

GeoPT42 — AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES — REPORT ON ROUND 42 (Queenston shale, QS-1) / January 2018

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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 GeoPT 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, GeoPT, 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

GeoPT42: 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 GeoPT42 (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 GeoPT42 (QS-1). Bar charts for the 57 measurands of GeoPT42 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: SiO₂, TiO₂, Al₂O₃, Fe₂O₃T, MnO, MgO, CaO, K₂O, P₂O₅, 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, Na₂O, H₂O⁺, CO₂, 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 GeoPT42, 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 GeoPT42, 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:

$$H_a = k \cdot X_a^{0.8495}$$

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 GeoPT42 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/>).

GeoPT1

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

GeoPT2

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

GeoPT3

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

GeoPT4

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

GeoPT5

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

GeoPT6

Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GEOPT6 - an international proficiency test for analytical geochemistry laboratories - report on round 6 (OU-3: Nanhorn microgranite) and 6A (CAL-S: CRPG limestone). International Association of Geoanalysts: Unpublished report.

GeoPT7

Potts P.J., Thompson M., Kane J.S., and Petrov L.L. (2000)
GEOPT7 - an international proficiency test for analytical geochemistry laboratories - report on round 7 (GBPG-1 Garnet-biotite plagiogneiss). International Association of Geoanalysts: Unpublished report.

GeoPT8

Potts P.J., Thompson M., Kane J.S., Webb, P.C. and Watson J.S. (2000) GEOPT8 - an international proficiency test for analytical geochemistry laboratories - report on round 8 / February 2001 (OU-4 Penmaenmawr microdiorite). International Association of Geoanalysts: Unpublished report.

GeoPT9

Potts P.J., Thompson M., Webb, P.C. and Watson J.S. (2001) GEOPT9 - an international proficiency test for analytical geochemistry laboratories - report on round 9 / July 2001 (OU-6 Penrhyn slate). International Association of Geoanalysts: Unpublished report.

GeoPT10

Potts P.J., Thompson M., Webb, P.C., Watson J.S. and Wang Yimin (2001) GEOPT10 - an international proficiency test for analytical geochemistry laboratories - report on round 10 / December 2001 (CH-1 Marine sediment). International Association of Geoanalysts: Unpublished report.

GeoPT11

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Watson J.S. (2002) GEOPT11 - an international proficiency test for analytical geochemistry laboratories - report on round 11 / July 2002 (OU-5 Leatton dolerite). International Association of Geoanalysts: Unpublished report.

GeoPT12

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Batjargal B. (2003) GEOPT12 - an international proficiency test for analytical geochemistry laboratories - report on round 12 / January 2003 (GAS Serpentinite). International Association of Geoanalysts: Unpublished report.

GeoPT13

Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Kaspar H.U. (2003) GEOPT13 - an international proficiency test for analytical geochemistry laboratories - report on round 13 / July 2003 (Köln Loess). International Association of Geoanalysts: Unpublished report.

GeoPT14

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

GeoPT15

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

GeoPT16

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

GeoPT17

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

GeoPT18

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

GeoPT19

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

GeoPT20

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

GeoPT21

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

GeoPT22

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

GeoPT23

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

GeoPT24

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

GeoPT25

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

GeoPT26

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

GeoPT27

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

GeoPT28

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

GeoPT29

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

GeoPT30

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

GeoPT31

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

GeoPT32

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

GeoPT33

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

GeoPT34

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

GeoPT35

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

GeoPT35A

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

GeoPT36

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

GeoPT36A

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

GeoPT37

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

GeoPT37A

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

GeoPT38

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

GeoPT38A

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

GeoPT39

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

GeoPT39A

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

GeoPT40

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

GeoPT40A

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

GeoPT41

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

GeoPT41A

Webb, P.C., Thompson, M., Potts, P.J, Gowing, C.J.B. and Wilson, S.A. (2017)
GeoPT41A - an international proficiency test for analytical geochemistry laboratories - report on round 41A (Mineralized stream sediment, SSCO-1) / July 2017. International Association of Geoanalysts: 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
SiO ₂	g 100g ⁻¹	41.5	<u>50.82</u>	49.99	<u>49.11</u>		51.1	50.85	51.58	50.87	50.92	51.37	51.39
TiO ₂	g 100g ⁻¹	1.83	<u>0.75</u>	0.75	<u>0.75</u>		0.75	<u>0.77</u>	0.74	<u>0.75</u>	0.765	0.76	0.779
Al ₂ O ₃	g 100g ⁻¹	9.8	<u>14.23</u>	14.06	<u>13.48</u>		14.39	<u>14.24</u>	14.42	<u>14.4</u>	14.204	14.3	14.04
Fe ₂ O ₃ T	g 100g ⁻¹	6.6	<u>6.53</u>	6.29	<u>6.27</u>	6.58	<u>6.37</u>	6.54	<u>6.21</u>	6.5	6.454	6.45	6.722
Fe(II)O	g 100g ⁻¹												
MnO	g 100g ⁻¹	0.24	<u>0.1</u>			0.09	<u>0.103</u>	0.109	<u>0.105</u>	0.093	0.07	0.1	0.099
MgO	g 100g ⁻¹	4.69	<u>3.61</u>	3.63	<u>5.23</u>	3.63	<u>3.58</u>	3.68	<u>3.63</u>	3.79	3.667	3.57	3.621
CaO	g 100g ⁻¹	8.76	<u>8.12</u>	8.09	<u>7.78</u>	8.09	<u>7.88</u>	8.174	<u>8.02</u>	7.8	8.091	8.02	8.118
Na ₂ O	g 100g ⁻¹	1.99	<u>0.1</u>			0.09		0.13	<u>0.11</u>		0.08	0.055	0.116
K ₂ O	g 100g ⁻¹	3.91	<u>4.51</u>	4.46	<u>4.05</u>		4.64	<u>4.25</u>	4.39	<u>4.46</u>	4.401	4.37	4.382
P ₂ O ₅	g 100g ⁻¹	1.1	<u>0.18</u>			0.16		0.152	<u>0.149</u>	0.16	0.156	0.154	0.148
H ₂ O+	g 100g ⁻¹			<u>0.57</u>									
CO ₂	g 100g ⁻¹												
LOI	g 100g ⁻¹	11.55	<u>10.79</u>	10.88	<u>11.91</u>		11.12	<u>10.96</u>	10.74	<u>10.62</u>	10.75	10.79	<u>10.73</u>
Ag	mg kg ⁻¹												0.021
As	mg kg ⁻¹	71	<u>7</u>		1	7.84		6.8		8	<u>6.3</u>		4.53
B	mg kg ⁻¹				<u>2</u>						<u>177</u>		
Ba	mg kg ⁻¹	0.1	<u>382</u>	389	<u>307</u>	374.5		353		388	<u>404.3</u>	367.3	<u>374</u>
Be	mg kg ⁻¹					2				2.46	<u>2.833</u>		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		<u>83</u>	<u>74</u>	<u>64.47</u>	81.3		<u>77.1</u>		78	<u>79.13</u>		80.08
Cl	mg kg ⁻¹						<u>138</u>						
Co	mg kg ⁻¹					1	15.74		16		15.9	16.27	16.05
Cr	mg kg ⁻¹	211	<u>78</u>	<u>74</u>	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	<u>10</u>		8	11.9		38.5		12.5	10.75	12.75	13
Dy	mg kg ⁻¹				<u>3.82</u>	5.43				5.1	5.331		5.358
Er	mg kg ⁻¹				<u>2.2</u>	2.96				2.8	3.035		2.859
Eu	mg kg ⁻¹				<u>1.15</u>	1.412				1.38	1.441		1.388
F	mg kg ⁻¹										<u>1084</u>		
Ga	mg kg ⁻¹		<u>19</u>			19.65		19		19	21.72		20.43
Gd	mg kg ⁻¹					<u>5.3</u>	6.57			6.26	5.877		6.29
Ge	mg kg ⁻¹												2.04
Hf	mg kg ⁻¹						<u>3.69</u>			4	3.501		4.148
Hg	mg kg ⁻¹												
Ho	mg kg ⁻¹					<u>0.73</u>	1.06			1.01	<u>1.051</u>		1.065
I	mg kg ⁻¹							0.7					
In	mg kg ⁻¹												0.072
La	mg kg ⁻¹		51		<u>30.98</u>	39.59		<u>35.9</u>		38	<u>38.83</u>	40.65	35
Li	mg kg ⁻¹					<u>57</u>				68	<u>71.05</u>		61.73
Lu	mg kg ⁻¹					<u>0.3</u>	0.431			0.39	<u>0.421</u>		0.432
Mo	mg kg ⁻¹	<u>3</u>				1				1.2		1.12	18
Nb	mg kg ⁻¹	15	<u>15</u>	14			15.36		14.5		14.6	15.71	14.47
Nd	mg kg ⁻¹					<u>29.81</u>	37		<u>34.2</u>		36	36.14	36.57
Ni	mg kg ⁻¹	181	<u>37</u>	<u>46</u>	31	37.13		38.3		37	37.09	38.8	49
Pb	mg kg ⁻¹	8	<u>14</u>		<u>4</u>	9.03		9		9.2	<u>8.644</u>	11.93	7
Pd	mg kg ⁻¹												
Pr	mg kg ⁻¹					<u>7.35</u>	9.98			9.2	<u>9.319</u>		9.84
Rb	mg kg ⁻¹	136	<u>137</u>	140			136.410		132		137	<u>193.3</u>	134.6
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		<u>18</u>			11.96	14.24			14.8	<u>19.29</u>		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					<u>2</u>		2.1			2.48		2.54
Sr	mg kg ⁻¹		<u>113</u>	113	<u>97</u>	114.960		<u>111</u>		112	<u>121.9</u>		113.5
Ta	mg kg ⁻¹						1.01			0.69	<u>1.04</u>		1.075
Tb	mg kg ⁻¹					<u>0.7</u>	1.007			0.91	<u>0.876</u>		0.935
Te	mg kg ⁻¹												0.053
Th	mg kg ⁻¹		<u>11</u>			8.89	11.01		11.8		9.8	11.97	11
Tl	mg kg ⁻¹									0.61			0.677
Tm	mg kg ⁻¹					<u>0.31</u>	0.463			0.4	0.419		0.472
U	mg kg ⁻¹		<u>3</u>				2.58			2.62	<u>2.594</u>		2.755
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	<u>33</u>	<u>31</u>	18.67	30.86			29	28.65		29.99	30
Yb	mg kg ⁻¹					2.14	2.81			2.63	<u>2.892</u>		2.838
Zn	mg kg ⁻¹	227	<u>74</u>	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
SiO ₂	g 100g ⁻¹		50.84	51.14	51.06	51.03	51.05	50.62		50.4	50.8	50.9	50.08
TiO ₂	g 100g ⁻¹	0.781	0.759	<u>0.765</u>	<u>0.769</u>	<u>0.76</u>	<u>0.76</u>	<u>0.759</u>		<u>0.766</u>	0.63	0.75	<u>0.771</u>
Al ₂ O ₃	g 100g ⁻¹		14.178	<u>14.35</u>	<u>14.28</u>	<u>14.08</u>	<u>14.15</u>	<u>14.54</u>		<u>14.2</u>	13.99	14.2	<u>14.56</u>
Fe ₂ O ₃ T	g 100g ⁻¹		6.536	<u>6.44</u>	<u>6.469</u>	<u>6.65</u>	<u>6.46</u>	<u>6.49</u>		<u>6.49</u>	6.18	6.48	<u>6.49</u>
Fe(II)O	g 100g ⁻¹		2			<u>1.93</u>					2.26	1.88	
MnO	g 100g ⁻¹		<u>0.102</u>	<u>0.101</u>	<u>0.099</u>	<u>0.099</u>	<u>0.099</u>	<u>0.11</u>		<u>0.102</u>	0.1	0.101	<u>0.099</u>
MgO	g 100g ⁻¹		<u>3.633</u>	<u>3.62</u>	<u>3.52</u>	<u>3.66</u>	<u>3.72</u>	<u>3.62</u>		<u>3.6</u>	3.85	3.6	<u>3.72</u>
CaO	g 100g ⁻¹		8.164	8.14	<u>7.95</u>	<u>7.76</u>	<u>8.29</u>	<u>8.03</u>		<u>8.02</u>	7.97	8.16	<u>7.91</u>
Na ₂ O	g 100g ⁻¹		0.127	<u>0.11</u>	<u>0.1</u>		<u>0.12</u>			<u>0.142</u>	0.35	0.14	<u>0.19</u>
K ₂ O	g 100g ⁻¹		4.417	<u>4.41</u>	<u>4.46</u>	<u>4.61</u>	<u>4.47</u>	<u>4.41</u>		<u>4.37</u>	4.07	4.41	<u>4.46</u>
P ₂ O ₅	g 100g ⁻¹		0.16	<u>0.151</u>	<u>0.14</u>	<u>0.153</u>	<u>0.147</u>	<u>0.156</u>		<u>0.156</u>	0.14	0.16	<u>0.159</u>
H ₂ O+	g 100g ⁻¹		3.57										
CO ₂	g 100g ⁻¹												
LOI	g 100g ⁻¹		11.04	<u>10.68</u>	<u>11.5</u>	<u>10.47</u>	<u>10.74</u>	<u>11.13</u>		<u>10.65</u>	11.18	10.94	<u>11.5</u>
Ag	mg kg ⁻¹					<u>0.022</u>					0.73		
As	mg kg ⁻¹	8.976	6.474	<u>5</u>	<u>4</u>		<u>7.3</u>			<u>10.5</u>	3.64	7	<u>8</u>
B	mg kg ⁻¹		190										
Ba	mg kg ⁻¹	297.660	361.348	<u>360</u>	<u>359</u>		<u>351.1</u>	<u>354</u>	<u>368</u>	<u>388</u>	376	340	<u>348</u>
Be	mg kg ⁻¹	2.305	2.232				<u>2.59</u>				2.53		
Bi	mg kg ⁻¹		0.226			<u>0.18</u>	<u>0.7</u>				0.19		
Br	mg kg ⁻¹						<u>0.6</u>						<u>3</u>
C(org)	mg kg ⁻¹		286										
C(tot)	mg kg ⁻¹		19886			<u>1974</u>				<u>20100</u>			
Cd	mg kg ⁻¹	0.096	0.093	<u>0.1</u>		<u>0.059</u>	<u>3.7</u>				0.08		
Ce	mg kg ⁻¹	68.107	79.627	<u>81</u>	<u>91</u>	<u>88.95</u>	<u>77</u>	<u>73</u>	<u>83.23</u>	<u>84.8</u>	81.2	97	<u>92</u>
Cl	mg kg ⁻¹		110		<u>230</u>								
Co	mg kg ⁻¹	15.855	16.276	<u>12</u>	<u>26</u>	<u>13.27</u>	<u>18.9</u>	<u>22</u>		<u>18.6</u>	16.56	14	<u>14</u>
Cr	mg kg ⁻¹	69.796	75.868	<u>69</u>	<u>71</u>	<u>65.9</u>	<u>65.7</u>			<u>81.6</u>	75.1	68	<u>56</u>
Cs	mg kg ⁻¹	4.687	6.010		<u>4</u>	<u>5.62</u>	<u>10.9</u>	<u>6.07</u>	<u>6.074</u>				<u>6.24</u>
Cu	mg kg ⁻¹	10.431	11.851	<u>13</u>	<u>16</u>	<u>6.25</u>	<u>12.4</u>		<u>10.17</u>	<u>10.7</u>	5.84	16	<u>13</u>
Dy	mg kg ⁻¹	5.403	5.487			<u>4.74</u>		<u>4.91</u>	<u>5.62</u>		5.75		<u>5.4</u>
Er	mg kg ⁻¹	3.088	3.072			<u>2.86</u>		<u>2.77</u>	<u>3.163</u>		3.16		<u>3.08</u>
Eu	mg kg ⁻¹	1.261	1.424			<u>1.66</u>		<u>1.44</u>	<u>1.428</u>		1.42		<u>1.41</u>
F	mg kg ⁻¹		1106										
Ga	mg kg ⁻¹	18.703	20.713	<u>20</u>	<u>19</u>	<u>24.11</u>	<u>18.3</u>	<u>19.62</u>		<u>20.6</u>	21.72	21	<u>17</u>
Gd	mg kg ⁻¹	5.890	5.954			<u>6.91</u>		<u>7.37</u>	<u>6.35</u>		5.61		<u>6.29</u>
Ge	mg kg ⁻¹		1.782					<u>2.26</u>					
Hf	mg kg ⁻¹	4.174	4.375	<u>4.4</u>			<u>3.9</u>	<u>3.19</u>			<u>4.76</u>	4	<u>4.21</u>
Hg	mg kg ⁻¹												
Ho	mg kg ⁻¹	1.115	1.113			<u>0.954</u>		<u>0.83</u>	<u>1.124</u>		1.03		<u>1.08</u>
I	mg kg ⁻¹					<u>2.6</u>							
In	mg kg ⁻¹		0.057			<u>0.063</u>							
La	mg kg ⁻¹	30.691	38.921	<u>31</u>	<u>45</u>	<u>37.8</u>	<u>42.8</u>	<u>38.97</u>	<u>40.64</u>	<u>44.2</u>	39.7	46	<u>43</u>
Li	mg kg ⁻¹	58.91	58.4					<u>64.83</u>					
Lu	mg kg ⁻¹	0.419	0.433			<u>0.369</u>		<u>0.3</u>	<u>0.435</u>		0.37		<u>0.45</u>
Mo	mg kg ⁻¹	1.116	1.006		<u>2</u>		<u>1.5</u>				1.09		
Nb	mg kg ⁻¹	14.769	12.368	<u>15</u>	<u>15</u>	<u>12</u>	<u>13.3</u>	<u>13.05</u>	<u>15.48</u>	<u>15</u>	13.53	14	<u>16</u>
Nd	mg kg ⁻¹	30.941	35.806	<u>34</u>		<u>43.63</u>	<u>33.6</u>	<u>32.53</u>	<u>36.4</u>	<u>32.8</u>	36.69	39	<u>36.9</u>
Ni	mg kg ⁻¹	37.646	42.992	<u>34</u>	<u>39</u>	<u>37.09</u>	<u>33.6</u>	<u>41.48</u>		<u>42.4</u>	39.77	29	<u>38</u>
Pb	mg kg ⁻¹	7.85	9.019	<u>17</u>	<u>8</u>	<u>7.92</u>	<u>7.9</u>		<u>9.189</u>	<u>9.35</u>	8.39	10	<u>8</u>
Pd	mg kg ⁻¹												
Pr	mg kg ⁻¹	8.283	9.570	<u>7</u>		<u>9.94</u>			<u>9.703</u>		9.48		<u>9.82</u>
Rb	mg kg ⁻¹	71.901	135.547	<u>135</u>	<u>136</u>	<u>127.5</u>	<u>124.7</u>	<u>123</u>	<u>162.3</u>	<u>144</u>	141.6	142	<u>128</u>
Re	mg kg ⁻¹												
S	mg kg ⁻¹		116			<u>95</u>					282		
Sb	mg kg ⁻¹	0.729	0.712		<u>2</u>		<u>3.8</u>				0.85		
Sc	mg kg ⁻¹	10.691	15.06	<u>15</u>	<u>16</u>		<u>13.5</u>	<u>13.53</u>	<u>16.29</u>	<u>21.8</u>	13.59		<u>12.6</u>
Se	mg kg ⁻¹		0.016				<u>0.1</u>				0.94		
Sm	mg kg ⁻¹	6.163	7.169	<u>6</u>		<u>8.13</u>	<u>3.7</u>	<u>7.14</u>	<u>6.814</u>		7.33		<u>7.18</u>
Sn	mg kg ⁻¹	2.849	2.593		<u>4</u>		<u>4</u>				2.72		<u>2.33</u>
Sr	mg kg ⁻¹	106.770	111.378	<u>108</u>	<u>112</u>	<u>130.7</u>	<u>104.1</u>	<u>113</u>	<u>114.2</u>	<u>115</u>	117.7	116	<u>114</u>
Ta	mg kg ⁻¹	0.974	1.093							<u>1.074</u>	0.96		<u>1.04</u>
Tb	mg kg ⁻¹	0.922	0.910			<u>0.955</u>		<u>0.86</u>	<u>0.942</u>		0.88		<u>0.98</u>
Te	mg kg ⁻¹						<u>4.7</u>				0.07		
Th	mg kg ⁻¹	8.222	10.645		<u>12</u>	<u>8.57</u>	<u>9.7</u>	<u>11.02</u>	<u>13.2</u>	<u>11.2</u>	11.67	14	<u>12</u>
Tl	mg kg ⁻¹	0.667		<u>0.5</u>		<u>0.532</u>	<u>0.2</u>	<u>0.8</u>			0.07		
Tm	mg kg ⁻¹	0.466	0.435			<u>0.384</u>		<u>0.28</u>	<u>0.449</u>		0.33		<u>0.47</u>
U	mg kg ⁻¹	2.551	2.598		<u>5</u>	<u>2.08</u>	<u>3.2</u>		<u>2.564</u>		2.6	5	<u>3</u>
V	mg kg ⁻¹	105.420	109.960	<u>112</u>	<u>121</u>	<u>108.5</u>	<u>94.5</u>			<u>122</u>	109.7	110	<u>102</u>
W	mg kg ⁻¹	1.161	1.411				<u>0.7</u>				1.14		<u>1.32</u>
Y	mg kg ⁻¹	25.436	29.022	<u>32</u>	<u>30</u>	<u>28.1</u>	<u>27</u>	<u>30</u>	<u>28.64</u>	<u>31.8</u>	28.9	34	<u>29</u>
Yb	mg kg ⁻¹	2.882	2.958			<u>2.5</u>	<u>2.8</u>		<u>2.945</u>		2.89		<u>2.84</u>
Zn	mg kg ⁻¹	72.837	77.831	<u>75</u>	<u>69</u>	<u>68.55</u>	<u>70.3</u>	<u>75</u>		<u>81.1</u>	81.2	72	<u>74</u>
Zr	mg kg ⁻¹	154.560	161.561	<u>156</u>	<u>161</u>	<u>149.1</u>	<u>152.6</u>	<u>171</u>		<u>171</u>		151	<u>147</u>
													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	
SiO ₂	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
TiO ₂	g 100g ⁻¹	0.77	0.72	<u>0.842</u>	0.763	0.853	<u>0.759</u>	0.681	0.755	0.75	0.741	<u>0.75</u>	0.73	0.925
Al ₂ O ₃	g 100g ⁻¹	14.51	14.09	16.5	14.134	14.7	<u>13.8</u>	14.368	14.36	14.17	14.155	<u>12.99</u>	<u>14.32</u>	13.48
Fe ₂ O ₃ T	g 100g ⁻¹	6.53	6.48	6.42	6.515	7.82	<u>6.77</u>	6.823	6.47	<u>6.42</u>	6.428	6.36	<u>6.49</u>	<u>7.76</u>
Fe(II)O	g 100g ⁻¹													
MnO	g 100g ⁻¹	0.098	0.1	<u>0.104</u>	0.099	676.5	<u>0.102</u>	0.102	0.099	0.1	0.098	<u>0.1</u>	<u>0.1</u>	0.13
MgO	g 100g ⁻¹	3.66	3.63	<u>1.47</u>	3.66	3.16	<u>3.44</u>	<u>3.665</u>	3.48	<u>3.62</u>	3.677	<u>3.24</u>	<u>3.71</u>	3.34
CaO	g 100g ⁻¹	8.26	7.81	<u>8.14</u>	8.11	8.94	7.17	<u>7.982</u>	8.16	7.96	8.048	8.06	<u>7.88</u>	10.03
Na ₂ O	g 100g ⁻¹	0.07	0.11		0.149		<u>0.14</u>	0.133	0.102	<u>0.12</u>	0.097	<u>0.12</u>		0.083
K ₂ O	g 100g ⁻¹	4.35	4.43	<u>4.9</u>	4.331	4.93	<u>4.33</u>	4.463	4.45	<u>4.33</u>	4.366	<u>4.42</u>	<u>4.47</u>	4.34
P ₂ O ₅	g 100g ⁻¹	0.171	0.15		0.156	0.184	<u>0.14</u>	0.166	0.152	<u>0.132</u>	0.153	<u>0.14</u>	<u>0.14</u>	0.106
H ₂ O+	g 100g ⁻¹													
CO ₂	g 100g ⁻¹			<u>6.4</u>										
LOI	g 100g ⁻¹	10.97	10.66		10.881	10.76	<u>10.8</u>	<u>10.262</u>	10.66	<u>10.65</u>	11.114	<u>9.94</u>	<u>11.11</u>	10.834
Ag	mg kg ⁻¹													
As	mg kg ⁻¹	4.6		<u>9.8</u>			<u>5.7</u>		6.76					
B	mg kg ⁻¹													
Ba	mg kg ⁻¹	377	378		343.050		<u>364</u>	<u>530</u>	362.890		357.4	<u>400</u>	<u>352</u>	<u>375</u>
Be	mg kg ⁻¹				<u>2.32</u>		<u>2.3</u>		<u>2.61</u>		<u>2.3</u>	<u>1.78</u>		
Bi	mg kg ⁻¹				0.23				0.23				<u>0.25</u>	
Br	mg kg ⁻¹			<u>5</u>					0.71					
C(org)	mg kg ⁻¹													
C(tot)	mg kg ⁻¹									20552.110				
Cd	mg kg ⁻¹				0.15	<u>1.16</u>	<u>0.06</u>		<u>0.06</u>					
Ce	mg kg ⁻¹	73	78		80.66		<u>81</u>		79.38		80.4	<u>83.49</u>		
Cl	mg kg ⁻¹				0.018									
Co	mg kg ⁻¹	15	15		14.81		<u>16</u>	<u>16</u>			15.2	<u>12</u>	<u>16</u>	
Cr	mg kg ⁻¹	73	85	<u>131</u>	69.82	101.1	<u>56</u>	<u>75</u>	86.68		67.8	<u>97</u>	<u>68</u>	
Cs	mg kg ⁻¹	<u>4.3</u>			6.26		<u>6.24</u>		5.77		6	<u>6.61</u>		
Cu	mg kg ⁻¹	9.6	15	<u>36.9</u>	10.05	26.48	<u>11.4</u>	18	10.74		10.6	<u>12</u>	<u>12</u>	106
Dy	mg kg ⁻¹				5.61		<u>4.93</u>		5.57		5.5	<u>5.89</u>		
Er	mg kg ⁻¹				3.17		<u>2.76</u>		3.15		3	<u>3.2</u>		
Eu	mg kg ⁻¹				1.45		<u>1.41</u>		1.45		1.4	<u>1.58</u>		
F	mg kg ⁻¹		1050				<u>1100</u>	<u>888</u>	0.118					
Ga	mg kg ⁻¹	19	17	<u>21.9</u>	18.41		<u>20.7</u>	<u>15</u>	19.79		20.2	<u>17</u>	<u>17</u>	22
Gd	mg kg ⁻¹		5		6.15		<u>6.18</u>		6.19		5.9	<u>6.19</u>		
Ge	mg kg ⁻¹												<u>1.4</u>	
Hf	mg kg ⁻¹	8.1	5		4.77			<u>2</u>	4.16		4.4	<u>4.62</u>		
Hg	mg kg ⁻¹													
Ho	mg kg ⁻¹				1.07		<u>0.98</u>		1.11		1.1	<u>1.1</u>		
I	mg kg ⁻¹													
In	mg kg ⁻¹												<u>0.06</u>	
La	mg kg ⁻¹	46	44		38.98		<u>39</u>		39.18		38.7	<u>41.25</u>		
Li	mg kg ⁻¹				61.69	<u>41.59</u>	<u>59.8</u>	<u>62</u>	57.13		59.7			
Lu	mg kg ⁻¹				0.44		<u>0.41</u>		0.45		0.43	<u>0.47</u>		
Mo	mg kg ⁻¹				1.01		<u>1.15</u>		1.05				<u>0.98</u>	
Nb	mg kg ⁻¹	14	13	<u>11.7</u>	13.61		<u>16</u>		16.19		14.8	<u>15</u>	<u>14</u>	
Nd	mg kg ⁻¹	42	39		37.11		<u>37.2</u>		36.48		36.1	<u>38.87</u>		
Ni	mg kg ⁻¹	38	42		37.4		<u>38.2</u>	<u>44</u>	33.85		38.5	<u>36</u>	<u>38</u>	
Pb	mg kg ⁻¹	9.9	11		9.02		<u>9.66</u>	<u>4</u>	9.48		9.2	<u>10</u>	<u>13</u>	
Pd	mg kg ⁻¹													
Pr	mg kg ⁻¹				9.15		<u>9.76</u>		9.48		9.8	<u>10.19</u>		
Rb	mg kg ⁻¹	132	155	<u>141</u>	127.5	0.02	<u>135</u>		142.870		135.3	<u>136</u>	<u>126</u>	486
Re	mg kg ⁻¹													
S	mg kg ⁻¹		53				<u>180</u>		0.011					
Sb	mg kg ⁻¹	<u>1.1</u>			0.78				0.73			<u>0.52</u>		
Sc	mg kg ⁻¹	18	16		13.68		<u>14</u>		18.31		14.2	<u>24</u>	<u>15</u>	
Se	mg kg ⁻¹			<u>12.4</u>										
Sm	mg kg ⁻¹	11			7.21		<u>7.08</u>		7.37		7.3	<u>7.16</u>		
Sn	mg kg ⁻¹	4.8			2.57		<u>2.52</u>		2.12		2.4	<u>2.28</u>		
Sr	mg kg ⁻¹	105	130	<u>119</u>	106.7		<u>115</u>	<u>118</u>	110.150		112.8	<u>111</u>	<u>107</u>	119
Ta	mg kg ⁻¹				1.33				1.06		0.97	<u>1.06</u>		
Tb	mg kg ⁻¹				0.94		<u>0.85</u>		0.97		0.94	<u>1.05</u>		
Te	mg kg ⁻¹								0.05			<u>0.1</u>		
Th	mg kg ⁻¹	11	12	<u>11.6</u>	11.48				11.63		11.5	<u>19</u>	<u>9</u>	
Tl	mg kg ⁻¹						<u>0.7</u>		0.62		0.72	<u>0.76</u>		
Tm	mg kg ⁻¹				0.45		<u>0.42</u>		0.45		0.45	<u>0.5</u>		
U	mg kg ⁻¹	<u>3</u>			2.67		<u>2.64</u>		2.61		2.8	<u>2.66</u>		
V	mg kg ⁻¹	118	133		107.330		<u>114</u>		104.180		108.3	<u>127</u>	<u>105</u>	
W	mg kg ⁻¹				1.37				1.15				<u>1.15</u>	
Y	mg kg ⁻¹	27	36	<u>28.8</u>	27.37		<u>26</u>	<u>29</u>	29.99		30.6	<u>30</u>	<u>29</u>	
Yb	mg kg ⁻¹				3.01		<u>2.77</u>		2.97		2.9	<u>3.18</u>		
Zn	mg kg ⁻¹	69	75	<u>75.7</u>	68.54	0.014	<u>89</u>	73	82.74		68	<u>71</u>	<u>71</u>	90
Zr	mg kg ⁻¹	158	166	<u>145</u>	159.640	0.022	<u>175</u>	<u>158</u>	168.350		160.8	<u>172</u>	<u>160</u>	

