II)O	g 100g-1							2.105		2.3				
MnO	g 100g-1	0.1	0.1	0.1	0.1	0.1	0.099	0.1	0.097	0.11	0.1	0.1	0.094	0.095
MgO	g 100g-1	3.58		3.7	3.61	3.67	3.61	3.46	3.625	3.65	3.57	3.72	3.53	3.69
CaO	g 100g-1	7.78		7.61	8.24	7.9	8.03	7.96	8.112	8.49	8.08	7.89	8.56	7.96
Na2O	g 100g-1	0.144		0.17	0.127	0.16	0.16	0.11	0.154	0.17	0.08	0.17	0.17	0.071
K2O	g 100g-1	4.4		4.36	4.68	4.34	4.41	4.37	4.442	4.65	4.42	4.37	4.44	4.4
P2O5	g 100g-1	0.17	0.18	0.16	0.18	0.15	0.156	0.148	0.149	0.16	0.15	0.15	0.161	0.119
H2O+	g 100g-1	4.14						1.7						
CO2	g 100g-1	7.45										7.3	7.25	
LOI	g 100g-1	11.59		11.3		11.07		10.55	10.763	10.87	10.67	11.5	11.1	11.04
Ag	mg kg-1	0.02						0.256		0.08				
As	mg kg-1	4.85			16.4			9		7.04		8.95	8.495	
B	mg kg-1											215	212	
Ba	mg kg-1	361.1	372	373.5	353	371		322	390	374	350	361	374	
Be	mg kg-1	3.84	2.41	2.3	2.1	2.51		2.3		2.31		2.65	2.66	
Bi	mg kg-1	0.25						1.08		0.24		0.2		
Br	mg kg-1													
C(org)	mg kg-1													
C(tot)	mg kg-1						19900	1.95	19700				20263	19800
Cd	mg kg-1	0.15	0.15					0.09		0.1		0.2		
Ce	mg kg-1	81.2	78.3	80.9	78.6	80		87		87.8		85	85.8	
Cl	mg kg-1												157	
Co	mg kg-1	15.97	16.3	15.8		16.4		15	19.7	16.7	19	16	16.2	
Cr	mg kg-1	84	70.9	71.6	75	68.4		51	75.7	82.6	65	80	85	
Cs	mg kg-1	5.58	6.1	6.1		6.25		6.04		6.2		7		
Cu	mg kg-1	12.94	11.1	12.2	6.8	11.4		13.3	10.3	14.7		12		
Dy	mg kg-1	5.6	5.2	5.3	5.8	5.44		6.28		5.41		5.41	6.15	
Er	mg kg-1		2.97	2.9	3.2	3.06		3.59		3.15		3.06	3.5	
Eu	mg kg-1	1.38	1.37	1.4	1.4	1.42		1.7		1.42		1.51	1.58	
F	mg kg-1							0.11	1005				1060	
Ga	mg kg-1	20.33	20.1	18.8		20.1		20.2		20.7	23	20.3		
Gd	mg kg-1	6.05	6.12	5.9	6.8	6.3		7.06		6.32		7	6.88	
Ge	mg kg-1	1.79				1.78				1.81		2		
Hf	mg kg-1	4.22	4.25	5.1		4.23		2.84		4.47		4	5.03	
Hg	mg kg-1													
Ho	mg kg-1	1.09	1.05	1.1	1.1	1.07		1.2		1.05		1.1	1.14	
I	mg kg-1													
In	mg kg-1	0.09						0.08						
La	mg kg-1	38.81	38.3	39.1	38.4	38.3		44		38.6		39.2	41.7	
Li	mg kg-1		62.7			65.7		70				61	68.7	
Lu	mg kg-1	0.4	0.42	0.4	0.44	0.43						0.4	0.492	
Mo	mg kg-1	1.34	1.33	1.1				1.68		1.52		1.18		
Nb	mg kg-1	13.68	14.4	13.5		14.8		12.6		14.2		15	14.7	
Nd	mg kg-1	37.4	35	36.9	35.3	36.7		41.2		37.7		37.3	38.7	
Ni	mg kg-1	46.6	38.8	36.2	36	38.5		38.2	46	48.1	35	43	44	
Pb	mg kg-1	9.38	8.98	11.2	9.8	9.5		16.9	18	9.39		10	8.82	
Pd	mg kg-1													
Pr	mg kg-1	9.32	9.38	9.1	9.3	9.52		10.7		9.64		10	10.1	
Rb	mg kg-1	124.6	138	133.7		135		121.350		137		160	140	
Re	mg kg-1													
S	mg kg-1	74.6						0.01		787			161	177.5
Sb	mg kg-1	1.41			0.8			1.52		0.89		1.1	0.869	
Sc	mg kg-1	18.05	14.4	14.1	16.4	14.8		13.6		13	12	15	14.1	
Se	mg kg-1													
Sm	mg kg-1	6.96	6.69	7.1	7	7.06		8.1		7.06		7.2	7.63	
Sn	mg kg-1	3.22	2.53	2.4				4		2.57		2	2.38	
Sr	mg kg-1	113.2	111	114.2		114		115		113	103	122	119	
Ta	mg kg-1	0.9	0.98	1.1		1		1.09		0.92		0.8	0.63	
Tb	mg kg-1	0.89	0.9	0.9	1	0.939		1.14		0.9		1	1	
Te	mg kg-1							0.97						
Th	mg kg-1	10.48	10.5	11.1	12.5	10.8		10.1		10.7		10.9	12.4	
Tl	mg kg-1	0.01	0.65	0.76	0.49			0.7				0.7	0.65	
Tm	mg kg-1	0.42	0.44	0.45	0.47	0.457		0.53				0.41	0.483	
U	mg kg-1	3.02	2.47	2.6	2.8	2.58		2.57		2.6		2.6	3.03	
V	mg kg-1	117.6	118	112.1	111	110		96.4	113.9	116	105	132	113	
W	mg kg-1	2.13	1.35	1.6				2.5		1.37		1		
Y	mg kg-1	27.95	29.1	31.1	24.7	30.1		31.2		28.3		29.6	30.4	
Yb	mg kg-1	2.74	2.81	2.8	2.9	2.9		3.3		2.9		3	3.15	
Zn	mg kg-1	72.7	74.4	98.2	76	72.8		65	82.3	75.6	68	78	74.4	
Zr	mg kg-1	158.3	156	153.1	134	159		86.3	206.7	165	139	171	153	

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A68	A69	A70	A71	A73	A74	A75	A76	A77	A78	A79	A80	A81
SiO2	g 100g-1	50.842	54.42	51.4	49.87	49.75	51.16	50.624	50.81	52.36	50.82		59.9	50.762
TiO2	g 100g-1	0.792	0.78	0.7		0.77	0.76	0.776	0.75	0.754	0.77		0.79	0.64
Al2O3	g 100g-1	14.202	14.73	14.61	15.49	14.36	14.4	14.29	14.14	14.308	14.14		15.13	14.177
Fe2O3T	g 100g-1	6.682	6.66	6.18	6.4	6.62	6.41	6.689	6.4	6.48	6.44		6.56	6.715
Fe(II)O	g 100g-1			1.4		2.16								2.111
MnO	g 100g-1	0.104	0.11	0.1		0.11	0.1	0.104		0.106	0.1	0.102	0.11	0.106
MgO	g 100g-1	3.645	3.76	3.37	3.74	3.56	3.68	3.681	3.6	3.487	3.66		4.18	3.578
CaO	g 100g-1	8.221	8.46	8.24	6.94	8.36	8.11	8.22	8.05	8.637	8.11		8.1	8.013
Na2O	g 100g-1	0.055	0.09	0.13	0.706	0.22	0.14	0.184	0.13	0.136	0.13		0.126	0.136
K2O	g 100g-1	4.514	4.53	4.51	4.76	4.63	4.56	4.512	4.47	4.357	4.45		4.336	4.364
P2O5	g 100g-1	0.153	0.16	0.17		0.14	0.15	0.153	0.15	0.159	0.15			0.150
H2O+	g 100g-1					3.99								4.123
CO2	g 100g-1					8.29								6.934
LOI	g 100g-1	10.8	10.88	11.14	10.98		10.8	10.73	10.78	10.85	10.58			10.94
Ag	mg kg-1										0.02			
As	mg kg-1						6.2	9.1	6.2		6.7	6.8	6.7	
B	mg kg-1													
Ba	mg kg-1	360	362	362		380	372.3	348.3	358	362.1	368	361.2	360	338.6
Be	mg kg-1			2.03					2.38	2.4	2.27			
Bi	mg kg-1			0.22					0.21		0.22			
Br	mg kg-1												0.88	
C(org)	mg kg-1										400			1278
C(tot)	mg kg-1										19800			20202
Cd	mg kg-1			0.14							0.07			
Ce	mg kg-1			81.8		83	81.8	73.15	88.3	78.42	89.9	82.8	85	
Cl	mg kg-1					96							160	
Co	mg kg-1	19	16	16.7		28	18.8		14.5	15.53	15	15.19	16.3	
Cr	mg kg-1	79	34	68.9		76	72.2	78.5	60	77.8	80	81.5	72.1	
Cs	mg kg-1			5.68		7	6	6.1	6.41	5.81	6.34	7.4	6.5	
Cu	mg kg-1	12	27	10.6		14	7.5	11.2	10.3	12.2	10.6			
Dy	mg kg-1			5.25				5.15	5.18	5.26	5.63		6.5	
Er	mg kg-1			2.96					2.82	3.06	3			
Eu	mg kg-1			1.45					1.41	1.45	1.46		1.48	
F	mg kg-1					1076						1060		1108
Ga	mg kg-1		15	20.9		16	19.2	19	21.7	19.5	21.5	19.36	19.6	
Gd	mg kg-1			6.57					5.56	5.72	6.24			
Ge	mg kg-1						1.7				0.21			
Hf	mg kg-1		6	4.67		7	3.6	4.65	4.2	3.91	4.3			
Hg	mg kg-1													
Ho	mg kg-1			1.04					1.04	1.05	1.08			
I	mg kg-1													
In	mg kg-1			0.084					0.077		0.07			
La	mg kg-1			39.6		43	42.5	38.2	38.3	37.9	40.3	42.1	39	
Li	mg kg-1			61.9					65.3		62.8			58.5
Lu	mg kg-1			0.44					0.41	0.43	0.43		0.442	
Mo	mg kg-1			1.03		3	1.4		1.13	1.09	1.08			
Nb	mg kg-1	17	15	13.9		17	13.3	12.9	13.6	11.64	14.3	14.3		
Nd	mg kg-1			35.9		38	37.8	32.7	37.2	35.47	38.2		36	
Ni	mg kg-1	44	46	37.9		41	37.2	37.3	37.2	38.5	37.3	39.3		
Pb	mg kg-1	9	10	9.84		8	10.2	9.6	8.7	10.15	9.2	7.86		
Pd	mg kg-1													
Pr	mg kg-1			9.48					9.23	9.33	9.8			
Rb	mg kg-1	137	139	128		135	129.7	134.6	140.5	129.260	141	133.040	138	
Re	mg kg-1													
S	mg kg-1					68					0.01			
Sb	mg kg-1			0.82			0.99		0.89		0.82			
Sc	mg kg-1		18	14.8		19	15.6	14.7	13.4	13.6	13.9	15.2	14.38	
Se	mg kg-1										1			
Sm	mg kg-1			6.85			3.8	6.4	7.09	6.93	7.25		6.83	
Sn	mg kg-1			2.79		1	2.61			2.52	3			
Sr	mg kg-1	114	117	115		111	107.8	113.2	118	106.760	124.5	108.040		119.2
Ta	mg kg-1			0.86		5			0.88	0.9	1		0.9	
Tb	mg kg-1			1.03					0.86	0.87	0.94		0.87	
Te	mg kg-1			0.078										
Th	mg kg-1	13	10	9.48		11	11.7	12.2	10.95	10.52	11.25	10.83	11.2	
Tl	mg kg-1			0.66			1		0.7	0.59	0.67			
Tm	mg kg-1			0.44					0.42	0.44	0.48			
U	mg kg-1			2.34		3	2.2	1.75	2.77	2.57	2.66	2.69	2.5	
V	mg kg-1	106	114	114		132	111.4	107.4	119	114.8	120	117.880	125	
W	mg kg-1			1.07			2.1			9.87	2		1.2	
Y	mg kg-1	36	31	29.8		30	28.3	32.1	27.7	25.22	30.1	29.06		
Yb	mg kg-1			2.86					2.53	2.88	2.83		3.02	
Zn	mg kg-1	99	73	69.7		73	74.2	71.4	80	81	77	76.98	80	
Zr	mg kg-1	131	167	168		161	154.5	162.6	164	139.840	164	160.740	160	

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A82	A83	A84	A85	A86	A87	A89	A90	A91	A92	A93	A94	A95
SiO2	g 100g-1		53.39	51.6	50.49	52.2		50.4	50.7	50.3	50.82	51.23	50.53	50.34
TiO2	g 100g-1		0.683	0.72	0.737	0.71	0.003	0.747	0.75	0.76	0.765	0.76	0.76	
Al2O3	g 100g-1		13.49	14.15	14.46	14.4	2.776	14.22	14.1	14	14.334	14.28	14.15	
Fe2O3T	g 100g-1		5.63	6.27	6.55	6.9	3.464	6.43	6.56	6.51	6.479	6.52	6.54	
Fe(II)O	g 100g-1		0.5					2.1						
MnO	g 100g-1		0.084	0.09	0.102	0.1	0.093	0.101	0.1	0.1	0.101	0.1	0.1	
MgO	g 100g-1		3.94	3.75	3.546	3.6	2.499	3.61	3.63	3.55	3.664	3.57	3.65	
CaO	g 100g-1		6.72	8.04	8.113	6.7	7.595	8	8.08	8.14	8.143	8.14	7.86	
Na2O	g 100g-1		0.15	0.16	0.048	0.15	0.02	0.18	0.2	0.13	0.083	0.13	0.13	
K2O	g 100g-1		4.31	4.47	4.377	4.2	0.449	4.34	4.36	4.44	4.377	4.38	4.42	
P2O5	g 100g-1		0.121	0.17	0.151	0.15	0.146	0.154	0.15	0.152	0.147	0.157	0.15	
H2O+	g 100g-1													
CO2	g 100g-1													
LOI	g 100g-1		11.4	10.6	11.273	11.2		11	10.8	10.7	10.85	10.51	11.02	10.76
Ag	mg kg-1		0.589				0.05						0.02	
As	mg kg-1		7.936			6	2.96					6.9	7.77	
B	mg kg-1						18.31					207		
Ba	mg kg-1	336	317.015		371.7	362	70.89	367		357	349	361	361	
Be	mg kg-1		2.294				0.88					2.32	2.09	
Bi	mg kg-1	0.246	0.138				0.12					0.25		
Br	mg kg-1												0.89	
C(org)	mg kg-1												0.27	
C(tot)	mg kg-1											20300	2.22	
Cd	mg kg-1		0.052				0.07		0.1			0.08		
Ce	mg kg-1	77	72.384		77.58	75	33	81.4	81.6	48.1		83.9	70.7	
Cl	mg kg-1					57								
Co	mg kg-1		19.752		15.84	15	13.21	20			11	16	13.3	
Cr	mg kg-1		78.781		73	69	24.64	77		63	61	68	70	
Cs	mg kg-1	5.03	5.743					6.4	6.28	5.15		6.38	7	
Cu	mg kg-1		19.605			6	6.57	13				9.9	8.04	
Dy	mg kg-1	5.22	3.636		4.95		3.38	5.4	5.63	3.13		5.7	4.94	
Er	mg kg-1	2.93	2.05		2.58	2	1.52	3.1	3.25	1.8		2.86	2.8	
Eu	mg kg-1	1.41	1.165		1.411	1	1.08	1.44	1.54	0.87		1.4	1.27	
F	mg kg-1							1027						
Ga	mg kg-1		22.933			19		20	21.5	18.5	16	19.9	18.6	
Gd	mg kg-1	5.65	4.652		5.9	2	5.18	6.09	7.52	3.83		6.1	5.88	
Ge	mg kg-1		1.837				0.08		2.05			2	1.28	
Hf	mg kg-1	3.89	2.562					4.01				4.1	5.45	
Hg	mg kg-1													
Ho	mg kg-1	1.04	0.705			1	0.59	1.11	1.1	0.62		1.1	0.96	
I	mg kg-1													
In	mg kg-1											0.07		
La	mg kg-1	35	35.607		37.68	26	12	39.8	41.4	23		41.5	34.2	
Li	mg kg-1	62	61.252				51.2			52.9		60	37.9	
Lu	mg kg-1	0.435	0.278				0.13	0.45	0.44	0.26		0.5	0.38	
Mo	mg kg-1	1.12	1.172				0.18	1.47		0.94		1.1	0.97	
Nb	mg kg-1	13.5	14.893		14.17	17	0.01	15.7	14.4	11.7	17	13.8	13.9	
Nd	mg kg-1	36.8	29.662		35.3	26	20.11	37.8	36.2	21.76		38	32.3	
Ni	mg kg-1		45.682		39.3	44	34.28	40		42	26	32	31.2	
Pb	mg kg-1	9.35	6.277			12	4.07	9.94		6.19		10	7.99	
Pd	mg kg-1													
Pr	mg kg-1	9.77	8.255				4.81	10.9	9.7	5.78		9.9	8.34	
Rb	mg kg-1	122	143.256			132	16	138	137	133	143	136	125	
Re	mg kg-1													
S	mg kg-1					46						115	0.02	
Sb	mg kg-1		0.719			2			1.43			0.75	0.68	
Sc	mg kg-1		23.869		14.38	18	4.29	25	17.1	21.5	12	15.2	17.1	
Se	mg kg-1						0.52						3.08	
Sm	mg kg-1	7.08	5.623		7.14	2	5.09	7.31	7.13	4.22		6.9	6.44	
Sn	mg kg-1		2.372				0.02		2.55			2.5		
Sr	mg kg-1	110	108.930		113.2	110	83	113		110	114	112	105	
Ta	mg kg-1	0.984	0.948					1.18	1.41	0.8		0.9		
Tb	mg kg-1	0.89	0.646				0.68	0.95	1.02	0.52		0.9	0.85	
Te	mg kg-1		0.037											
Th	mg kg-1	11.6	7.312		11.14	14	5.44	11.3	11.2	6.31		10.9	11.3	
Tl	mg kg-1	0.655	0.462				0.1		0.62			0.65	0.61	
Tm	mg kg-1	0.442	0.293				0.17	0.48	0.46	0.23		0.5	0.4	
U	mg kg-1	2.65	1.669			4	0.86	2.76	2.7	1.55		2.6	2.85	
V	mg kg-1		127.995		114.5	124	16	124		109	146	106	113	
W	mg kg-1		1.053				0.03	1.07	1.28			2	1.71	
Y	mg kg-1	27.4	22.807		28.86	33	14	28.6	29.7		30	27.5	24.2	
Yb	mg kg-1	2.77	1.967		2.762		1.01	2.83	3.05	1.65		2.9	2.6	
Zn	mg kg-1		81.546			68	56.82	77		74	76	68	62.7	111
Zr	mg kg-1	133	114.417		121.8	165	8.7	162		134	155	154	147	

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A96	A97	A98	A99	A101	A102	A103	A104	A105	A106	A107	A108	A109
SiO2	g 100g-1		51.57	53.11	51.75		50.78		51.54		53.15	51.16	51.5	49.024
TiO2	g 100g-1		0.78	0.787	0.765	0.78	0.757		0.68	0.74	0.734	0.759	0.764	0.739
Al2O3	g 100g-1		14.78	14.48	14.59		14.23		14.44		13.9	14.339	14.5	13.972
Fe2O3T	g 100g-1		6.57	6.518	6.69	6.88			6.28		6.3		6.54	6.081
Fe(II)O	g 100g-1						6.02					2.069		
MnO	g 100g-1		0.1	0.098	0.102	0.1	0.101		0.08	0.1	0.099	0.103	0.105	0.102
MgO	g 100g-1		3.74	3.65	3.605	2.75	3.57		3.4		3.488	3.626	3.61	3.575
CaO	g 100g-1		7.84	8.321	8.065	8.03	8.04		7.97		8.05	8.082	8.24	7.549
Na2O	g 100g-1		0.11	0.218	0.128		0.11		0.56		0.125	0.172	0.11	0.11
K2O	g 100g-1		4.46	4.656	4.555	4.71	4.39		4.65		4.31	4.443	4.83	4.402
P2O5	g 100g-1		0.14	0.169	0.160		0.147		0.13		0.15	0.156	0.18	0.168
H2O+	g 100g-1			4.84								3.673		
CO2	g 100g-1			7.47				7.62						
LOI	g 100g-1		11.1				11.48		11.72			10.627	10.69	9.968
Ag	mg kg-1													1.915
As	mg kg-1		8.8	7.84										6.756
B	mg kg-1													
Ba	mg kg-1		368	374	364	379	362		371	348	358	379.040		356.547
Be	mg kg-1			2.216						2.4		2.395	0.195	1.461
Bi	mg kg-1				0.207					0.26				
Br	mg kg-1													
C(org)	mg kg-1													
C(tot)	mg kg-1							20785			19600	19719		
Cd	mg kg-1			0.077								0.053		0.114
Ce	mg kg-1	103	81	82.33	83	83.6	81.52		72	79.4	81	81.88		98.876
Cl	mg kg-1											52		
Co	mg kg-1		17	15.54	16.5	14.6			18	15.4		16.55		12.325
Cr	mg kg-1		71	35.69	79	59.4	69		63	68	73	74.03		54.582
Cs	mg kg-1		9	6.541	6.567	5.13	6.24			6.12		6.431		
Cu	mg kg-1		10	10.29	12.3	11.2	11		13	10.3		10.6		5.74
Dy	mg kg-1	7.18		5.56	4.61	5.88	5.86		3.7	5.41		5.481		6.579
Er	mg kg-1	3.735		3.151	2.59	3.49	3.2		2.2	2.99		3.068		3.689
Eu	mg kg-1	2.32		1.429	1.4	1.19	1.51		1.3	1.41		1.435		1.851
F	mg kg-1											1172		
Ga	mg kg-1		18	19.61	18.13				17	19.7		20.249		30.719
Gd	mg kg-1	8.775		6.157	5.995	7.17	6.26		4.4	5.94		6.328		8.283
Ge	mg kg-1													
Hf	mg kg-1			4.618	3.58		4.35			4.13		4.24		
Hg	mg kg-1													0.077
Ho	mg kg-1	1.36		1.092	0.91	0.92	1.17		0.8	1.05		1.068		1.256
I	mg kg-1													
In	mg kg-1											0.071		
La	mg kg-1	51.65	64	39.85	39.67	33	40.03		33	37.6	36	39.965		48.477
Li	mg kg-1			58.16	61.3	58.4			53	61.3		60.22		
Lu	mg kg-1	0.585		0.439	0.367	0.35	0.44		0.4	0.43		0.425		0.200
Mo	mg kg-1			1.096	1.257					1.08		1.227		0.911
Nb	mg kg-1		13	14.06	11.5		13.98		22	14.6		14.466		
Nd	mg kg-1	54.3	33	36.78	37.97	40.5	36.6		31	35.8		38.242		44.295
Ni	mg kg-1		41	37.34	39.85	34.7	36		34	38	31	39.7		28.5
Pb	mg kg-1		18	9.074	9.523	9.11	9.32			9.41		9.18		10.868
Pd	mg kg-1													
Pr	mg kg-1	13.85		9.706	9.767	8.45	9.84		7	9.16		9.824		11.564
Rb	mg kg-1		131	137.270	129.7		132.2		127	134		142.740		139.243
Re	mg kg-1													
S	mg kg-1							83			30	82		
Sb	mg kg-1			0.835								0.747		0.972
Sc	mg kg-1		16	13.5	13.1		14.2		12	14.2		14.7		
Se	mg kg-1													1.454
Sm	mg kg-1	10.45	3	7.11	7.267	7.72	7.47		6	6.97		7.309		8.643
Sn	mg kg-1			2.557						2.73		2.73		2.236
Sr	mg kg-1		108	115.9	114	112	119		110	113		113.960		67.956
Ta	mg kg-1			0.993			1			0.97		0.972		
Tb	mg kg-1	1.67		0.93	0.878	0.79	1.01		0.6	0.89		0.948		1.124
Te	mg kg-1													
Th	mg kg-1		11	11.41	11.4	10.8	11.27		10	10.5		11.033		13.409
Tl	mg kg-1			0.681	0.74					0.74		0.646		0.573
Tm	mg kg-1	0.54		0.458		0.37	0.46		0.4	0.45		0.461		0.491
U	mg kg-1		4.8	2.5	2.705	2.68	2.66		3	2.59		2.659		2.947
V	mg kg-1		108	111.6	103.7	113	110		99	107	112	112.650		98.415
W	mg kg-1		20	1.488								1.32		
Y	mg kg-1	34.25	29	27.82	35.53	19.3	30.31		22	29.9	27	30.426		38.981
Yb	mg kg-1	3.81		2.96	2.587	3.11			2.3	2.89		3.013		3.52
Zn	mg kg-1		73	75.66	73.8	74.4	70		78	70.2	74	76.9		57.342
Zr	mg kg-1		153	162.6	165.7		158		157	156	156	156.6		