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	
SiO ₂	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
TiO ₂	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
Al ₂ O ₃	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
Fe ₂ O ₃ T	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	0.099	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
Na ₂ O	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
K ₂ O	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
P ₂ O ₅	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
H ₂ O+	g 100g ⁻¹	4.14						1.7						
CO ₂	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	19.5	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		96.3	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
SiO ₂	g 100g ⁻¹	<u>50.842</u>	54.42	51.4	<u>49.87</u>	49.75	51.16	<u>50.624</u>	50.81	52.36	<u>50.82</u>		59.9
TiO ₂	g 100g ⁻¹	<u>0.792</u>	0.78	0.7		0.77	<u>0.76</u>	0.776	<u>0.75</u>	0.754	<u>0.77</u>		0.79
Al ₂ O ₃	g 100g ⁻¹	<u>14.202</u>	14.73	14.61	<u>15.49</u>	14.36	<u>14.4</u>	14.29	14.14	<u>14.308</u>	14.14		15.13
Fe ₂ O ₃ T	g 100g ⁻¹	<u>6.682</u>	6.66	6.18	<u>6.4</u>	6.62	<u>6.41</u>	6.689	<u>6.4</u>	6.48	<u>6.44</u>		6.56
Fe(II)O	g 100g ⁻¹			1.4		2.16							2.111
MnO	g 100g ⁻¹	<u>0.104</u>	0.11	0.1		0.11	<u>0.1</u>	0.104		0.106	<u>0.1</u>	<u>0.102</u>	0.11
MgO	g 100g ⁻¹	<u>3.645</u>	3.76	3.37	<u>3.74</u>	3.56	<u>3.68</u>	3.681	<u>3.6</u>	3.487	<u>3.66</u>		4.18
CaO	g 100g ⁻¹	<u>8.221</u>	8.46	8.24	<u>6.94</u>	8.36	<u>8.11</u>	8.22	<u>8.05</u>	8.637	<u>8.11</u>		8.013
Na ₂ O	g 100g ⁻¹	<u>0.055</u>	0.09	0.13	<u>0.706</u>	0.22	<u>0.14</u>	0.184	<u>0.13</u>	0.136	<u>0.13</u>		0.126
K ₂ O	g 100g ⁻¹	<u>4.514</u>	4.53	4.51	<u>4.76</u>	4.63	<u>4.56</u>	4.512	<u>4.47</u>	4.357	<u>4.45</u>		4.336
P ₂ O ₅	g 100g ⁻¹	<u>0.153</u>	0.16	0.17		0.14	<u>0.15</u>	0.153	<u>0.15</u>	0.159	<u>0.15</u>		0.150
H ₂ O+	g 100g ⁻¹				3.99								4.123
CO ₂	g 100g ⁻¹				8.29								6.934
LOI	g 100g ⁻¹	<u>10.8</u>	10.88	11.14	<u>10.98</u>		10.8	10.73	<u>10.78</u>	10.85	<u>10.58</u>		10.94
Ag	mg kg ⁻¹										<u>0.02</u>		
As	mg kg ⁻¹						<u>6.2</u>	9.1	<u>6.2</u>		<u>6.7</u>	<u>6.8</u>	6.7
B	mg kg ⁻¹												
Ba	mg kg ⁻¹	<u>360</u>	362	362		380	<u>372.3</u>	348.3	<u>358</u>	362.1	<u>368</u>	<u>361.2</u>	360
Be	mg kg ⁻¹			2.03					2.38	<u>2.4</u>	<u>2.27</u>		
Bi	mg kg ⁻¹			0.22					0.21		<u>0.22</u>		
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								<u>0.07</u>		
Ce	mg kg ⁻¹		81.8		83	<u>81.8</u>	73.15	<u>88.3</u>	78.42	<u>89.9</u>	<u>82.8</u>		85
Cl	mg kg ⁻¹			96									160
Co	mg kg ⁻¹	<u>19</u>	16	16.7		28	<u>18.8</u>		14.5	<u>15.53</u>	<u>15</u>	<u>15.19</u>	16.3
Cr	mg kg ⁻¹	<u>79</u>	34	68.9		76	<u>72.2</u>	78.5	<u>60</u>	77.8	<u>80</u>	<u>81.5</u>	72.1
Cs	mg kg ⁻¹			5.68		7	<u>6</u>	6.1	<u>6.41</u>	<u>5.81</u>	6.34	<u>7.4</u>	6.5
Cu	mg kg ⁻¹	<u>12</u>	27	10.6		14	<u>7.5</u>	11.2	10.3	12.2	10.6		
Dy	mg kg ⁻¹		5.25					5.15	<u>5.18</u>	5.26	<u>5.63</u>		6.5
Er	mg kg ⁻¹		2.96						<u>2.82</u>	3.06	<u>3</u>		
Eu	mg kg ⁻¹		1.45						<u>1.41</u>	<u>1.45</u>	<u>1.46</u>		1.48
F	mg kg ⁻¹			1076								1060	1108
Ga	mg kg ⁻¹		<u>15</u>	20.9		16	<u>19.2</u>	19	21.7	<u>19.5</u>	<u>21.5</u>	<u>19.36</u>	19.6
Gd	mg kg ⁻¹			6.57					<u>5.56</u>	<u>5.72</u>	<u>6.24</u>		
Ge	mg kg ⁻¹						1.7				<u>0.21</u>		
Hf	mg kg ⁻¹		6	<u>4.67</u>		7	<u>3.6</u>	<u>4.65</u>	4.2	3.91	4.3		
Hg	mg kg ⁻¹												
Ho	mg kg ⁻¹			1.04					<u>1.04</u>	<u>1.05</u>	<u>1.08</u>		
I	mg kg ⁻¹												
In	mg kg ⁻¹			0.084					<u>0.077</u>		<u>0.07</u>		
La	mg kg ⁻¹		39.6		43	<u>42.5</u>	38.2	<u>38.3</u>	<u>37.9</u>	<u>40.3</u>	<u>42.1</u>		39
Li	mg kg ⁻¹		61.9						<u>65.3</u>		<u>62.8</u>		58.5
Lu	mg kg ⁻¹		0.44						<u>0.41</u>	<u>0.43</u>	<u>0.43</u>		0.442
Mo	mg kg ⁻¹		1.03		3	<u>1.4</u>			<u>1.13</u>	<u>1.09</u>	<u>1.08</u>		
Nb	mg kg ⁻¹	<u>17</u>	15	13.9		17	<u>13.3</u>	<u>12.9</u>	13.6	<u>11.64</u>	<u>14.3</u>	<u>14.3</u>	
Nd	mg kg ⁻¹		35.9		38	<u>37.8</u>	32.7	<u>37.2</u>	35.47	<u>38.2</u>			36
Ni	mg kg ⁻¹	<u>44</u>	46	37.9		41	<u>37.2</u>	37.3	<u>37.2</u>	<u>38.5</u>	<u>37.3</u>	<u>39.3</u>	
Pb	mg kg ⁻¹	<u>9</u>	10	9.84		8	<u>10.2</u>	9.6	<u>8.7</u>	<u>10.15</u>	<u>9.2</u>	<u>7.86</u>	
Pd	mg kg ⁻¹												
Pr	mg kg ⁻¹			9.48					<u>9.23</u>	<u>9.33</u>	<u>9.8</u>		
Rb	mg kg ⁻¹	<u>137</u>	139	128		135	<u>129.7</u>	134.6	<u>140.5</u>	129.260	<u>141</u>	<u>133.040</u>	138
Re	mg kg ⁻¹												
S	mg kg ⁻¹			68							<u>0.01</u>		
Sb	mg kg ⁻¹		0.82				<u>0.99</u>		<u>0.89</u>		<u>0.82</u>		
Sc	mg kg ⁻¹		<u>18</u>	14.8		19	<u>15.6</u>	14.7	<u>13.4</u>	<u>13.6</u>	<u>13.9</u>	<u>15.2</u>	14.38
Se	mg kg ⁻¹										<u>1</u>		
Sm	mg kg ⁻¹		6.85				<u>3.8</u>	6.4	<u>7.09</u>	<u>6.93</u>	<u>7.25</u>		6.83
Sn	mg kg ⁻¹		2.79		1	<u>2.61</u>			<u>2.52</u>	<u>3</u>			
Sr	mg kg ⁻¹	<u>114</u>	117	115		111	<u>107.8</u>	113.2	<u>118</u>	<u>106.760</u>	<u>124.5</u>	<u>108.040</u>	119.2
Ta	mg kg ⁻¹		0.86		5				<u>0.88</u>	<u>0.9</u>	<u>1</u>		0.9
Tb	mg kg ⁻¹		1.03						<u>0.86</u>	<u>0.87</u>	<u>0.94</u>		0.87
Te	mg kg ⁻¹		0.078										
Th	mg kg ⁻¹	<u>13</u>	10	9.48		11	<u>11.7</u>	12.2	<u>10.95</u>	<u>10.52</u>	<u>11.25</u>	<u>10.83</u>	11.2
Tl	mg kg ⁻¹		0.66				<u>1</u>		<u>0.7</u>	<u>0.59</u>	<u>0.67</u>		
Tm	mg kg ⁻¹		0.44						<u>0.42</u>	<u>0.44</u>	<u>0.48</u>		
U	mg kg ⁻¹		2.34		3	<u>2.2</u>	<u>1.75</u>	<u>2.77</u>	<u>2.57</u>	<u>2.66</u>	<u>2.69</u>		2.5
V	mg kg ⁻¹	<u>106</u>	114	114		132	<u>111.4</u>	107.4	<u>119</u>	<u>114.8</u>	<u>120</u>	<u>117.880</u>	125
W	mg kg ⁻¹		1.07				<u>2.1</u>			<u>9.87</u>	<u>2</u>		1.2
Y	mg kg ⁻¹	<u>36</u>	31	29.8		30	<u>28.3</u>	32.1	<u>27.7</u>	<u>25.22</u>	<u>30.1</u>	<u>29.06</u>	
Yb	mg kg ⁻¹			2.86					<u>2.53</u>	<u>2.88</u>	<u>2.83</u>		3.02
Zn	mg kg ⁻¹	<u>99</u>	73	69.7		73	<u>74.2</u>	71.4	<u>80</u>	<u>81</u>	<u>77</u>	<u>76.98</u>	80
Zr	mg kg ⁻¹	<u>131</u>	167	168		161	<u>154.5</u>	162.6	<u>164</u>	<u>139.840</u>	<u>164</u>	<u>160.740</u>	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
SiO ₂	g 100g ⁻¹		53.39	51.6	50.49	52.2		50.4	50.7	50.3	50.82	51.23	50.53
TiO ₂	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
Al ₂ O ₃	g 100g ⁻¹		13.49	14.15	14.46	14.4	2.776	14.22	14.1	14	14.334	14.28	14.15
Fe ₂ O ₃ T	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
Na ₂ O	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
K ₂ O	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
P ₂ O ₅	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
H ₂ O+	g 100g ⁻¹												
CO ₂	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
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	Z
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
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	
SiO ₂	g 100g ⁻¹		51.57	53.11	51.75		50.78		51.54		53.15	51.16	51.5	49.024
TiO ₂	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
Al ₂ O ₃	g 100g ⁻¹		14.78	14.48	14.59		14.23		14.44		13.9	14.339	14.5	13.972
Fe ₂ O ₃ T	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
Na ₂ O	g 100g ⁻¹		0.11	0.218	0.128		0.11		0.56		0.125	0.172	0.11	0.11
K ₂ O	g 100g ⁻¹		4.46	4.656	4.555	4.71	4.39		4.65		4.31	4.443	4.83	4.402
P ₂ O ₅	g 100g ⁻¹		0.14	0.169	0.160		0.147		0.13		0.15	0.156	0.18	0.168
H ₂ O+	g 100g ⁻¹			4.84								3.673		
CO ₂	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		0.077	
Hg	mg kg ⁻¹													
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
SiO ₂	g 100g ⁻¹	50.96	<u>51.05</u>		<u>51.23</u>	50.04	49.7	50.83	51.01	49.8	50.93	50.83	50.67
TiO ₂	g 100g ⁻¹	0.77	<u>0.76</u>		<u>0.77</u>	0.74	0.8	0.74	0.812	0.74	0.748	0.78	0.754
Al ₂ O ₃	g 100g ⁻¹	14.73	<u>14.3</u>	<u>14</u>	14.89	16.25	14	14.17	14.35	14.11	14.24	14.41	15.15
Fe ₂ O ₃ T	g 100g ⁻¹	6.45	<u>6.42</u>	<u>6.22</u>	<u>6.42</u>	5.67	6.9	6.49	6.53	6.64	6.525	6.39	6.55
Fe(II)O	g 100g ⁻¹				<u>1.98</u>						<u>2.4</u>		
MnO	g 100g ⁻¹	0.12	<u>0.098</u>	<u>0.096</u>	<u>0.103</u>	0.08	0.09	0.1	0.101	0.11	<u>0.112</u>	0.1	<u>0.094</u>
MgO	g 100g ⁻¹	3.76	<u>3.56</u>		<u>3.98</u>	3.56	3.7	3.66	3.763	3.63	<u>3.64</u>	3.64	<u>3.56</u>
CaO	g 100g ⁻¹	7.55	<u>8.01</u>		<u>7.81</u>	7.7	8.1	8.06	7.774	8.63	<u>8.156</u>	8.04	<u>8.07</u>
Na ₂ O	g 100g ⁻¹	0.12	<u>0.14</u>	<u>0.152</u>		0.18	0.12	0.11	0.165	0.34	<u>0.146</u>	0.17	<u>0.143</u>
K ₂ O	g 100g ⁻¹	4.38	<u>4.48</u>	<u>4.55</u>	<u>4.4</u>	4.31	5.26	4.43	4.475	4.45	<u>4.459</u>	4.5	<u>4.47</u>
P ₂ O ₅	g 100g ⁻¹	0.15	<u>0.15</u>	<u>0.148</u>		0.15	0.06	0.15	0.175	0.13	<u>0.157</u>	0.17	<u>0.151</u>
H ₂ O+	g 100g ⁻¹										<u>4.4</u>	0.97	
CO ₂	g 100g ⁻¹										<u>7.06</u>		
LOI	g 100g ⁻¹	10.99	<u>10.74</u>	<u>10.67</u>	<u>10.3</u>	11.2	11.6	<u>11.48</u>	10.73	11.4	<u>10.71</u>	11.02	11.27
Ag	mg kg ⁻¹										<u>0.36</u>		
As	mg kg ⁻¹							13	5.5	11	<u>7.2</u>		
B	mg kg ⁻¹				<u>181</u>								
Ba	mg kg ⁻¹			<u>382</u>	<u>400</u>			356	362		<u>363.1</u>	<u>367.3</u>	397
Be	mg kg ⁻¹				<u>2.1</u>						<u>1.976</u>		
Bi	mg kg ⁻¹										<u>0.3</u>		
Br	mg kg ⁻¹												
C(org)	mg kg ⁻¹												
C(tot)	mg kg ⁻¹			<u>18200</u>							20300	19900	20300
Cd	mg kg ⁻¹							1					
Ce	mg kg ⁻¹			<u>86.5</u>				73.1	84		<u>82.5</u>	<u>83.01</u>	75.03
Cl	mg kg ⁻¹					200	142		359		<u>103</u>		
Co	mg kg ⁻¹			<u>14.5</u>			18	13.1	18		<u>18.1</u>	70.8	1
Cr	mg kg ⁻¹						52	68.4	68		<u>71</u>		89
Cs	mg kg ⁻¹									6	<u>6.4</u>		6.29
Cu	mg kg ⁻¹						13	8	9	16	<u>11.06</u>		12
Dy	mg kg ⁻¹			<u>4.7</u>							<u>5.53</u>	6.12	5.74
Er	mg kg ⁻¹			<u>2.72</u>							<u>3.21</u>	<u>3.32</u>	2.69
Eu	mg kg ⁻¹			<u>1.39</u>							<u>1.42</u>	<u>1.53</u>	1.41
F	mg kg ⁻¹								1720		<u>1026</u>		
Ga	mg kg ⁻¹			<u>18</u>				19	21	20	<u>21.52</u>		31.62
Gd	mg kg ⁻¹			<u>6.39</u>							<u>5.98</u>	<u>6.55</u>	5.4
Ge	mg kg ⁻¹										<u>1.96</u>		3.4
Hf	mg kg ⁻¹			<u>4.47</u>							<u>4.37</u>		4.6
Hg	mg kg ⁻¹					2							
Ho	mg kg ⁻¹			<u>0.9</u>							<u>1.09</u>	<u>1.18</u>	0.85
I	mg kg ⁻¹												
In	mg kg ⁻¹			<u>0.05</u>									
La	mg kg ⁻¹			<u>41.5</u>				36.2	36		<u>39.8</u>	<u>39.76</u>	41.56
Li	mg kg ⁻¹			<u>58</u>							<u>63</u>	71.43	
Lu	mg kg ⁻¹			<u>0.39</u>							<u>0.44</u>	0.481	0.38
Mo	mg kg ⁻¹							1.3	4	7	<u>1.85</u>		
Nb	mg kg ⁻¹			<u>15.9</u>				14.6	14		<u>14</u>		15
Nd	mg kg ⁻¹			<u>35.4</u>				35.4	37		<u>37.8</u>	<u>38.45</u>	33.77
Ni	mg kg ⁻¹			<u>38.7</u>			43	40	41	32	<u>44</u>		41
Pb	mg kg ⁻¹						33	13.5	5		<u>8.62</u>		22
Pd	mg kg ⁻¹						63						
Pr	mg kg ⁻¹			<u>9.17</u>							<u>9.68</u>	<u>10.05</u>	9.04
Rb	mg kg ⁻¹			<u>136</u>	<u>100</u>	100		128.2	137	132	<u>141</u>		134
Re	mg kg ⁻¹												
S	mg kg ⁻¹	<u>400</u>					1600		200		<u>200</u>		
Sb	mg kg ⁻¹								1		<u>0.8</u>		
Sc	mg kg ⁻¹			<u>15.1</u>				13.5	15		<u>13</u>	<u>17.04</u>	16.7
Se	mg kg ⁻¹						16	1.4					
Sm	mg kg ⁻¹			<u>6.74</u>				8.3			<u>6.88</u>	<u>7.43</u>	6.64
Sn	mg kg ⁻¹								2		<u>2.27</u>		
Sr	mg kg ⁻¹	<u>300</u>		<u>113</u>	<u>100</u>	94		110.7	113	105	<u>111.8</u>	<u>119.5</u>	112.5
Ta	mg kg ⁻¹							3.2			<u>0.9</u>		2.93
Tb	mg kg ⁻¹			<u>0.89</u>							<u>0.86</u>	<u>1.01</u>	0.84
Te	mg kg ⁻¹					1							
Th	mg kg ⁻¹			<u>10.7</u>				13.1	12		<u>10.72</u>	<u>12.23</u>	10.2
Tl	mg kg ⁻¹			<u>0.66</u>			1				<u>0.7</u>		
Tm	mg kg ⁻¹			<u>0.38</u>							<u>0.46</u>	<u>0.481</u>	0.37
U	mg kg ⁻¹							3.7	5		<u>2.45</u>	<u>2.88</u>	2.59
V	mg kg ⁻¹			<u>116</u>			58	107.6	122		<u>105</u>	<u>112.9</u>	112
W	mg kg ⁻¹							3.8			<u>1.44</u>		
Y	mg kg ⁻¹			<u>29.7</u>				28.2	29	32	<u>29.4</u>	<u>29.27</u>	32.6
Yb	mg kg ⁻¹			<u>2.51</u>							<u>2.84</u>	<u>3.06</u>	2.47
Zn	mg kg ⁻¹	<u>200</u>		<u>76</u>	<u>100</u>	88	96	92.5	76	76	<u>79</u>	<u>84.8</u>	81
Zr	mg kg ⁻¹			<u>161</u>	<u>200</u>	200		151.3	155	156	<u>164</u>	<u>209.7</u>	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	-	-	-	-	-	-	-	-	-	-	-
SiO ₂	g 100g ⁻¹	51.36											
TiO ₂	g 100g ⁻¹	0.76											
Al ₂ O ₃	g 100g ⁻¹	14.38											
Fe ₂ O ₃ T	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											
Na ₂ O	g 100g ⁻¹												
K ₂ O	g 100g ⁻¹	4.35											
P ₂ O ₅	g 100g ⁻¹	0.15											
H ₂ O+	g 100g ⁻¹												
CO ₂	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	edn/H_a	n					
	$g\ 100g^{-1}$	$g\ 100g^{-1}$	$g\ 100g^{-1}$			$g\ 100g^{-1}$	$g\ 100g^{-1}$	$g\ 100g^{-1}$		
SiO ₂	50.91	0.04869	0.5636	0.08639	92	50.95	0.6692	50.91	Assigned	Median
TiO ₂	0.7583	0.002341	0.01581	0.1481	95	0.7583	0.02282	0.76	Assigned	Robust Mean
Al ₂ O ₃	14.28	0.02901	0.1914	0.1515	93	14.28	0.2797	14.28	Assigned	Robust Mean
Fe ₂ O ₃ T	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
K ₂ O	4.414	0.015	0.07059	0.2125	94	4.438	0.109	4.425	Assigned	Mode
P ₂ O ₅	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
SiO ₂	-8.35	-0.08	-1.64	-1.60	*	0.16	-0.06	0.59	-0.04	0.01	0.81	0.42	7.67
TiO ₂	33.89	-0.26	-0.26	-0.26	*	-0.26	0.37	-0.58	-0.26	0.43	0.11	0.66	-3.69
Al ₂ O ₃	-11.70	-0.13	-1.15	-2.09	*	0.29	-0.11	0.37	0.31	-0.40	0.10	-0.63	2.61
Fe ₂ O _{3T}	<u>0.58</u>	<u>0.22</u>	<u>-2.01</u>	<u>-1.11</u>	<u>0.96</u>	<u>-0.59</u>	<u>0.27</u>	<u>-1.41</u>	<u>0.07</u>	<u>-0.33</u>	<u>-0.37</u>	<u>1.20</u>	<u>-5.48</u>
MnO	24.75	<u>0.00</u>	*	-1.77	1.06	1.59	<u>0.88</u>	-1.24	-5.30	0.00	-0.35	<u>0.88</u>	<u>0.00</u>
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	<u>0.22</u>	0.19	-1.22	<u>0.19</u>	-0.80	0.45	-0.20	-1.13	0.20	-0.40	<u>0.21</u>	-6.85
K ₂ O	-3.57	<u>0.68</u>	<u>0.66</u>	-2.57	*	1.60	-1.16	-0.17	0.33	-0.18	-0.62	-0.22	6.04
P ₂ O ₅	118.06	3.58	*	1.09	*	0.10	-0.27	1.09	0.60	0.70	-0.80	-0.27	-2.79
LOI	<u>2.58</u>	<u>0.06</u>	<u>0.72</u>	<u>3.78</u>	*	<u>1.16</u>	<u>0.62</u>	-0.11	-0.50	-0.15	<u>0.12</u>	*	-0.14
As	<u>78.21</u>	<u>0.18</u>	*	-7.13	<u>2.41</u>	*	<u>-0.06</u>	*	<u>1.40</u>	<u>-0.67</u>	*	<u>-2.83</u>	*
Ba	-15.17	0.83	<u>2.25</u>	-2.31	1.04	*	-0.38	*	1.09	1.77	*	0.22	<u>1.00</u>
Be	*	*	*	-0.94	*	*	*	*	0.47	1.61	*	1.56	*
Bi	<u>496.07</u>	*	*	<u>16.78</u>	*	*	*	*	*	*	*	-0.26	*
C(tot)	*	*	*	*	*	*	*	*	*	*	-1.39	*	1.25
Ce	*	<u>0.28</u>	-1.06	-2.48	<u>0.06</u>	*	-0.60	*	-0.93	-0.29	*	-0.15	*
Co	*	*	*	-8.90	-0.31	*	<u>0.00</u>	*	-0.06	0.16	*	0.03	<u>27.28</u>
Cr	<u>23.62</u>	<u>1.26</u>	<u>0.58</u>	-1.27	-0.11	*	0.13	*	-0.26	-0.09	*	-0.14	-2.20
Cs	*	*	*	*	-0.13	*	<u>0.13</u>	*	0.00	3.16	*	-0.17	*
Cu	<u>82.73</u>	<u>-1.11</u>	*	-2.69	<u>0.79</u>	*	<u>21.43</u>	*	<u>0.87</u>	-0.51	*	<u>1.07</u>	<u>2.53</u>
Dy	*	*	*	-2.37	<u>0.06</u>	*	*	*	-0.92	-0.12	*	-0.08	*
Er	*	*	*	-2.07	-0.45	*	*	*	-1.22	-0.04	*	-0.47	*
Eu	*	*	*	-1.26	-0.09	*	*	*	-0.39	<u>0.09</u>	*	-0.16	*
F	*	*	*	*	*	*	*	*	*	<u>0.40</u>	*	*	*
Ga	*	<u>-0.35</u>	*	*	-0.05	*	-0.35	*	-0.35	1.00	*	0.36	*
Gd	*	*	*	-1.13	<u>1.13</u>	*	*	*	<u>0.31</u>	-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	*	<u>3.20</u>	*	-2.32	<u>0.11</u>	*	-0.96	*	-0.77	-0.16	*	0.35	-2.43
Li	*	*	*	-0.78	*	*	*	*	1.31	1.89	*	0.12	*
Lu	*	*	*	-1.66	<u>0.03</u>	*	*	*	-1.02	-0.12	*	0.03	*
Mo	<u>11.03</u>	*	*	-0.55	*	*	*	*	<u>0.61</u>	*	*	0.14	<u>195.67</u>
Nb	<u>0.34</u>	<u>0.34</u>	-0.61	*	<u>1.15</u>	*	<u>0.02</u>	*	<u>0.08</u>	<u>0.80</u>	*	0.00	-4.48
Nd	*	*	*	-1.99	<u>0.24</u>	*	-0.70	*	-0.34	-0.13	*	-0.00	*
Ni	<u>40.20</u>	<u>-0.39</u>	<u>2.14</u>	-2.09	-0.72	*	<u>-0.03</u>	*	-0.39	-0.37	*	0.11	<u>5.98</u>
Pb	-1.24	<u>4.39</u>	*	-4.99	<u>-0.54</u>	*	<u>-0.30</u>	*	-0.11	-0.63	*	2.45	-4.35
Pr	*	*	*	-2.06	<u>0.69</u>	*	*	*	<u>-0.74</u>	-0.26	*	0.21	*
Rb	<u>0.04</u>	<u>0.14</u>	<u>0.86</u>	*	<u>0.17</u>	*	<u>-0.34</u>	*	<u>0.14</u>	<u>5.58</u>	*	-0.09	<u>2.02</u>
Sb	*	*	*	<u>24.86</u>	*	*	*	*	-0.23	*	*	-0.19	*
Sc	*	<u>2.46</u>	*	-1.49	<u>0.00</u>	*	*	*	<u>0.37</u>	<u>3.31</u>	*	0.67	*
Sm	*	*	*	-1.61	<u>0.02</u>	*	-0.33	*	<u>-0.64</u>	<u>0.15</u>	*	-0.41	*
Sn	*	*	*	-1.51	*	*	-1.22	*	-0.14	*	*	0.03	*
Sr	*	<u>0.00</u>	<u>0.00</u>	-1.80	<u>0.44</u>	*	<u>-0.23</u>	*	-0.11	<u>1.00</u>	*	0.06	-2.03
Ta	*	*	*	*	<u>0.33</u>	*	*	*	-1.86	0.35	*	0.57	*
Tb	*	*	*	-1.42	<u>1.31</u>	*	*	*	<u>0.00</u>	-0.23	*	0.17	*
Th	*	<u>-0.02</u>	*	-1.74	-0.03	*	<u>0.63</u>	*	-1.00	<u>0.77</u>	*	-0.02	-3.30
Tl	*	*	*	*	*	*	*	*	-0.40	*	*	0.20	*
Tm	*	*	*	-1.72	<u>0.32</u>	*	*	*	<u>-1.23</u>	<u>-0.38</u>	*	0.27	*
U	*	<u>1.05</u>	*	*	-0.22	*	*	*	<u>0.00</u>	-0.07	*	0.37	<u>92.07</u>
V	*	<u>0.79</u>	<u>-0.45</u>	<u>0.00</u>	-1.03	*	<u>0.11</u>	*	-1.02	<u>1.45</u>	*	-0.12	<u>1.36</u>
W	<u>460.92</u>	*	*	<u>8.76</u>	*	*	*	*	-0.19	*	*	0.19	*
Y	-2.56	<u>1.35</u>	<u>0.64</u>	-3.75	<u>1.18</u>	*	*	*	-0.07	-0.20	*	0.28	<u>0.57</u>
Yb	*	*	*	-1.84	-0.26	*	*	*	<u>-1.18</u>	<u>0.08</u>	*	-0.06	*
Zn	24.26	-0.16	<u>0.32</u>	-2.55	-2.51	*	<u>0.00</u>	*	-0.16	<u>0.02</u>	*	-0.26	<u>2.87</u>
Zr	1.83	0.73	<u>0.96</u>	-9.37	-4.60	*	-0.28	*	<u>0.40</u>	-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
SiO ₂	*	-0.13	<u>0.20</u>	<u>0.13</u>	<u>0.10</u>	0.12	<u>-0.26</u>	*	-0.46	-0.20	-0.03	<u>-0.74</u>	*
TiO ₂	1.42	0.05	<u>0.21</u>	<u>0.34</u>	<u>0.05</u>	<u>0.05</u>	<u>0.02</u>	*	<u>0.24</u>	-8.11	-0.52	<u>0.40</u>	*
Al ₂ O ₃	*	-0.53	<u>0.18</u>	<u>-0.00</u>	<u>-0.52</u>	<u>-0.34</u>	<u>0.68</u>	*	<u>-0.21</u>	-1.52	-0.42	<u>0.73</u>	*
Fe ₂ O _{3T}	*	<u>0.51</u>	<u>-0.24</u>	<u>-0.09</u>	<u>0.84</u>	<u>-0.13</u>	<u>0.02</u>	*	<u>0.02</u>	-3.13	-0.07	<u>0.02</u>	*
MnO	*	<u>0.60</u>	<u>0.18</u>	<u>-0.18</u>	<u>-0.18</u>	<u>-0.18</u>	<u>1.77</u>	*	<u>0.35</u>	<u>0.00</u>	0.35	<u>-0.18</u>	*
MgO	*	<u>0.05</u>	<u>-0.08</u>	<u>-0.92</u>	<u>0.25</u>	<u>0.75</u>	<u>-0.08</u>	*	<u>-0.25</u>	<u>3.68</u>	-0.50	<u>0.75</u>	*
CaO	*	<u>0.82</u>	<u>0.31</u>	<u>-0.50</u>	<u>-1.30</u>	<u>0.94</u>	<u>-0.16</u>	*	<u>-0.20</u>	-0.83	0.78	<u>-0.67</u>	*
K ₂ O	*	<u>0.05</u>	<u>-0.02</u>	<u>0.33</u>	<u>1.39</u>	<u>0.40</u>	<u>-0.02</u>	*	<u>-0.31</u>	-4.87	-0.05	<u>0.33</u>	*
P ₂ O ₅	*	<u>2.19</u>	<u>-0.02</u>	<u>-1.39</u>	<u>0.22</u>	<u>-0.52</u>	<u>0.60</u>	*	<u>0.60</u>	<u>-2.79</u>	2.19	<u>0.97</u>	*
LOI	*	<u>1.78</u>	<u>-0.31</u>	<u>2.42</u>	<u>-1.00</u>	<u>-0.11</u>	<u>1.19</u>	*	<u>-0.40</u>	<u>2.71</u>	1.12	<u>2.42</u>	*
As	5.18	-0.92	-2.26	-3.47	*	<u>0.55</u>	*	*	<u>4.45</u>	-7.83	0.37	<u>1.40</u>	*
Ba	-5.40	-0.06	-0.09	-0.13	*	<u>-0.46</u>	<u>-0.34</u>	0.49	1.09	1.16	-1.85	-0.59	0.66
Be	-0.02	-0.46	*	*	*	*	<u>0.87</u>	*	*	<u>1.37</u>	*	*	*
Bi	*	<u>-0.16</u>	*	*	<u>-1.09</u>	<u>10.24</u>	*	*	*	<u>-1.74</u>	*	*	*
C(tot)	*	<u>-0.32</u>	*	*	<u>-25.01</u>	*	*	*	<u>0.14</u>	*	*	*	*
Ce	-3.88	-0.44	-0.01	1.48	1.17	-0.61	-1.21	0.64	0.55	0.03	4.75	<u>1.63</u>	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	*	<u>-2.92</u>	<u>-0.77</u>	<u>6.24</u>	<u>-0.17</u>	-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	*	*	<u>-1.00</u>	*	<u>-0.74</u>	0.63	*	1.01	*	*	-0.03
Er	0.17	0.09	*	*	<u>-0.47</u>	*	<u>-0.69</u>	0.53	*	0.52	*	*	0.13
Eu	-1.50	0.01	*	*	<u>1.10</u>	*	<u>0.08</u>	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	*	*	<u>1.02</u>	*	<u>1.64</u>	0.55	*	-1.43	*	*	0.39
Ge	*	<u>-0.79</u>	*	*	*	*	<u>1.34</u>	*	*	*	*	*	*
Hf	-0.24	0.50	0.29	*	*	<u>-0.62</u>	<u>-1.92</u>	*	*	1.91	*	-0.44	-0.11
Ho	0.45	0.42	*	*	<u>-0.72</u>	*	<u>-1.45</u>	0.55	*	-0.55	*	*	0.04
In	*	<u>-1.64</u>	*	*	<u>-0.45</u>	*	*	*	*	*	*	*	*
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	*	*	*	*	<u>0.71</u>	*	*	*	*	*	*
Lu	-0.28	0.07	*	*	<u>-0.78</u>	*	<u>-1.66</u>	0.13	*	-1.54	*	*	0.51
Mo	0.25	-1.03	*	<u>5.24</u>	*	<u>2.34</u>	*	*	*	-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	*	<u>2.07</u>	<u>-0.88</u>	<u>-1.19</u>	-0.11	<u>-1.11</u>	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	*	<u>0.31</u>	*	*	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	*	<u>9.42</u>	*	<u>23.32</u>	*	*	*	1.08	*	*	*
Sc	-4.65	1.07	0.50	1.15	*	<u>-0.48</u>	<u>-0.46</u>	2.68	4.95	-0.85	*	*	-2.15
Sm	-2.17	0.21	-1.28	*	<u>1.24</u>	<u>-4.01</u>	<u>0.07</u>	-0.63	*	0.59	*	*	0.24
Sn	1.81	0.36	*	<u>4.18</u>	*	<u>4.18</u>	*	*	*	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	*	*	<u>0.30</u>	*	<u>-0.34</u>	0.43	*	-0.41	*	*	0.95
Th	-4.56	-0.62	*	<u>0.79</u>	<u>-2.00</u>	<u>-1.08</u>	<u>-0.01</u>	3.54	0.14	1.05	4.84	0.79	0.12
Tl	0.22	*	<u>-1.39</u>	*	<u>-1.10</u>	<u>-4.07</u>	<u>1.30</u>	*	*	-10.48	*	*	*
Tm	0.39	-0.37	*	*	<u>-0.81</u>	*	<u>-2.09</u>	-0.02	*	-2.96	*	*	0.49
U	-0.38	-0.12	*	<u>6.56</u>	<u>-1.49</u>	<u>1.60</u>	*	-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	*	*	*	<u>-2.93</u>	*	*	*	-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	*	*	<u>-0.92</u>	<u>-0.15</u>	*	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 - 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
SiO ₂	-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
TiO ₂	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
Al ₂ O ₃	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
Fe ₂ O _{3T}	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
K ₂ O	-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
P ₂ O ₅	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
SiO ₂	-0.09	*	0.20	-0.19	0.27	0.03	-1.34	0.16	1.93	0.11	-0.37	1.02	-0.05
TiO ₂	-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
Al ₂ O ₃	-0.50	*	-0.00	3.71	-0.21	0.13	-1.52	0.08	0.36	-0.24	-0.47	4.44	0.10
Fe ₂ O _{3T}	-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
K ₂ O	-0.10	*	-0.76	1.89	-0.52	-0.02	-0.31	0.20	3.35	0.05	-0.31	0.19	-0.10
P ₂ O ₅	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
SiO ₂	-0.06	6.22	0.86	-0.93	-2.07	0.22	-0.52	-0.09	1.28	-0.08	*	15.94	-0.27
TiO ₂	1.07	1.37	-3.69	*	0.74	0.05	1.14	-0.26	-0.14	0.37	*	2.01	-7.48
Al ₂ O ₃	-0.20	2.35	1.72	3.16	0.42	0.31	0.05	-0.37	0.07	-0.37	*	4.44	-0.54
Fe ₂ O _{3T}	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
K ₂ O	0.71	1.65	1.37	2.45	3.07	1.04	1.40	0.40	-0.40	0.26	*	-1.10	-0.70
P ₂ O ₅	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
SiO ₂	*	<u>2.20</u>	<u>0.61</u>	-0.75	<u>1.14</u>	*	-0.91	-0.38	-1.09	-0.17	<u>0.28</u>	-0.68	<u>-0.51</u>
TiO ₂	*	<u>-2.38</u>	<u>-1.21</u>	-1.35	<u>-1.53</u>	<u>-23.89</u>	-0.71	-0.52	0.11	<u>0.39</u>	<u>0.05</u>	0.11	*
Al ₂ O ₃	*	<u>-2.06</u>	<u>-0.34</u>	<u>0.94</u>	<u>0.31</u>	<u>-30.05</u>	-0.31	-0.94	-1.46	<u>0.28</u>	<u>-0.00</u>	-0.68	*
Fe ₂ O ₃ T	*	<u>-4.37</u>	<u>-1.11</u>	0.65	<u>2.11</u>	<u>-15.43</u>	-0.58	0.75	0.24	-0.08	<u>0.17</u>	<u>0.55</u>	*
MnO	*	<u>-2.83</u>	<u>-1.77</u>	<u>0.64</u>	<u>0.00</u>	<u>-1.24</u>	0.35	0.00	0.00	<u>0.35</u>	<u>0.00</u>	0.00	*
MgO	*	<u>2.59</u>	<u>1.00</u>	-1.40	<u>-0.25</u>	<u>-9.46</u>	-0.33	0.00	-1.34	<u>0.57</u>	<u>-0.50</u>	0.33	*
CaO	*	<u>-5.72</u>	<u>-0.12</u>	0.39	<u>-5.80</u>	<u>-2.00</u>	-0.57	0.11	0.62	<u>0.64</u>	<u>0.31</u>	-1.76	*
K ₂ O	*	<u>-0.73</u>	<u>0.40</u>	-0.52	<u>-1.51</u>	<u>-28.08</u>	-1.04	-0.76	0.38	-0.52	<u>-0.24</u>	0.09	*
P ₂ O ₅	*	<u>-3.76</u>	<u>2.34</u>	0.00	<u>-0.15</u>	<u>-0.65</u>	0.70	-0.30	0.20	-1.05	<u>0.72</u>	-0.30	*
LOI	*	<u>2.08</u>	<u>-0.57</u>	3.33	<u>1.42</u>	*	1.51	<u>0.19</u>	-0.48	<u>0.52</u>	<u>-0.87</u>	1.65	<u>-0.04</u>
As	*	<u>1.32</u>	*	*	<u>-1.04</u>	<u>-4.74</u>	*	*	*	*	<u>0.06</u>	2.24	*
Ba	<u>-2.19</u>	<u>-1.89</u>	*	<u>0.80</u>	<u>-0.00</u>	<u>-12.20</u>	<u>0.41</u>	*	-0.43	<u>-1.10</u>	<u>-0.05</u>	-0.09	*
Be	*	<u>-0.04</u>	*	*	*	<u>-4.39</u>	*	*	*	*	<u>0.04</u>	-1.34	*
Bi	<u>0.70</u>	<u>-2.00</u>	*	*	*	<u>-2.40</u>	*	*	*	*	<u>0.44</u>	*	*
C(tot)	*	*	*	*	*	*	*	*	*	*	<u>0.42</u>	<u>-55.50</u>	*
Ce	<u>-1.22</u>	<u>-1.30</u>	*	-1.05	<u>-0.91</u>	<u>-7.18</u>	<u>0.09</u>	<u>0.15</u>	-9.86	*	<u>0.42</u>	-3.11	*
Co	*	<u>2.23</u>	*	<u>-0.19</u>	<u>-0.59</u>	<u>-1.65</u>	<u>4.74</u>	*	*	<u>-5.93</u>	<u>0.00</u>	3.20	*
Cr	*	<u>1.39</u>	*	<u>0.83</u>	<u>-0.26</u>	<u>-7.72</u>	2.18	*	-2.53	<u>-3.21</u>	<u>-0.43</u>	-0.18	*
Cs	<u>-3.10</u>	<u>-0.61</u>	*	*	*	*	0.53	0.21	-2.79	*	<u>0.24</u>	1.06	*
Cu	*	<u>6.49</u>	*	*	<u>-4.27</u>	<u>-3.82</u>	<u>1.27</u>	*	*	*	<u>-1.19</u>	<u>-5.31</u>	*
Dy	<u>-0.57</u>	<u>-2.64</u>	*	-1.37	*	<u>-3.02</u>	-0.03	0.66	-6.79	*	<u>0.43</u>	-1.40	*
Er	<u>-0.59</u>	<u>-2.43</u>	*	-2.29	<u>-2.55</u>	<u>-3.71</u>	0.23	0.96	-6.07	*	<u>-0.47</u>	-1.22	*
Eu	<u>-0.11</u>	<u>-1.19</u>	*	<u>-0.10</u>	<u>-1.96</u>	<u>-1.59</u>	0.17	1.09	-5.12	*	<u>-0.10</u>	-1.41	*
F	*	*	*	*	*	*	<u>-0.56</u>	*	*	*	*	*	*
Ga	*	<u>1.61</u>	*	*	<u>-0.35</u>	*	<u>0.15</u>	1.79	-1.19	<u>-3.68</u>	<u>0.10</u>	<u>-0.55</u>	*
Gd	<u>-1.33</u>	<u>-2.00</u>	*	<u>-0.66</u>	<u>-5.54</u>	<u>-1.29</u>	<u>-0.15</u>	3.67	<u>-6.19</u>	*	<u>-0.06</u>	<u>-0.71</u>	*
Ge	*	<u>-0.20</u>	*	*	*	<u>-6.59</u>	*	<u>1.16</u>	*	*	<u>0.40</u>	<u>-2.22</u>	*
Hf	<u>-1.28</u>	<u>-3.07</u>	*	*	*	*	<u>-0.84</u>	*	*	*	<u>-0.26</u>	<u>2.22</u>	*
Ho	<u>-0.43</u>	<u>-2.18</u>	*	*	<u>-0.45</u>	<u>-2.86</u>	<u>0.39</u>	0.27	<u>-5.36</u>	*	<u>0.14</u>	-1.37	*
In	*	*	*	*	*	*	*	*	*	*	*	<u>-0.03</u>	*
La	<u>-2.43</u>	<u>-1.05</u>	*	<u>-0.95</u>	<u>-3.70</u>	<u>-7.56</u>	0.22	1.10	-9.05	*	<u>0.58</u>	-2.87	*
Li	0.35	<u>0.03</u>	*	*	*	<u>-1.88</u>	*	*	-3.11	*	<u>-0.21</u>	<u>-8.81</u>	*
Lu	0.13	<u>-1.95</u>	*	*	*	<u>-3.84</u>	<u>0.51</u>	<u>0.26</u>	-4.35	*	<u>0.90</u>	-1.28	*
Mo	0.29	<u>0.45</u>	*	*	*	<u>-5.30</u>	<u>2.17</u>	*	-1.79	*	<u>0.03</u>	-1.45	*
Nb	<u>-1.25</u>	<u>0.27</u>	*	<u>-0.39</u>	<u>1.63</u>	<u>-9.34</u>	<u>1.59</u>	<u>-0.09</u>	-3.58	<u>3.27</u>	<u>-0.43</u>	-0.37	*
Nd	0.13	<u>-2.03</u>	*	<u>-0.75</u>	<u>-3.11</u>	<u>-4.84</u>	0.71	<u>-0.23</u>	-8.71	*	<u>0.42</u>	-2.52	*
Ni	*	<u>2.05</u>	*	<u>0.51</u>	<u>1.58</u>	<u>-1.16</u>	0.90	*	2.03	<u>-6.99</u>	<u>-1.80</u>	-4.06	*
Pb	0.06	<u>-2.86</u>	*	*	<u>2.52</u>	<u>-4.93</u>	1.16	*	-5.88	*	<u>0.64</u>	-2.50	*
Pr	0.30	<u>-1.24</u>	*	*	*	<u>-4.39</u>	2.37	0.17	-7.00	*	<u>0.27</u>	-2.31	*
Rb	<u>-2.62</u>	<u>0.74</u>	*	*	<u>-0.34</u>	<u>-11.54</u>	<u>0.47</u>	0.28	<u>-0.49</u>	1.44	<u>0.04</u>	<u>-1.02</u>	*
Sb	*	<u>-0.47</u>	*	*	<u>9.42</u>	*	*	10.04	*	*	<u>-0.23</u>	-1.54	*
Sc	*	<u>6.30</u>	*	<u>0.18</u>	<u>2.46</u>	<u>-6.51</u>	<u>7.04</u>	3.75	<u>9.51</u>	<u>-2.93</u>	<u>0.63</u>	<u>1.87</u>	*
Sm	0.00	<u>-1.73</u>	*	<u>0.14</u>	<u>-6.02</u>	<u>-2.36</u>	<u>0.55</u>	0.12	-6.78	*	<u>-0.21</u>	<u>-1.52</u>	*
Sn	*	<u>-0.45</u>	*	*	*	<u>-7.13</u>	*	0.11	*	*	<u>-0.09</u>	*	*
Sr	<u>-0.68</u>	<u>-0.46</u>	*	<u>0.05</u>	<u>-0.34</u>	<u>-3.38</u>	<u>0.00</u>	*	-0.68	<u>0.23</u>	<u>-0.11</u>	<u>-0.90</u>	*
Ta	<u>-0.00</u>	<u>-0.23</u>	*	*	*	*	<u>1.24</u>	<u>5.39</u>	<u>-2.34</u>	*	<u>-0.53</u>	*	*
Tb	<u>-0.27</u>	<u>-1.79</u>	*	*	*	<u>-1.56</u>	<u>0.54</u>	<u>1.49</u>	-5.28	*	<u>-0.07</u>	-0.81	*
Th	0.93	<u>-3.02</u>	*	<u>0.18</u>	<u>2.42</u>	<u>-4.55</u>	<u>0.45</u>	0.28	-7.67	*	<u>-0.10</u>	0.45	*
Tl	0.00	<u>-1.73</u>	*	*	*	<u>-4.97</u>	*	-0.63	*	*	<u>-0.04</u>	-0.81	*
Tm	<u>-0.20</u>	<u>-1.93</u>	*	*	*	<u>-3.45</u>	<u>0.74</u>	0.25	<u>-5.42</u>	*	<u>0.62</u>	-1.23	*
U	0.17	<u>-2.62</u>	*	*	<u>3.81</u>	<u>-4.85</u>	<u>0.77</u>	0.44	<u>-5.90</u>	*	<u>-0.05</u>	1.27	*
V	*	<u>1.82</u>	*	<u>0.57</u>	<u>1.36</u>	<u>-10.90</u>	2.73	*	-0.68	<u>7.72</u>	<u>-0.68</u>	0.23	*
W	*	<u>-1.14</u>	*	*	*	<u>-6.33</u>	<u>-1.05</u>	<u>0.04</u>	*	*	<u>3.68</u>	<u>2.20</u>	*
Y	<u>-1.28</u>	<u>-2.27</u>	*	<u>-0.24</u>	<u>1.35</u>	<u>-5.41</u>	<u>-0.43</u>	0.35	*	<u>0.57</u>	<u>-0.61</u>	<u>-3.56</u>	*
Yb	<u>-0.46</u>	<u>-2.29</u>	*	<u>-0.50</u>	*	<u>-4.74</u>	<u>-0.15</u>	0.97	-6.20	*	<u>0.10</u>	-1.33	*
Zn	*	<u>1.04</u>	*	*	<u>-1.12</u>	<u>-2.90</u>	<u>0.64</u>	*	-0.32	<u>0.32</u>	<u>-1.12</u>	<u>-3.93</u>	<u>5.75</u>
Zr	<u>-4.43</u>	<u>-3.78</u>	*	<u>-6.31</u>	<u>0.48</u>	<u>-12.68</u>	<u>0.45</u>	*	-4.26	<u>-0.72</u>	<u>-0.45</u>	<u>-1.04</u>	*

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
SiO ₂	*	1.16	3.89	1.48	*	-0.24	*	1.11	*	1.98	0.22	0.52	-1.68
TiO ₂	*	1.37	1.80	0.43	<u>0.69</u>	-0.08	*	-4.95	-1.16	<u>-0.77</u>	0.02	0.18	-0.61
Al ₂ O ₃	*	2.61	1.04	1.62	*	-0.26	*	0.83	*	<u>-0.99</u>	0.15	0.57	-0.81
Fe ₂ O ₃ T	*	0.85	0.32	2.08	<u>2.01</u>	*	*	-2.11	*	<u>-0.95</u>	*	0.27	-2.07
MnO	*	0.00	-0.85	0.53	<u>0.00</u>	0.35	*	-7.07	0.00	<u>-0.18</u>	0.48	0.88	0.35
MgO	*	1.84	0.33	-0.42	<u>-7.36</u>	-1.00	*	-3.85	*	<u>-1.19</u>	-0.04	-0.17	-0.46
CaO	*	-1.93	2.15	-0.02	<u>-0.16</u>	-0.23	*	-0.83	*	<u>-0.07</u>	0.06	0.73	-2.20
K ₂ O	*	0.66	3.44	2.00	<u>2.10</u>	-0.33	*	3.35	*	<u>-0.73</u>	0.21	2.95	-0.08
P ₂ O ₅	*	-2.79	4.40	2.07	*	-1.05	*	-5.28	*	<u>-0.15</u>	0.58	3.58	2.09
LOI	*	2.18	*	*	*	4.70	*	6.29	*	*	-0.48	<u>-0.27</u>	-2.67
As	*	<u>4.75</u>	<u>2.41</u>	*	*	*	*	*	*	*	*	*	-0.11
Ba	*	<u>0.49</u>	1.00	<u>0.16</u>	<u>0.71</u>	-0.01	*	0.75	-1.18	<u>-0.17</u>	0.71	*	-0.23
Be	*	*	-0.56	*	*	*	*	*	0.57	*	0.27	-6.49	-2.60
Bi	*	*	*	-1.02	*	*	*	*	1.31	*	*	*	*
C(tot)	*	*	*	*	*	*	<u>1.09</u>	*	*	<u>-0.56</u>	-0.39	*	*
Ce	<u>3.27</u>	-0.03	0.37	0.57	<u>0.37</u>	0.13	*	-2.72	-0.51	<u>-0.01</u>	0.12	*	2.66
Co	*	1.19	-0.55	0.59	<u>-0.83</u>	*	*	2.37	-0.71	*	0.33	*	-2.18
Cr	*	0.16	-11.72	2.85	<u>-1.87</u>	-0.51	*	-2.53	-0.85	<u>0.42</u>	0.59	*	-2.68
Cs	*	7.43	0.90	0.97	<u>-1.42</u>	0.11	*	*	-0.21	*	0.31	*	*
Cu	*	-2.21	-1.76	1.42	<u>-0.16</u>	-0.63	*	2.53	-1.74	*	<u>-0.63</u>	*	-4.48
Dy	<u>2.64</u>	*	0.45	-2.38	<u>0.70</u>	1.34	*	-5.10	0.00	*	0.11	*	1.74
Er	<u>1.65</u>	*	0.48	-2.24	<u>1.06</u>	0.71	*	-4.13	-0.30	*	<u>0.04</u>	*	1.54
Eu	<u>4.16</u>	*	0.06	-0.21	<u>-1.08</u>	0.81	*	-1.13	-0.11	*	<u>0.06</u>	*	1.99
F	*	*	*	*	*	*	*	*	*	*	1.88	*	*
Ga	*	-1.69	-0.09	-1.56	*	*	*	-2.68	0.00	*	0.27	*	5.48
Gd	<u>3.52</u>	*	0.03	-0.40	<u>1.37</u>	0.31	*	-4.67	-0.55	*	<u>0.24</u>	*	2.86
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	*	*	1.39	-2.42	*	0.40	*	*	-0.40	*	0.00	*	*
Ho	<u>1.66</u>	*	0.18	-1.96	<u>-0.92</u>	1.09	*	-3.25	-0.31	*	<u>-0.05</u>	*	1.05
In	*	*	*	*	*	*	*	*	*	*	<u>0.03</u>	*	*
La	<u>3.38</u>	13.57	0.25	0.15	<u>-1.76</u>	0.35	*	-3.53	-0.99	<u>-0.94</u>	0.16	*	2.50
Li	*	*	-1.11	0.08	<u>-0.51</u>	*	*	-3.07	0.08	*	<u>-0.17</u>	*	*
Lu	<u>1.98</u>	*	0.23	-1.62	<u>-1.02</u>	0.26	*	-0.77	0.00	*	<u>-0.07</u>	*	-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	*	<u>-0.00</u>	*	*
Nd	<u>5.20</u>	-2.11	0.11	0.81	<u>1.15</u>	0.01	*	-3.28	-0.46	*	0.49	*	2.26
Ni	*	1.47	-0.60	0.82	<u>-1.04</u>	-1.35	*	-2.48	-0.23	<u>-2.09</u>	0.37	*	-2.79
Pb	*	<u>16.29</u>	-0.46	0.38	<u>-0.20</u>	0.00	*	*	0.17	*	<u>-0.13</u>	*	1.45
Pr	<u>3.88</u>	*	0.18	0.30	<u>-1.06</u>	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	<u>3.99</u>	-9.67	0.07	0.44	<u>0.76</u>	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	<u>-0.11</u>	1.35	*	-0.68	0.00	*	0.11	*	-5.08
Ta	*	*	0.11	*	*	0.20	*	*	-0.18	*	<u>-0.08</u>	*	*
Tb	<u>5.15</u>	*	0.27	-0.44	<u>-0.81</u>	1.35	*	-4.20	-0.27	*	0.25	*	1.45
Th	*	-0.04	0.62	0.61	<u>-0.18</u>	0.40	*	-1.67	-0.86	*	0.01	*	1.94
Tl	*	*	0.46	1.52	*	*	*	*	1.52	*	-0.08	*	-0.73
Tm	<u>1.11</u>	*	0.18	*	<u>-0.99</u>	0.25	*	-1.23	0.00	*	0.13	*	0.51
U	*	12.03	-0.66	0.47	<u>0.17</u>	0.22	*	2.10	-0.16	*	0.11	*	0.90
V	*	-0.91	-0.09	-1.88	<u>0.11</u>	-0.45	*	-2.95	-1.14	<u>0.00</u>	0.07	*	-1.54
W	*	<u>190.25</u>	2.15	*	*	*	*	*	*	*	<u>0.22</u>	*	*
Y	<u>1.80</u>	-0.14	-0.98	4.50	<u>-3.52</u>	0.79	*	-5.12	0.50	<u>-0.78</u>	0.44	*	3.48
Yb	<u>2.43</u>	*	0.51	-1.40	<u>0.64</u>	*	*	-2.87	0.15	*	0.39	*	1.69
Zn	*	-0.64	0.21	-0.38	<u>-0.10</u>	-1.60	*	0.96	-1.53	<u>-0.16</u>	0.30	*	-2.82
Zr	*	-1.06	0.56	1.08	*	-0.22	*	-0.39	-0.56	<u>-0.28</u>	-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
SiO ₂	<u>0.04</u>	<u>0.12</u>	*	<u>0.28</u>	-1.55	-2.16	-0.15	0.17	-1.98	<u>0.01</u>	-0.15	<u>-0.22</u>	<u>-0.97</u>
TiO ₂	<u>0.37</u>	<u>0.05</u>	*	<u>0.37</u>	-1.16	2.64	-1.16	3.40	-1.16	<u>-0.33</u>	1.37	<u>-0.14</u>	5.80
Al ₂ O ₃	<u>1.17</u>	<u>0.05</u>	<u>-0.73</u>	<u>1.59</u>	10.29	-1.46	-0.58	0.36	-0.89	<u>-0.11</u>	0.68	<u>2.27</u>	<u>-2.93</u>
Fe ₂ O _{3T}	<u>-0.19</u>	<u>-0.34</u>	<u>-1.36</u>	<u>-0.34</u>	-8.34	4.22	0.04	0.44	1.57	<u>0.20</u>	-0.98	<u>0.32</u>	4.02
MnO	<u>3.54</u>	<u>-0.35</u>	<u>-0.71</u>	<u>0.53</u>	-7.07	-3.54	0.00	0.46	3.54	<u>2.12</u>	0.00	<u>-1.11</u>	3.54
MgO	<u>1.09</u>	<u>-0.59</u>	*	<u>2.93</u>	-1.17	1.17	<u>0.50</u>	2.22	0.00	<u>0.08</u>	0.17	<u>-0.59</u>	3.85
CaO	<u>-2.20</u>	<u>-0.24</u>	*	<u>-1.09</u>	-3.12	0.28	-0.06	-2.49	4.77	<u>0.38</u>	-0.23	<u>0.01</u>	<u>-1.17</u>
K ₂ O	<u>-0.24</u>	<u>0.47</u>	<u>0.97</u>	<u>-0.10</u>	-1.47	11.99	0.23	0.87	0.52	<u>0.32</u>	1.23	<u>0.40</u>	5.47
P ₂ O ₅	<u>-0.15</u>	<u>-0.15</u>	<u>-0.40</u>	*	-0.30	-22.70	-0.30	5.92	-5.28	<u>0.72</u>	4.68	<u>-0.02</u>	2.19
LOI	<u>0.72</u>	<u>-0.11</u>	<u>-0.34</u>	<u>-1.57</u>	2.84	5.50	<u>2.35</u>	-0.28	4.17	<u>-0.21</u>	1.65	*	3.31
As	*	*	*	*	*	15.00	<u>-3.29</u>	10.12	*	<u>0.43</u>	*	*	*
Ba	*	*	<u>0.83</u>	<u>1.59</u>	*	*	<u>-0.51</u>	<u>-0.01</u>	*	<u>0.04</u>	*	<u>0.22</u>	2.92
Be	*	*	<u>-0.64</u>	*	*	*	*	*	*	<u>-1.02</u>	*	*	*
Bi	*	*	*	*	*	*	*	*	*	<u>1.53</u>	*	*	*
C(tot)	*	*	<u>-2.50</u>	*	*	*	*	*	*	<u>0.42</u>	<u>-0.28</u>	<u>0.42</u>	*
Ce	*	*	<u>0.81</u>	*	*	*	<u>-2.39</u>	0.87	*	<u>0.21</u>	*	<u>0.29</u>	<u>-1.81</u>
Co	*	*	<u>-0.89</u>	*	*	2.37	<u>-3.44</u>	2.37	*	<u>1.25</u>	*	<u>32.50</u>	<u>-17.79</u>
Cr	*	*	*	*	*	<u>-6.23</u>	<u>-0.72</u>	<u>-0.85</u>	*	<u>0.08</u>	*	*	6.21
Cs	*	*	*	*	*	*	*	<u>-0.53</u>	*	<u>0.27</u>	*	*	0.24
Cu	*	*	*	*	*	2.53	<u>-5.38</u>	<u>-3.80</u>	7.28	<u>-0.27</u>	*	*	0.95
Dy	*	*	<u>-1.06</u>	*	*	*	*	*	*	<u>0.18</u>	*	<u>1.06</u>	0.98
Er	*	*	<u>-0.81</u>	*	*	*	*	*	*	<u>0.38</u>	*	<u>0.65</u>	<u>-1.76</u>
Eu	*	*	<u>-0.15</u>	*	*	*	*	*	*	<u>-0.01</u>	*	<u>0.50</u>	<u>-0.11</u>
F	*	*	*	*	*	*	*	22.21	*	<u>-0.57</u>	*	*	*
Ga	*	*	<u>-0.84</u>	*	*	*	<u>-0.70</u>	1.29	0.30	<u>0.90</u>	*	*	11.85
Gd	*	*	<u>0.33</u>	*	*	*	*	*	*	<u>-0.22</u>	*	<u>0.54</u>	<u>-1.99</u>
Ge	*	*	*	*	*	*	*	*	*	<u>0.25</u>	*	*	10.98
Hf	*	*	<u>0.42</u>	*	*	*	*	*	*	<u>0.24</u>	*	*	1.32
Ho	*	*	<u>-1.04</u>	*	*	*	*	*	*	<u>0.08</u>	*	<u>0.61</u>	<u>-2.66</u>
In	*	*	<u>-1.22</u>	*	*	*	*	*	*	*	*	*	*
La	*	*	<u>0.58</u>	*	*	*	<u>-1.76</u>	<u>-1.87</u>	*	<u>0.11</u>	*	<u>0.10</u>	1.19
Li	*	*	<u>-0.59</u>	*	*	*	*	*	*	<u>0.36</u>	*	<u>1.96</u>	*
Lu	*	*	<u>-0.51</u>	*	*	*	*	*	*	<u>0.13</u>	*	<u>0.65</u>	<u>-1.28</u>
Mo	*	*	*	*	*	*	2.37	33.63	68.35	<u>4.37</u>	*	*	*
Nb	*	*	<u>0.92</u>	*	*	*	<u>0.17</u>	<u>-0.61</u>	*	<u>-0.30</u>	*	*	0.68
Nd	*	*	<u>-0.35</u>	*	*	*	<u>-0.70</u>	0.24	*	<u>0.36</u>	*	<u>0.55</u>	<u>-1.65</u>
Ni	*	*	<u>0.08</u>	*	*	2.59	0.90	1.47	<u>-3.61</u>	<u>1.58</u>	*	*	1.47
Pb	*	*	*	*	*	44.45	7.85	<u>-8.11</u>	*	<u>-0.66</u>	*	*	23.80
Pr	*	*	<u>-0.40</u>	*	*	*	*	*	*	<u>0.07</u>	*	<u>0.41</u>	<u>-1.03</u>
Rb	*	*	<u>0.04</u>	<u>-3.43</u>	<u>-6.86</u>	*	<u>-1.42</u>	0.28	<u>-0.68</u>	<u>0.53</u>	*	*	<u>-0.30</u>
Sb	*	*	*	*	*	*	*	3.40	*	<u>0.15</u>	*	*	*
Sc	*	*	<u>0.56</u>	*	*	*	<u>-0.97</u>	1.00	*	<u>-0.81</u>	*	<u>1.83</u>	3.22
Sm	*	*	<u>-0.40</u>	*	*	*	2.89	*	*	<u>-0.24</u>	*	<u>0.41</u>	<u>-1.04</u>
Sn	*	*	*	*	*	*	*	<u>-3.01</u>	*	<u>-0.74</u>	*	*	*
Sr	21.07	*	<u>0.00</u>	<u>-1.46</u>	<u>-4.28</u>	*	<u>-0.52</u>	0.00	<u>-1.80</u>	<u>-0.14</u>	*	<u>0.73</u>	<u>-0.11</u>
Ta	*	*	*	*	*	*	28.08	*	*	<u>-0.53</u>	*	*	24.66
Tb	*	*	<u>-0.14</u>	*	*	*	*	*	*	<u>-0.34</u>	*	<u>0.68</u>	<u>-0.95</u>
Th	*	*	<u>-0.27</u>	*	*	*	3.37	1.58	*	<u>-0.25</u>	*	<u>0.98</u>	<u>-1.34</u>
Tl	*	*	<u>0.04</u>	*	*	6.18	*	*	*	<u>0.40</u>	*	*	*
Tm	*	*	<u>-0.86</u>	*	*	*	*	*	*	<u>0.12</u>	*	<u>0.38</u>	<u>-1.97</u>
U	*	*	*	*	*	*	5.96	13.13	*	<u>-0.47</u>	*	<u>0.72</u>	<u>-0.16</u>
V	*	*	<u>0.45</u>	*	*	<u>-12.26</u>	<u>-1.00</u>	2.27	*	<u>-0.79</u>	*	<u>0.10</u>	0.00
W	*	*	*	*	*	*	25.64	*	*	<u>0.83</u>	*	*	*
Y	*	*	<u>0.18</u>	*	*	*	<u>-0.71</u>	<u>-0.14</u>	1.99	<u>0.07</u>	*	<u>0.02</u>	2.42
Yb	*	*	<u>-0.90</u>	*	*	*	*	*	*	<u>-0.05</u>	*	<u>0.51</u>	<u>-2.00</u>
Zn	19.95	*	<u>0.16</u>	<u>3.99</u>	4.15	6.70	5.59	0.32	0.32	<u>0.64</u>	*	<u>1.56</u>	1.92
Zr	*	*	<u>0.14</u>	<u>3.43</u>	6.85	*	<u>-1.35</u>	<u>-0.72</u>	<u>-0.56</u>	<u>0.40</u>	*	<u>4.24</u>	<u>-1.90</u>