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A110	A111	A112	A113	A114	A115	A116	A117	A118	A119	A120	A121	A122
SiO2	g 100g-1	50.96	51.05		51.23	50.04	49.7	50.83	51.01	49.8	50.93	50.83	50.67	50.37
TiO2	g 100g-1	0.77	0.76		0.77	0.74	0.8	0.74	0.812	0.74	0.748	0.78	0.754	0.85
Al2O3	g 100g-1	14.73	14.3	14	14.89	16.25	14	14.17	14.35	14.11	14.24	14.41	15.15	13.72
Fe2O3T	g 100g-1	6.45	6.42	6.22	6.42	5.67	6.9	6.49	6.53	6.64	6.525	6.39	6.55	6.88
Fe(II)O	g 100g-1			1.98							2.4			
MnO	g 100g-1	0.12	0.098	0.096	0.103	0.08	0.09	0.1	0.101	0.11	0.112	0.1	0.094	0.11
MgO	g 100g-1	3.76	3.56		3.98	3.56	3.7	3.66	3.763	3.63	3.64	3.64	3.56	3.86
CaO	g 100g-1	7.55	8.01		7.81	7.7	8.1	8.06	7.774	8.63	8.156	8.04	8.07	7.93
Na2O	g 100g-1	0.12	0.14	0.152		0.18	0.12	0.11	0.165	0.34	0.146	0.17	0.143	0.24
K2O	g 100g-1	4.38	4.48	4.55	4.4	4.31	5.26	4.43	4.475	4.45	4.459	4.5	4.47	4.8
P2O5	g 100g-1	0.15	0.15	0.148		0.15	0.06	0.15	0.175	0.13	0.157	0.17	0.151	0.16
H2O+	g 100g-1										4.4	0.97		
CO2	g 100g-1										7.06			
LOI	g 100g-1	10.99	10.74	10.67	10.3	11.2	11.6	11.48	10.73	11.4	10.71	11.02		11.27
Ag	mg kg-1										0.36			
As	mg kg-1						13	5.5	11		7.2			
B	mg kg-1			181										
Ba	mg kg-1			382	400			356	362		363.1		367.3	397
Be	mg kg-1			2.1							1.976			
Bi	mg kg-1										0.3			
Br	mg kg-1													
C(org)	mg kg-1													
C(tot)	mg kg-1			18200							20300	19900	20300	
Cd	mg kg-1						1							
Ce	mg kg-1			86.5				73.1	84		82.5		83.01	75.03
Cl	mg kg-1					200	142		359		103			
Co	mg kg-1			14.5			18	13.1	18		18.1		70.8	1
Cr	mg kg-1						52	68.4	68		71			89
Cs	mg kg-1								6		6.4			6.29
Cu	mg kg-1						13	8	9	16	11.06			12
Dy	mg kg-1			4.7							5.53		6.12	5.74
Er	mg kg-1			2.72							3.21		3.32	2.69
Eu	mg kg-1			1.39							1.42		1.53	1.41
F	mg kg-1								1720		1026			
Ga	mg kg-1			18				19	21	20	21.52			31.62
Gd	mg kg-1			6.39							5.98		6.55	5.4
Ge	mg kg-1										1.96			3.4
Hf	mg kg-1			4.47							4.37			4.6
Hg	mg kg-1						2							
Ho	mg kg-1			0.9							1.09		1.18	0.85
I	mg kg-1													
In	mg kg-1			0.05										
La	mg kg-1			41.5				36.2	36		39.8		39.76	41.56
Li	mg kg-1			58							63		71.43	
Lu	mg kg-1			0.39							0.44		0.481	0.38
Mo	mg kg-1							1.3	4	7	1.85			
Nb	mg kg-1			15.9				14.6	14		14			15
Nd	mg kg-1			35.4				35.4	37		37.8		38.45	33.77
Ni	mg kg-1			38.7			43	40	41	32	44			41
Pb	mg kg-1						33	13.5	5		8.62			22
Pd	mg kg-1						63							
Pr	mg kg-1			9.17							9.68		10.05	9.04
Rb	mg kg-1			136	100	100		128.2	137	132	141			134
Re	mg kg-1													
S	mg kg-1	400					1600		200		200			
Sb	mg kg-1								1		0.8			
Sc	mg kg-1			15.1				13.5	15		13		17.04	16.7
Se	mg kg-1						16	1.4						
Sm	mg kg-1			6.74				8.3			6.88		7.43	6.64
Sn	mg kg-1								2		2.27			
Sr	mg kg-1	300		113	100	94		110.7	113	105	111.8		119.5	112.5
Ta	mg kg-1							3.2			0.9			2.93
Tb	mg kg-1			0.89							0.86		1.01	0.84
Te	mg kg-1						1							
Th	mg kg-1			10.7				13.1	12		10.72		12.23	10.2
Tl	mg kg-1			0.66			1				0.7			
Tm	mg kg-1			0.38							0.46		0.481	0.37
U	mg kg-1							3.7	5		2.45		2.88	2.59
V	mg kg-1			116			58	107.6	122		105		112.9	112
W	mg kg-1							3.8			1.44			
Y	mg kg-1			29.7				28.2	29	32	29.4		29.27	32.6
Yb	mg kg-1			2.51							2.84		3.06	2.47
Zn	mg kg-1	200		76	100	88	96	92.5	76	76	79		84.8	81
Zr	mg kg-1			161	200	200		151.3	155	156	164		209.7	148

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 1 - GeoPT42 Contributed data for Queenston shale, QS-1. 13/12/2017

Lab Code		A123	-	-	-	-	-	-	-	-	-	-	-	-
SiO2	g 100g^{-1}	51.36												
TiO2	g 100g^{-1}	0.76												
Al2O3	g 100g^{-1}	14.38												
Fe2O3T	g 100g^{-1}	6.68												
Fe(II)O	g 100g^{-1}													
MnO	g 100g^{-1}	0.1												
MgO	g 100g^{-1}	3.52												
CaO	g 100g^{-1}	8.25												
Na2O	g 100g^{-1}													
K2O	g 100g^{-1}	4.35												
P2O5	g 100g^{-1}	0.15												
H2O+	g 100g^{-1}													
CO2	g 100g^{-1}													
LOI	g 100g^{-1}	10.7												
Ag	mg kg^{-1}	0.52												
As	mg kg^{-1}	37												
B	mg kg^{-1}	178												
Ba	mg kg^{-1}	409												
Be	mg kg^{-1}	2.43												
Bi	mg kg^{-1}	0.47												
Br	mg kg^{-1}													
C(org)	mg kg^{-1}													
C(tot)	mg kg^{-1}													
Cd	mg kg^{-1}	0.26												
Ce	mg kg^{-1}	74.5												
Cl	mg kg^{-1}													
Co	mg kg^{-1}	12.1												
Cr	mg kg^{-1}	82.1												
Cs	mg kg^{-1}	5.87												
Cu	mg kg^{-1}	9.76												
Dy	mg kg^{-1}	4.95												
Er	mg kg^{-1}	2.99												
Eu	mg kg^{-1}	1.54												
F	mg kg^{-1}													
Ga	mg kg^{-1}	18.4												
Gd	mg kg^{-1}	6.27												
Ge	mg kg^{-1}	7.23												
Hf	mg kg^{-1}	6.37												
Hg	mg kg^{-1}													
Ho	mg kg^{-1}	1.08												
I	mg kg^{-1}													
In	mg kg^{-1}													
La	mg kg^{-1}	44.3												
Li	mg kg^{-1}	75.3												
Lu	mg kg^{-1}	0.44												
Mo	mg kg^{-1}	1.2												
Nb	mg kg^{-1}	14.2												
Nd	mg kg^{-1}	32.9												
Ni	mg kg^{-1}	38.5												
Pb	mg kg^{-1}	8.13												
Pd	mg kg^{-1}													
Pr	mg kg^{-1}	9.68												
Rb	mg kg^{-1}	140												
Re	mg kg^{-1}	0.01												
S	mg kg^{-1}													
Sb	mg kg^{-1}													
Sc	mg kg^{-1}	15.7												
Se	mg kg^{-1}	1.24												
Sm	mg kg^{-1}	6.9												
Sn	mg kg^{-1}	7.84												
Sr	mg kg^{-1}	121												
Ta	mg kg^{-1}	1.86												
Tb	mg kg^{-1}	1												
Te	mg kg^{-1}	26.3												
Th	mg kg^{-1}	8.36												
Tl	mg kg^{-1}	0.64												
Tm	mg kg^{-1}	0.46												
U	mg kg^{-1}	2.65												
V	mg kg^{-1}	123												
W	mg kg^{-1}	7.32												
Y	mg kg^{-1}	25.1												
Yb	mg kg^{-1}	2.66												
Zn	mg kg^{-1}	96.9												
Zr	mg kg^{-1}	166												

Bold entries are Data Quality 1 - Underlined entries are Data Quality 2

Table 2 - GeoPT42 Assigned values and statistical summary for Queenston shale, QS-1.

	Assigned Value	Uncertainty of assigned value	Horwitz Target Value	Uncertainty/ Target	Number of reported results	Robust Mean of results	Robust SD of results	Median of results	Status of consensus value	Type of consensus value
	X_a	*sdm*	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	50.91	0.04869	0.5636	0.08639	92	50.95	0.6692	50.91	Assigned	Median
TiO2	0.7583	0.002341	0.01581	0.1481	95	0.7583	0.02282	0.76	Assigned	Robust Mean
Al2O3	14.28	0.02901	0.1914	0.1515	93	14.28	0.2797	14.28	Assigned	Robust Mean
Fe2O3T	6.486	0.01675	0.09791	0.1711	93	6.486	0.1615	6.48	Assigned	Robust Mean
MnO	0.1	0.0002738	0.002828	0.09681	95	0.1007	0.003986	0.1	Assigned	Median
MgO	3.63	0.008793	0.0598	0.147	94	3.625	0.09885	3.63	Assigned	Median
CaO	8.068	0.0225	0.1178	0.1909	94	8.041	0.2062	8.055	Assigned	Mode
K2O	4.414	0.015	0.07059	0.2125	94	4.438	0.109	4.425	Assigned	Mode
P2O5	0.1512	0.0008172	0.004018	0.2034	89	0.1533	0.0109	0.1512	Assigned	Median
LOI	10.77	0.0374	0.1506	0.2483	83	10.92	0.3221	10.85	Assigned	Mode
	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}			mg kg^{-1}	mg kg^{-1}	mg kg^{-1}		
As	6.85	0.256	0.4101	0.6242	46	7.259	2.179	7	Provisional	Mode
Ba	362.1	1.66	11.93	0.1391	83	364.6	16.05	362.1	Assigned	Median
Be	2.308	0.04268	0.1627	0.2622	38	2.316	0.2698	2.308	Assigned	Median
Bi	0.23	0.006909	0.02295	0.301	25	0.2475	0.07291	0.23	Assigned	Median
C(tot)	20000	150	360.4	0.4163	22	19860	651	19890	Assigned	Mode
Ce	81.1	0.4912	3.347	0.1467	74	80.63	5.578	81.1	Assigned	Median
Co	16	0.1772	0.8431	0.2102	70	16.04	2.356	16	Assigned	Median
Cr	70.53	0.927	2.973	0.3118	78	71.75	9.143	71	Assigned	Mode
Cs	6.2	0.04073	0.3768	0.1081	53	6.167	0.466	6.2	Assigned	Median
Cu	11.4	0.2534	0.6322	0.4008	72	11.68	2.893	11.4	Provisional	Median
Dy	5.41	0.05198	0.3356	0.1549	55	5.386	0.4925	5.41	Assigned	Median
Er	3.053	0.045	0.2064	0.218	53	2.984	0.2859	3	Assigned	Mode
Eu	1.422	0.0121	0.1079	0.1121	55	1.422	0.08971	1.42	Assigned	Robust Mean
F	1060	15.94	29.72	0.5363	16	1050	91.91	1060	Provisional	Median
Ga	19.7	0.1785	1.006	0.1774	69	19.69	1.732	19.7	Assigned	Median
Gd	6.146	0.08218	0.374	0.2197	55	6.146	0.6095	6.157	Assigned	Robust Mean
Ge	1.891	0.0367	0.1374	0.267	18	1.835	0.4128	1.824	Assigned	Mode
Hf	4.24	0.07201	0.2729	0.2639	49	4.299	0.5676	4.24	Assigned	Median
Ho	1.077	0.00825	0.08517	0.09686	53	1.048	0.09637	1.068	Assigned	Mode
In	0.0705	0.003638	0.008405	0.4328	12	0.07037	0.01183	0.0705	Provisional	Median
La	39.4	0.4287	1.813	0.2365	74	39.4	3.688	39.19	Assigned	Robust Mean
Li	61.09	0.846	2.631	0.3215	38	61.09	5.215	61.28	Assigned	Robust Mean
Lu	0.43	0.004152	0.03905	0.1063	51	0.4165	0.04161	0.43	Assigned	Median
Mo	1.095	0.0212	0.08639	0.2454	43	1.243	0.2864	1.15	Assigned	Mode
Nb	14.47	0.199	0.7741	0.2571	73	14.3	1.214	14.3	Assigned	Mode
Nd	36.59	0.24	1.702	0.141	68	36.18	2.696	36.59	Assigned	Median
Ni	38.4	0.4197	1.774	0.2366	78	38.76	4.344	38.4	Assigned	Median
Pb	9.32	0.1196	0.5327	0.2246	71	9.384	1.579	9.32	Assigned	Median
Pr	9.605	0.06579	0.5466	0.1204	52	9.491	0.607	9.605	Assigned	Median
Rb	135.5	0.7428	5.179	0.1434	79	134.8	7.365	135.5	Assigned	Median
Sb	0.78	0.0376	0.06476	0.5806	32	0.9501	0.2995	0.8425	Assigned	Mode
Sc	14.24	0.21	0.7637	0.275	68	15.12	2.239	14.8	Assigned	Mode
Sm	7.08	0.0467	0.4218	0.1107	63	6.969	0.5837	7.08	Assigned	Median
Sn	2.53	0.04748	0.176	0.2698	39	2.539	0.413	2.53	Assigned	Median
Sr	113	0.4882	4.437	0.11	83	112.5	5.36	113	Assigned	Median
Ta	0.9843	0.0472	0.07892	0.5981	41	1.005	0.1387	0.993	Assigned	Mode
Tb	0.91	0.01018	0.07383	0.1379	53	0.9208	0.08177	0.91	Assigned	Median
Th	11.03	0.09884	0.6145	0.1608	74	11.05	1.097	11.03	Assigned	Median
Tl	0.655	0.01068	0.05583	0.1913	39	0.6435	0.1062	0.655	Assigned	Median
Tm	0.45	0.00629	0.04059	0.155	50	0.4374	0.0484	0.45	Assigned	Median
U	2.62	0.0147	0.1813	0.08109	64	2.71	0.2746	2.66	Assigned	Mode
V	112	0.9013	4.404	0.2047	76	112.6	8.193	112	Assigned	Median
W	1.276	0.0652	0.09842	0.6625	35	1.599	0.6847	1.37	Provisional	Mode
Y	29.2	0.2774	1.406	0.1973	80	29.2	2.481	29.08	Assigned	Robust Mean
Yb	2.86	0.0224	0.1953	0.1147	53	2.832	0.2335	2.86	Assigned	Median
Zn	75	0.6395	3.132	0.2042	86	75.67	6.898	75	Assigned	Median
Zr	159.3	1.48	5.94	0.2492	82	156.7	12.47	158	Assigned	Mode

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A2	A3	A4	A6	A7	A8	A9	A11	A12	A13	A14	A15	A16
SiO2	-8.35	-0.08	**-1.64**	-1.60	*	0.16	-0.06	0.59	-0.04	**0.01**	**0.81**	0.42	**7.67**
TiO2	33.89	-0.26	-0.26	-0.26	*	-0.26	0.37	-0.58	-0.26	**0.43**	**0.11**	0.66	**-3.69**
Al2O3	-11.70	-0.13	**-1.15**	-2.09	*	0.29	-0.11	0.37	0.31	**-0.40**	**0.10**	-0.63	**2.61**
Fe2O3T	0.58	0.22	**-2.01**	-1.11	**0.96**	-0.59	0.27	-1.41	0.07	**-0.33**	**-0.37**	1.20	**-5.48**
MnO	24.75	0.00	*	-1.77	**1.06**	1.59	0.88	-1.24	-5.30	**0.00**	**-0.35**	0.88	**0.00**
MgO	8.86	-0.17	**0.00**	13.38	**0.00**	-0.42	0.42	0.00	1.34	**0.62**	**-1.00**	-0.08	**0.17**
CaO	2.94	0.22	**0.19**	-1.22	**0.19**	-0.80	0.45	-0.20	-1.13	**0.20**	**-0.40**	0.21	**-6.85**
K2O	-3.57	0.68	**0.66**	-2.57	*	1.60	-1.16	-0.17	0.33	**-0.18**	**-0.62**	-0.22	**6.04**
P2O5	118.06	3.58	*	1.09	*	0.10	-0.27	1.09	0.60	**0.70**	**-0.80**	-0.27	**-2.79**
LOI	2.58	0.06	**0.72**	3.78	*	1.16	0.62	-0.11	-0.50	**-0.15**	**0.12**	*	-0.14
As	*78.21*	*0.18*	*	*-7.13*	***2.41***	*	*-0.06*	*	*1.40*	*-0.67*	*	*-2.83*	*
Ba	-15.17	0.83	**2.25**	-2.31	**1.04**	*	-0.38	*	1.09	1.77	*	0.22	**1.00**
Be	*	*	*	-0.94	*	*	*	*	0.47	1.61	*	1.56	*
Bi	496.07	*	*	16.78	*	*	*	*	*	*	*	-0.26	*
C(tot)	*	*	*	*	*	*	*	*	*	*	**-1.39**	*	1.25
Ce	*	0.28	-1.06	-2.48	**0.06**	*	-0.60	*	**-0.93**	-0.29	*	-0.15	*
Co	*	*	*	-8.90	**-0.31**	*	0.00	*	-0.06	0.16	*	0.03	**27.28**
Cr	23.62	1.26	0.58	-1.27	**-0.11**	*	0.13	*	-0.26	-0.09	*	-0.14	**-2.20**
Cs	*	*	*	*	**-0.13**	*	0.13	*	0.00	3.16	*	-0.17	*
Cu	*82.73*	*-1.11*	*	*-2.69*	***0.79***	*	*21.43*	*	*0.87*	*-0.51*	*	*1.07*	***2.53***
Dy	*	*	*	-2.37	**0.06**	*	*	*	**-0.92**	-0.12	*	-0.08	*
Er	*	*	*	-2.07	**-0.45**	*	*	*	**-1.22**	-0.04	*	-0.47	*
Eu	*	*	*	-1.26	**-0.09**	*	*	*	**-0.39**	0.09	*	-0.16	*
F	*	*	*	*	*	*	*	*	*	*0.40*	*	*	*
Ga	*	-0.35	*	*	**-0.05**	*	-0.35	*	-0.35	1.00	*	0.36	*
Gd	*	*	*	-1.13	**1.13**	*	*	*	**0.31**	-0.36	*	0.19	*
Ge	*	*	*	*	*	*	*	*	*	*	*	0.54	*
Hf	*	*	*	*	**-2.02**	*	*	*	-0.44	-1.35	*	-0.17	*
Ho	*	*	*	-2.04	**-0.20**	*	*	*	**-0.78**	-0.15	*	-0.07	*
In	*	*	*	*	*	*	*	*	*	*	*	*0.09*	*
La	*	3.20	*	-2.32	**0.11**	*	-0.96	*	**-0.77**	-0.16	*	0.35	**-2.43**
Li	*	*	*	-0.78	*	*	*	*	1.31	1.89	*	0.12	*
Lu	*	*	*	-1.66	**0.03**	*	*	*	**-1.02**	-0.12	*	0.03	*
Mo	11.03	*	*	-0.55	*	*	*	*	0.61	*	*	0.14	**195.67**
Nb	0.34	0.34	**-0.61**	*	**1.15**	*	0.02	*	0.08	0.80	*	0.00	**-4.48**
Nd	*	*	*	-1.99	**0.24**	*	-0.70	*	**-0.34**	-0.13	*	-0.00	*
Ni	40.20	-0.39	2.14	-2.09	**-0.72**	*	-0.03	*	-0.39	-0.37	*	0.11	**5.98**
Pb	-1.24	4.39	*	-4.99	**-0.54**	*	-0.30	*	-0.11	-0.63	*	2.45	**-4.35**
Pr	*	*	*	-2.06	**0.69**	*	*	*	**-0.74**	-0.26	*	0.21	*
Rb	0.04	0.14	**0.86**	*	**0.17**	*	-0.34	*	0.14	5.58	*	-0.09	**2.02**
Sb	*	*	*	24.86	*	*	*	*	-0.23	*	*	-0.19	*
Sc	*	2.46	*	-1.49	**0.00**	*	*	*	0.37	3.31	*	0.67	*
Sm	*	*	*	-1.61	**0.02**	*	-0.33	*	**-0.64**	0.15	*	-0.41	*
Sn	*	*	*	-1.51	*	*	-1.22	*	-0.14	*	*	0.03	*
Sr	*	0.00	**0.00**	-1.80	**0.44**	*	-0.23	*	-0.11	1.00	*	0.06	**-2.03**
Ta	*	*	*	*	**0.33**	*	*	*	-1.86	0.35	*	0.57	*
Tb	*	*	*	-1.42	**1.31**	*	*	*	**0.00**	-0.23	*	0.17	*
Th	*	-0.02	*	-1.74	**-0.03**	*	0.63	*	-1.00	0.77	*	-0.02	**-3.30**
Tl	*	*	*	*	*	*	*	*	-0.40	*	*	0.20	*
Tm	*	*	*	-1.72	**0.32**	*	*	*	**-1.23**	-0.38	*	0.27	*
U	*	1.05	*	*	**-0.22**	*	*	*	0.00	-0.07	*	0.37	92.07
V	*	0.79	**-0.45**	0.00	**-1.03**	*	0.11	*	-1.02	1.45	*	-0.12	**1.36**
W	*460.92*	*	*	*8.76*	*	*	*	*	*-0.19*	*	*	*0.19*	*
Y	-2.56	1.35	0.64	-3.75	**1.18**	*	*	*	-0.07	-0.20	*	0.28	**0.57**
Yb	*	*	*	-1.84	**-0.26**	*	*	*	**-1.18**	0.08	*	-0.06	*
Zn	24.26	-0.16	**0.32**	-2.55	**-2.51**	*	0.00	*	-0.16	0.02	*	-0.26	**2.87**
Zr	1.83	0.73	**0.96**	-9.37	**-4.60**	*	-0.28	*	0.40	-3.02	*	0.14	**-2.24**

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A18	A19	A20	A24	A25	A26	A27	A28	A29	A30	A32	A33	A36
SiO2	*	**-0.13**	0.20	0.13	0.10	0.12	-0.26	*	-0.46	**-0.20**	-0.03	-0.74	*
TiO2	**1.42**	**0.05**	0.21	0.34	0.05	0.05	0.02	*	0.24	**-8.11**	-0.52	0.40	*
Al2O3	*	**-0.53**	0.18	-0.00	-0.52	-0.34	0.68	*	-0.21	**-1.52**	-0.42	0.73	*
Fe2O3T	*	**0.51**	-0.24	-0.09	0.84	-0.13	0.02	*	0.02	**-3.13**	-0.07	0.02	*
MnO	*	**0.60**	0.18	-0.18	-0.18	-0.18	1.77	*	0.35	**0.00**	0.35	-0.18	*
MgO	*	**0.05**	-0.08	-0.92	0.25	0.75	-0.08	*	-0.25	**3.68**	-0.50	0.75	*
CaO	*	**0.82**	0.31	-0.50	-1.30	0.94	-0.16	*	-0.20	**-0.83**	0.78	-0.67	*
K2O	*	**0.05**	-0.02	0.33	1.39	0.40	-0.02	*	-0.31	**-4.87**	-0.05	0.33	*
P2O5	*	**2.19**	-0.02	-1.39	0.22	-0.52	0.60	*	0.60	**-2.79**	2.19	0.97	*
LOI	*	**1.78**	-0.31	2.42	-1.00	-0.11	1.19	*	-0.40	**2.71**	1.12	2.42	*
As	***5.18***	***-0.92***	*-2.26*	*-3.47*	*	*0.55*	*	*	*4.45*	***-7.83***	*0.37*	*1.40*	*
Ba	**-5.40**	**-0.06**	-0.09	-0.13	*	-0.46	-0.34	**0.49**	1.09	**1.16**	-1.85	-0.59	0.66
Be	**-0.02**	**-0.46**	*	*	*	*	0.87	*	*	**1.37**	*	*	*
Bi	*	**-0.16**	*	*	-1.09	10.24	*	*	*	**-1.74**	*	*	*
C(tot)	*	**-0.32**	*	*	-25.01	*	*	*	0.14	*	*	*	*
Ce	**-3.88**	**-0.44**	-0.01	1.48	1.17	-0.61	-1.21	**0.64**	0.55	**0.03**	4.75	1.63	0.21
Co	**-0.17**	**0.33**	-2.37	5.93	-1.62	1.72	3.56	*	1.54	**0.66**	-2.37	-1.19	*
Cr	**-0.25**	**1.80**	-0.26	0.08	-0.78	-0.81	*	*	1.86	**1.54**	-0.85	-2.44	*
Cs	**-4.02**	**-0.50**	*	-2.92	-0.77	6.24	-0.17	**-0.33**	*	*	*	*	0.11
Cu	***-1.53***	***0.71***	*1.27*	*3.64*	*-4.07*	*0.79*	*	***-1.95***	*-0.55*	***-8.79***	*7.28*	*1.27*	*
Dy	**-0.02**	**0.23**	*	*	-1.00	*	-0.74	**0.63**	*	**1.01**	*	*	-0.03
Er	**0.17**	**0.09**	*	*	-0.47	*	-0.69	**0.53**	*	**0.52**	*	*	0.13
Eu	**-1.50**	**0.01**	*	*	1.10	*	0.08	**0.05**	*	**-0.02**	*	*	-0.11
F	*	***1.55***	*	*	*	*	*	*	*	*	*	*	*
Ga	**-0.99**	**1.01**	0.15	-0.35	2.19	-0.70	-0.04	*	0.45	**2.01**	1.29	-1.34	0.60
Gd	**-0.68**	**-0.51**	*	*	1.02	*	1.64	**0.55**	*	**-1.43**	*	*	0.39
Ge	*	**-0.79**	*	*	*	*	1.34	*	*	*	*	*	*
Hf	**-0.24**	**0.50**	0.29	*	*	-0.62	-1.92	*	*	**1.91**	*	-0.44	-0.11
Ho	**0.45**	**0.42**	*	*	-0.72	*	-1.45	**0.55**	*	**-0.55**	*	*	0.04
In	*	***-1.64***	*	*	*-0.45*	*	*	*	*	*	*	*	*
La	**-4.80**	**-0.26**	-2.32	1.54	-0.44	0.94	-0.12	**0.68**	1.32	**0.17**	3.64	0.99	0.44
Li	**-0.83**	**-1.02**	*	*	*	*	0.71	*	*	*	*	*	*
Lu	**-0.28**	**0.07**	*	*	-0.78	*	-1.66	**0.13**	*	**-1.54**	*	*	0.51
Mo	**0.25**	**-1.03**	*	5.24	*	2.34	*	*	*	**-0.06**	*	*	*
Nb	**0.39**	**-2.72**	0.34	0.34	-1.60	-0.76	-0.92	**1.30**	0.34	**-1.21**	-0.61	0.99	0.17
Nd	**-3.32**	**-0.46**	-0.76	*	2.07	-0.88	-1.19	**-0.11**	-1.11	**0.06**	1.42	*	0.19
Ni	**-0.43**	**2.59**	-1.24	0.17	-0.37	-1.35	0.87	*	1.13	**0.77**	-5.30	-0.11	*
Pb	**-2.76**	**-0.57**	7.21	-1.24	-1.31	-1.33	*	**-0.25**	0.03	**-1.75**	1.28	-1.24	*
Pr	**-2.42**	**-0.06**	-2.38	*	0.31	*	*	**0.18**	*	**-0.23**	*	*	0.39
Rb	**-12.29**	**0.00**	-0.05	0.04	-0.78	-1.05	-1.21	**5.17**	0.82	**1.17**	1.25	-0.73	0.28
Sb	**-0.79**	**-1.05**	*	9.42	*	23.32	*	*	*	**1.08**	*	*	*
Sc	**-4.65**	**1.07**	0.50	1.15	*	-0.48	-0.46	**2.68**	4.95	**-0.85**	*	*	-2.15
Sm	**-2.17**	**0.21**	-1.28	*	1.24	-4.01	0.07	**-0.63**	*	**0.59**	*	*	0.24
Sn	**1.81**	**0.36**	*	4.18	*	4.18	*	*	*	**1.08**	*	*	-1.14
Sr	**-1.40**	**-0.37**	-0.56	-0.11	1.99	-1.00	0.00	**0.27**	0.23	**1.06**	0.68	0.11	-0.23
Ta	**-0.13**	**1.38**	*	*	*	*	*	**1.14**	*	**-0.31**	*	*	0.71
Tb	**0.16**	**-0.01**	*	*	0.30	*	-0.34	**0.43**	*	**-0.41**	*	*	0.95
Th	**-4.56**	**-0.62**	*	0.79	-2.00	-1.08	-0.01	**3.54**	0.14	**1.05**	4.84	0.79	0.12
Tl	**0.22**	*	-1.39	*	-1.10	-4.07	1.30	*	*	**-10.48**	*	*	*
Tm	**0.39**	**-0.37**	*	*	-0.81	*	-2.09	**-0.02**	*	**-2.96**	*	*	0.49
U	**-0.38**	**-0.12**	*	6.56	-1.49	1.60	*	**-0.31**	*	**-0.11**	13.13	1.05	0.77
V	**-1.49**	**-0.46**	0.00	1.02	-0.40	-1.99	*	*	1.14	**-0.52**	-0.45	-1.14	*
W	***-1.18***	***1.37***	*	*	*	*-2.93*	*	*	*	***-1.39***	*	*	*0.44*
Y	**-2.68**	**-0.13**	1.00	0.28	-0.39	-0.78	0.28	**-0.40**	0.92	**-0.22**	3.41	-0.07	-0.64
Yb	**0.11**	**0.50**	*	*	-0.92	-0.15	*	**0.44**	*	**0.15**	*	*	-0.10
Zn	**-0.69**	**0.90**	0.00	-0.96	-1.03	-0.75	0.00	*	0.97	**1.98**	-0.96	-0.16	*
Zr	**-0.80**	**0.38**	-0.28	0.14	-0.86	-0.56	0.98	*	0.98	*	-1.40	-1.04	-1.23