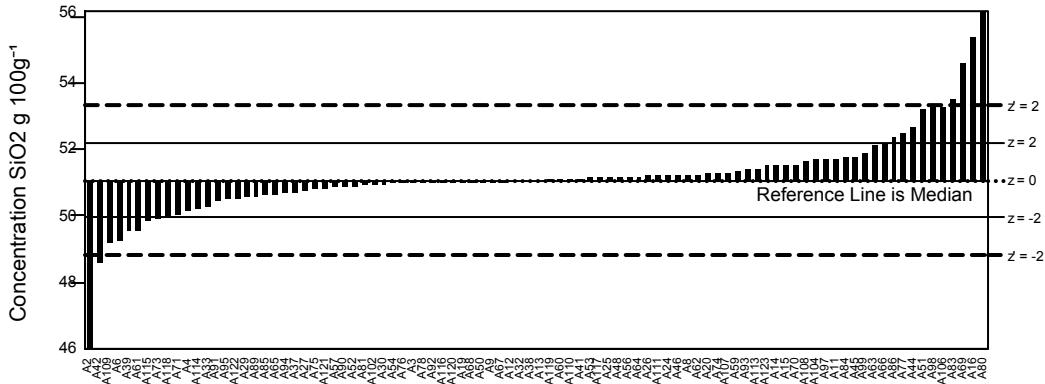
Bold entries are Data Quality 1 - Underlined entries are Data Quality 2 - Entries in italics are derived from Provisional Values.

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

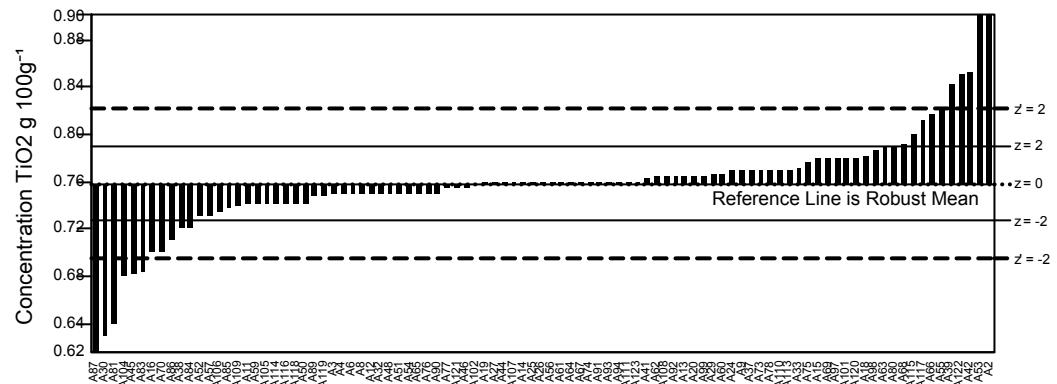
Lab Code	A123
SiO ₂	0.79
TiO ₂	0.11
Al ₂ O ₃	0.52
Fe ₂ O _{3T}	1.98
MnO	0.00
MgO	-1.84
CaO	1.55
K ₂ O	-0.90
P ₂ O ₅	-0.30
LOI	-0.48
As	73.51
Ba	3.93
Be	0.75
Bi	10.46
C(tot)	*
Ce	-1.97
Co	4.63
Cr	3.89
Cs	-0.88
Cu	-2.59
Dy	-1.37
Er	-0.30
Eu	1.09
F	*
Ga	-1.29
Gd	0.33
Ge	38.85
Hf	7.81
Ho	0.04
In	*
La	2.70
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.