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A37	A38	A39	A41	A42	A44	A45	A46	A48	A50	A51	A52	A53
SiO2	-0.67	-0.01	-1.34	0.12	-4.46	1.41	0.64	0.31	0.10	-0.13	1.90	-0.16	0.08
TiO2	0.74	-2.42	2.65	0.30	5.99	0.02	-2.44	-0.21	-0.26	-1.09	-0.26	-0.89	5.27
Al2O3	1.20	-0.99	5.80	-0.76	2.19	-1.25	0.23	0.42	-0.29	-0.65	-3.37	0.10	-2.09
Fe2O3T	0.44	-0.07	-0.34	0.29	13.62	1.45	1.72	-0.17	-0.34	-0.60	-0.65	0.02	6.50
MnO	-0.71	0.00	0.71	-0.39	239151.77	0.39	0.35	-0.35	0.00	-0.71	0.00	0.00	5.30
MgO	0.50	0.00	-18.06	0.50	-7.86	-1.59	0.29	-2.51	-0.08	0.79	-3.26	0.67	-2.42
CaO	1.63	-2.19	0.31	0.36	7.40	-3.81	-0.36	0.78	-0.46	-0.17	-0.03	-0.80	8.33
K2O	-0.90	0.23	3.45	-1.17	7.32	-0.59	0.35	0.52	-0.59	-0.67	0.05	0.40	-0.52
P2O5	4.93	-0.30	*	1.19	8.16	-1.39	1.84	0.20	-2.39	0.45	-1.39	-1.39	-5.62
LOI	1.31	-0.74	*	0.72	-0.08	0.09	-1.69	-0.74	-0.40	2.27	-2.76	1.12	0.20
As	*-5.49*	*	*3.60*	*	*	*-1.40*	*	*-0.22*	*	*	*	*	*
Ba	1.25	1.33	*	-1.60	*	0.08	7.04	0.07	*	-0.39	1.59	-0.42	0.54
Be	*	*	*	0.08	*	-0.02	*	1.86	*	-0.05	-1.62	*	*
Bi	*	*	*	0.00	*	*	*	0.00	*	*	0.44	*	*
C(tot)	*	*	*	*	*	*	*	*	0.77	*	*	*	*
Ce	-2.42	-0.93	*	-0.13	*	-0.01	*	-0.51	*	-0.21	0.36	*	*
Co	-1.19	-1.19	*	-1.41	*	0.00	0.00	*	*	-0.95	-2.37	0.00	*
Cr	0.83	4.87	10.17	-0.24	10.28	-2.44	0.75	5.43	*	-0.92	4.45	-0.43	*
Cs	-2.52	*	*	0.16	*	0.05	*	-1.14	*	-0.53	0.54	*	*
Cu	*-2.85*	*5.69*	*20.17*	*-2.14*	*23.85*	*0.00*	*5.22*	*-1.04*	*	*-1.27*	*0.47*	*0.47*	*74.82*
Dy	*	*	*	0.60	*	-0.72	*	0.48	*	0.27	0.72	*	*
Er	*	*	*	0.57	*	-0.71	*	0.47	*	-0.26	0.36	*	*
Eu	*	*	*	0.26	*	-0.06	*	0.26	*	-0.21	0.73	*	*
F	*	*-0.34*	*	*	*	*0.67*	*-2.89*	*-35.67*	*	*	*	*	*
Ga	-0.70	-2.68	1.09	-1.28	*	0.50	-2.34	0.09	*	0.50	-1.34	-1.34	1.14
Gd	*	-3.06	*	0.01	*	0.05	*	0.12	*	-0.66	0.06	*	*
Ge	*	*	*	*	*	*	*	*	*	*	-1.79	*	*
Hf	14.15	2.79	*	1.94	*	*	-4.10	-0.29	*	0.59	0.70	*	*
Ho	*	*	*	-0.08	*	-0.57	*	0.39	*	0.27	0.14	*	*
In	*	*	*	*	*	*	*	*	*	*	*-0.62*	*	*
La	3.64	2.54	*	-0.23	*	-0.11	*	-0.12	*	-0.39	0.51	*	*
Li	*	*	*	0.23	-7.41	-0.25	0.17	-1.50	*	-0.53	*	*	*
Lu	*	*	*	0.26	*	-0.26	*	0.51	*	0.00	0.51	*	*
Mo	*	*	*	-0.98	*	0.32	*	-0.52	*	*	-0.67	*	*
Nb	-0.61	-1.90	-1.79	-1.11	*	0.99	*	2.22	*	0.43	0.34	-0.30	*
Nd	3.18	1.42	*	0.31	*	0.18	*	-0.06	*	-0.28	0.67	*	*
Ni	-0.23	2.03	*	-0.56	*	-0.06	1.58	-2.57	*	0.06	-0.68	-0.11	*
Pb	1.09	3.15	*	-0.56	*	0.32	-4.99	0.30	*	-0.23	0.64	3.45	*
Pr	*	*	*	-0.83	*	0.14	*	-0.23	*	0.36	0.54	*	*
Rb	-0.68	3.76	0.53	-1.55	-26.17	-0.05	*	1.41	*	-0.05	0.04	-0.92	33.84
Sb	2.47	*	*	0.00	*	*	*	-0.77	*	*	-2.01	*	*
Sc	4.92	2.30	*	-0.73	*	-0.16	*	5.33	*	-0.05	6.39	0.50	*
Sm	9.29	*	*	0.31	*	0.00	*	0.69	*	0.52	0.09	*	*
Sn	12.90	*	*	0.23	*	-0.03	*	-2.33	*	-0.74	-0.71	*	*
Sr	-1.80	3.83	0.68	-1.42	*	0.23	0.56	-0.64	*	-0.05	-0.23	-0.68	0.68
Ta	*	*	*	4.38	*	*	*	0.96	*	-0.18	0.48	*	*
Tb	*	*	*	0.41	*	-0.41	*	0.81	*	0.41	0.95	*	*
Th	-0.04	1.58	0.47	0.74	*	*	*	0.98	*	0.77	6.49	-1.65	*
Tl	*	*	*	*	*	0.40	*	-0.63	*	1.16	0.94	*	*
Tm	*	*	*	0.00	*	-0.37	*	0.00	*	0.00	0.62	*	*
U	1.05	*	*	0.28	*	0.06	*	-0.05	*	0.99	0.11	*	*
V	1.36	4.77	*	-1.06	*	0.23	*	-1.78	*	-0.84	1.70	-0.79	*
W	*	*	*	*0.95*	*	*	*	*-1.29*	*	*	*-0.64*	*	*
Y	-1.57	4.84	-0.14	-1.30	*	-1.14	-0.07	0.56	*	0.99	0.28	-0.07	*
Yb	*	*	*	0.77	*	-0.23	*	0.56	*	0.20	0.82	*	*
Zn	-1.92	0.00	0.11	-2.06	-23.94	2.23	-0.32	2.47	*	-2.23	-0.64	-0.64	2.39
Zr	-0.22	1.13	-1.20	0.06	-26.81	1.32	-0.11	1.52	*	0.25	1.07	0.06	*

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A54	A55	A56	A57	A59	A60	A61	A62	A63	A64	A65	A66	A67
SiO2	-0.09	*	**0.20**	-0.19	0.27	0.03	-1.34	0.16	**1.93**	0.11	-0.37	1.02	-0.05
TiO2	-0.26	**3.90**	**0.11**	-0.89	-0.58	0.24	0.05	0.18	**2.01**	0.05	-0.26	1.86	0.05
Al2O3	-0.50	*	**-0.00**	3.71	-0.21	0.13	-1.52	0.08	**0.36**	-0.24	-0.47	4.44	0.10
Fe2O3T	-0.70	*	**-0.37**	0.58	-0.54	-0.39	-0.85	-0.34	**1.57**	-0.44	-0.54	0.73	-0.44
MnO	0.00	**0.00**	**0.00**	0.00	0.00	-0.18	0.00	-0.58	**3.54**	0.00	0.00	-1.06	-0.88
MgO	-0.42	*	**1.17**	-0.17	0.33	-0.17	-1.42	-0.04	**0.33**	-0.50	0.75	-0.84	0.50
CaO	-1.22	*	**-3.88**	0.73	-0.71	-0.16	-0.46	0.19	**3.59**	0.05	-0.75	2.09	-0.46
K2O	-0.10	*	**-0.76**	1.89	-0.52	-0.02	-0.31	0.20	**3.35**	0.05	-0.31	0.19	-0.10
P2O5	2.34	**7.17**	**2.19**	3.58	-0.15	0.60	-0.40	-0.34	**2.19**	-0.15	-0.15	1.22	-4.01
LOI	2.71	*	**3.50**	*	0.99	*	-0.74	-0.03	**0.65**	-0.34	2.42	1.09	0.89
As	*-2.44*	*	*	*11.64*	*	*	*2.62*	*	***0.46***	*	*2.56*	*2.01*	*
Ba	-0.04	**0.83**	**0.96**	-0.38	0.37	*	-1.68	1.17	**1.00**	-0.51	-0.05	0.50	*
Be	4.71	**0.63**	**-0.05**	-0.64	0.62	*	-0.02	*	**0.02**	*	1.05	1.08	*
Bi	0.44	*	*	*	*	*	18.52	*	**0.44**	*	-0.65	*	*
C(tot)	*	*	*	*	*	-0.14	-27.75	-0.42	*	*	*	0.36	-0.28
Ce	0.01	**-0.84**	**-0.06**	-0.37	-0.16	*	0.88	*	**2.00**	*	0.58	0.70	*
Co	-0.02	**0.36**	**-0.24**	*	0.24	*	-0.59	2.19	**0.83**	1.78	0.00	0.12	*
Cr	2.27	**0.12**	**0.36**	0.75	-0.36	*	-3.28	0.87	**4.06**	-0.93	1.59	2.43	*
Cs	-0.82	**-0.27**	**-0.27**	*	0.07	*	-0.21	*	**0.00**	*	1.06	*	*
Cu	*1.22*	***-0.47***	***1.27***	*-3.64*	*0.00*	*	*1.50*	*-0.87*	***5.22***	*	*0.47*	*	*
Dy	0.28	**-0.63**	**-0.33**	0.58	0.04	*	1.30	*	**0.00**	*	0.00	1.10	*
Er	*	**-0.40**	**-0.74**	0.36	0.02	*	1.30	*	**0.47**	*	0.02	1.08	*
Eu	-0.20	**-0.48**	**-0.21**	-0.10	-0.01	*	1.29	*	**-0.02**	*	0.41	0.73	*
F	*	*	*	*	*	*	*-17.83*	*-0.93*	*	*	*	*0.00*	*
Ga	0.31	**0.40**	**-0.89**	*	0.20	*	0.25	*	**0.99**	1.64	0.30	*	*
Gd	-0.13	**-0.07**	**-0.66**	0.87	0.21	*	1.22	*	**0.47**	*	1.14	0.98	*
Ge	-0.37	*	*	*	-0.40	*	*	*	**-0.59**	*	0.40	*	*
Hf	-0.04	**0.04**	**3.15**	*	-0.02	*	-2.57	*	**0.84**	*	-0.44	1.45	*
Ho	0.08	**-0.31**	**0.27**	0.14	-0.04	*	0.72	*	**-0.31**	*	0.14	0.37	*
In	*1.16*	*	*	*	*	*	*0.57*	*	*	*	*	*	*
La	-0.16	**-0.61**	**-0.16**	-0.28	-0.30	*	1.27	*	**-0.44**	*	-0.05	0.63	*
Li	*	**0.61**	*	*	0.88	*	1.69	*	*	*	-0.02	1.45	*
Lu	-0.38	**-0.26**	**-0.77**	0.13	0.00	*	*	*	*	*	-0.38	0.79	*
Mo	1.42	**2.72**	**0.06**	*	*	*	3.39	*	**4.92**	*	0.49	*	*
Nb	-0.51	**-0.09**	**-1.25**	*	0.21	*	-1.21	*	**-0.35**	*	0.34	0.15	*
Nd	0.24	**-0.93**	**0.19**	-0.38	0.03	*	1.36	*	**0.66**	*	0.21	0.62	*
Ni	2.31	**0.23**	**-1.24**	-0.68	0.03	*	-0.06	2.14	**5.47**	-0.96	1.30	1.58	*
Pb	0.06	**-0.64**	**3.53**	0.45	0.17	*	7.11	8.15	**0.13**	*	0.64	-0.47	*
Pr	-0.26	**-0.41**	**-0.92**	-0.28	-0.08	*	1.00	*	**0.06**	*	0.36	0.45	*
Rb	-1.06	**0.47**	**-0.36**	*	-0.05	*	-1.37	*	**0.28**	*	2.36	0.43	*
Sb	4.86	*	*	0.15	*	*	5.71	*	**1.70**	*	2.47	0.69	*
Sc	2.49	**0.21**	**-0.18**	1.41	0.37	*	-0.42	*	**-1.62**	-1.47	0.50	-0.09	*
Sm	-0.14	**-0.92**	**0.05**	-0.09	-0.02	*	1.21	*	**-0.05**	*	0.14	0.65	*
Sn	1.96	**0.00**	**-0.74**	*	*	*	4.18	*	**0.23**	*	-1.51	-0.43	*
Sr	0.02	**-0.45**	**0.27**	*	0.11	*	0.23	*	**0.00**	-1.13	1.01	0.68	*
Ta	-0.53	**-0.05**	**1.47**	*	0.10	*	0.67	*	**-0.81**	*	-1.17	-2.24	*
Tb	-0.14	**-0.14**	**-0.14**	0.61	0.20	*	1.56	*	**-0.14**	*	0.61	0.61	*
Th	-0.44	**-0.86**	**0.12**	1.20	-0.18	*	-0.75	*	**-0.53**	*	-0.10	1.12	*
Tl	-5.78	**-0.09**	**1.88**	-1.48	*	*	0.40	*	*	*	0.40	-0.04	*
Tm	-0.37	**-0.25**	**0.00**	0.25	0.09	*	0.99	*	*	*	-0.49	0.41	*
U	1.10	**-0.83**	**-0.11**	0.50	-0.11	*	-0.14	*	**-0.11**	*	-0.05	1.13	*
V	0.64	**1.36**	**0.02**	-0.11	-0.23	*	-1.77	0.22	**0.91**	-0.79	2.27	0.11	*
W	*4.34*	***0.75***	***3.29***	*	*	*	*6.22*	*	***0.95***	*	*-1.40*	*	*
Y	-0.45	**-0.07**	**1.35**	-1.60	0.32	*	0.71	*	**-0.64**	*	0.14	0.43	*
Yb	-0.31	**-0.26**	**-0.31**	0.10	0.10	*	1.13	*	**0.20**	*	0.36	0.74	*
Zn	-0.37	**-0.19**	**7.41**	0.16	-0.35	*	-1.60	1.17	**0.19**	-1.12	0.48	-0.10	*
Zr	-0.08	**-0.56**	**-1.04**	-2.13	-0.03	*	-6.14	3.99	**0.96**	-1.71	0.98	-0.53	*

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A68	A69	A70	A71	A73	A74	A75	A76	A77	A78	A79	A80	A81
SiO2	-0.06	6.22	0.86	-0.93	-2.07	0.22	-0.52	-0.09	1.28	-0.08	*	15.94	-0.27
TiO2	1.07	1.37	-3.69	*	0.74	0.05	1.14	-0.26	-0.14	0.37	*	2.01	-7.48
Al2O3	-0.20	2.35	1.72	3.16	0.42	0.31	0.05	-0.37	0.07	-0.37	*	4.44	-0.54
Fe2O3T	1.00	1.77	-3.13	-0.44	1.36	-0.39	2.07	-0.44	-0.03	-0.24	*	0.75	2.33
MnO	0.71	3.54	0.00	*	3.54	0.00	1.38	*	1.06	0.00	0.33	3.54	2.26
MgO	0.13	2.17	-4.35	0.92	-1.17	0.42	0.85	-0.25	-1.20	0.25	*	9.20	-0.87
CaO	0.65	3.33	1.46	-4.78	2.48	0.18	1.29	-0.07	2.42	0.18	*	0.28	-0.46
K2O	0.71	1.65	1.37	2.45	3.07	1.04	1.40	0.40	-0.40	0.26	*	-1.10	-0.70
P2O5	0.22	2.19	4.68	*	-2.79	-0.15	0.50	-0.15	0.97	-0.15	*	*	-0.25
LOI	0.09	0.72	2.44	0.69	*	0.09	-0.28	0.03	0.26	-0.64	*	*	1.12
As	*	*	*	*	*	*-0.79*	***5.49***	*-0.79*	*	*-0.18*	*-0.06*	***-0.37***	*
Ba	-0.09	-0.01	-0.01	*	1.50	0.43	-1.16	-0.17	0.00	0.25	-0.04	-0.18	-0.98
Be	*	*	-1.71	*	*	*	*	0.22	0.28	-0.12	*	*	*
Bi	*	*	-0.44	*	*	*	*	-0.44	*	-0.22	*	*	*
C(tot)	*	*	*	*	*	*	*	*	*	-0.28	*	*	0.56
Ce	*	*	0.21	*	0.57	0.10	-2.37	1.08	-0.40	1.31	0.25	1.17	*
Co	1.78	0.00	0.83	*	14.23	1.66	*	-0.89	-0.28	-0.59	-0.48	0.36	*
Cr	1.42	-12.29	-0.55	*	1.84	0.28	2.68	-1.77	1.22	1.59	1.84	0.53	*
Cs	*	*	-1.38	*	2.12	-0.27	-0.27	0.28	-0.52	0.19	1.59	0.80	*
Cu	*0.47*	***24.68***	***-1.27***	*	***4.11***	*-3.08*	***-0.32***	*-0.87*	*0.63*	*-0.63*	*	*	*
Dy	*	*	-0.48	*	*	*	-0.77	-0.34	-0.22	0.33	*	3.25	*
Er	*	*	-0.45	*	*	*	*	-0.56	0.02	-0.13	*	*	*
Eu	*	*	0.26	*	*	*	*	-0.06	0.13	0.18	*	0.54	*
F	*	*	*	*	*0.27*	*	*	*	*	*	*0.00*	*	***1.62***
Ga	*	-4.67	1.19	*	-3.68	-0.25	-0.70	0.99	-0.10	0.89	-0.17	-0.10	*
Gd	*	*	1.13	*	*	*	*	-0.78	-0.57	0.13	*	*	*
Ge	*	*	*	*	*	-0.70	*	*	*	-6.12	*	*	*
Hf	*	6.45	1.58	*	10.11	-1.17	1.50	-0.07	-0.60	0.11	*	*	*
Ho	*	*	-0.43	*	*	*	*	-0.22	-0.16	0.02	*	*	*
In	*	*	***1.61***	*	*	*	*	*0.39*	*	*-0.03*	*	*	*
La	*	*	0.11	*	1.99	0.86	-0.66	-0.30	-0.41	0.25	0.75	-0.22	*
Li	*	*	0.31	*	*	*	*	0.80	*	0.32	*	*	-0.98
Lu	*	*	0.26	*	*	*	*	-0.26	0.00	0.00	*	0.31	*
Mo	*	*	-0.75	*	22.05	1.77	*	0.20	-0.03	-0.09	*	*	*
Nb	1.63	0.68	-0.74	*	3.27	-0.76	-2.03	-0.56	-1.83	-0.11	-0.11	*	*
Nd	*	*	-0.40	*	0.83	0.36	-2.28	0.18	-0.33	0.47	*	-0.34	*
Ni	1.58	4.28	-0.28	*	1.47	-0.34	-0.62	-0.34	0.03	-0.31	0.25	*	*
Pb	-0.30	1.28	0.98	*	-2.48	0.83	0.53	-0.58	0.78	-0.11	-1.37	*	*
Pr	*	*	-0.23	*	*	*	*	-0.34	-0.25	0.18	*	*	*
Rb	0.14	0.67	-1.46	*	-0.11	-0.56	-0.18	0.48	-0.61	0.53	-0.24	0.47	*
Sb	*	*	0.62	*	*	1.62	*	0.85	*	0.31	*	*	*
Sc	*	4.92	0.73	*	6.23	0.89	0.60	-0.55	-0.42	-0.22	0.63	0.18	*
Sm	*	*	-0.55	*	*	-3.89	-1.61	0.01	-0.18	0.20	*	-0.59	*
Sn	*	*	1.48	*	-8.69	0.23	*	*	-0.03	1.34	*	*	*
Sr	0.11	0.90	0.45	*	-0.45	-0.59	0.05	0.56	-0.70	1.30	-0.56	*	1.40
Ta	*	*	-1.58	*	50.89	*	*	-0.66	-0.53	0.10	*	-1.07	*
Tb	*	*	1.63	*	*	*	*	-0.34	-0.27	0.20	*	-0.54	*
Th	1.61	-1.67	-2.52	*	-0.04	0.55	1.91	-0.06	-0.41	0.18	-0.16	0.28	*
Tl	*	*	0.09	*	*	3.09	*	0.40	-0.58	0.13	*	*	*
Tm	*	*	-0.25	*	*	*	*	-0.37	-0.12	0.37	*	*	*
U	*	*	-1.54	*	2.10	-1.16	-4.80	0.41	-0.14	0.11	0.19	-0.66	*
V	-0.68	0.45	0.45	*	4.54	-0.07	-1.04	0.79	0.32	0.91	0.67	2.95	*
W	*	*	***-2.10***	*	*	*4.18*	*	*	*43.66*	*3.68*	*	***-0.78***	*
Y	2.42	1.28	0.43	*	0.57	-0.32	2.06	-0.53	-1.42	0.32	-0.05	*	*
Yb	*	*	0.00	*	*	*	*	-0.84	0.05	-0.08	*	0.82	*
Zn	3.83	-0.64	-1.69	*	-0.64	-0.13	-1.15	0.80	0.96	0.32	0.32	1.60	*
Zr	-2.38	1.30	1.46	*	0.29	-0.40	0.56	0.40	-1.64	0.40	0.12	0.12	*