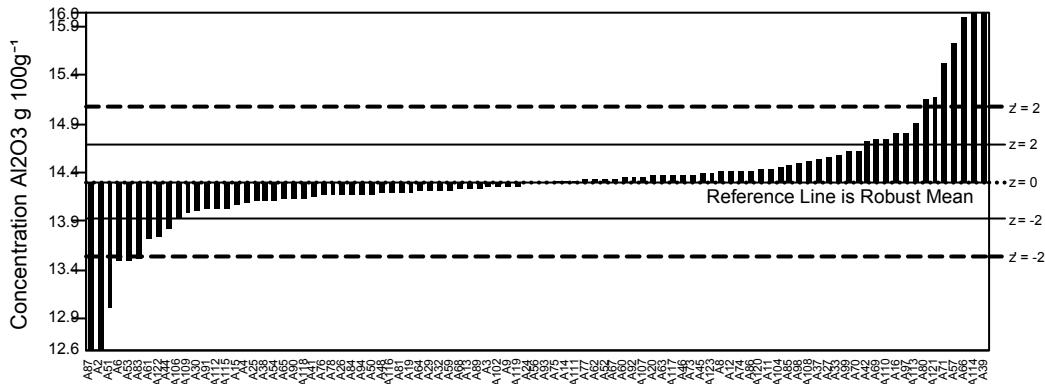
GeoPT42 - Barchart for SiO₂



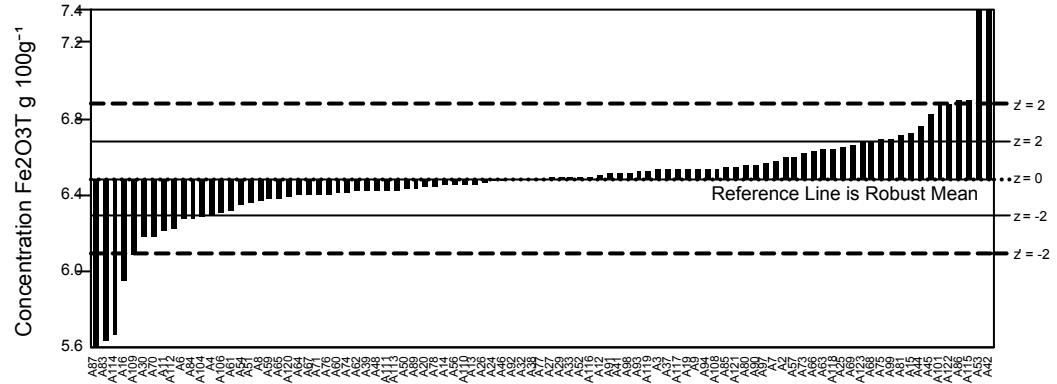
GeoPT42 - Barchart for TiO₂



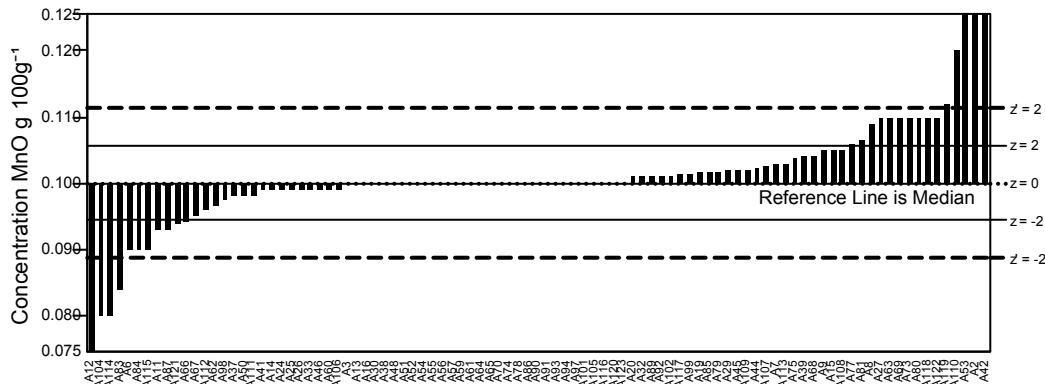
GeoPT42 - Barchart for Al₂O₃



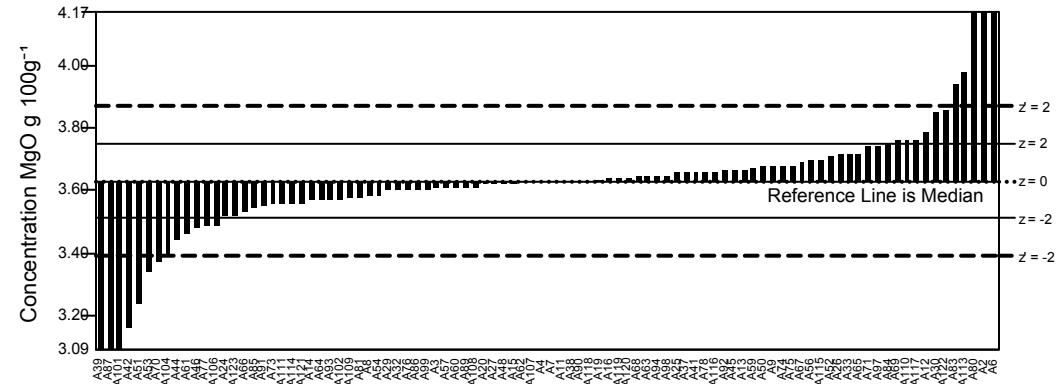
GeoPT42 - Barchart for Fe₂O_{3T}



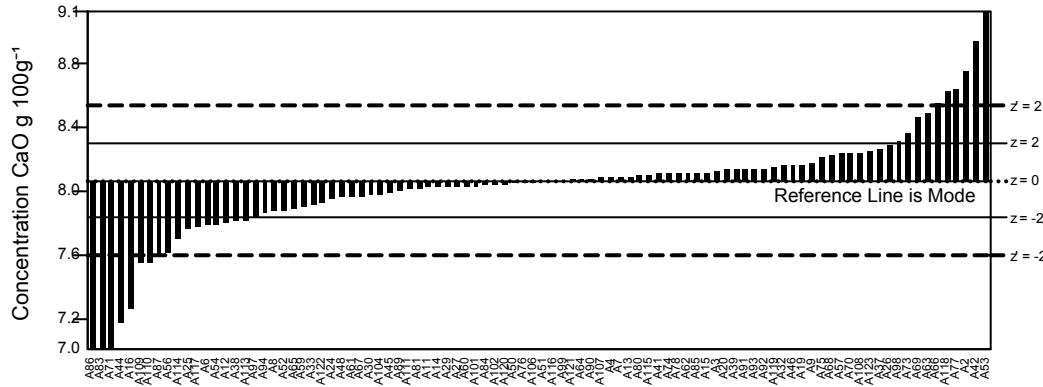
GeoPT42 - Barchart for MnO



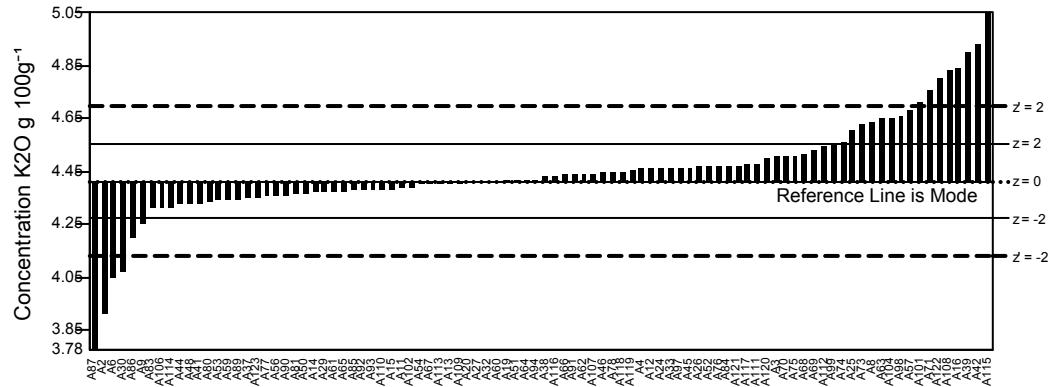
GeoPT42 - Barchart for MgO



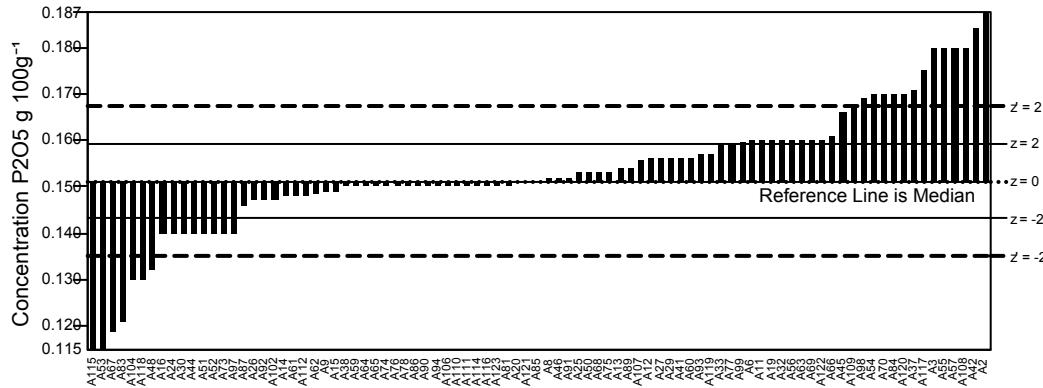
GeoPT42 - Barchart for CaO



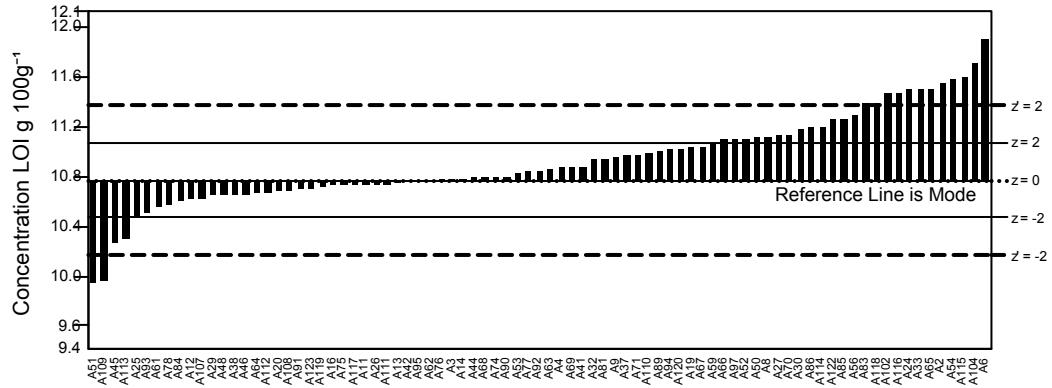
GeoPT42 - Barchart for K2O



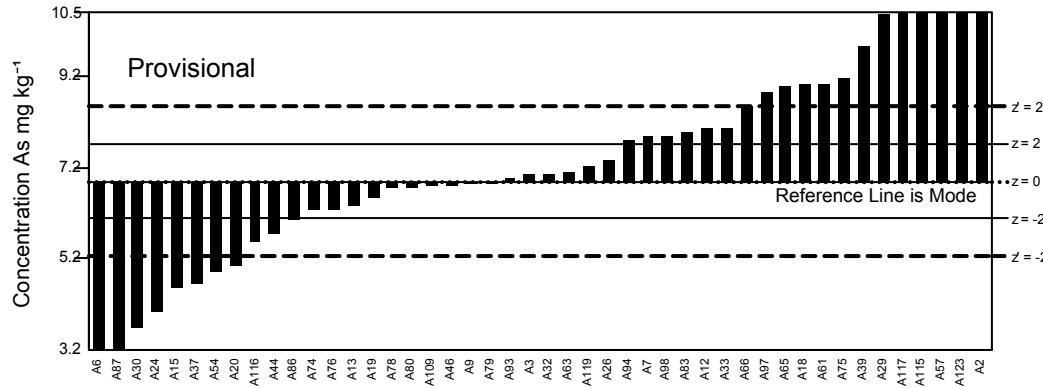
GeoPT42 - Barchart for P2O5



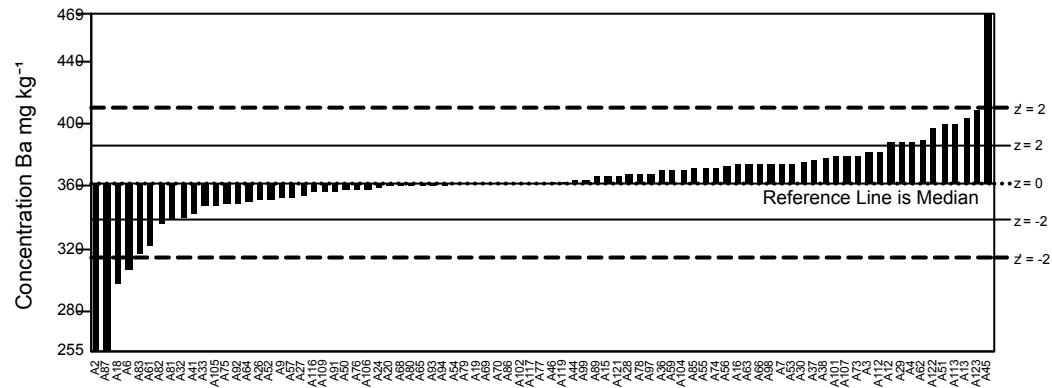
GeoPT42 - Barchart for LOI

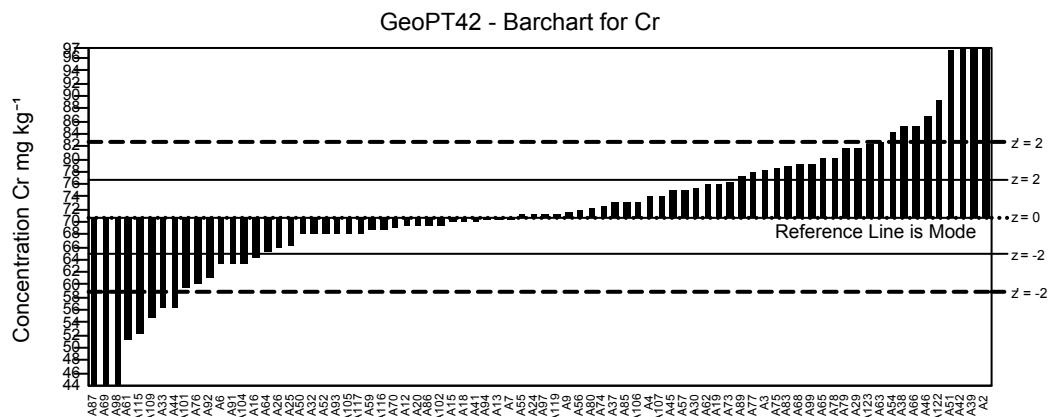
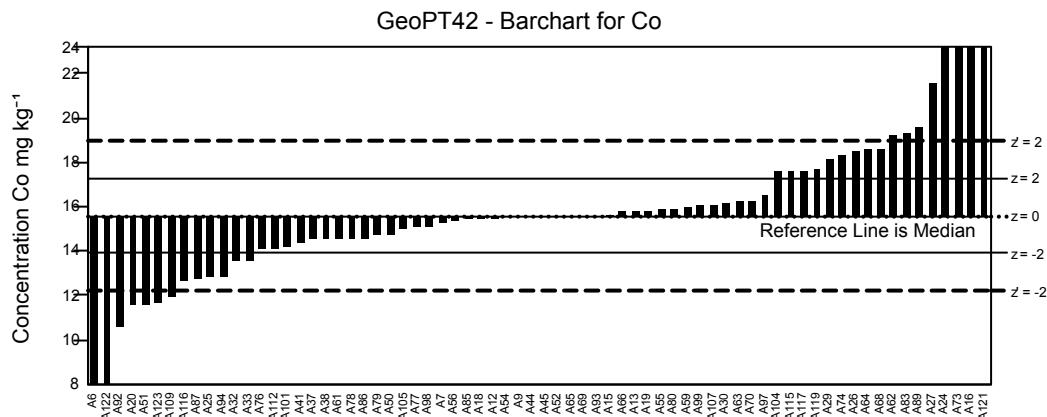
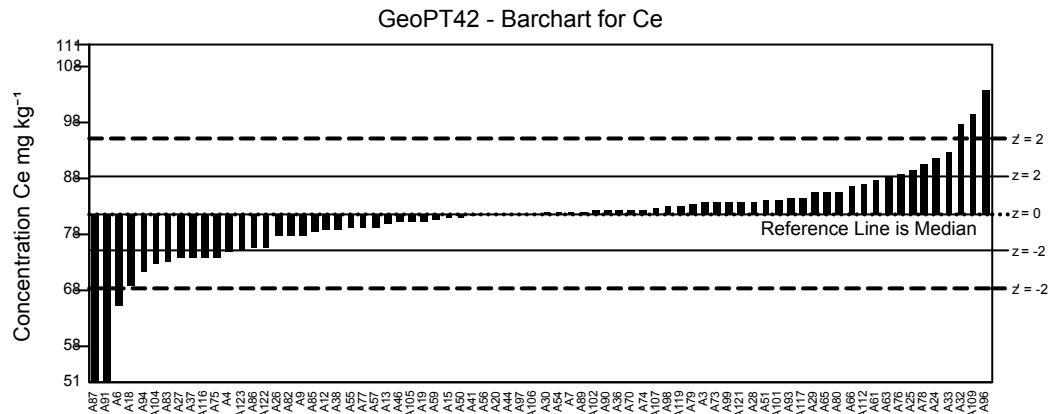
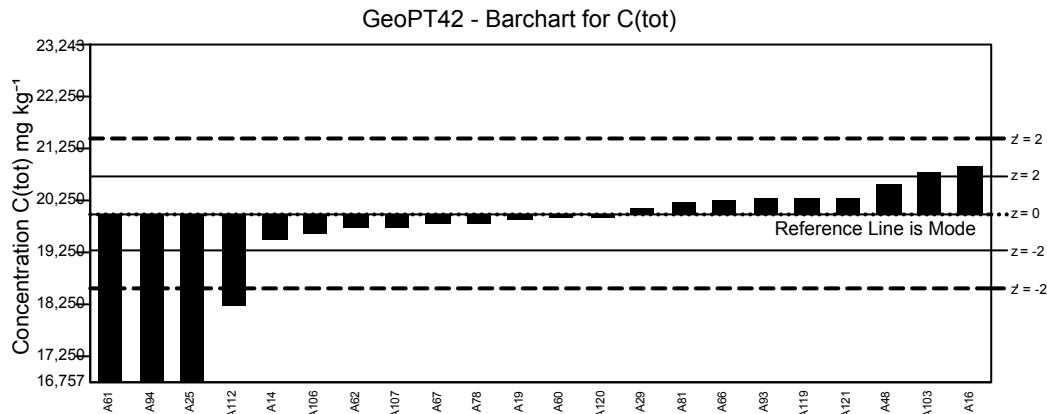
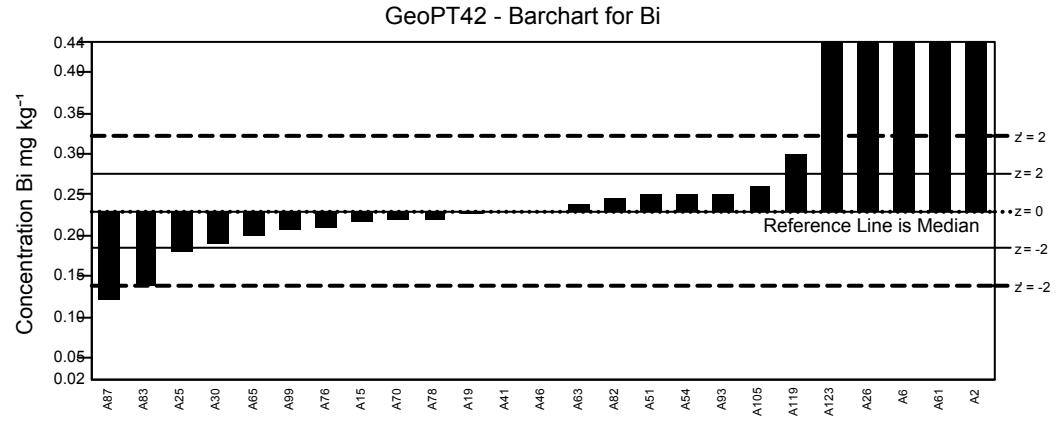
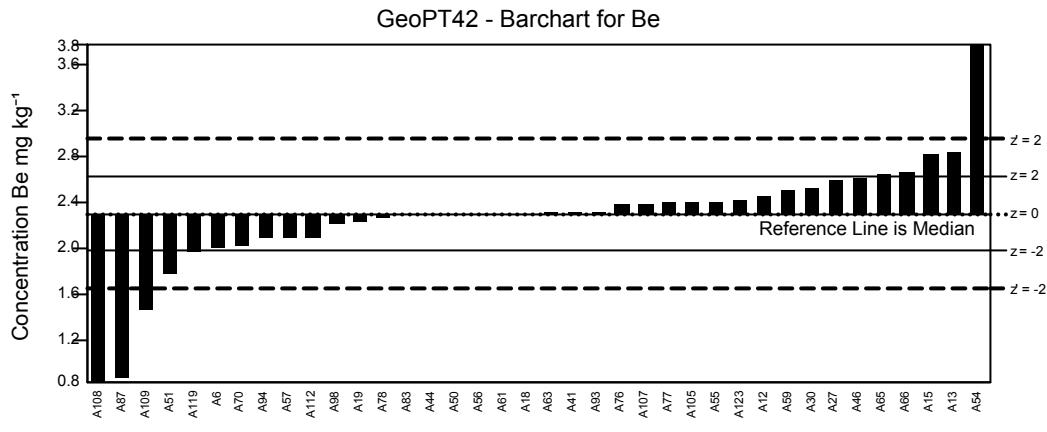


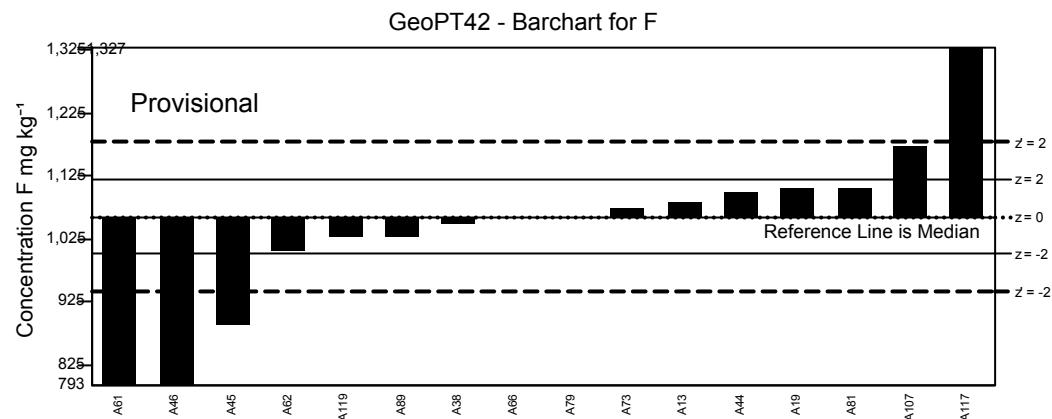
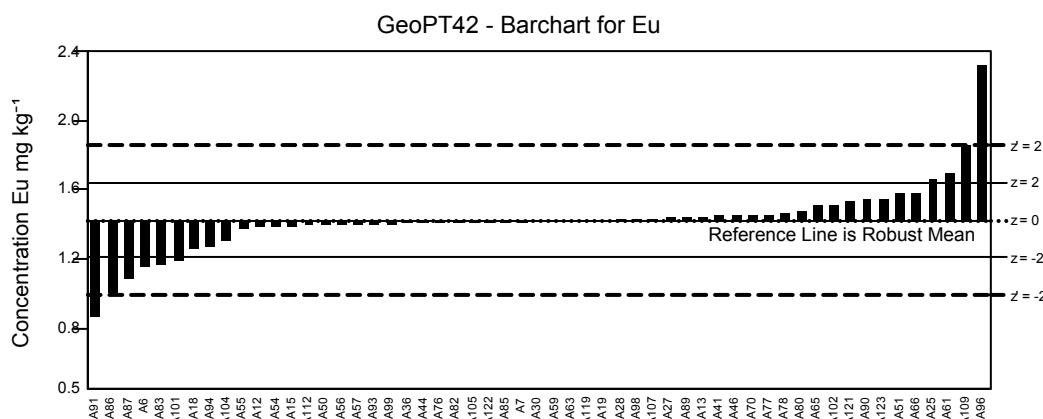
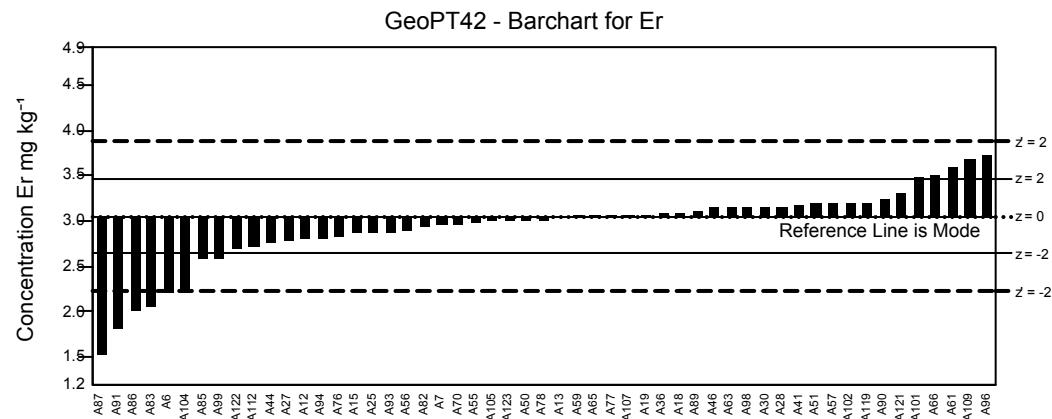
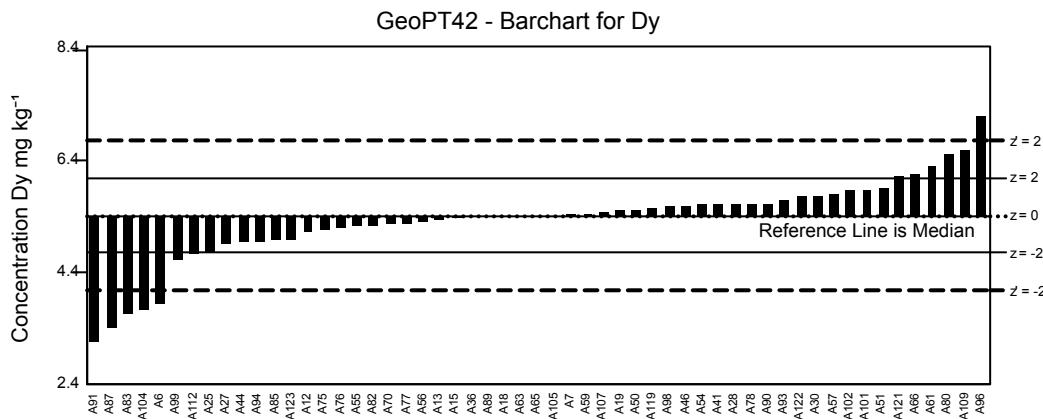
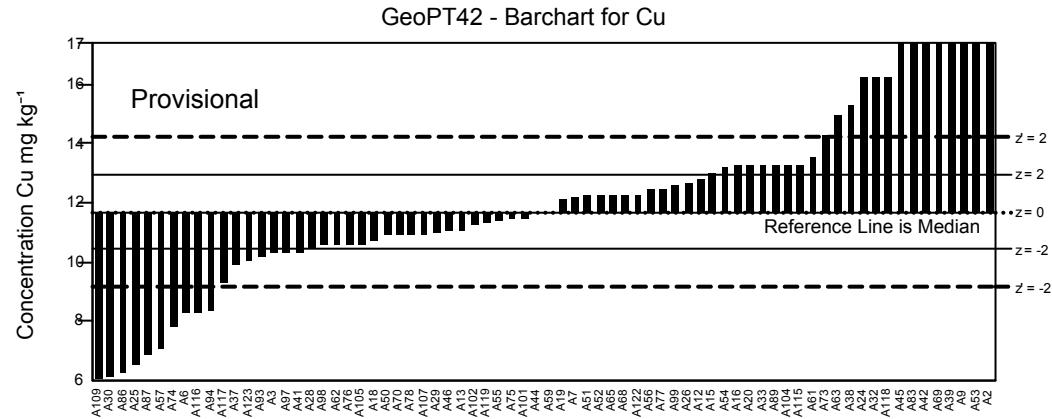
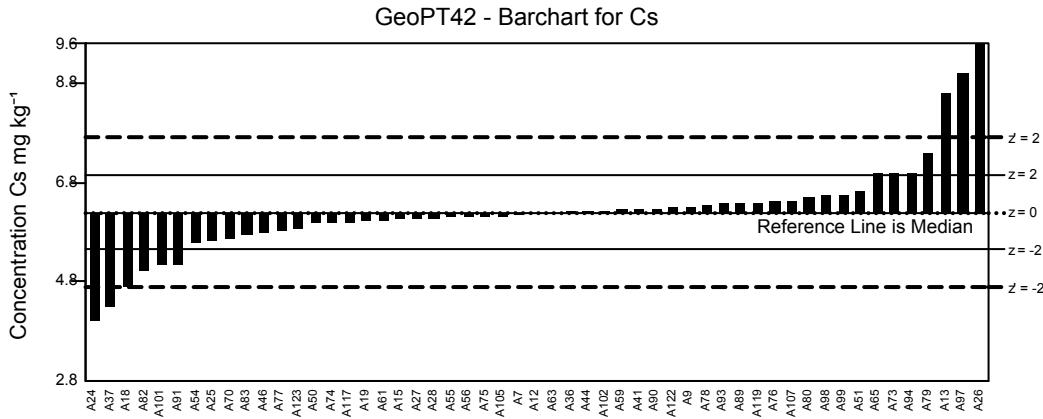
GeoPT42 - Barchart for As