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A82	A83	A84	A85	A86	A87	A89	A90	A91	A92	A93	A94	A95
SiO2	*	2.20	0.61	**-0.75**	1.14	*	**-0.91**	**-0.38**	**-1.09**	**-0.17**	0.28	**-0.68**	-0.51
TiO2	*	-2.38	-1.21	**-1.35**	-1.53	-23.89	**-0.71**	**-0.52**	**0.11**	**0.39**	0.05	**0.11**	*
Al2O3	*	-2.06	-0.34	**0.94**	0.31	-30.05	**-0.31**	**-0.94**	**-1.46**	**0.28**	-0.00	**-0.68**	*
Fe2O3T	*	-4.37	-1.11	**0.65**	2.11	-15.43	**-0.58**	**0.75**	**0.24**	**-0.08**	0.17	**0.55**	*
MnO	*	-2.83	-1.77	**0.64**	0.00	-1.24	**0.35**	**0.00**	**0.00**	**0.35**	0.00	**0.00**	*
MgO	*	2.59	1.00	**-1.40**	-0.25	-9.46	**-0.33**	**0.00**	**-1.34**	**0.57**	-0.50	**0.33**	*
CaO	*	-5.72	-0.12	**0.39**	-5.80	-2.00	**-0.57**	**0.11**	**0.62**	**0.64**	0.31	**-1.76**	*
K2O	*	-0.73	0.40	**-0.52**	-1.51	-28.08	**-1.04**	**-0.76**	**0.38**	**-0.52**	-0.24	**0.09**	*
P2O5	*	-3.76	2.34	**0.00**	-0.15	-0.65	**0.70**	**-0.30**	**0.20**	**-1.05**	0.72	**-0.30**	*
LOI	*	2.08	-0.57	**3.33**	1.42	*	**1.51**	**0.19**	**-0.48**	**0.52**	-0.87	**1.65**	-0.04
As	*	*1.32*	*	*	*-1.04*	*-4.74*	*	*	*	*	*0.06*	***2.24***	*
Ba	**-2.19**	-1.89	*	**0.80**	-0.00	-12.20	**0.41**	*	**-0.43**	**-1.10**	-0.05	**-0.09**	*
Be	*	-0.04	*	*	*	-4.39	*	*	*	*	0.04	**-1.34**	*
Bi	**0.70**	-2.00	*	*	*	-2.40	*	*	*	*	0.44	*	*
C(tot)	*	*	*	*	*	*	*	*	*	*	0.42	**-55.50**	*
Ce	**-1.22**	-1.30	*	**-1.05**	-0.91	-7.18	**0.09**	**0.15**	**-9.86**	*	0.42	**-3.11**	*
Co	*	2.23	*	**-0.19**	-0.59	-1.65	**4.74**	*	*	**-5.93**	0.00	**-3.20**	*
Cr	*	1.39	*	**0.83**	-0.26	-7.72	**2.18**	*	**-2.53**	**-3.21**	-0.43	**-0.18**	*
Cs	**-3.10**	-0.61	*	*	*	*	**0.53**	**0.21**	**-2.79**	*	0.24	1.06	*
Cu	*	*6.49*	*	*	*-4.27*	*-3.82*	*1.27*	*	*	*	*-1.19*	***-5.31***	*
Dy	**-0.57**	-2.64	*	**-1.37**	*	-3.02	**-0.03**	**0.66**	**-6.79**	*	0.43	**-1.40**	*
Er	**-0.59**	-2.43	*	**-2.29**	-2.55	-3.71	**0.23**	**0.96**	**-6.07**	*	-0.47	**-1.22**	*
Eu	**-0.11**	-1.19	*	**-0.10**	-1.96	-1.59	**0.17**	**1.09**	**-5.12**	*	-0.10	**-1.41**	*
F	*	*	*	*	*	*	*-0.56*	*	*	*	*	*	*
Ga	*	1.61	*	*	-0.35	*	0.15	**1.79**	**-1.19**	**-3.68**	0.10	-0.55	*
Gd	**-1.33**	-2.00	*	**-0.66**	-5.54	-1.29	**-0.15**	**3.67**	**-6.19**	*	-0.06	**-0.71**	*
Ge	*	-0.20	*	*	*	-6.59	*	**1.16**	*	*	0.40	-2.22	*
Hf	**-1.28**	-3.07	*	*	*	*	**-0.84**	*	*	*	-0.26	2.22	*
Ho	**-0.43**	-2.18	*	*	-0.45	-2.86	**0.39**	**0.27**	**-5.36**	*	0.14	**-1.37**	*
In	*	*	*	*	*	*	*	*	*	*	*-0.03*	*	*
La	**-2.43**	-1.05	*	**-0.95**	-3.70	-7.56	**0.22**	**1.10**	**-9.05**	*	0.58	**-2.87**	*
Li	**0.35**	0.03	*	*	*	-1.88	*	*	**-3.11**	*	-0.21	**-8.81**	*
Lu	**0.13**	-1.95	*	*	*	-3.84	**0.51**	**0.26**	**-4.35**	*	0.90	**-1.28**	*
Mo	**0.29**	0.45	*	*	*	-5.30	2.17	*	**-1.79**	*	0.03	**-1.45**	*
Nb	**-1.25**	0.27	*	**-0.39**	1.63	-9.34	**1.59**	**-0.09**	**-3.58**	**3.27**	-0.43	-0.37	*
Nd	**0.13**	-2.03	*	**-0.75**	-3.11	-4.84	**0.71**	**-0.23**	**-8.71**	*	0.42	**-2.52**	*
Ni	*	2.05	*	**0.51**	1.58	-1.16	**0.90**	*	**2.03**	**-6.99**	-1.80	**-4.06**	*
Pb	**0.06**	-2.86	*	*	2.52	-4.93	**1.16**	*	**-5.88**	*	0.64	**-2.50**	*
Pr	**0.30**	-1.24	*	*	*	-4.39	**2.37**	**0.17**	**-7.00**	*	0.27	**-2.31**	*
Rb	**-2.62**	0.74	*	*	-0.34	-11.54	**0.47**	**0.28**	**-0.49**	**1.44**	0.04	-1.02	*
Sb	*	-0.47	*	*	9.42	*	*	**10.04**	*	*	-0.23	**-1.54**	*
Sc	*	6.30	*	**0.18**	2.46	-6.51	7.04	**3.75**	**9.51**	**-2.93**	0.63	1.87	*
Sm	**0.00**	-1.73	*	**0.14**	-6.02	-2.36	**0.55**	**0.12**	**-6.78**	*	-0.21	**-1.52**	*
Sn	*	-0.45	*	*	*	-7.13	*	**0.11**	*	*	-0.09	*	*
Sr	**-0.68**	-0.46	*	**0.05**	-0.34	-3.38	**0.00**	*	**-0.68**	**0.23**	-0.11	-0.90	*
Ta	**-0.00**	-0.23	*	*	*	*	1.24	**5.39**	**-2.34**	*	-0.53	*	*
Tb	**-0.27**	-1.79	*	*	*	-1.56	**0.54**	**1.49**	**-5.28**	*	-0.07	**-0.81**	*
Th	**0.93**	-3.02	*	**0.18**	2.42	-4.55	**0.45**	**0.28**	**-7.67**	*	-0.10	**0.45**	*
Tl	**0.00**	-1.73	*	*	*	-4.97	*	**-0.63**	*	*	-0.04	**-0.81**	*
Tm	**-0.20**	-1.93	*	*	*	-3.45	**0.74**	**0.25**	**-5.42**	*	0.62	**-1.23**	*
U	**0.17**	-2.62	*	*	3.81	-4.85	**0.77**	**0.44**	**-5.90**	*	-0.05	**1.27**	*
V	*	1.82	*	**0.57**	1.36	-10.90	**2.73**	*	**-0.68**	**7.72**	-0.68	**0.23**	*
W	*	*-1.14*	*	*	*	*-6.33*	*-1.05*	***0.04***	*	*	*3.68*	*2.20*	*
Y	**-1.28**	-2.27	*	**-0.24**	1.35	-5.41	**-0.43**	**0.35**	*	**0.57**	-0.61	**-3.56**	*
Yb	**-0.46**	-2.29	*	**-0.50**	*	-4.74	**-0.15**	**0.97**	**-6.20**	*	0.10	**-1.33**	*
Zn	*	1.04	*	*	-1.12	-2.90	**0.64**	*	**-0.32**	**0.32**	-1.12	**-3.93**	5.75
Zr	**-4.43**	-3.78	*	**-6.31**	0.48	-12.68	**0.45**	*	**-4.26**	**-0.72**	-0.45	-1.04	*

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A96	A97	A98	A99	A101	A102	A103	A104	A105	A106	A107	A108	A109
SiO2	*	1.16	3.89	1.48	*	-0.24	*	1.11	*	1.98	0.22	0.52	-1.68
TiO2	*	1.37	1.80	0.43	0.69	-0.08	*	-4.95	-1.16	-0.77	0.02	0.18	-0.61
Al2O3	*	2.61	1.04	1.62	*	-0.26	*	0.83	*	-0.99	0.15	0.57	-0.81
Fe2O3T	*	0.85	0.32	2.08	2.01	*	*	-2.11	*	-0.95	*	0.27	-2.07
MnO	*	0.00	-0.85	0.53	0.00	0.35	*	-7.07	0.00	-0.18	0.48	0.88	0.35
MgO	*	1.84	0.33	-0.42	-7.36	-1.00	*	-3.85	*	-1.19	-0.04	-0.17	-0.46
CaO	*	-1.93	2.15	-0.02	-0.16	-0.23	*	-0.83	*	-0.07	0.06	0.73	-2.20
K2O	*	0.66	3.44	2.00	2.10	-0.33	*	3.35	*	-0.73	0.21	2.95	-0.08
P2O5	*	-2.79	4.40	2.07	*	-1.05	*	-5.28	*	-0.15	0.58	3.58	2.09
LOI	*	2.18	*	*	*	4.70	*	6.29	*	*	-0.48	-0.27	-2.67
As	*	*4.75*	*2.41*	*	*	*	*	*	*	*	*	*	*-0.11*
Ba	*	0.49	1.00	0.16	0.71	-0.01	*	0.75	-1.18	-0.17	0.71	*	-0.23
Be	*	*	-0.56	*	*	*	*	*	0.57	*	0.27	-6.49	-2.60
Bi	*	*	*	-1.02	*	*	*	*	1.31	*	*	*	*
C(tot)	*	*	*	*	*	*	1.09	*	*	-0.56	-0.39	*	*
Ce	3.27	-0.03	0.37	0.57	0.37	0.13	*	-2.72	-0.51	-0.01	0.12	*	2.66
Co	*	1.19	-0.55	0.59	-0.83	*	*	2.37	-0.71	*	0.33	*	-2.18
Cr	*	0.16	-11.72	2.85	-1.87	-0.51	*	-2.53	-0.85	0.42	0.59	*	-2.68
Cs	*	7.43	0.90	0.97	-1.42	0.11	*	*	-0.21	*	0.31	*	*
Cu	*	*-2.21*	*-1.76*	*1.42*	*-0.16*	*-0.63*	*	*2.53*	*-1.74*	*	*-0.63*	*	*-4.48*
Dy	2.64	*	0.45	-2.38	0.70	1.34	*	-5.10	0.00	*	0.11	*	1.74
Er	1.65	*	0.48	-2.24	1.06	0.71	*	-4.13	-0.30	*	0.04	*	1.54
Eu	4.16	*	0.06	-0.21	-1.08	0.81	*	-1.13	-0.11	*	0.06	*	1.99
F	*	*	*	*	*	*	*	*	*	*	*1.88*	*	*
Ga	*	-1.69	-0.09	-1.56	*	*	*	-2.68	0.00	*	0.27	*	5.48
Gd	3.52	*	0.03	-0.40	1.37	0.31	*	-4.67	-0.55	*	0.24	*	2.86
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	*	*	1.39	-2.42	*	0.40	*	*	-0.40	*	0.00	*	*
Ho	1.66	*	0.18	-1.96	-0.92	1.09	*	-3.25	-0.31	*	-0.05	*	1.05
In	*	*	*	*	*	*	*	*	*	*	*0.03*	*	*
La	3.38	13.57	0.25	0.15	-1.76	0.35	*	-3.53	-0.99	-0.94	0.16	*	2.50
Li	*	*	-1.11	0.08	-0.51	*	*	-3.07	0.08	*	-0.17	*	*
Lu	1.98	*	0.23	-1.62	-1.02	0.26	*	-0.77	0.00	*	-0.07	*	-2.95
Mo	*	*	0.01	1.88	*	*	*	*	-0.17	*	0.76	*	-1.06
Nb	*	-1.90	-0.53	-3.84	*	-0.63	*	9.73	0.17	*	-0.00	*	*
Nd	5.20	-2.11	0.11	0.81	1.15	0.01	*	-3.28	-0.46	*	0.49	*	2.26
Ni	*	1.47	-0.60	0.82	-1.04	-1.35	*	-2.48	-0.23	-2.09	0.37	*	-2.79
Pb	*	16.29	-0.46	0.38	-0.20	0.00	*	*	0.17	*	-0.13	*	1.45
Pr	3.88	*	0.18	0.30	-1.06	0.43	*	-4.77	-0.81	*	0.20	*	1.79
Rb	*	-0.88	0.33	-1.13	*	-0.65	*	-1.65	-0.30	*	0.69	*	0.36
Sb	*	*	0.85	*	*	*	*	*	*	*	-0.25	*	1.48
Sc	*	2.30	-0.97	-1.49	*	-0.05	*	-2.93	-0.05	*	0.30	*	*
Sm	3.99	-9.67	0.07	0.44	0.76	0.92	*	-2.56	-0.26	*	0.27	*	1.85
Sn	*	*	0.15	*	*	*	*	*	1.14	*	0.57	*	-0.84
Sr	*	-1.13	0.65	0.23	-0.11	1.35	*	-0.68	0.00	*	0.11	*	-5.08
Ta	*	*	0.11	*	*	0.20	*	*	-0.18	*	-0.08	*	*
Tb	5.15	*	0.27	-0.44	-0.81	1.35	*	-4.20	-0.27	*	0.25	*	1.45
Th	*	-0.04	0.62	0.61	-0.18	0.40	*	-1.67	-0.86	*	0.01	*	1.94
Tl	*	*	0.46	1.52	*	*	*	*	1.52	*	-0.08	*	-0.73
Tm	1.11	*	0.18	*	-0.99	0.25	*	-1.23	0.00	*	0.13	*	0.51
U	*	12.03	-0.66	0.47	0.17	0.22	*	2.10	-0.16	*	0.11	*	0.90
V	*	-0.91	-0.09	-1.88	0.11	-0.45	*	-2.95	-1.14	0.00	0.07	*	-1.54
W	*	*190.25*	*2.15*	*	*	*	*	*	*	*	*0.22*	*	*
Y	1.80	-0.14	-0.98	4.50	-3.52	0.79	*	-5.12	0.50	-0.78	0.44	*	3.48
Yb	2.43	*	0.51	-1.40	0.64	*	*	-2.87	0.15	*	0.39	*	1.69
Zn	*	-0.64	0.21	-0.38	-0.10	-1.60	*	0.96	-1.53	-0.16	0.30	*	-2.82
Zr	*	-1.06	0.56	1.08	*	-0.22	*	-0.39	-0.56	-0.28	-0.23	*	*

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

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017

Lab Code	A110	A111	A112	A113	A114	A115	A116	A117	A118	A119	A120	A121	A122
SiO2	0.04	0.12	*	0.28	**-1.55**	**-2.16**	**-0.15**	**0.17**	**-1.98**	0.01	**-0.15**	-0.22	**-0.97**
TiO2	0.37	0.05	*	0.37	**-1.16**	**2.64**	**-1.16**	**3.40**	**-1.16**	-0.33	**1.37**	-0.14	**5.80**
Al2O3	1.17	0.05	-0.73	1.59	**10.29**	**-1.46**	**-0.58**	**0.36**	**-0.89**	-0.11	**0.68**	2.27	**-2.93**
Fe2O3T	-0.19	-0.34	-1.36	-0.34	**-8.34**	**4.22**	**0.04**	**0.44**	**1.57**	0.20	**-0.98**	0.32	**4.02**
MnO	3.54	-0.35	-0.71	0.53	**-7.07**	**-3.54**	**0.00**	**0.46**	**3.54**	2.12	**0.00**	-1.11	**3.54**
MgO	1.09	-0.59	*	2.93	**-1.17**	**1.17**	**0.50**	**2.22**	**0.00**	0.08	**0.17**	-0.59	**3.85**
CaO	-2.20	-0.24	*	-1.09	**-3.12**	**0.28**	**-0.06**	**-2.49**	**4.77**	0.38	**-0.23**	0.01	**-1.17**
K2O	-0.24	0.47	0.97	-0.10	**-1.47**	**11.99**	**0.23**	**0.87**	**0.52**	0.32	**1.23**	0.40	**5.47**
P2O5	-0.15	-0.15	-0.40	*	**-0.30**	**-22.70**	**-0.30**	**5.92**	**-5.28**	0.72	**4.68**	-0.02	**2.19**
LOI	0.72	-0.11	-0.34	-1.57	**2.84**	**5.50**	2.35	**-0.28**	**4.17**	-0.21	**1.65**	*	**3.31**
As	*	*	*	*	*	***15.00***	***-3.29***	***10.12***	*	*0.43*	*	*	*
Ba	*	*	0.83	1.59	*	*	**-0.51**	**-0.01**	*	0.04	*	0.22	**2.92**
Be	*	*	-0.64	*	*	*	*	*	*	-1.02	*	*	*
Bi	*	*	*	*	*	*	*	*	*	1.53	*	*	*
C(tot)	*	*	-2.50	*	*	*	*	*	*	0.42	**-0.28**	0.42	*
Ce	*	*	0.81	*	*	*	**-2.39**	**0.87**	*	0.21	*	0.29	**-1.81**
Co	*	*	-0.89	*	*	**2.37**	**-3.44**	**2.37**	*	1.25	*	32.50	**-17.79**
Cr	*	*	*	*	*	**-6.23**	**-0.72**	**-0.85**	*	0.08	*	*	**6.21**
Cs	*	*	*	*	*	*	*	**-0.53**	*	0.27	*	*	**0.24**
Cu	*	*	*	*	*	***2.53***	***-5.38***	***-3.80***	***7.28***	*-0.27*	*	*	***0.95***
Dy	*	*	-1.06	*	*	*	*	*	*	0.18	*	1.06	**0.98**
Er	*	*	-0.81	*	*	*	*	*	*	0.38	*	0.65	**-1.76**
Eu	*	*	-0.15	*	*	*	*	*	*	-0.01	*	0.50	**-0.11**
F	*	*	*	*	*	*	*	***22.21***	*	*-0.57*	*	*	*
Ga	*	*	-0.84	*	*	*	**-0.70**	**1.29**	**0.30**	0.90	*	*	**11.85**
Gd	*	*	0.33	*	*	*	*	*	*	-0.22	*	0.54	**-1.99**
Ge	*	*	*	*	*	*	*	*	*	0.25	*	*	**10.98**
Hf	*	*	0.42	*	*	*	*	*	*	0.24	*	*	**1.32**
Ho	*	*	-1.04	*	*	*	*	*	*	0.08	*	0.61	**-2.66**
In	*	*	*-1.22*	*	*	*	*	*	*	*	*	*	*
La	*	*	0.58	*	*	*	**-1.76**	**-1.87**	*	0.11	*	0.10	**1.19**
Li	*	*	-0.59	*	*	*	*	*	*	0.36	*	1.96	*
Lu	*	*	-0.51	*	*	*	*	*	*	0.13	*	0.65	**-1.28**
Mo	*	*	*	*	*	*	**2.37**	**33.63**	**68.35**	4.37	*	*	*
Nb	*	*	0.92	*	*	*	**0.17**	**-0.61**	*	-0.30	*	*	**0.68**
Nd	*	*	-0.35	*	*	*	**-0.70**	**0.24**	*	0.36	*	0.55	**-1.65**
Ni	*	*	0.08	*	*	**2.59**	**0.90**	**1.47**	**-3.61**	1.58	*	*	**1.47**
Pb	*	*	*	*	*	**44.45**	**7.85**	**-8.11**	*	-0.66	*	*	**23.80**
Pr	*	*	-0.40	*	*	*	*	*	*	0.07	*	0.41	**-1.03**
Rb	*	*	0.04	-3.43	**-6.86**	*	**-1.42**	**0.28**	**-0.68**	0.53	*	*	**-0.30**
Sb	*	*	*	*	*	*	*	**3.40**	*	0.15	*	*	*
Sc	*	*	0.56	*	*	*	**-0.97**	**1.00**	*	-0.81	*	1.83	**3.22**
Sm	*	*	-0.40	*	*	*	**2.89**	*	*	-0.24	*	0.41	**-1.04**
Sn	*	*	*	*	*	*	*	**-3.01**	*	-0.74	*	*	*
Sr	21.07	*	0.00	-1.46	**-4.28**	*	**-0.52**	**0.00**	**-1.80**	-0.14	*	0.73	**-0.11**
Ta	*	*	*	*	*	*	**28.08**	*	*	-0.53	*	*	**24.66**
Tb	*	*	-0.14	*	*	*	*	*	*	-0.34	*	0.68	**-0.95**
Th	*	*	-0.27	*	*	*	**3.37**	**1.58**	*	-0.25	*	0.98	**-1.34**
Tl	*	*	0.04	*	*	**6.18**	*	*	*	0.40	*	*	*
Tm	*	*	-0.86	*	*	*	*	*	*	0.12	*	0.38	**-1.97**
U	*	*	*	*	*	*	**5.96**	**13.13**	*	-0.47	*	0.72	**-0.16**
V	*	*	0.45	*	*	**-12.26**	**-1.00**	**2.27**	*	-0.79	*	0.10	**0.00**
W	*	*	*	*	*	*	***25.64***	*	*	*0.83*	*	*	*
Y	*	*	0.18	*	*	*	**-0.71**	**-0.14**	**1.99**	0.07	*	0.02	**2.42**
Yb	*	*	-0.90	*	*	*	*	*	*	-0.05	*	0.51	**-2.00**
Zn	19.95	*	0.16	3.99	**4.15**	**6.70**	**5.59**	**0.32**	**0.32**	0.64	*	1.56	**1.92**
Zr	*	*	0.14	3.43	**6.85**	*	**-1.35**	**-0.72**	**-0.56**	0.40	*	4.24	**-1.90**

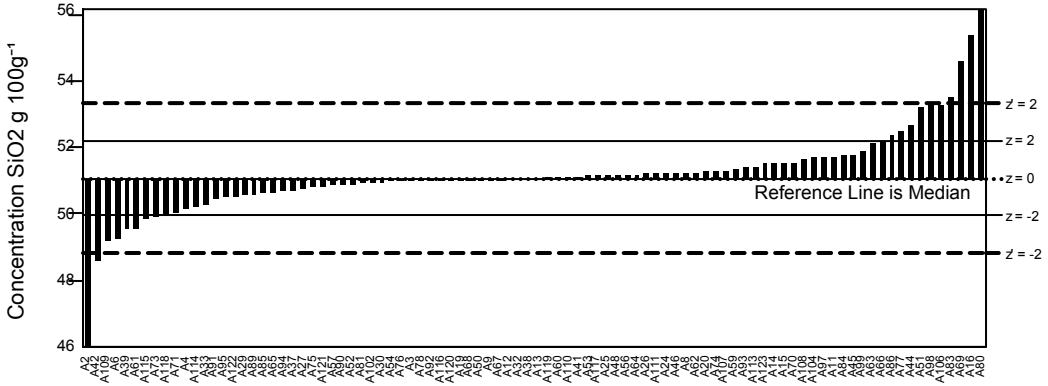
Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - *Entries in italics* are derived from Provisional Values.

Table 3 - GeoPT42 Z-scores for Queenston shale, QS-1. 13/12/2017 9

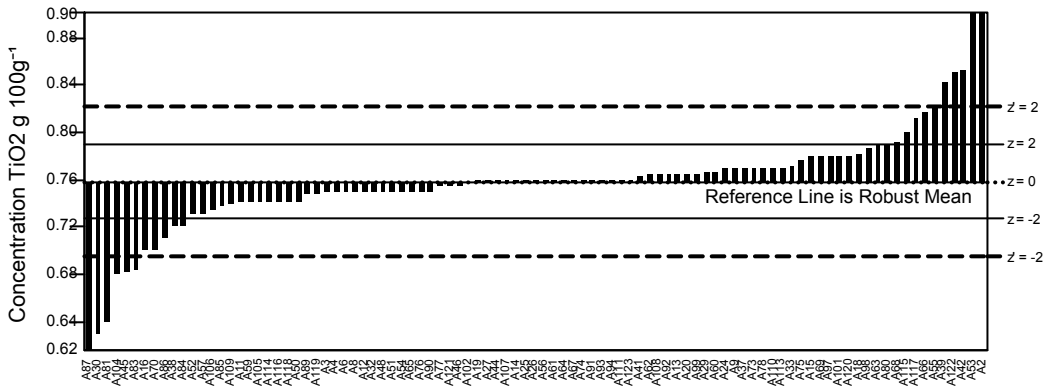
Lab Code	A123
SiO2	0.79
TiO2	0.11
Al2O3	0.52
Fe2O3T	1.98
MnO	0.00
MgO	-1.84
CaO	1.55
K2O	-0.90
P2O5	-0.30
LOI	-0.48
As	*73.51*
Ba	3.93
Be	0.75
Bi	10.46
C(tot)	*
Ce	-1.97
Co	-4.63
Cr	3.89
Cs	-0.88
Cu	*-2.59*
Dy	-1.37
Er	-0.30
Eu	1.09
F	*
Ga	-1.29
Gd	0.33
Ge	38.85
Hf	7.81
Ho	0.04
In	*
La	2.70
Li	5.40
Lu	0.26
Mo	1.22
Nb	-0.35
Nd	-2.16
Ni	0.06
Pb	-2.23
Pr	0.14
Rb	0.86
Sb	*
Sc	1.91
Sm	-0.43
Sn	30.17
Sr	1.80
Ta	11.10
Tb	1.22
Th	-4.34
Tl	-0.27
Tm	0.25
U	0.17
V	2.50
W	*61.41*
Y	-2.92
Yb	-1.02
Zn	6.99
Zr	1.13

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

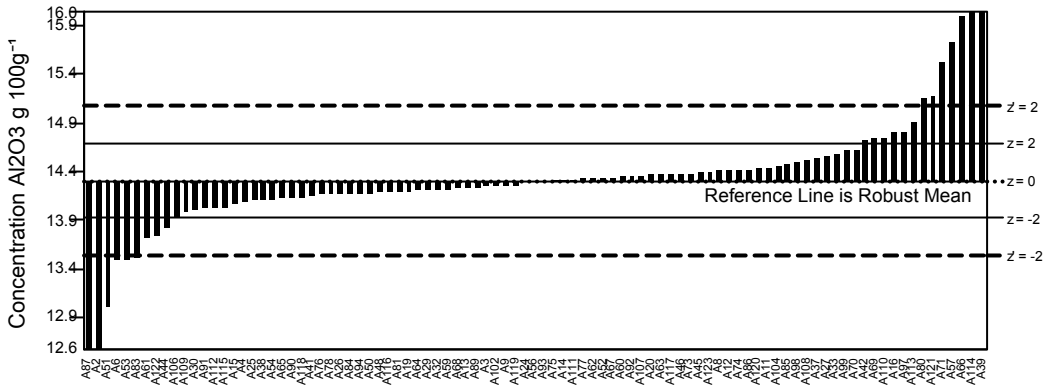
GeoPT42 - Barchart for SiO2



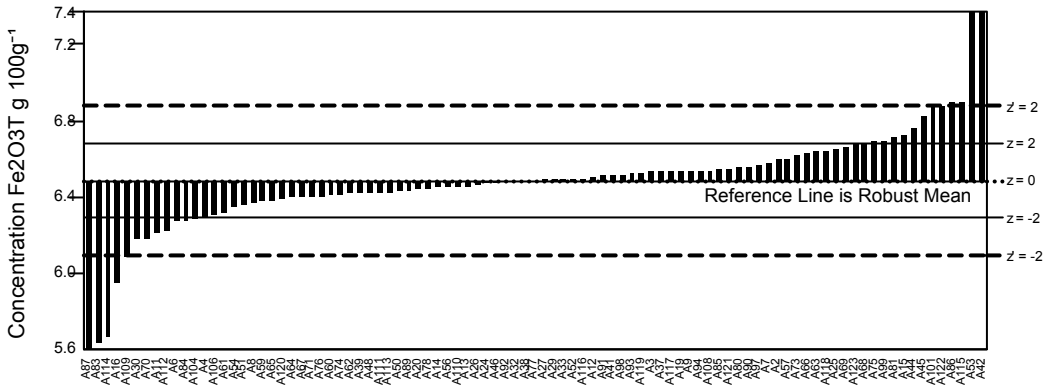
GeoPT42 - Barchart for TiO2



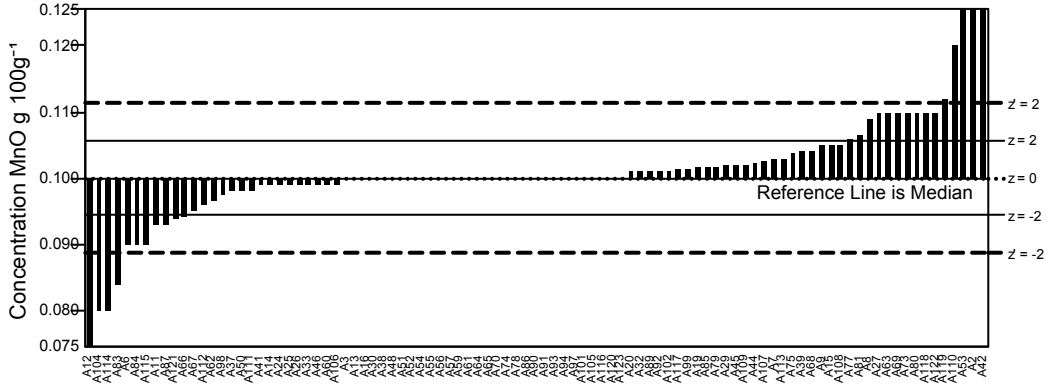
GeoPT42 - Barchart for Al2O3



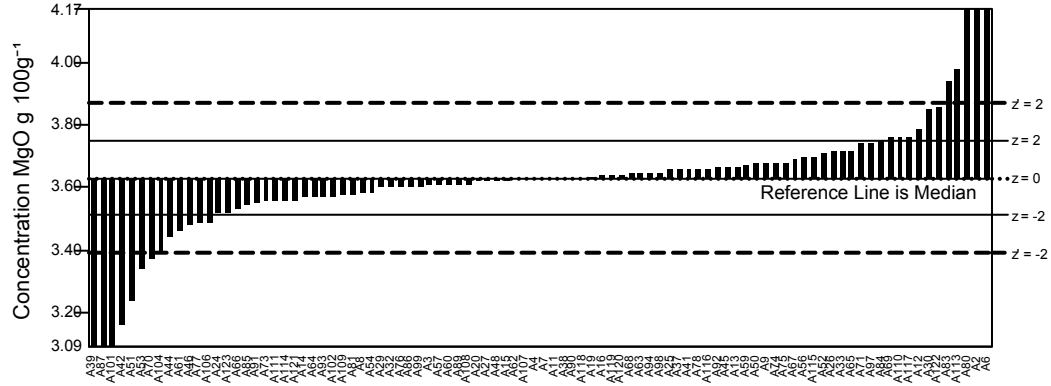
GeoPT42 - Barchart for Fe2O3T



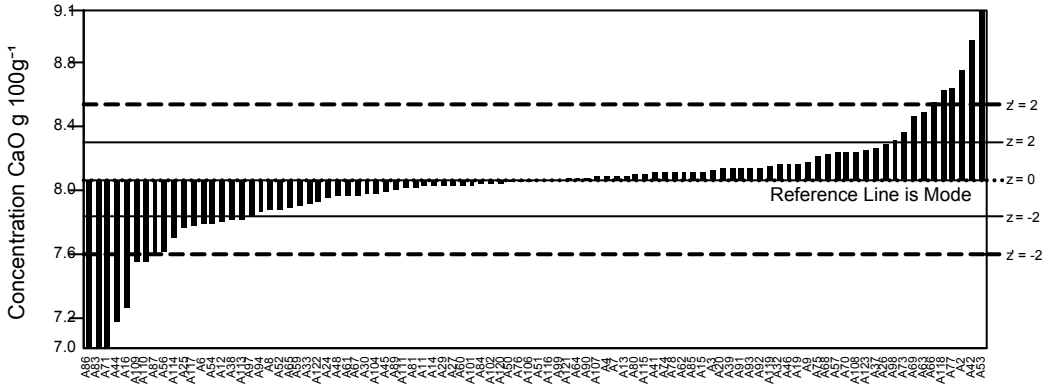
GeoPT42 - Barchart for MnO



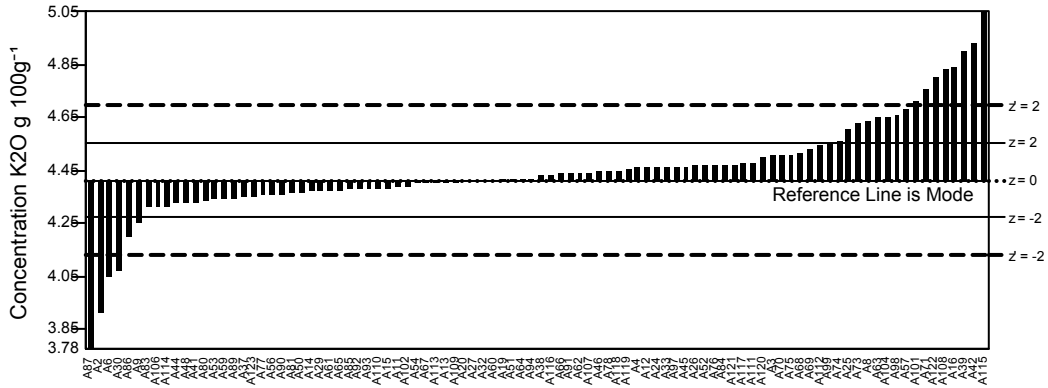
GeoPT42 - Barchart for MgO



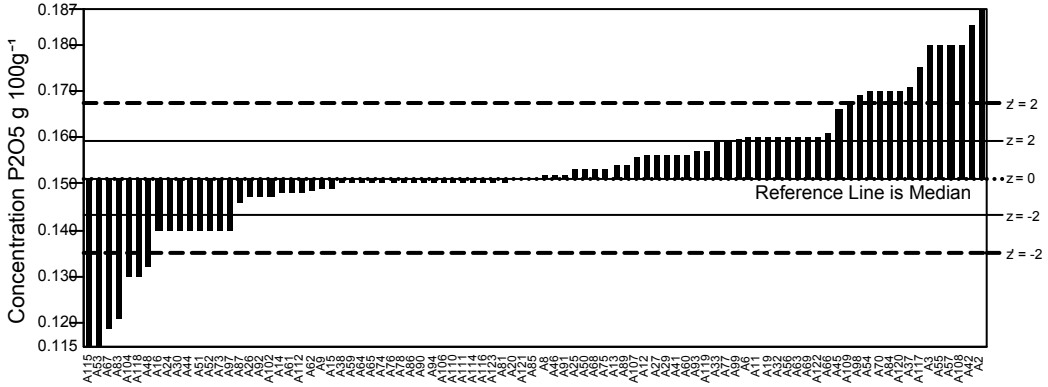
GeoPT42 - Barchart for CaO



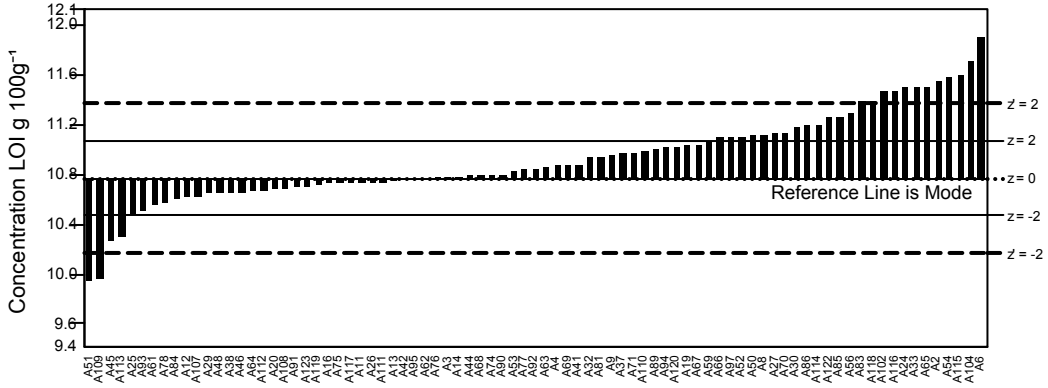
GeoPT42 - Barchart for K2O



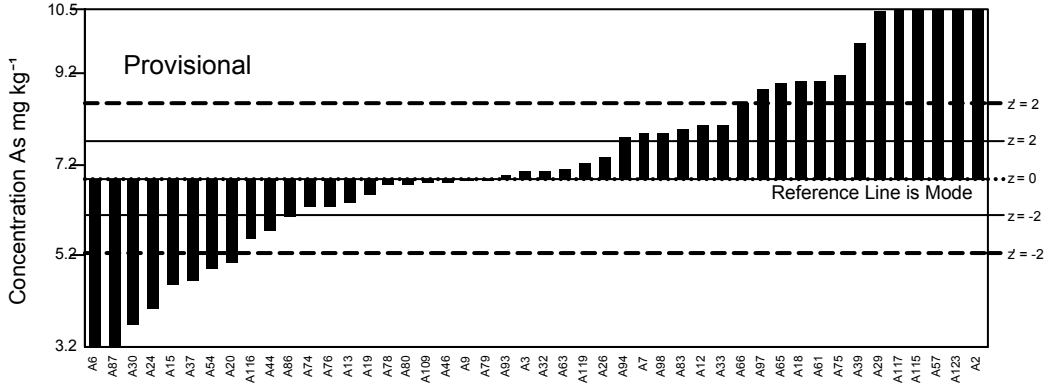
GeoPT42 - Barchart for P2O5



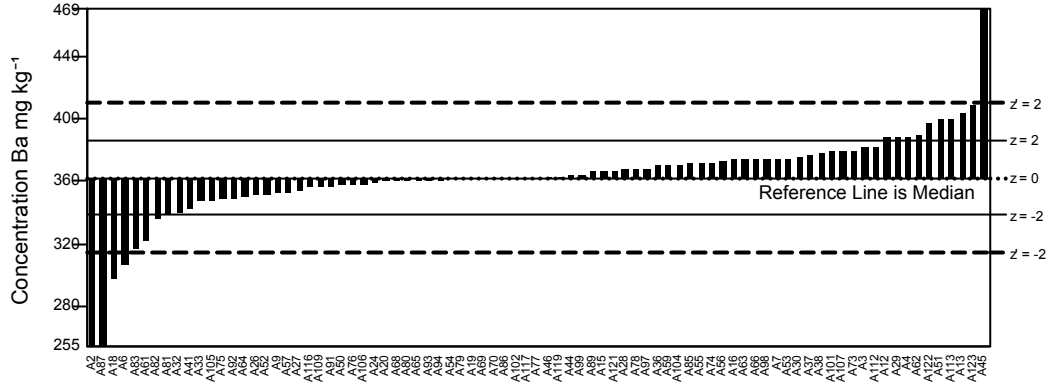
GeoPT42 - Barchart for LOI



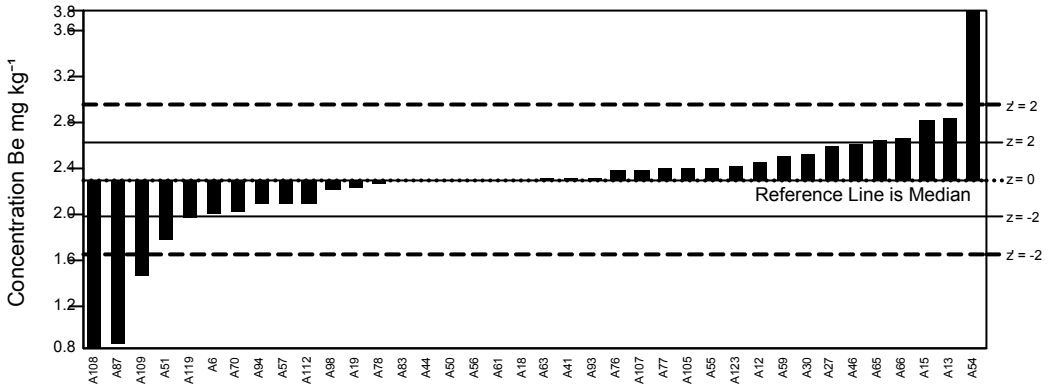
GeoPT42 - Barchart for As



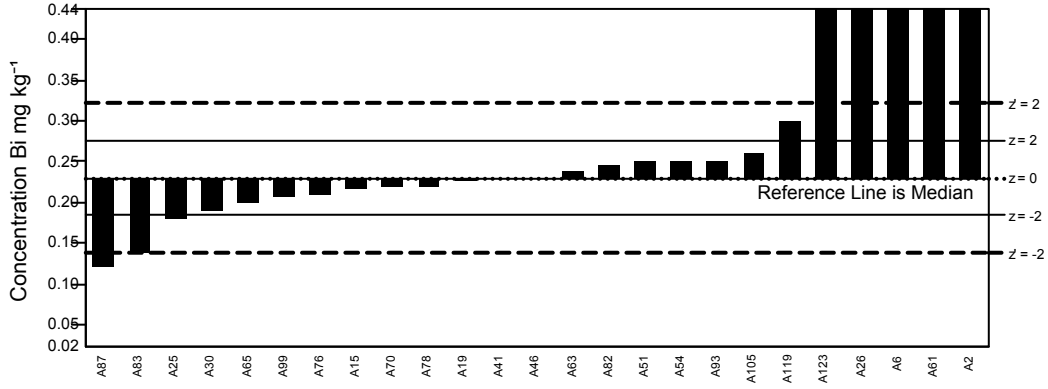
GeoPT42 - Barchart for Ba



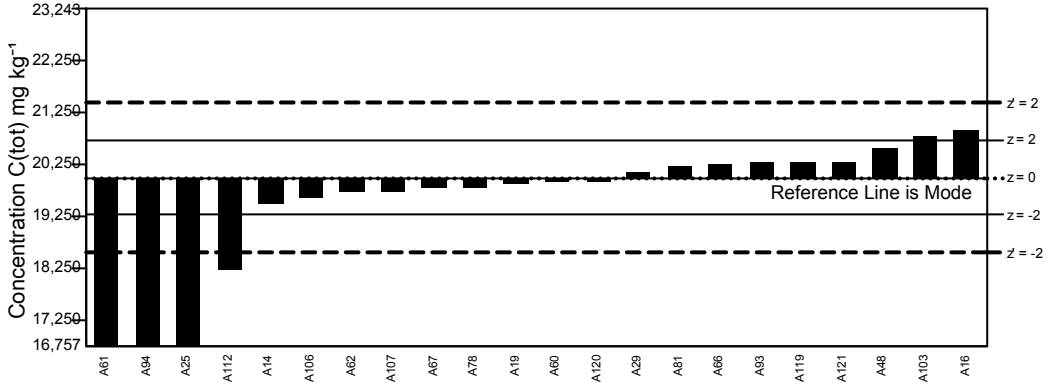
GeoPT42 - Barchart for Be



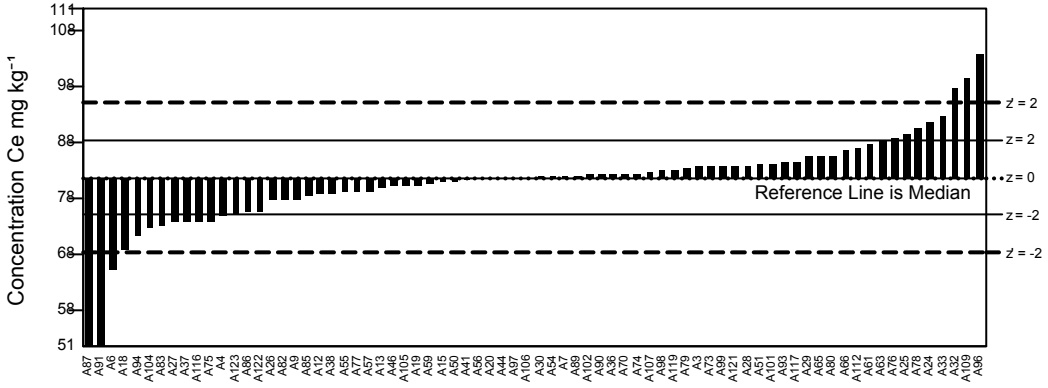
GeoPT42 - Barchart for Bi



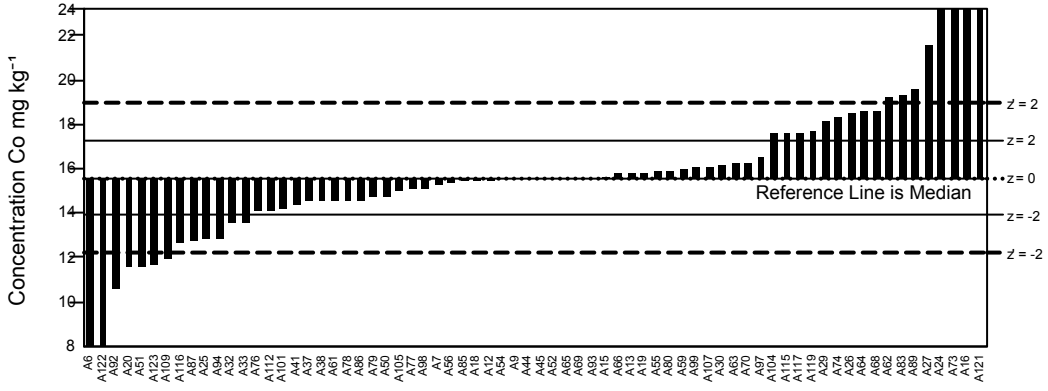
GeoPT42 - Barchart for C(tot)