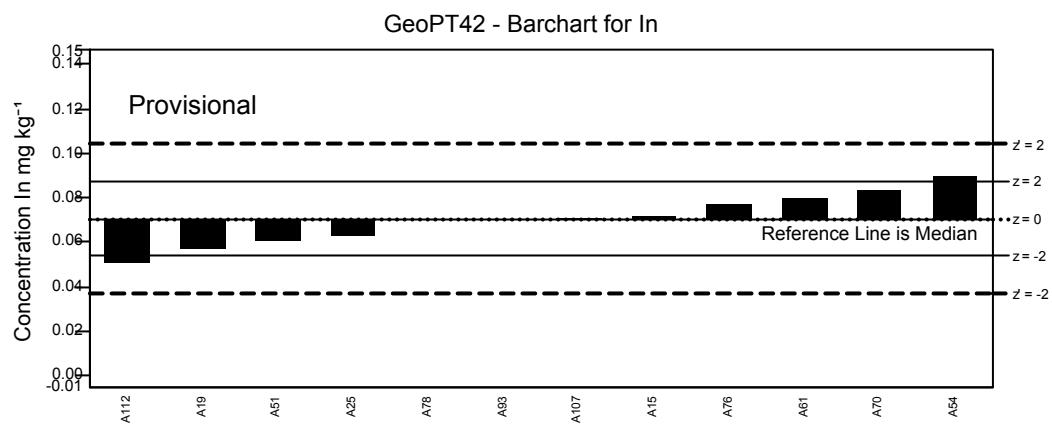
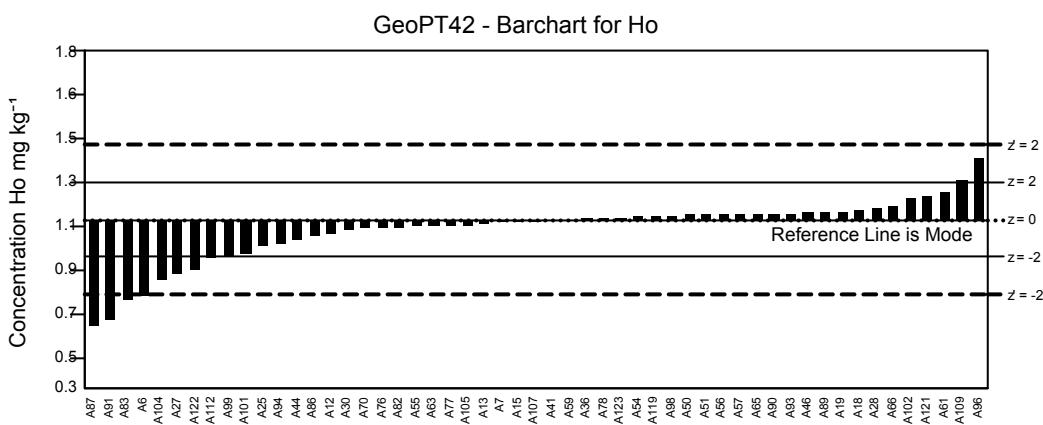
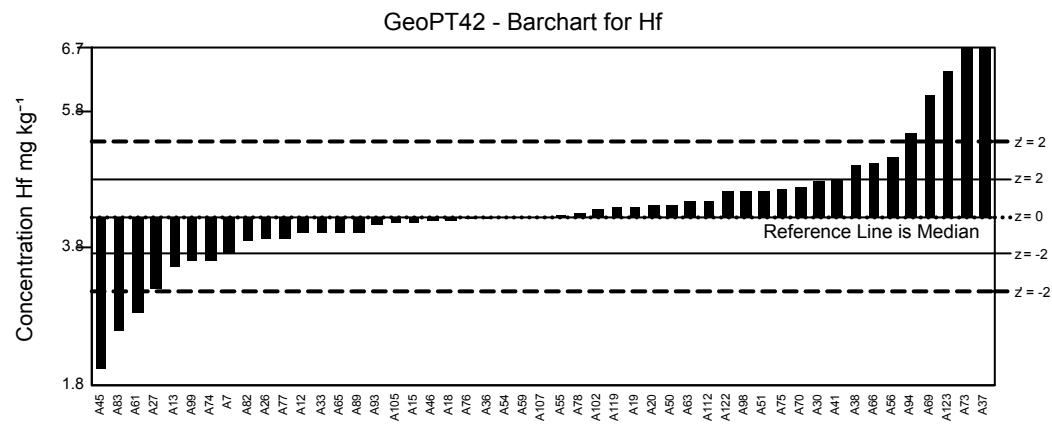
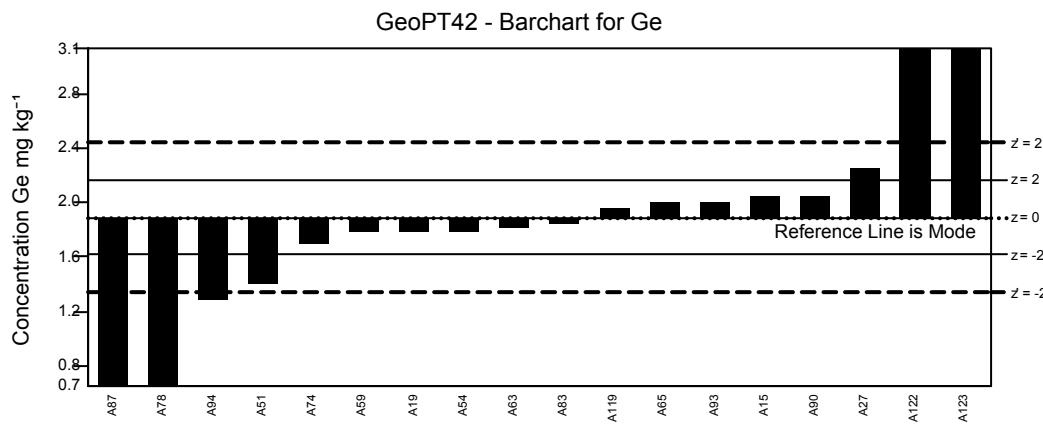
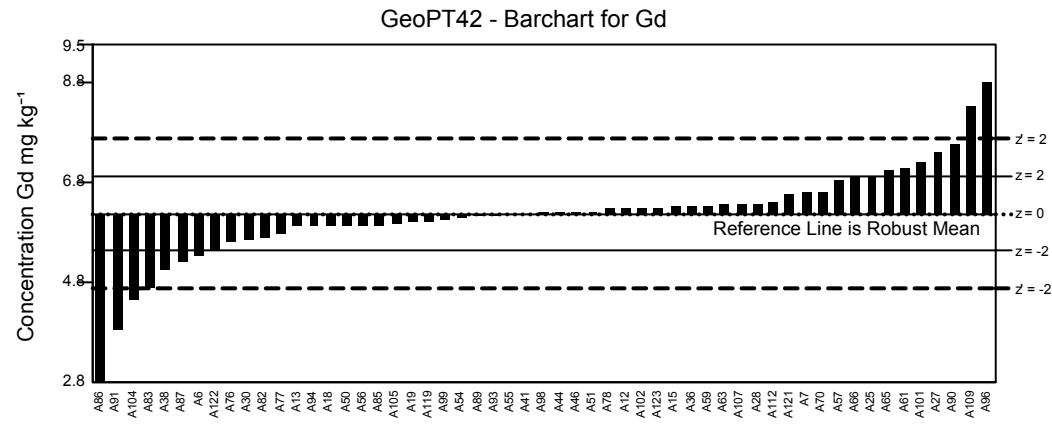
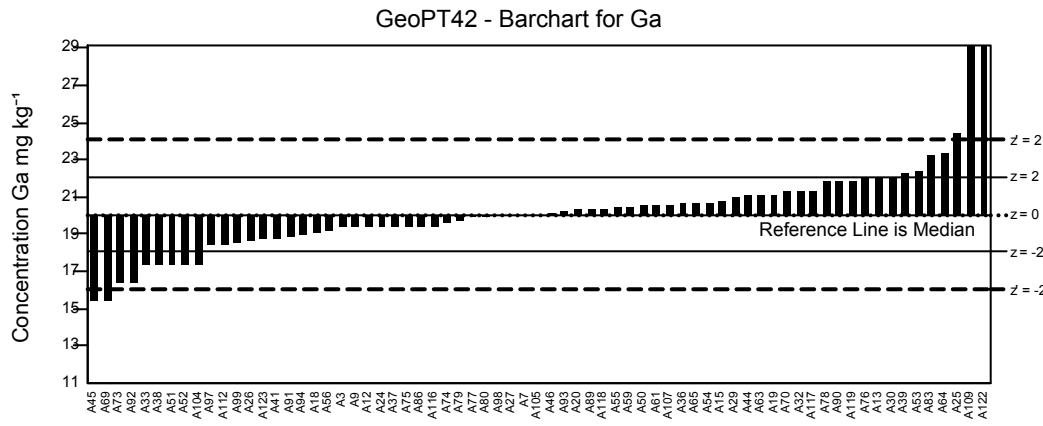