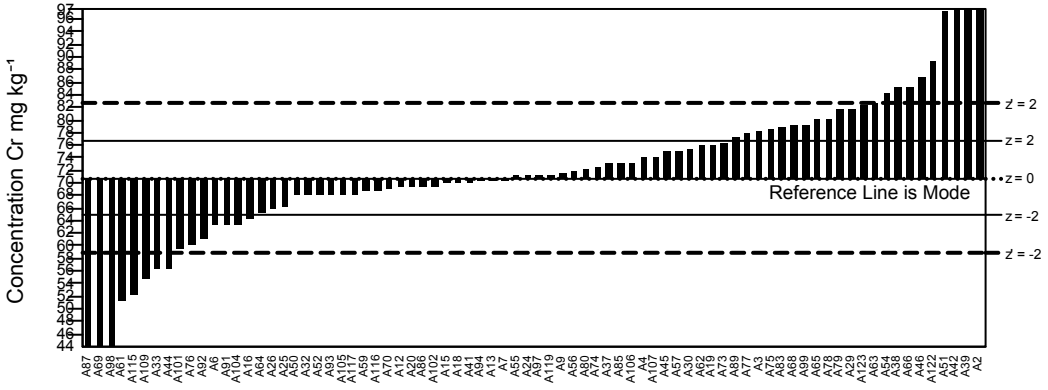
GeoPT42 - Barchart for Ce



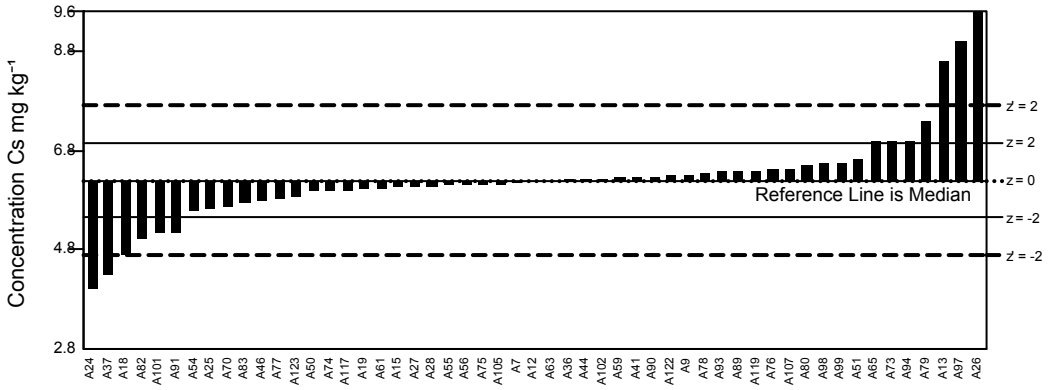
GeoPT42 - Barchart for Co



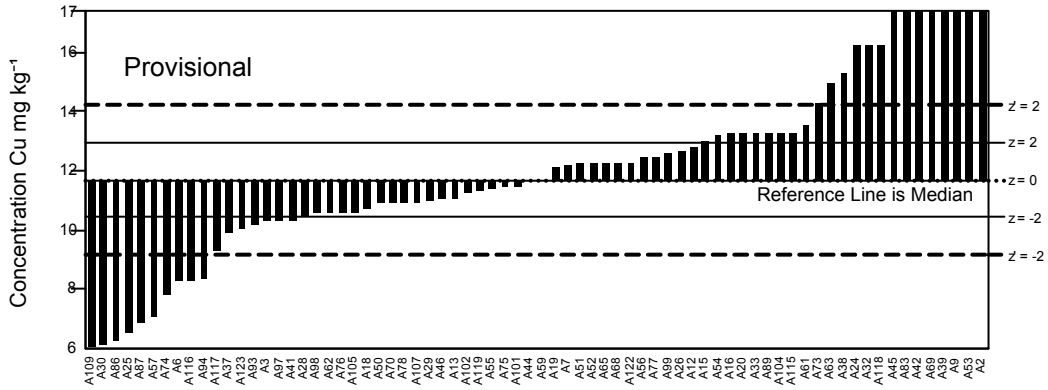
GeoPT42 - Barchart for Cr



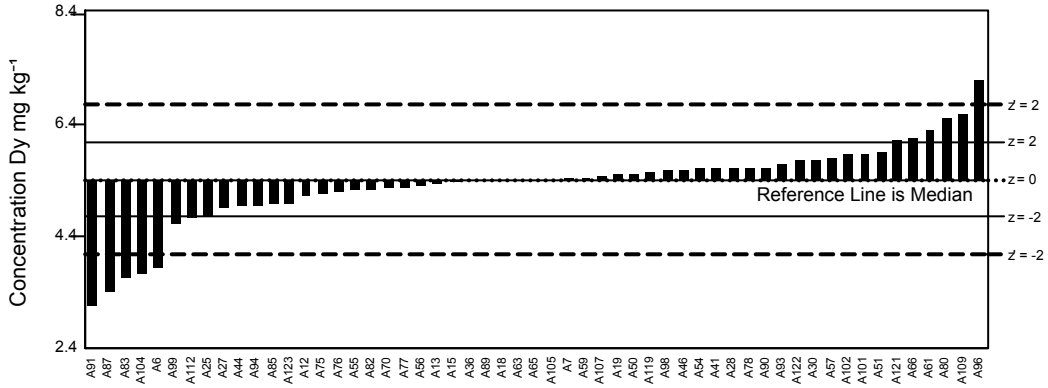
GeoPT42 - Barchart for Cs



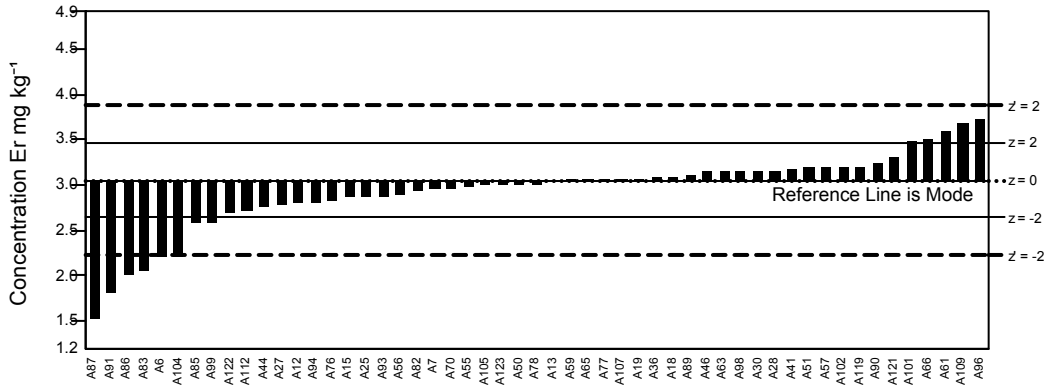
GeoPT42 - Barchart for Cu



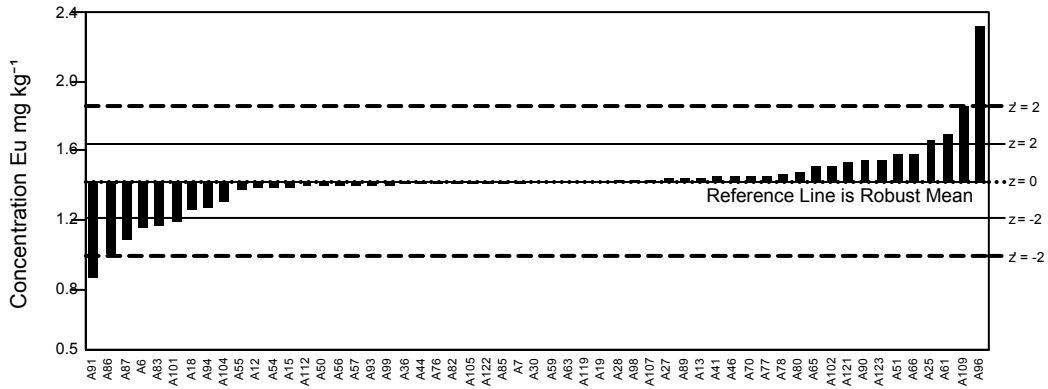
GeoPT42 - Barchart for Dy



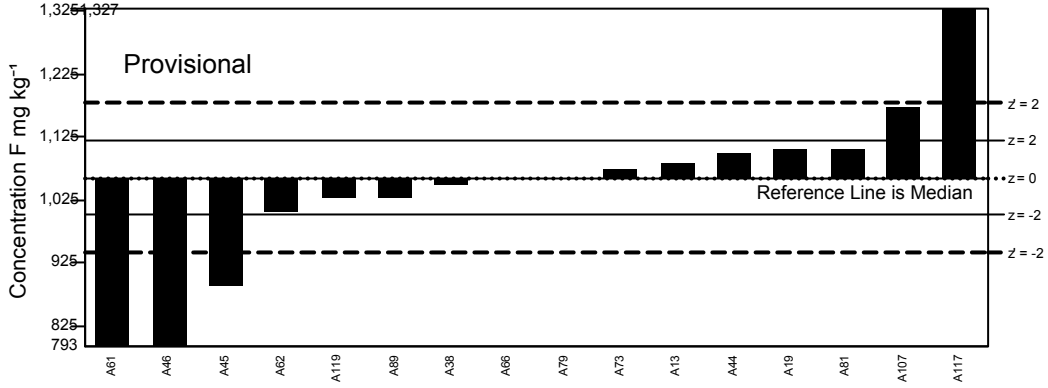
GeoPT42 - Barchart for Er



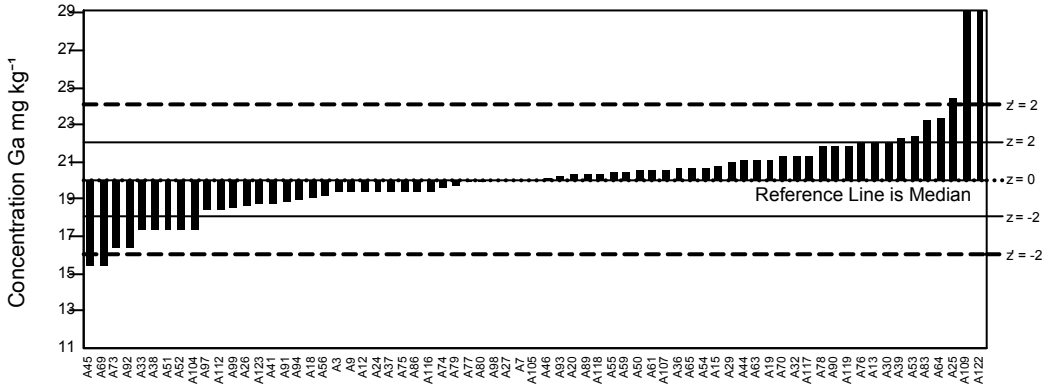
GeoPT42 - Barchart for Eu



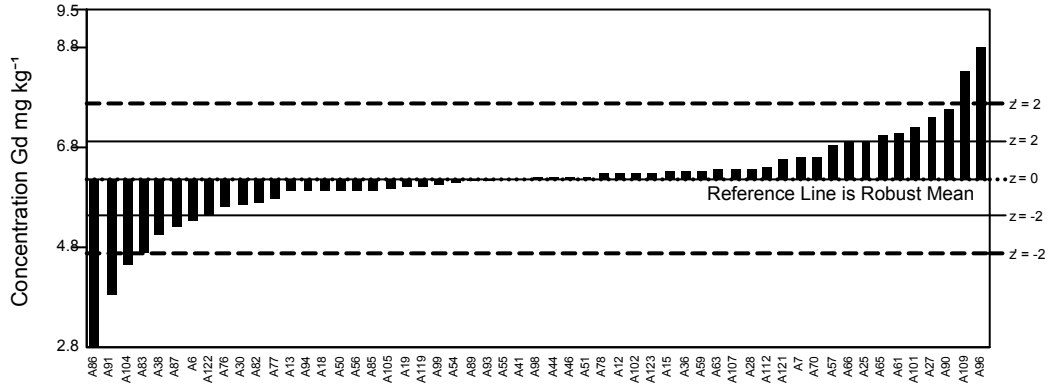
GeoPT42 - Barchart for F



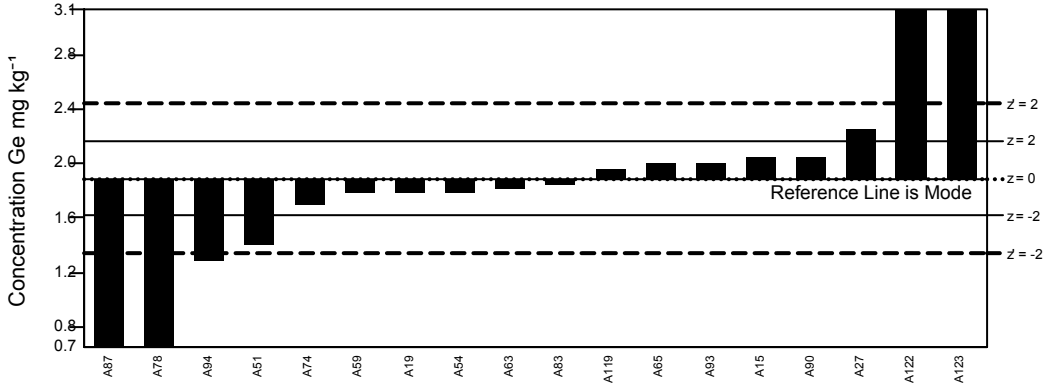
GeoPT42 - Barchart for Ga



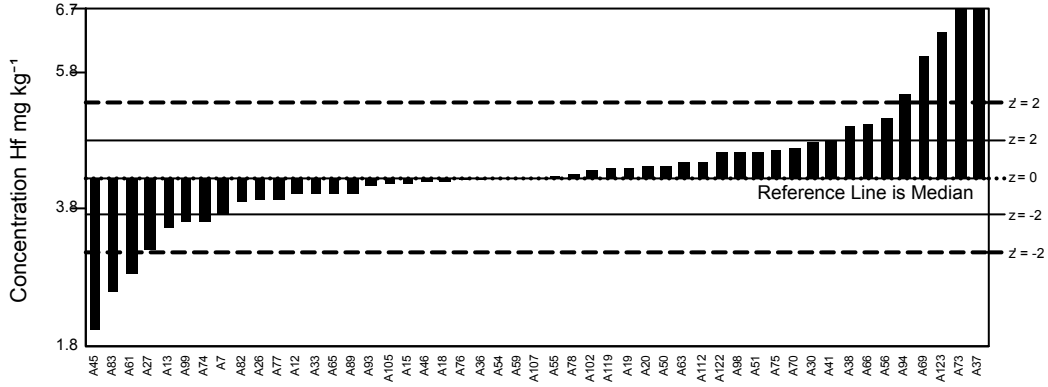
GeoPT42 - Barchart for Gd



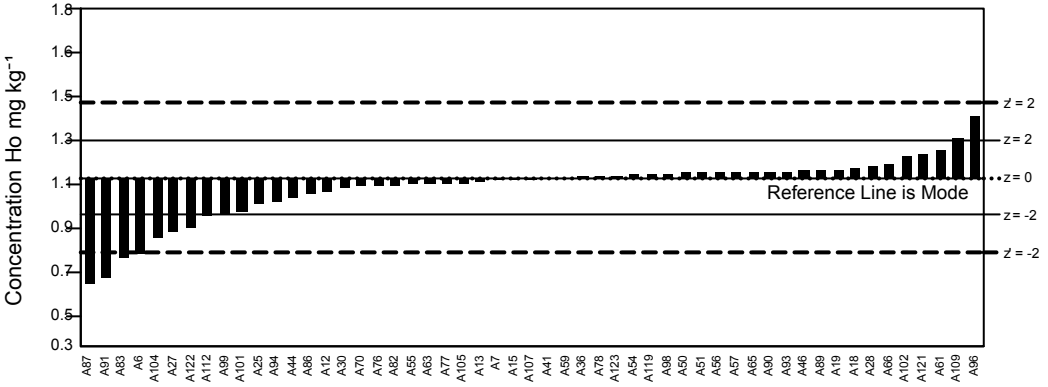
GeoPT42 - Barchart for Ge



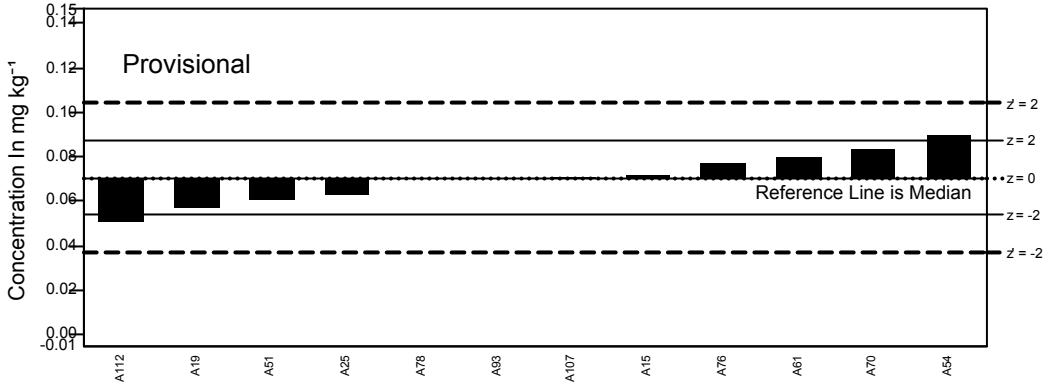
GeoPT42 - Barchart for Hf



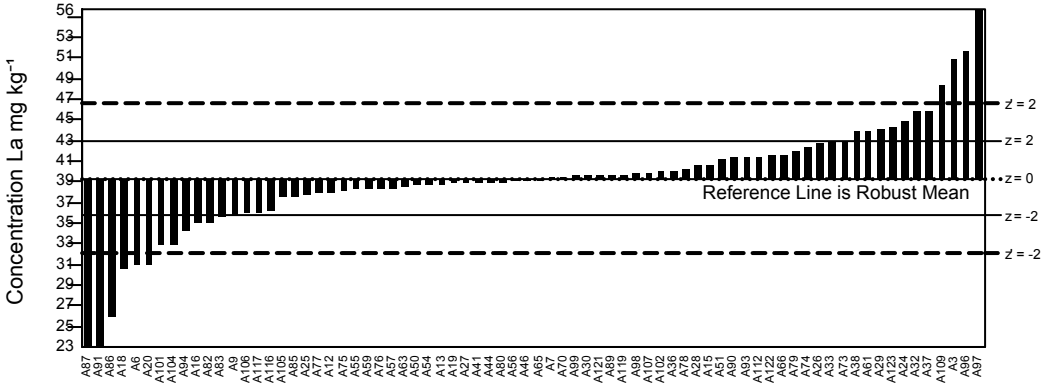
GeoPT42 - Barchart for Ho



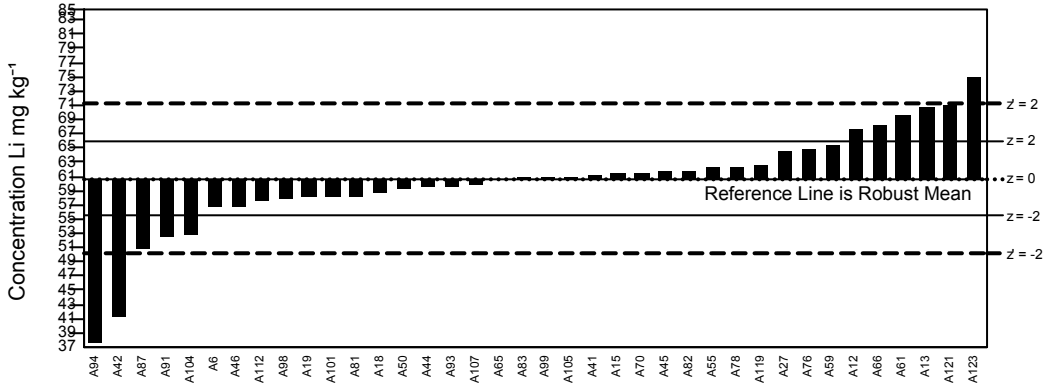
GeoPT42 - Barchart for In



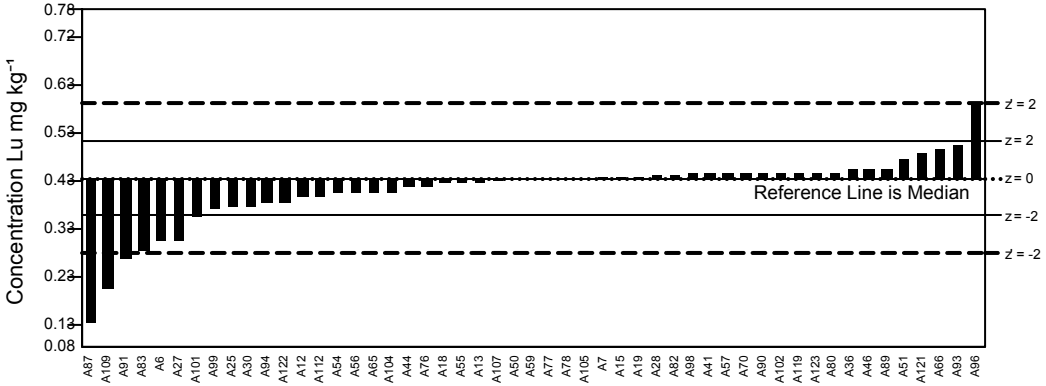
GeoPT42 - Barchart for La



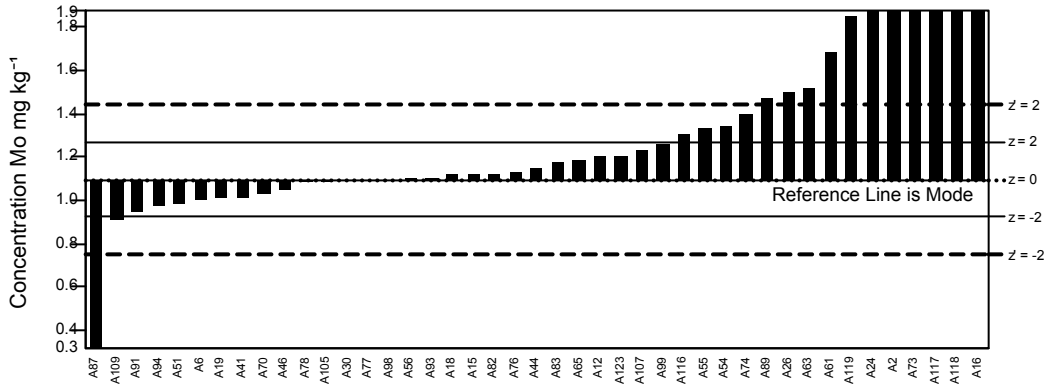
GeoPT42 - Barchart for Li



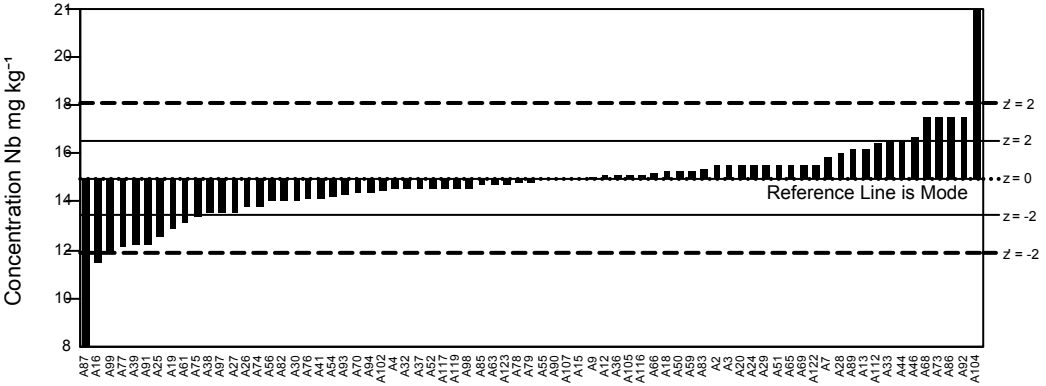
GeoPT42 - Barchart for Lu



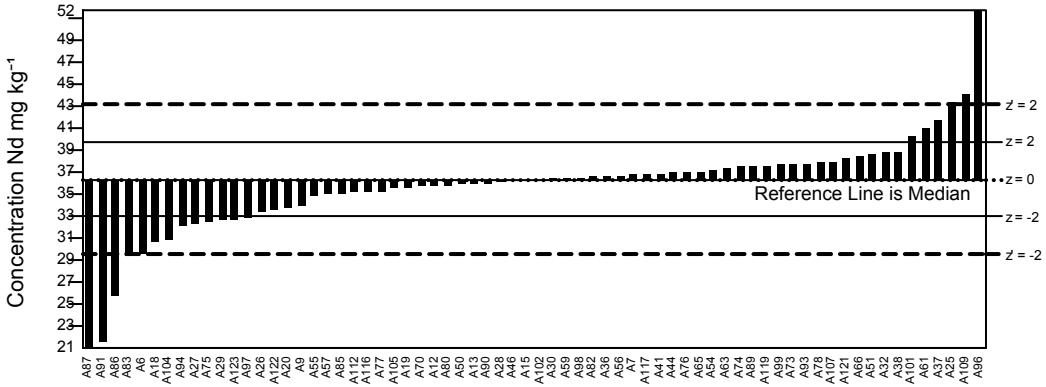
GeoPT42 - Barchart for Mo



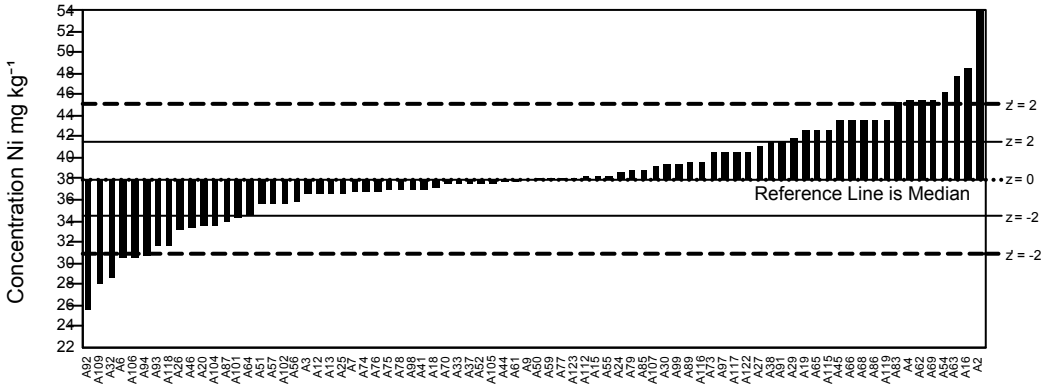
GeoPT42 - Barchart for Nb



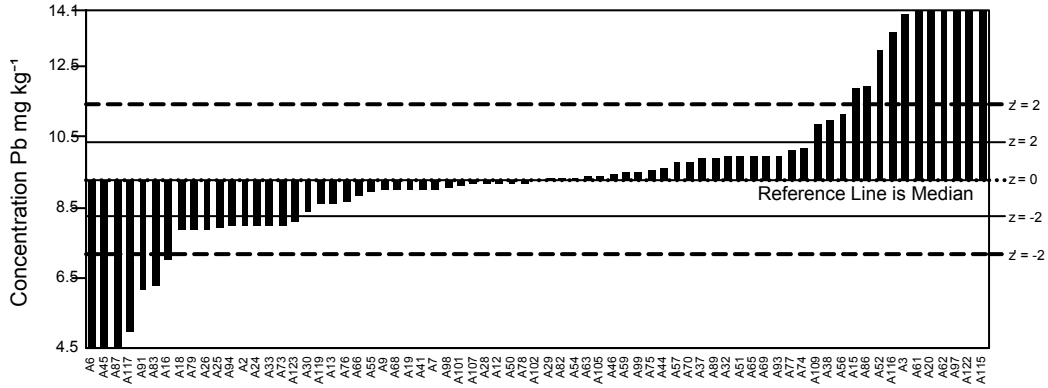
GeoPT42 - Barchart for Nd



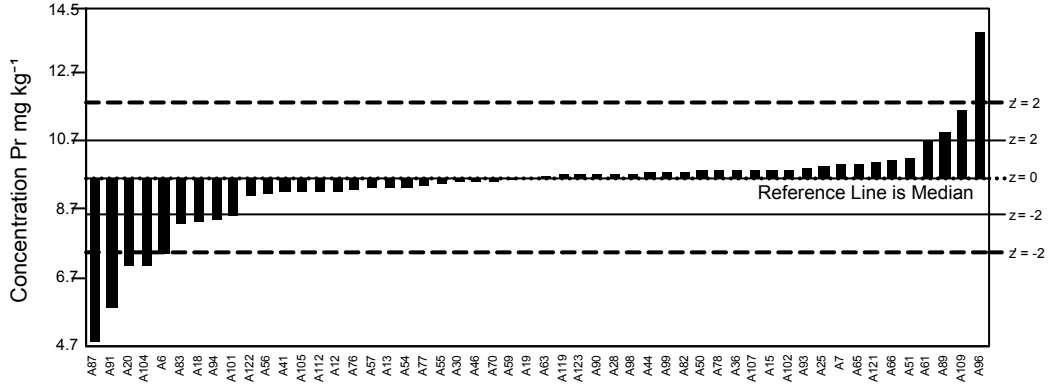
GeoPT42 - Barchart for Ni



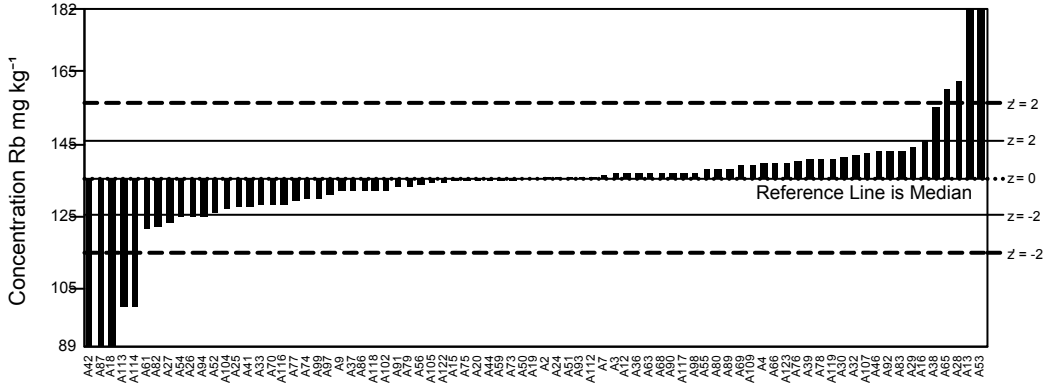
GeoPT42 - Barchart for Pb



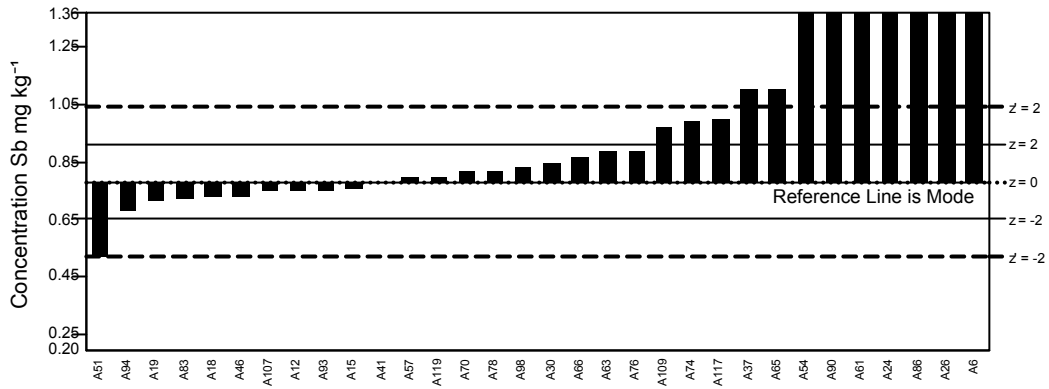
GeoPT42 - Barchart for Pr



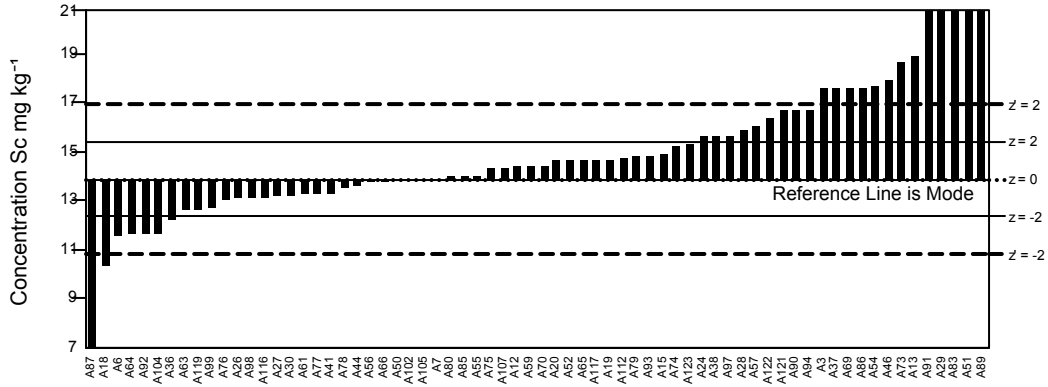
GeoPT42 - Barchart for Rb



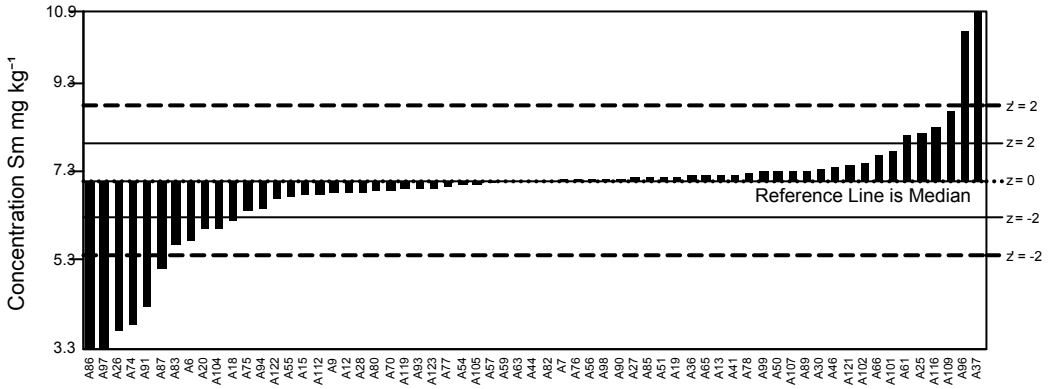
GeoPT42 - Barchart for Sb



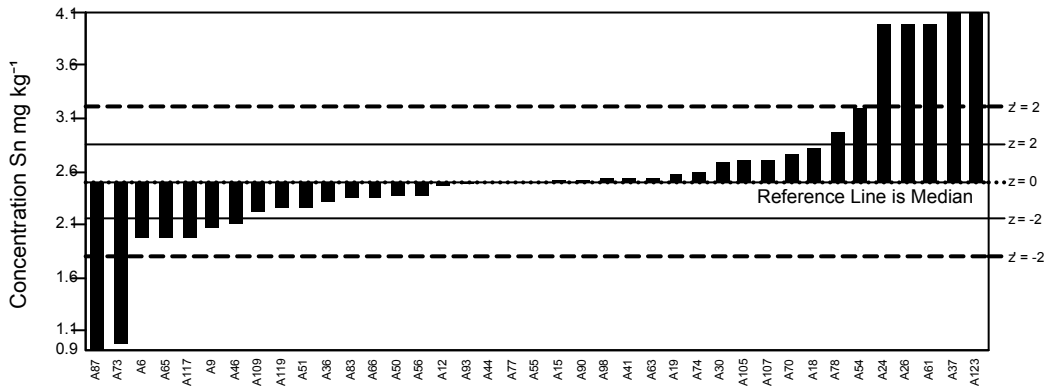
GeoPT42 - Barchart for Sc



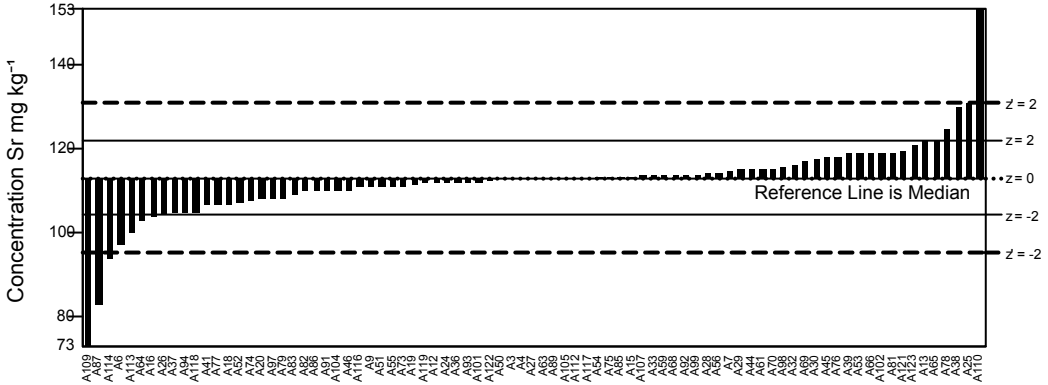
GeoPT42 - Barchart for Sm



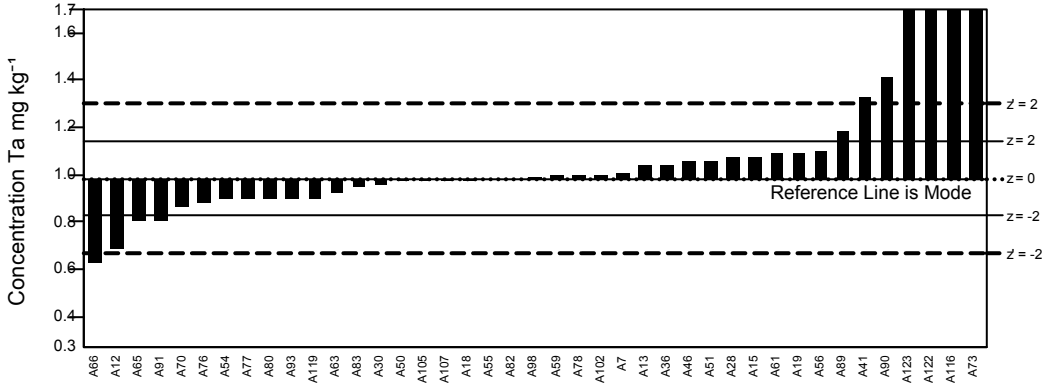
GeoPT42 - Barchart for Sn



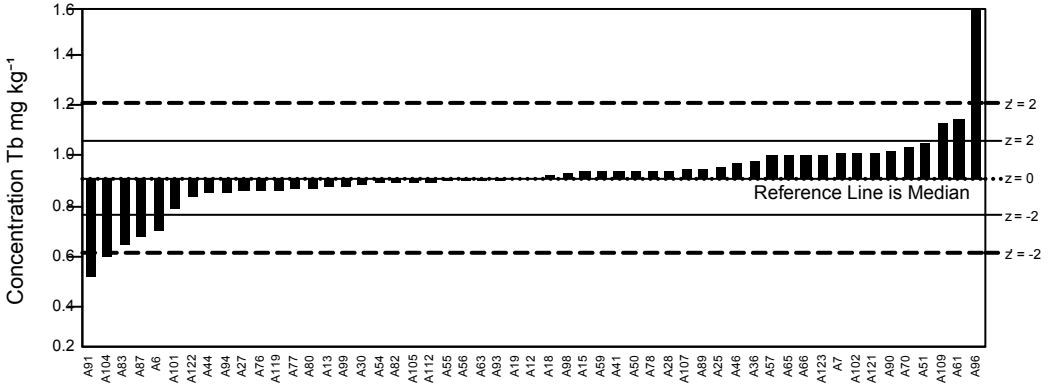
GeoPT42 - Barchart for Sr



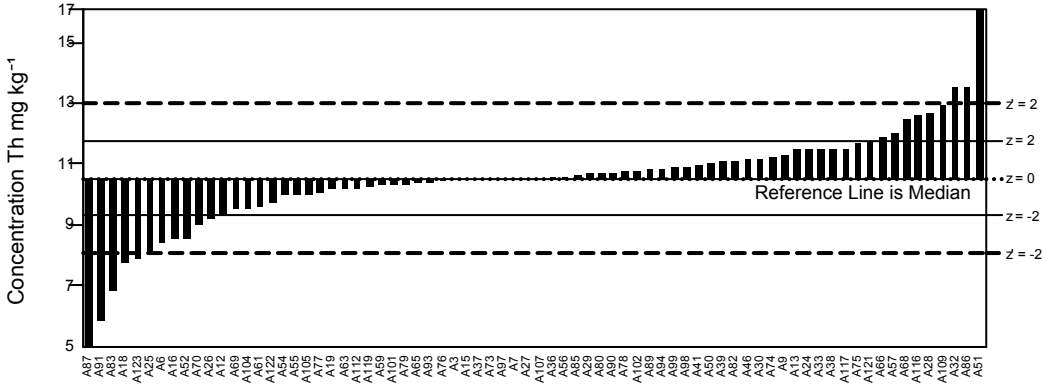
GeoPT42 - Barchart for Ta



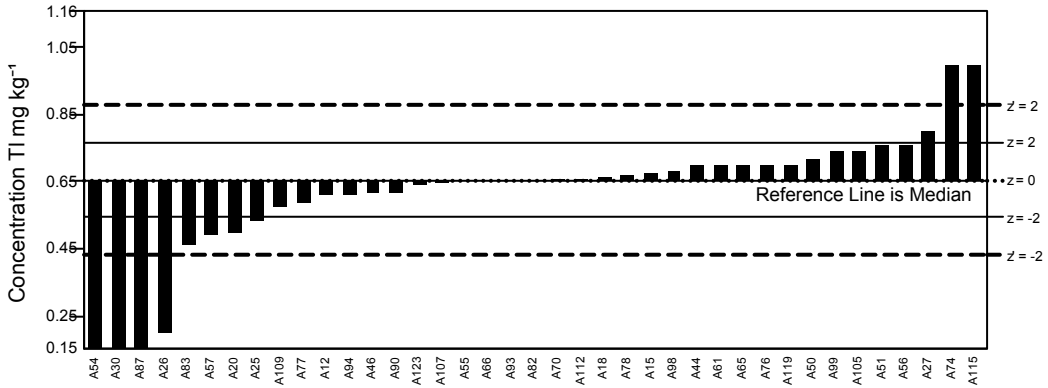
GeoPT42 - Barchart for Tb



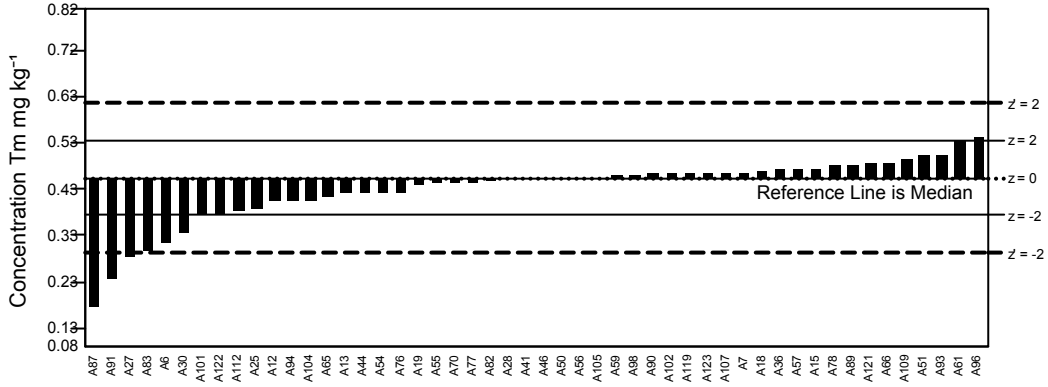
GeoPT42 - Barchart for Th



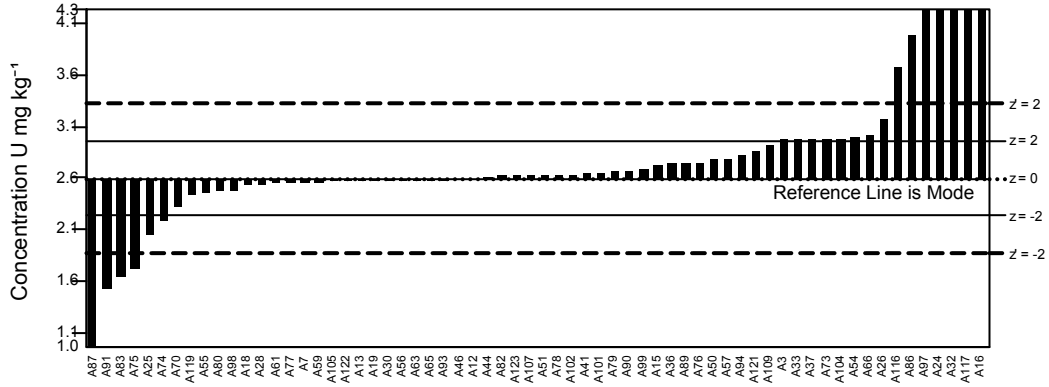
GeoPT42 - Barchart for Tl



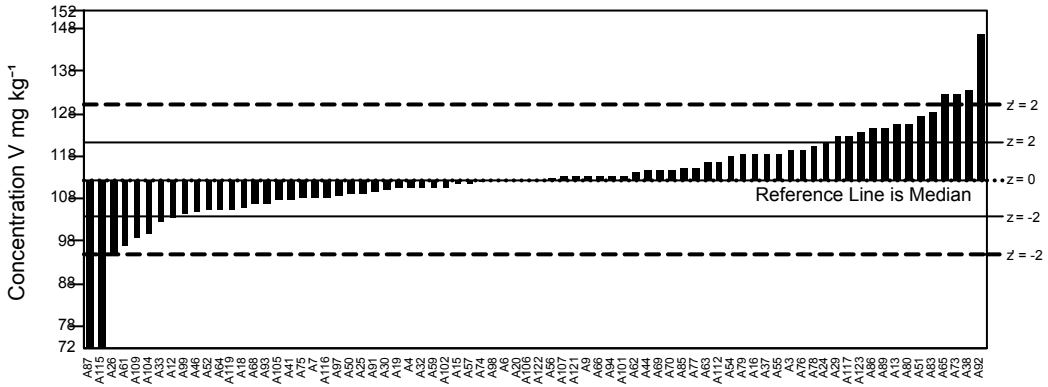
GeoPT42 - Barchart for Tm



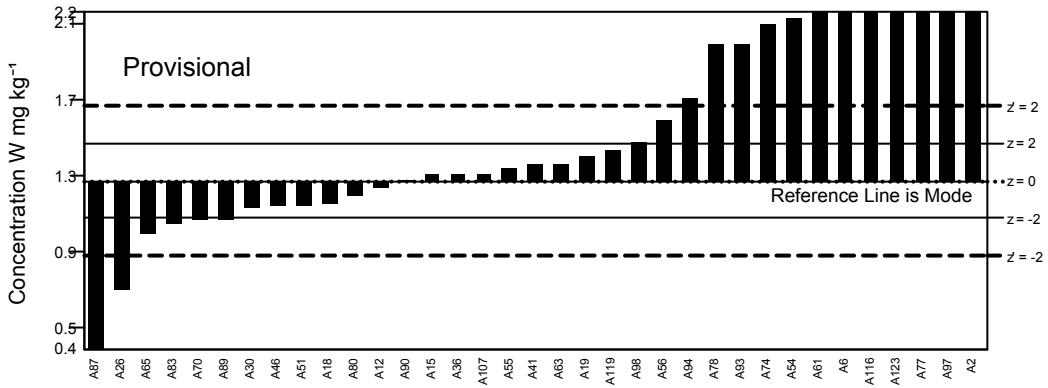
GeoPT42 - Barchart for U



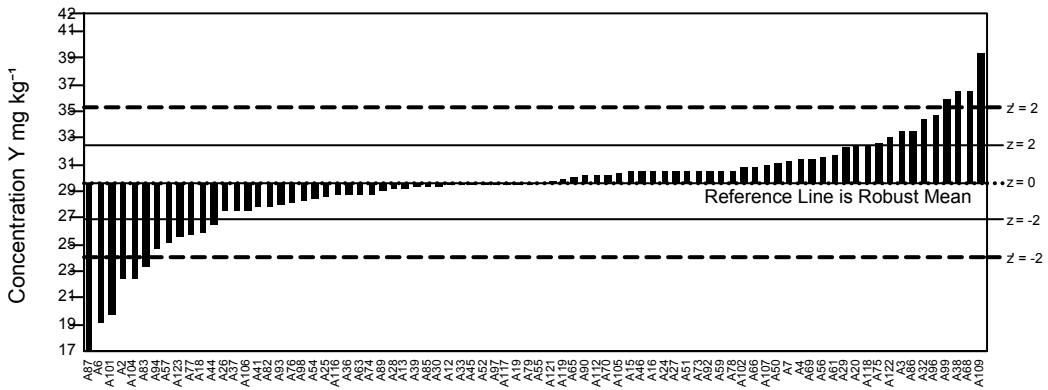
GeoPT42 - Barchart for V

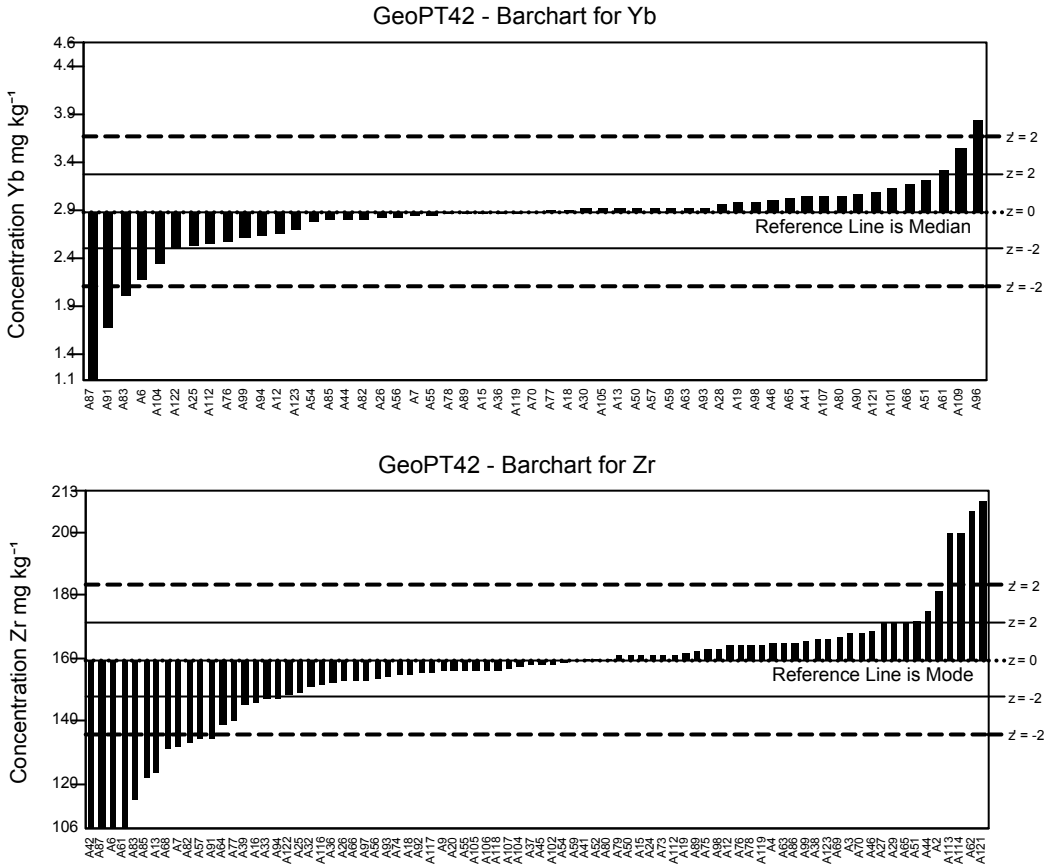


GeoPT42 - Barchart for W



GeoPT42 - Barchart for Y





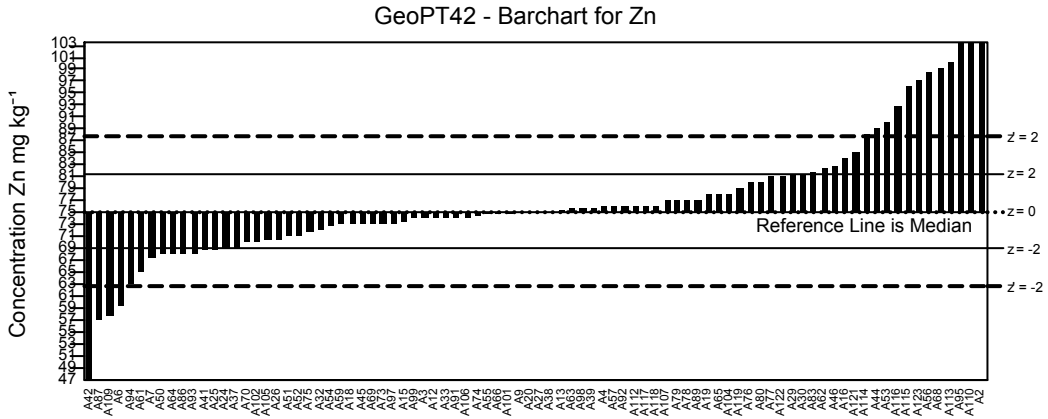
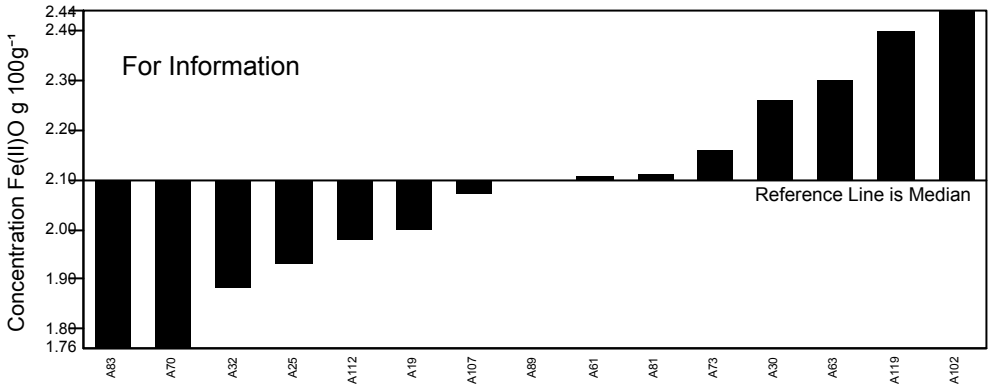
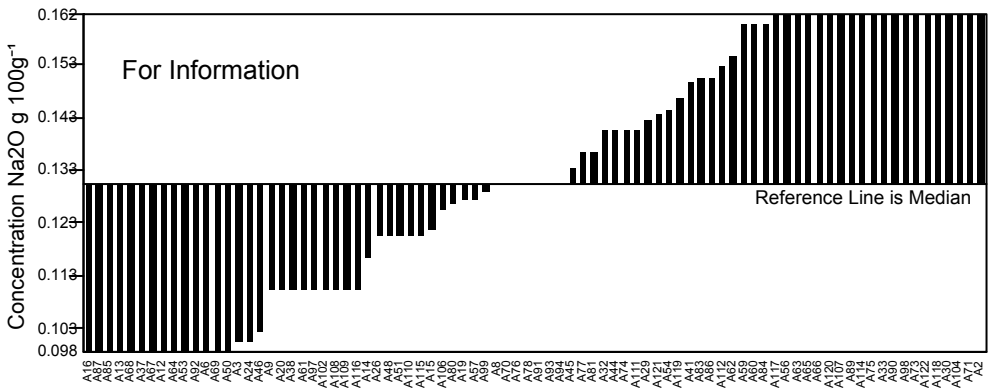


Figure 1: GeoPT42 - Queenston shale, QS-1. Data distribution charts for elements for which values were assigned or provisional values given for guidance. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

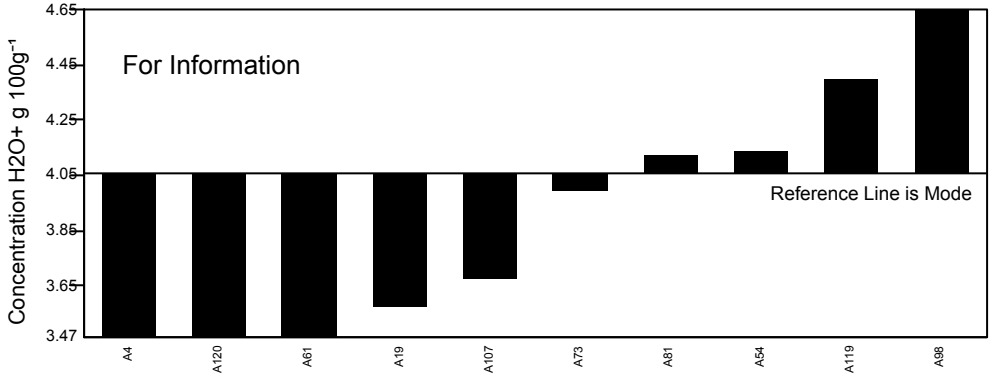
GeoPT42 - Barchart for Fe(II)O



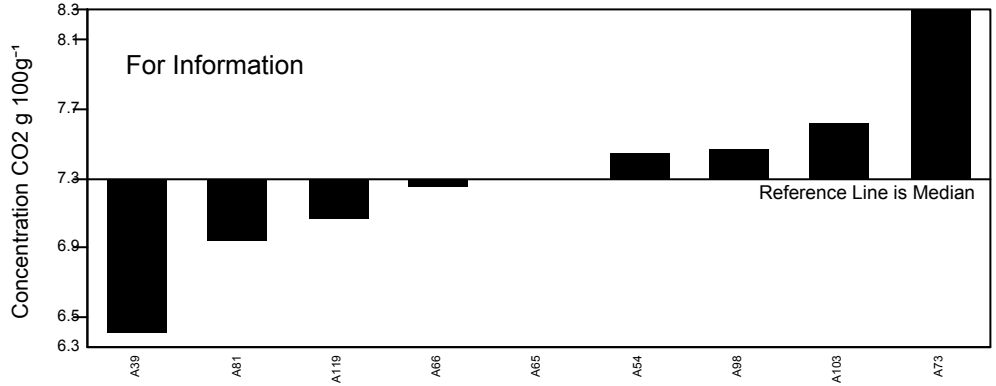
GeoPT42 - Barchart for Na2O



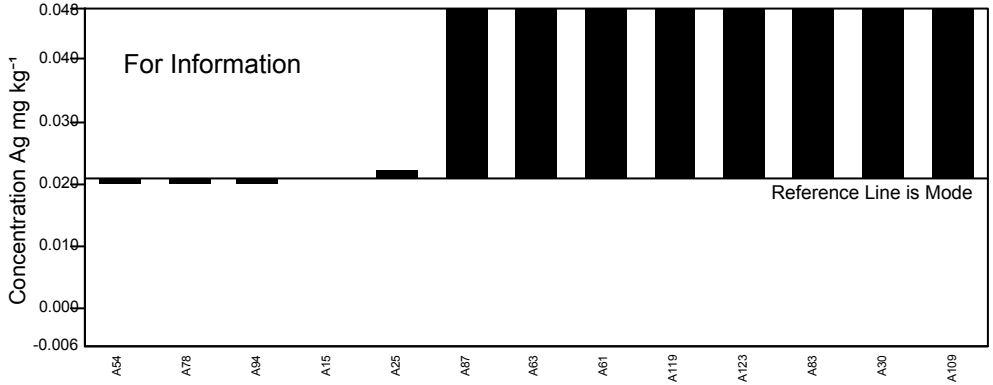
GeoPT42 - Barchart for H2O+



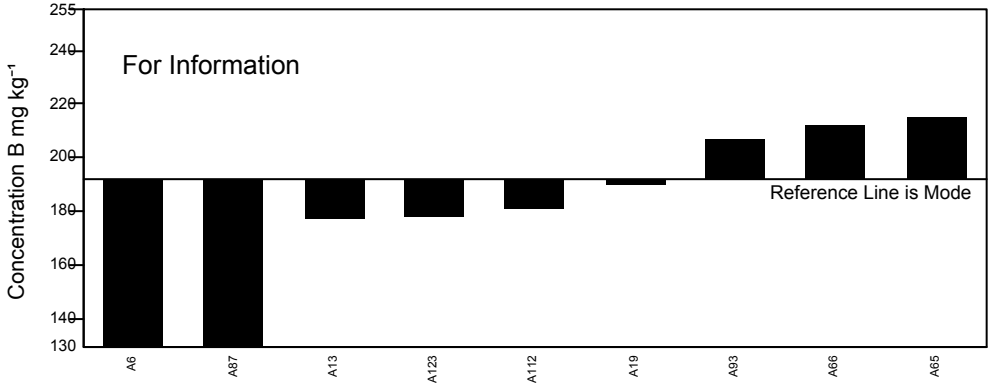
GeoPT42 - Barchart for CO2

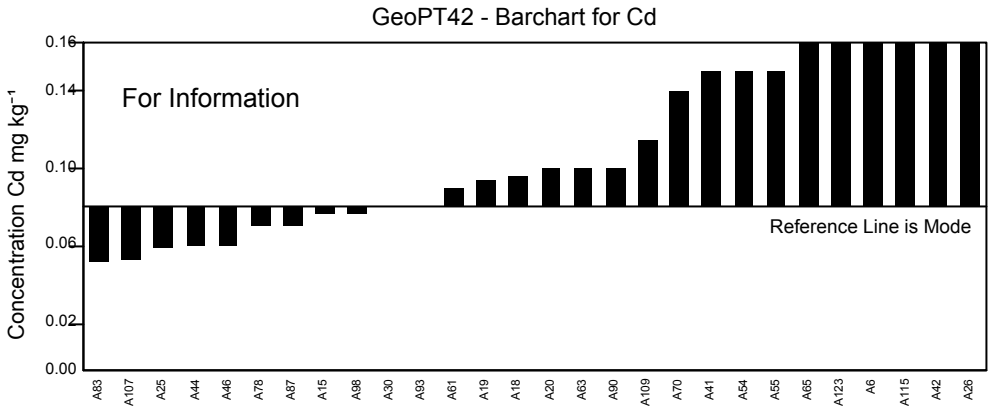


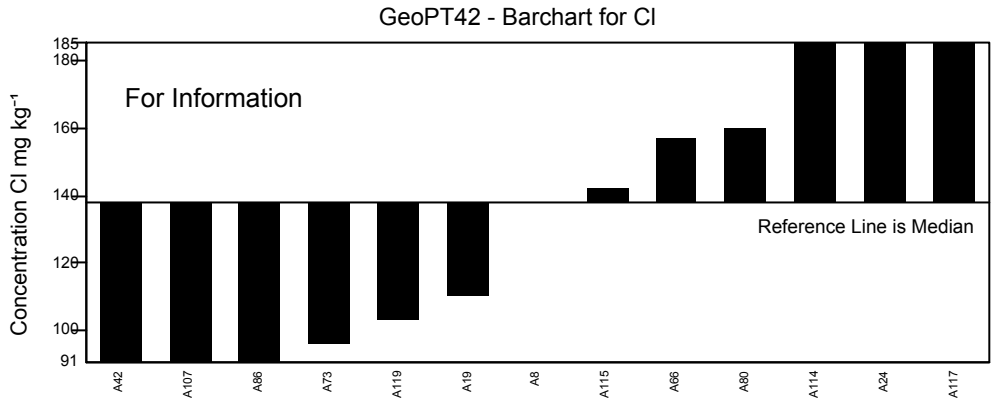
GeoPT42 - Barchart for Ag

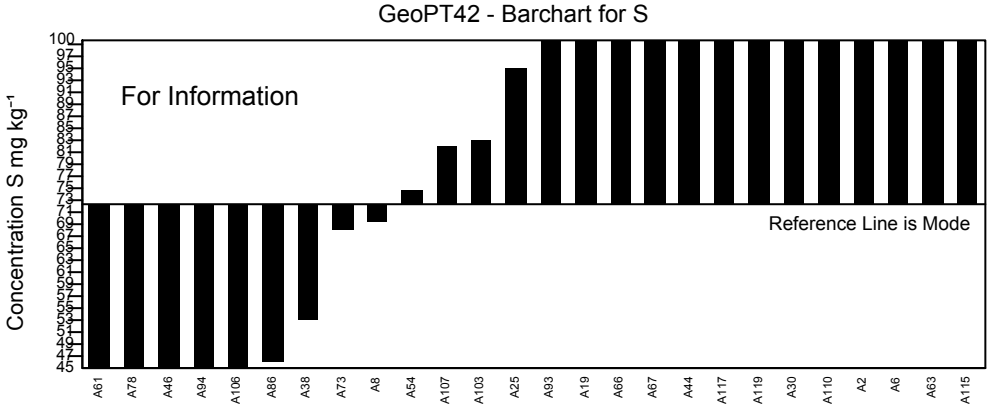


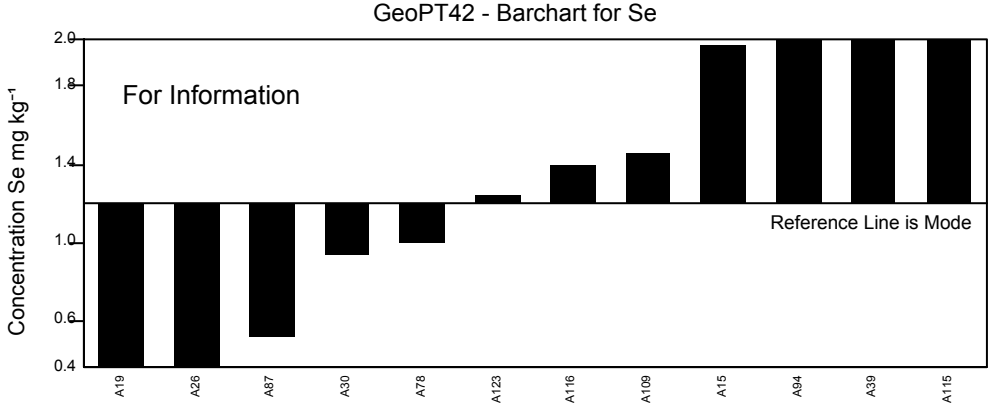
GeoPT42 - Barchart for B











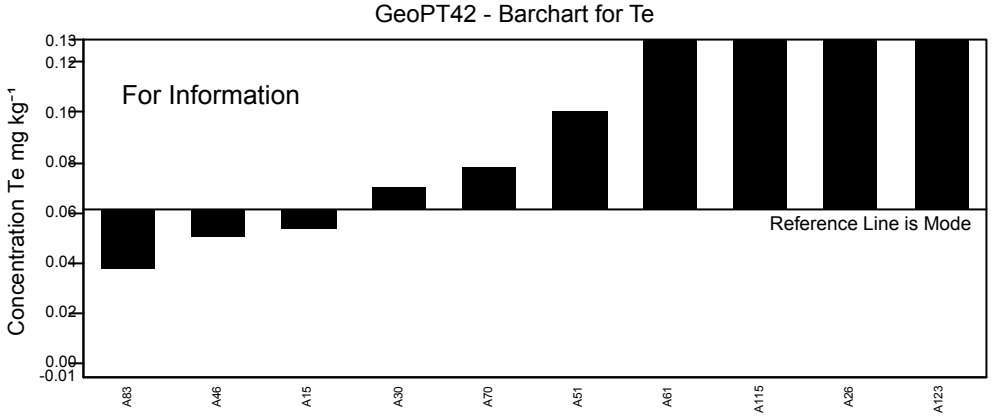
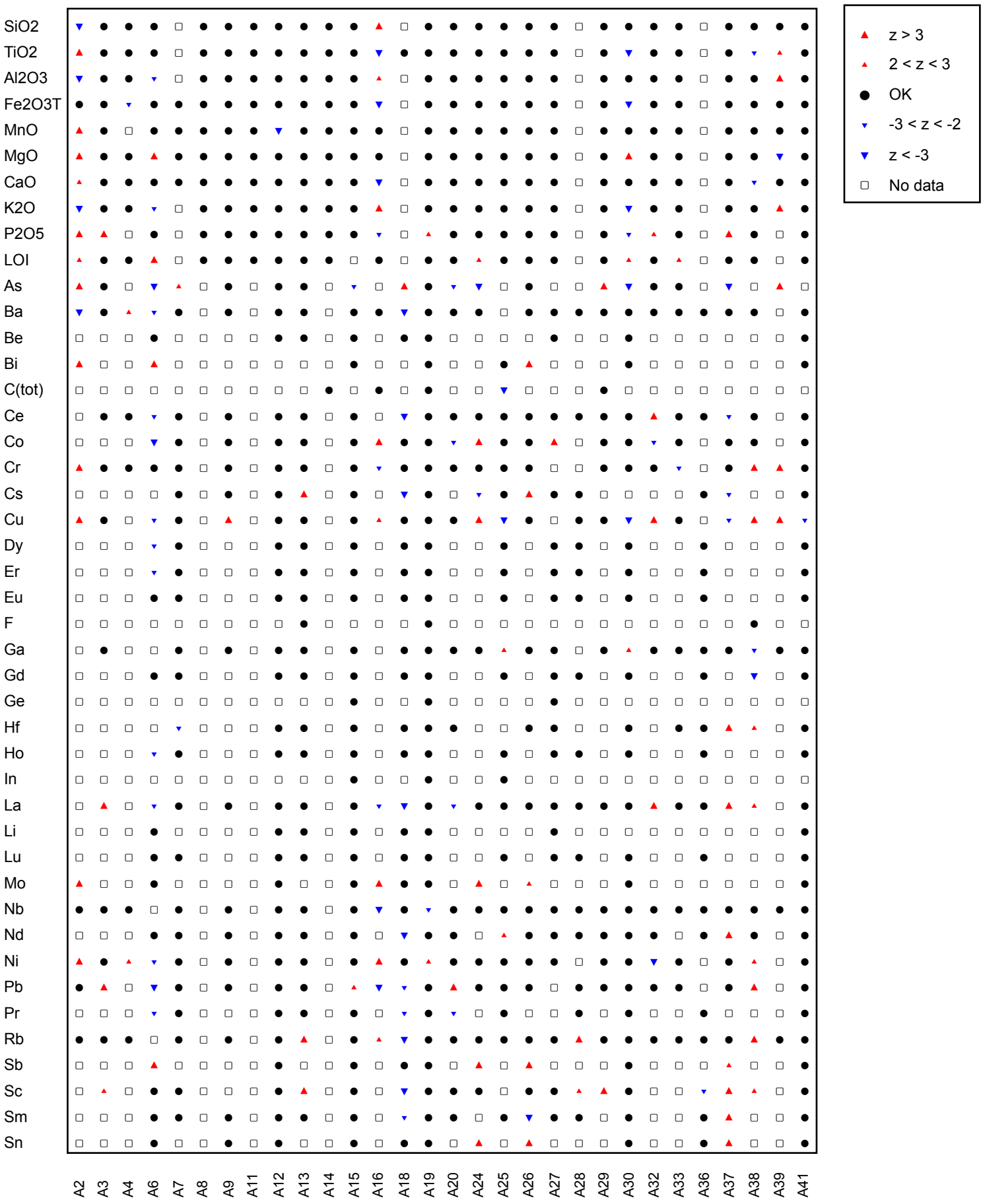


Figure 2: GeoPT42 - Queenston shale, QS-1. Data distribution charts provided for information only for elements for which values could not be assigned.

Multiple Z-Score Chart for GeoPT42



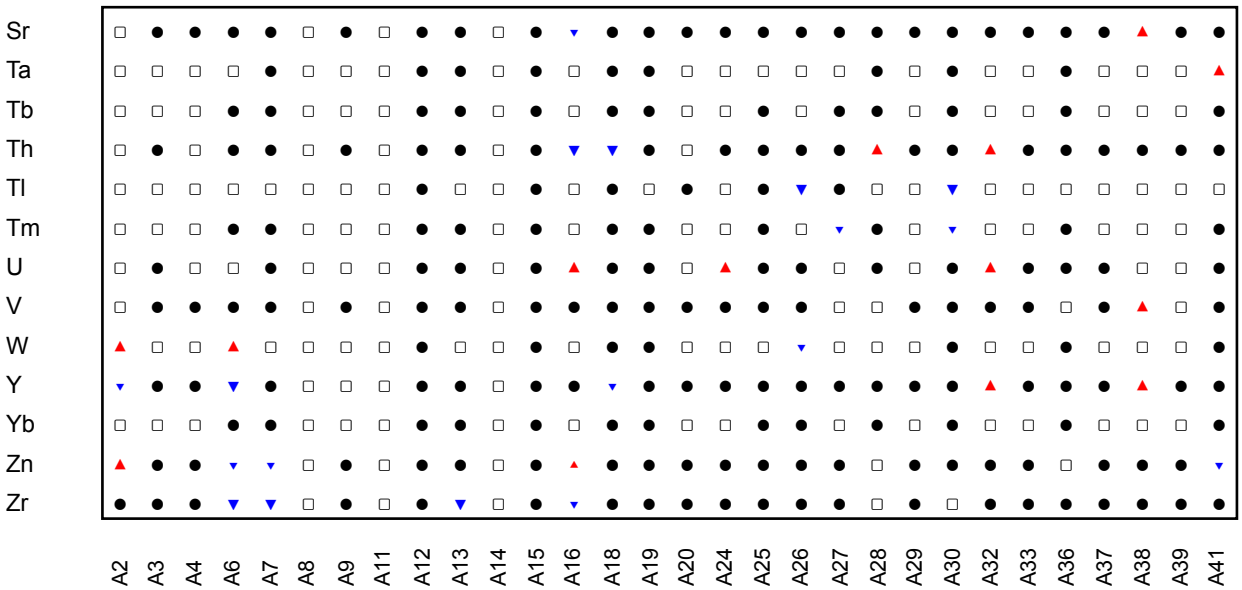
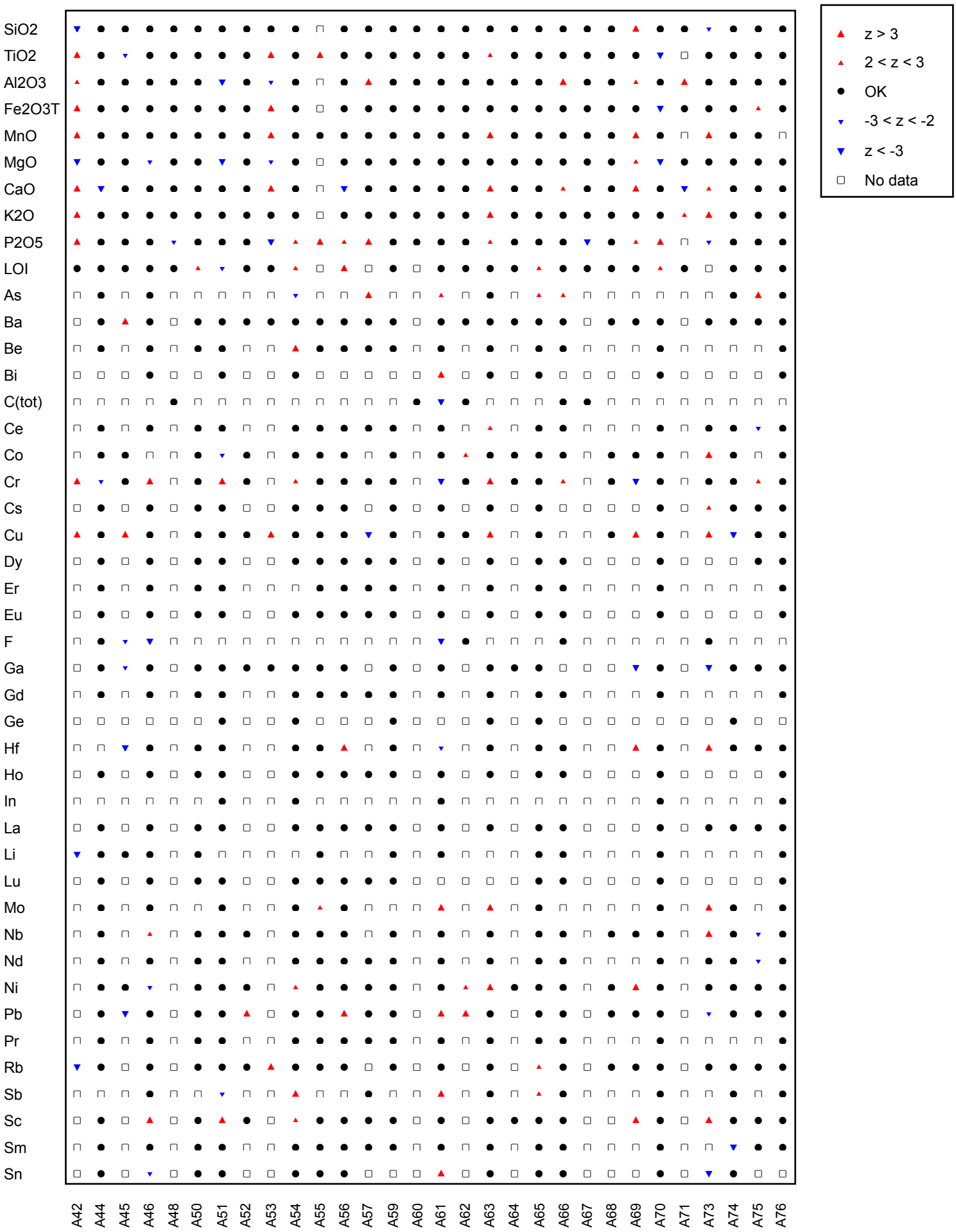
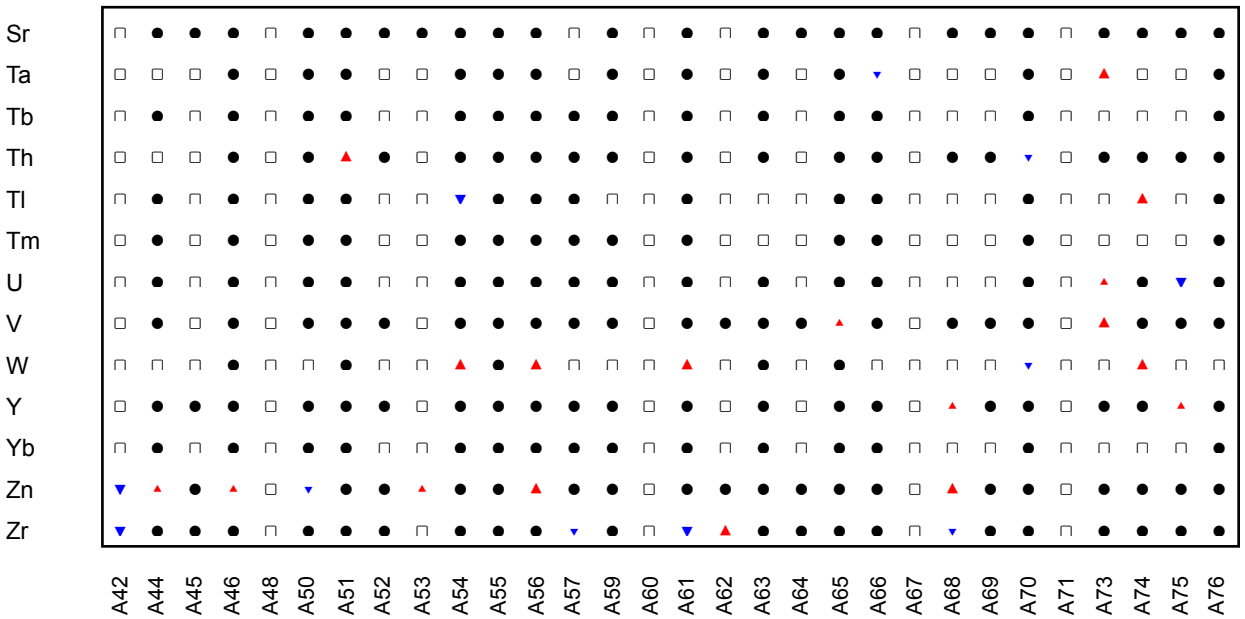


Figure 3: GeoPT42 - Queenston shale, QS-1. Multiple z-score charts for laboratories participating in the GeoPT42 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria (see key).

Multiple Z-Score Chart for GeoPT42





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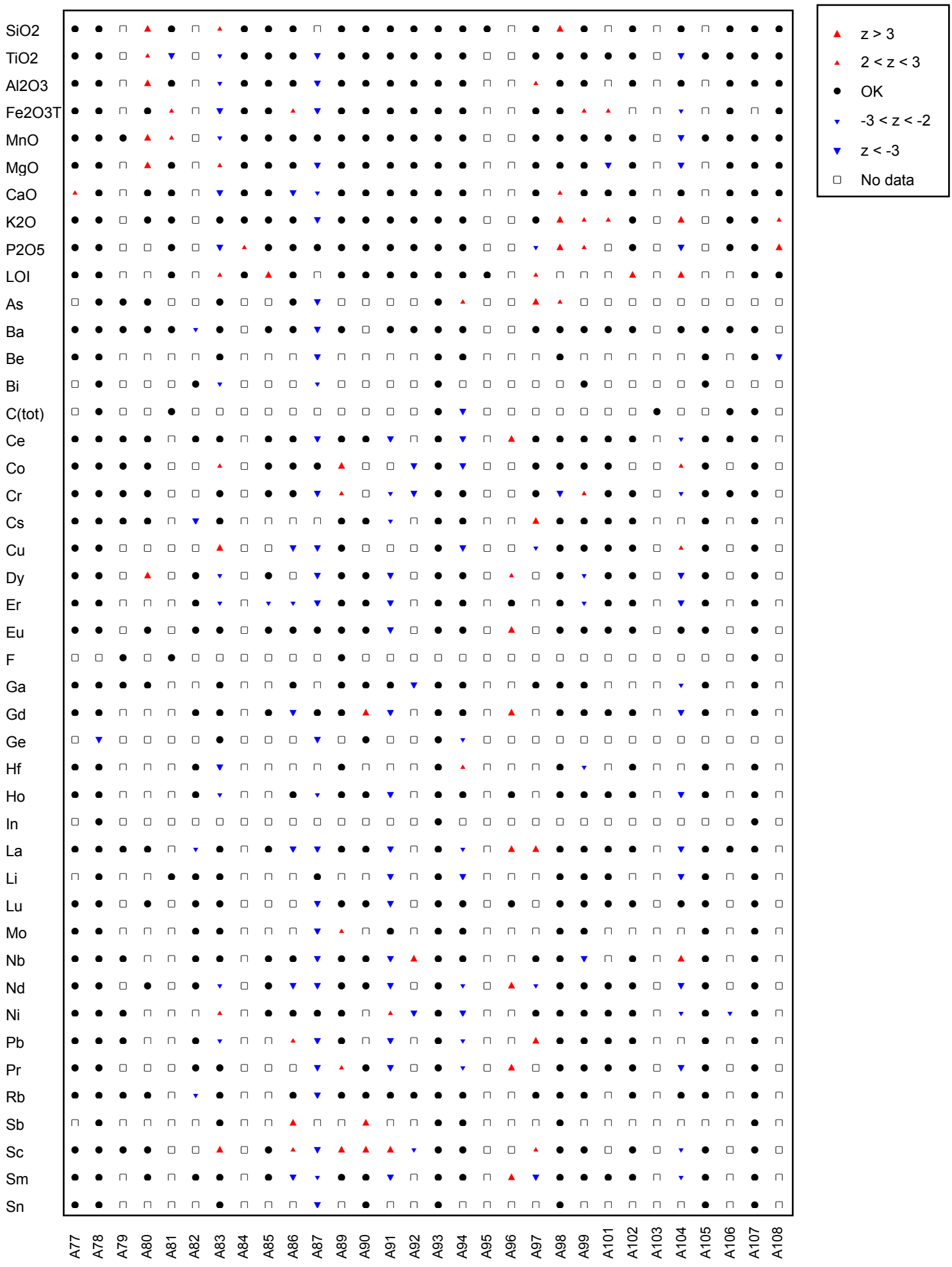
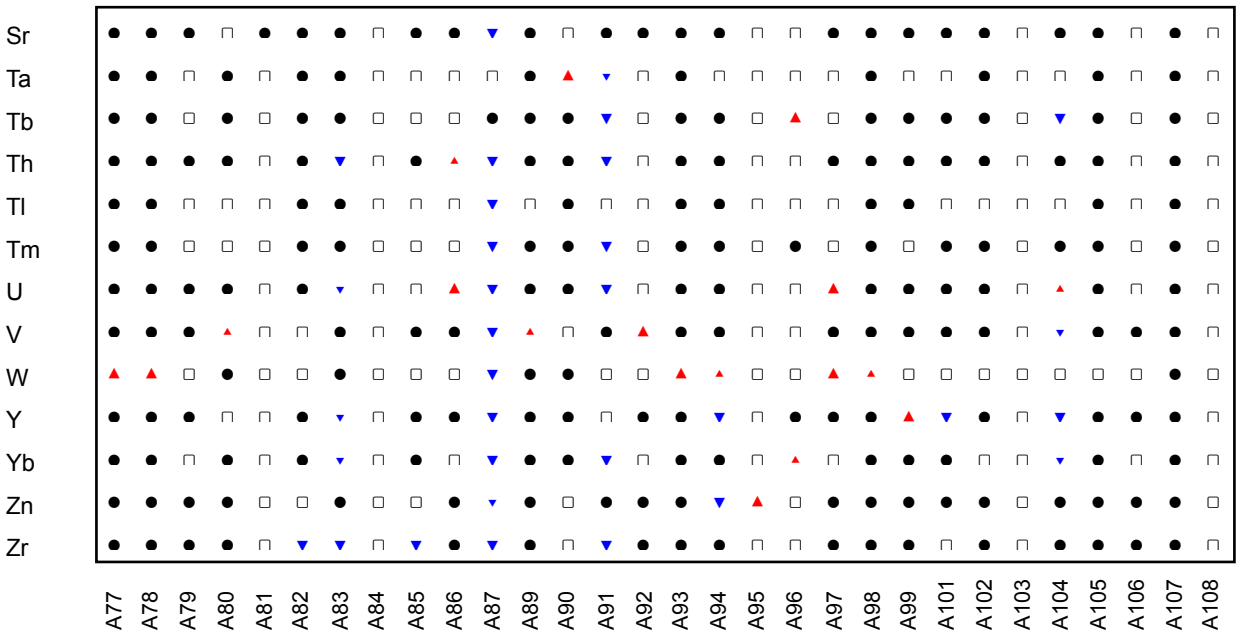
Multiple Z-Score Chart for GeoPT42





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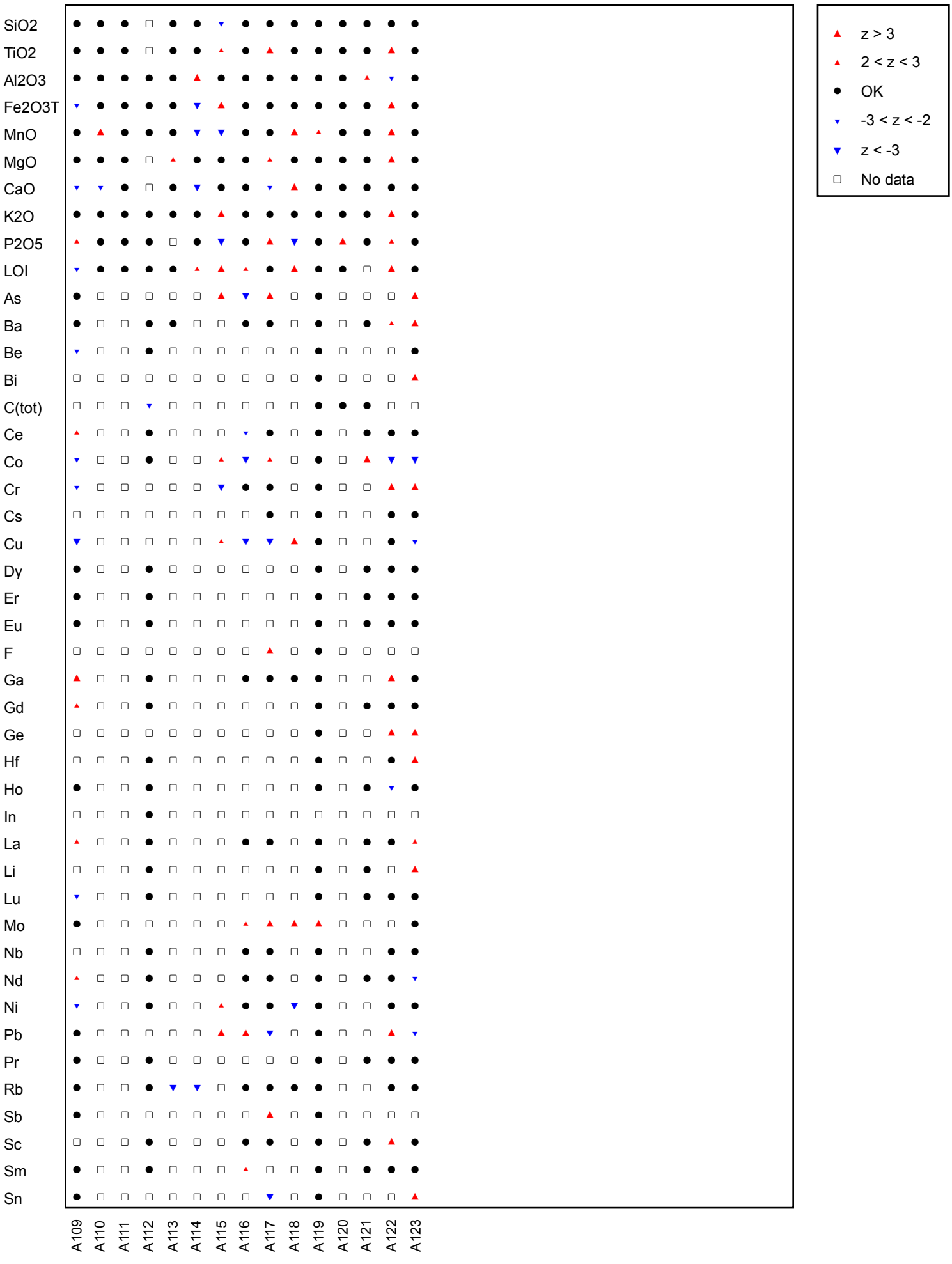
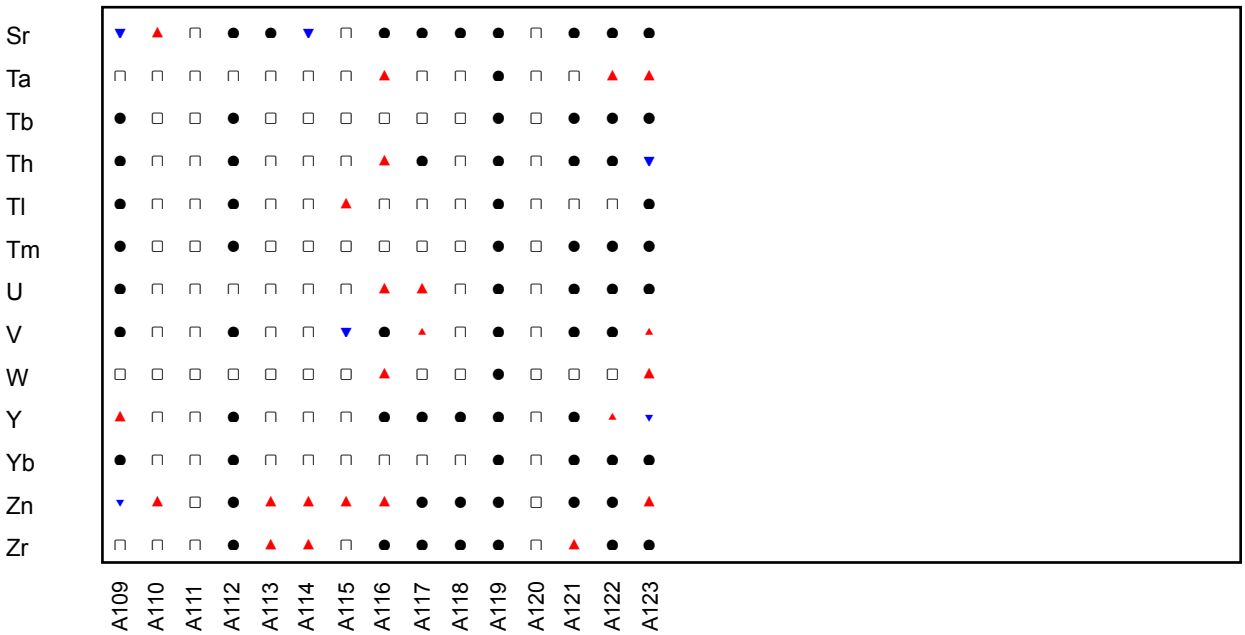
Multiple Z-Score Chart for GeoPT42





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