GeoPT42 - Barchart for Ba

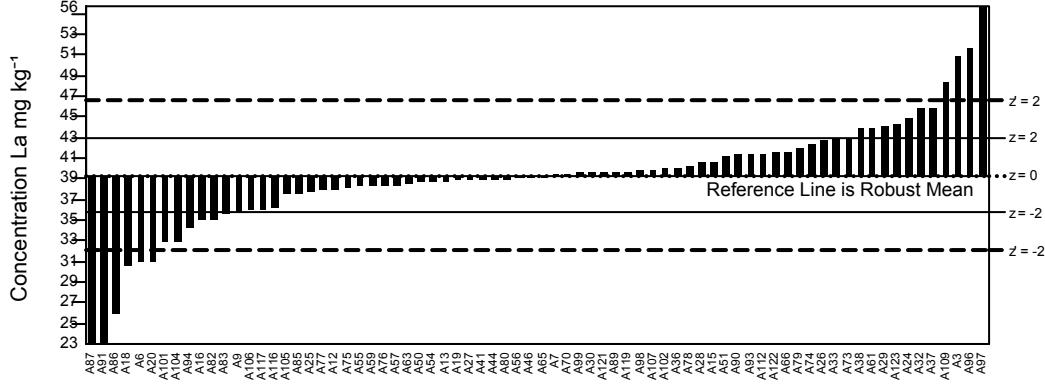




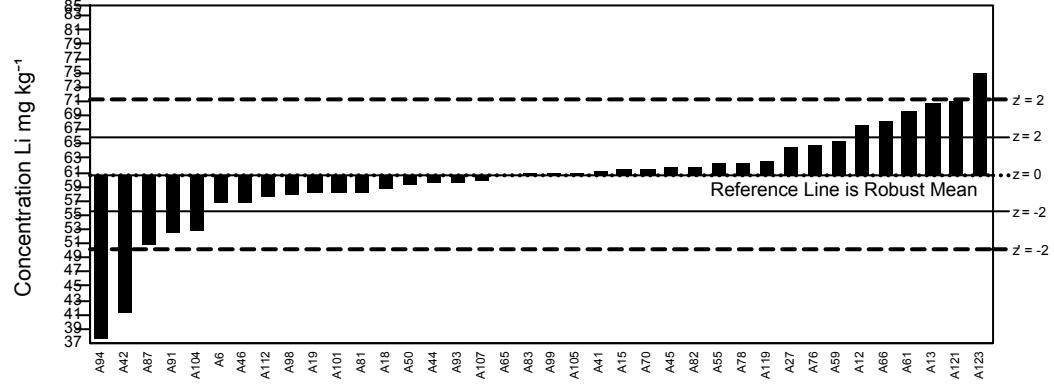




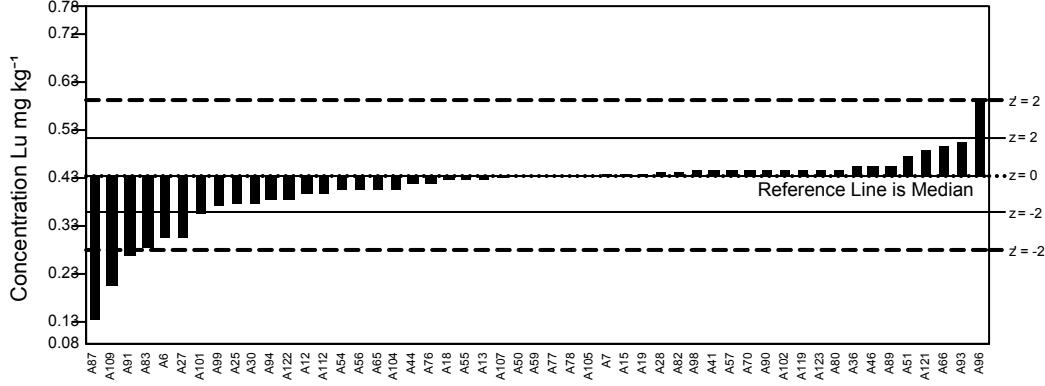
GeoPT42 - Barchart for La



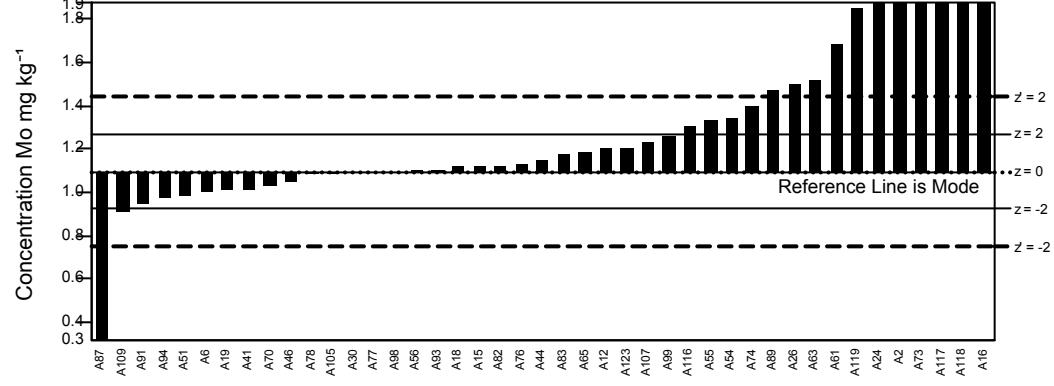
GeoPT42 - Barchart for Li



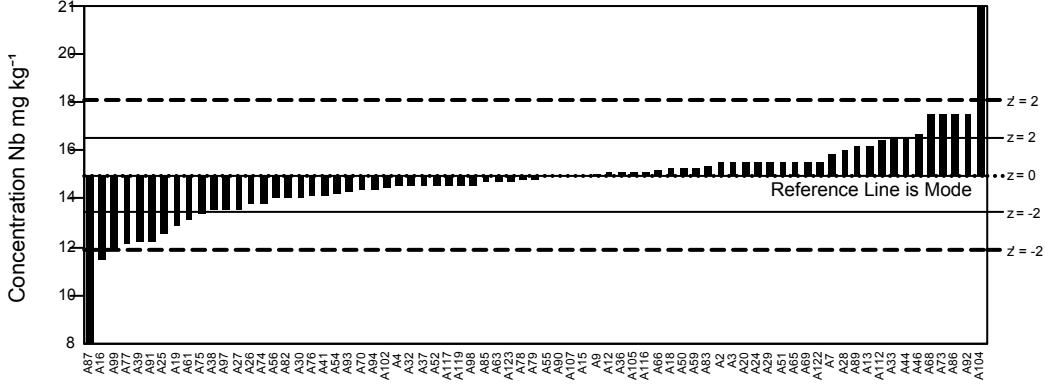
GeoPT42 - Barchart for Lu



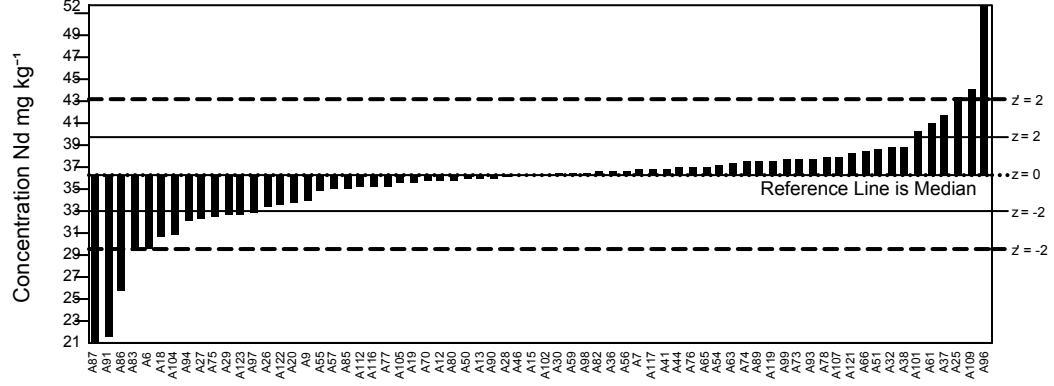
GeoPT42 - Barchart for Mo



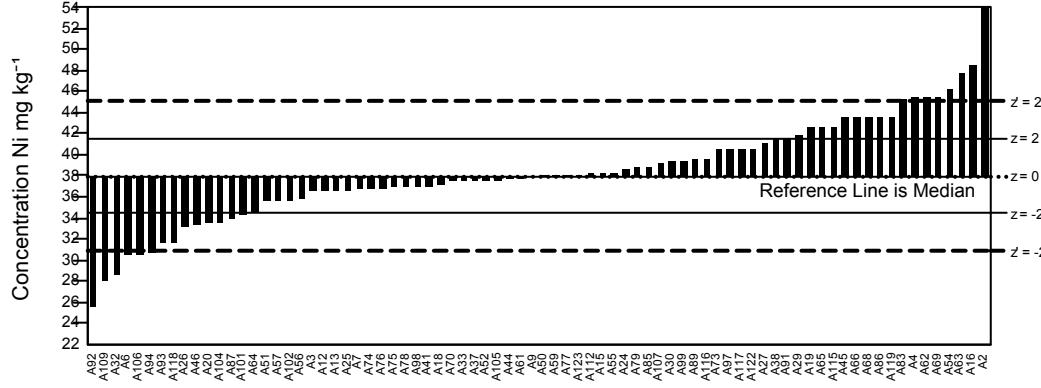
GeoPT42 - Barchart for Nb



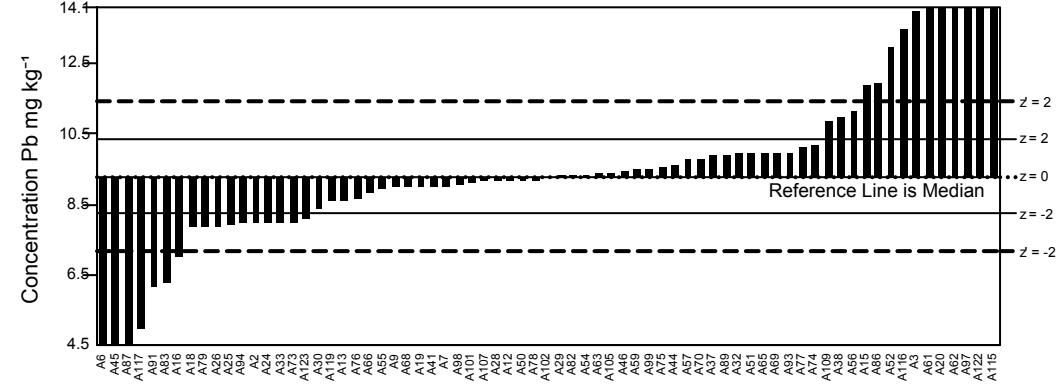
GeoPT42 - Barchart for Nd



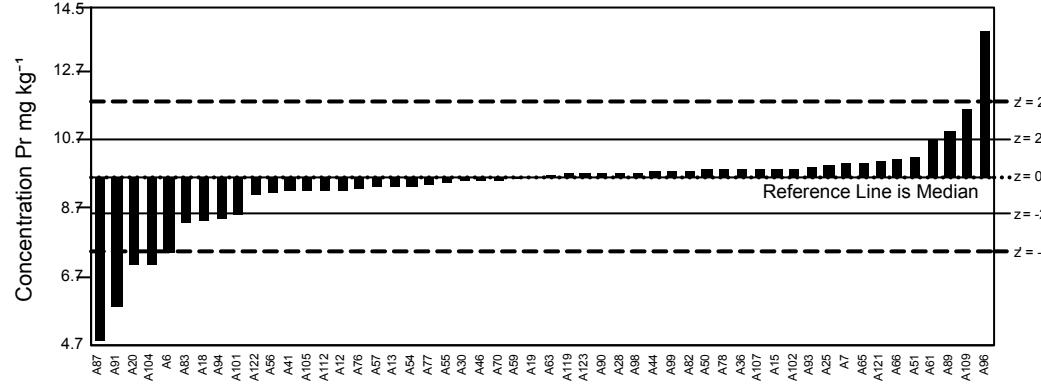
GeoPT42 - Barchart for Ni



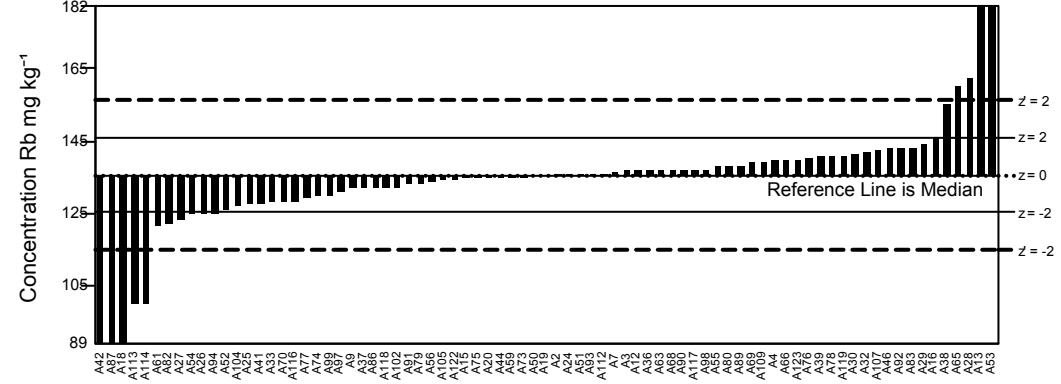
GeoPT42 - Barchart for Pb



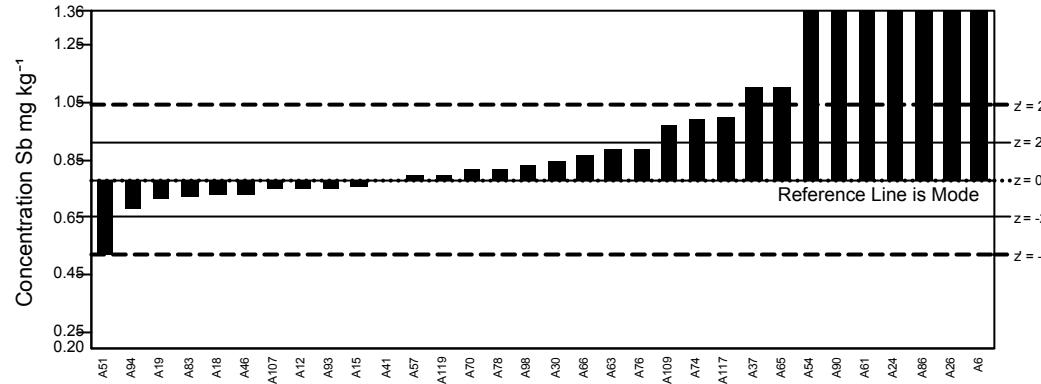
GeoPT42 - Barchart for Pr



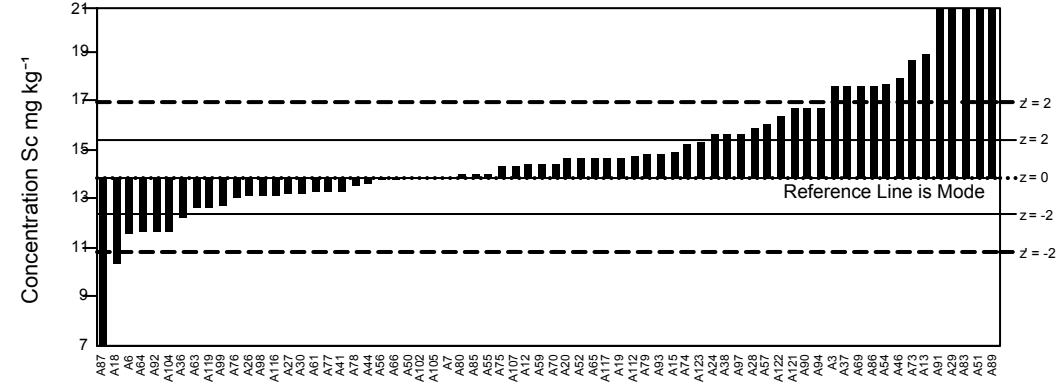
GeoPT42 - Barchart for Rb

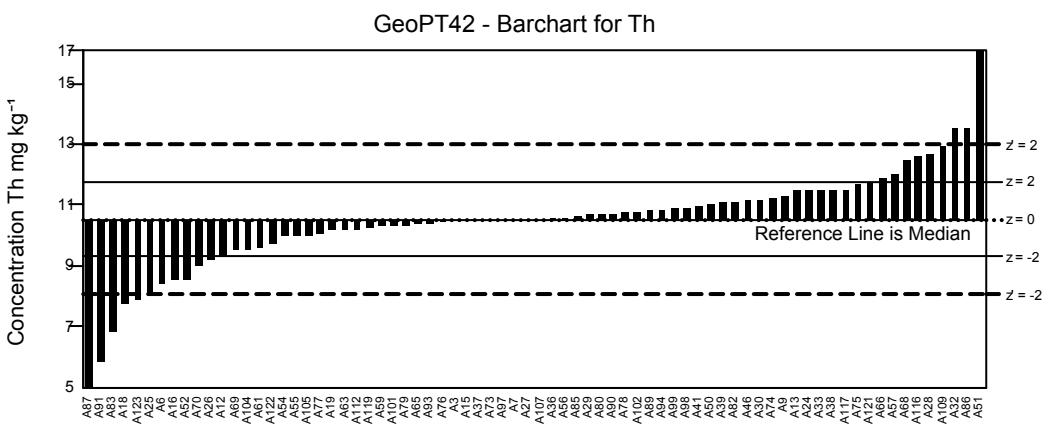
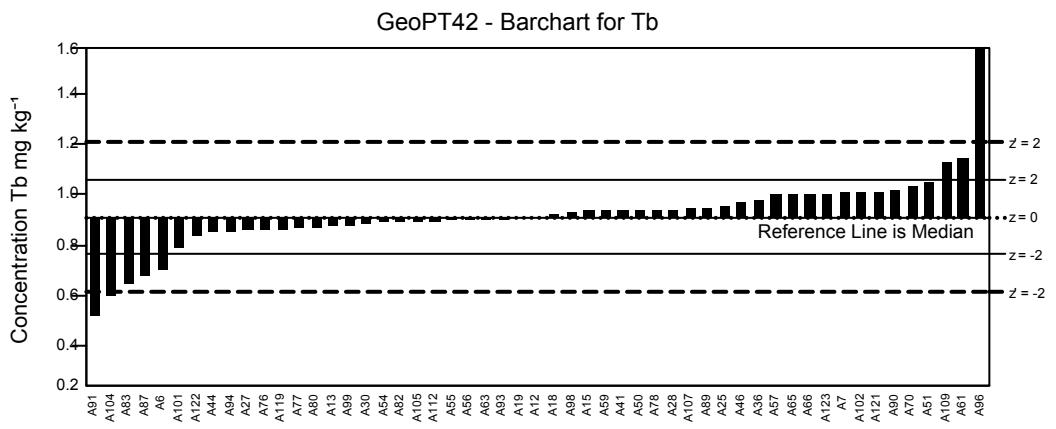
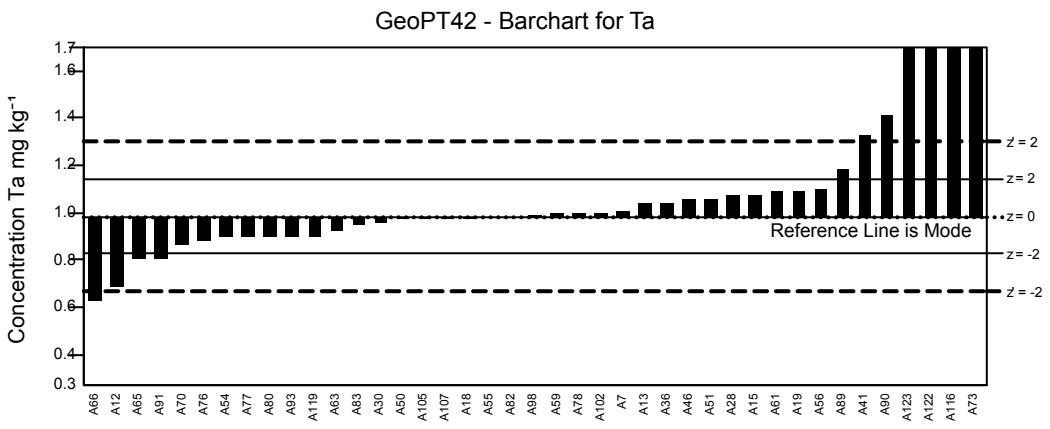
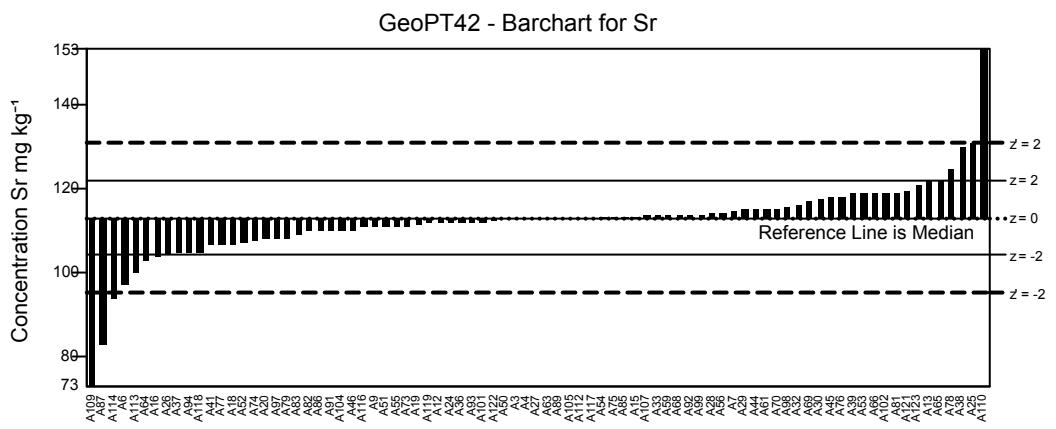
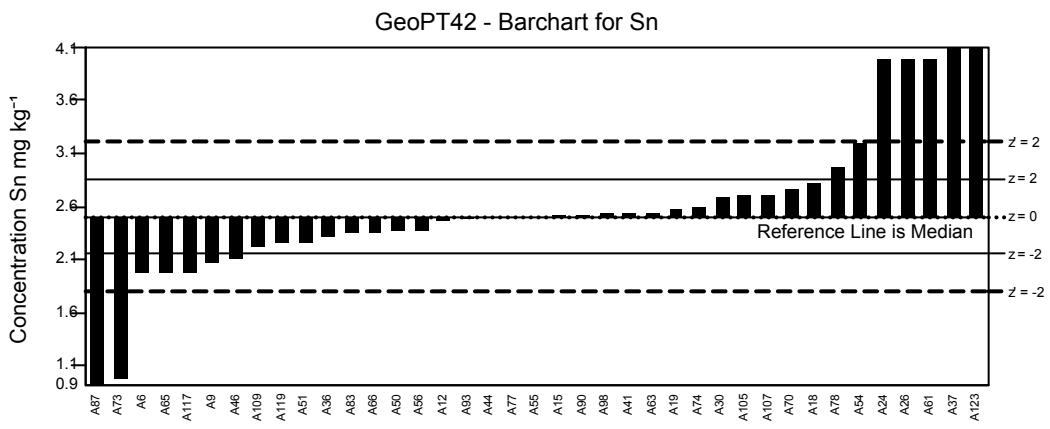
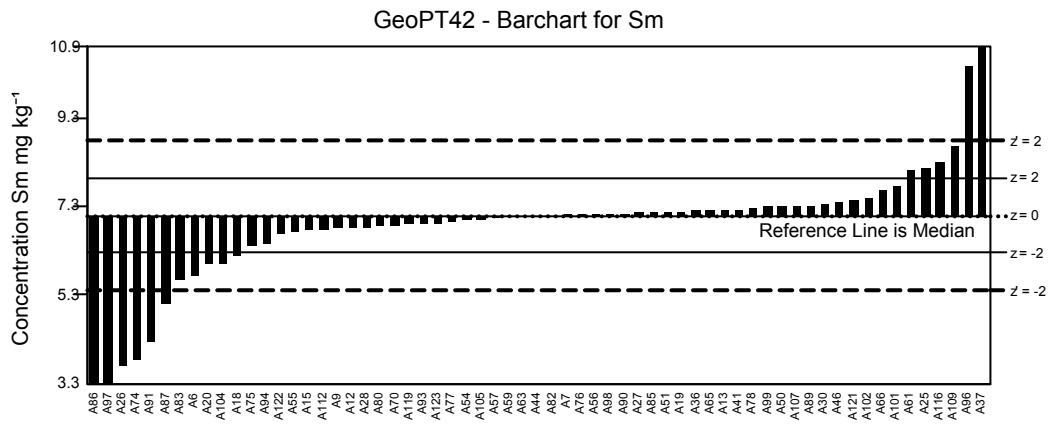


GeoPT42 - Barchart for Sb

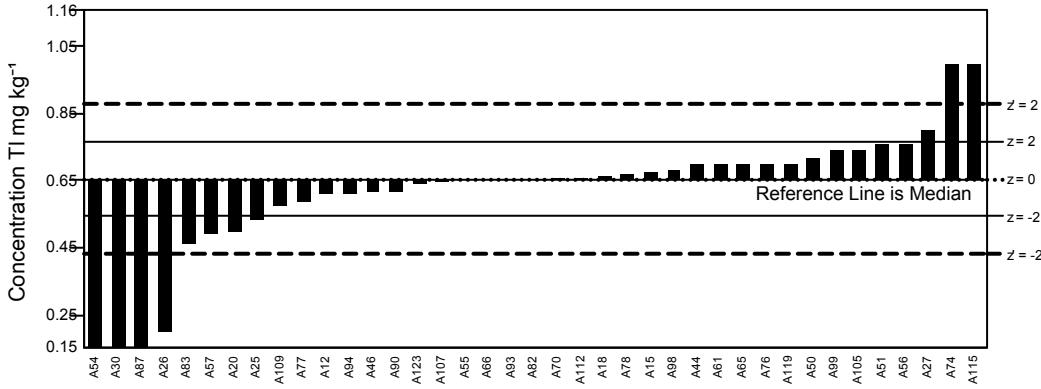


GeoPT42 - Barchart for So

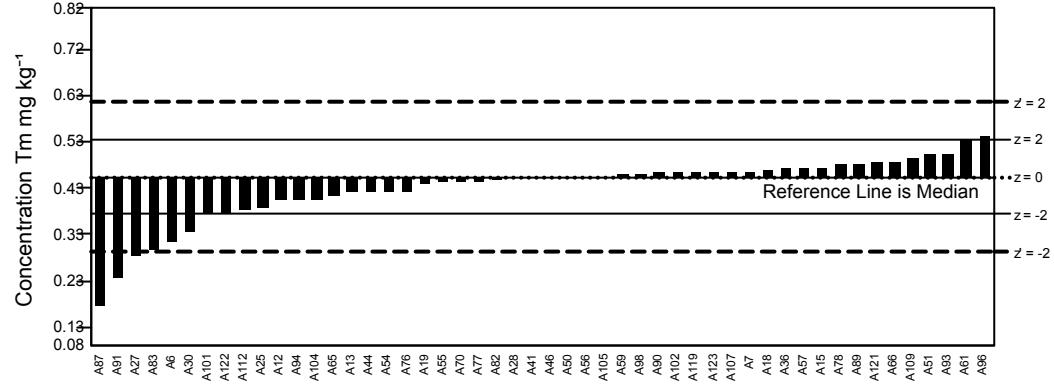




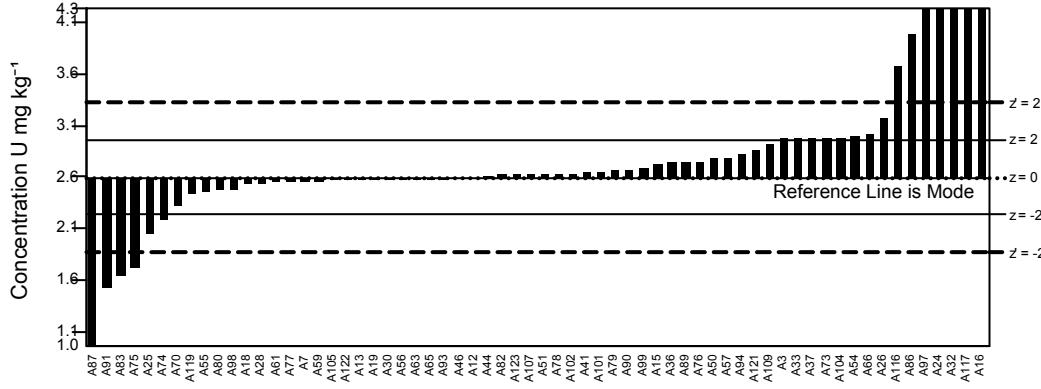
GeoPT42 - Barchart for TI



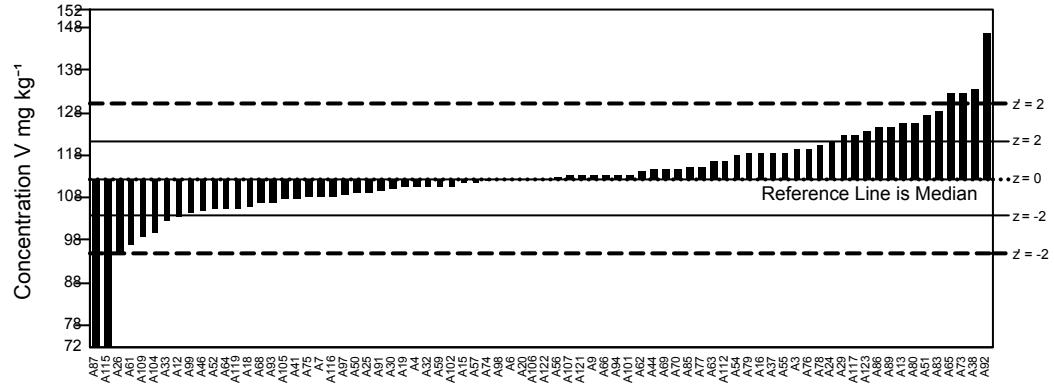
GeoPT42 - Barchart for Tm



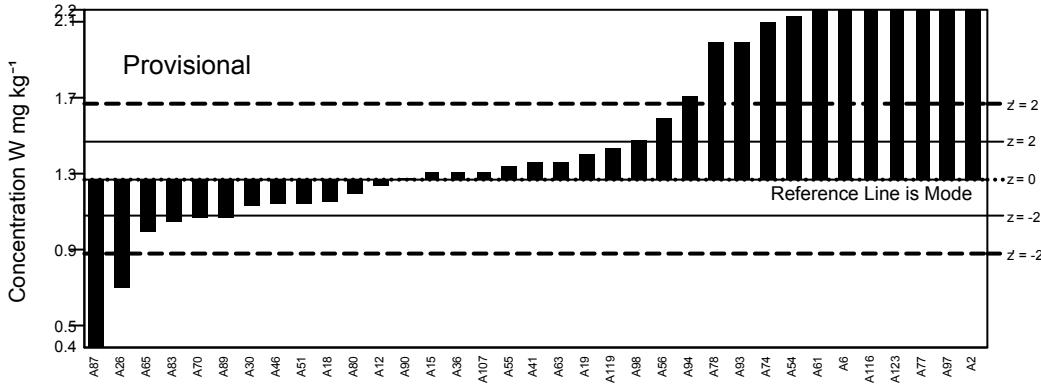
GeoPT42 - Barchart for U



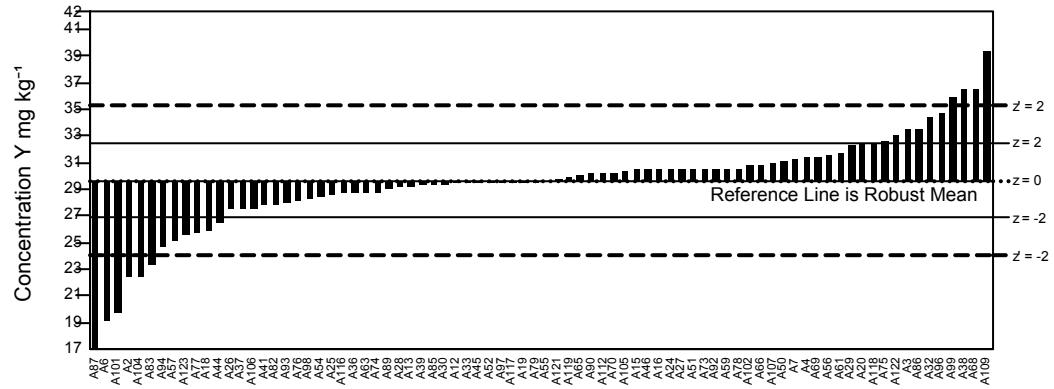
GeoPT42 - Barchart for V



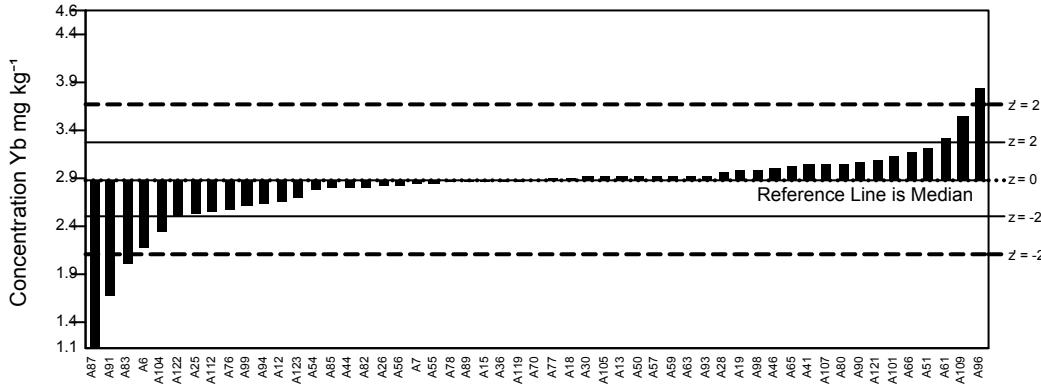
GeoPT42 - Barchart for W



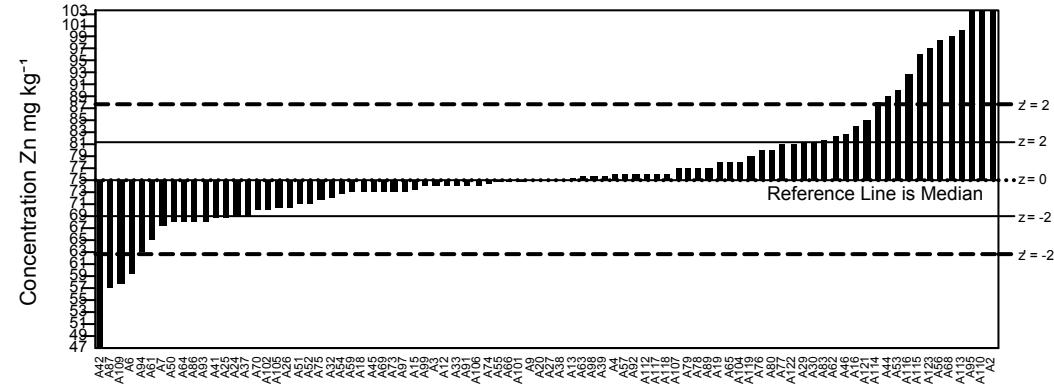
GeoPT42 - Barchart for Y



GeoPT42 - Barchart for Yb



GeoPT42 - Barchart for Zn



GeoPT42 - Barchart for Zr

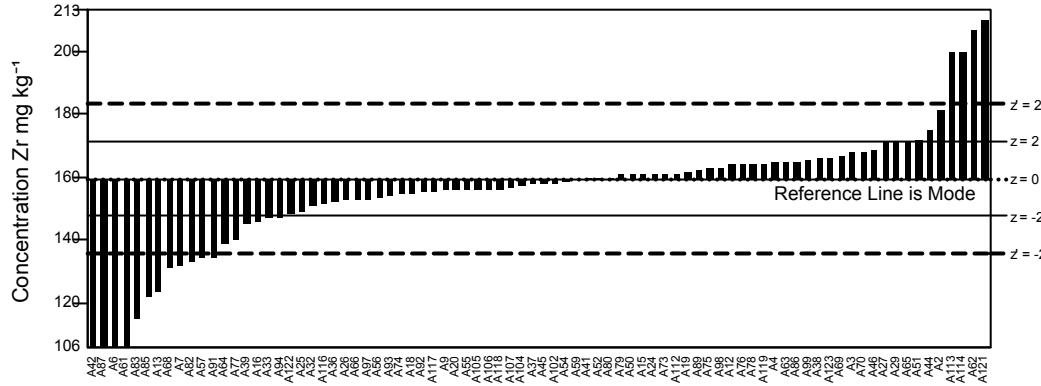
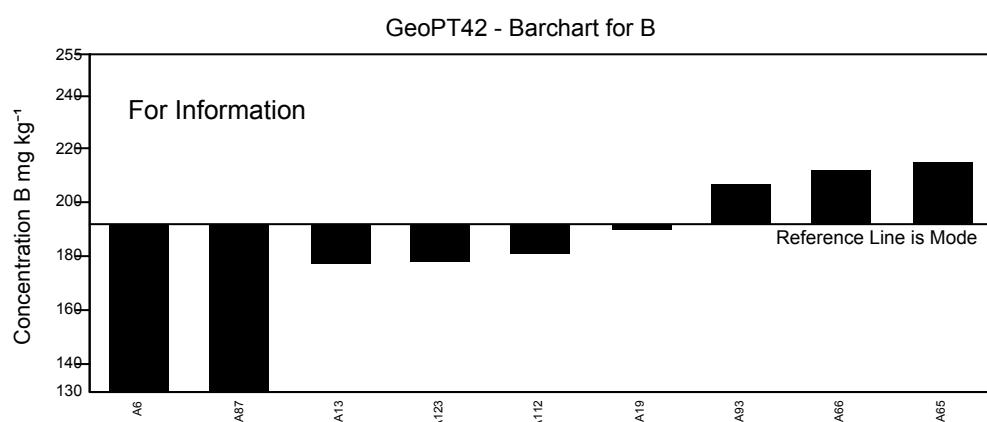
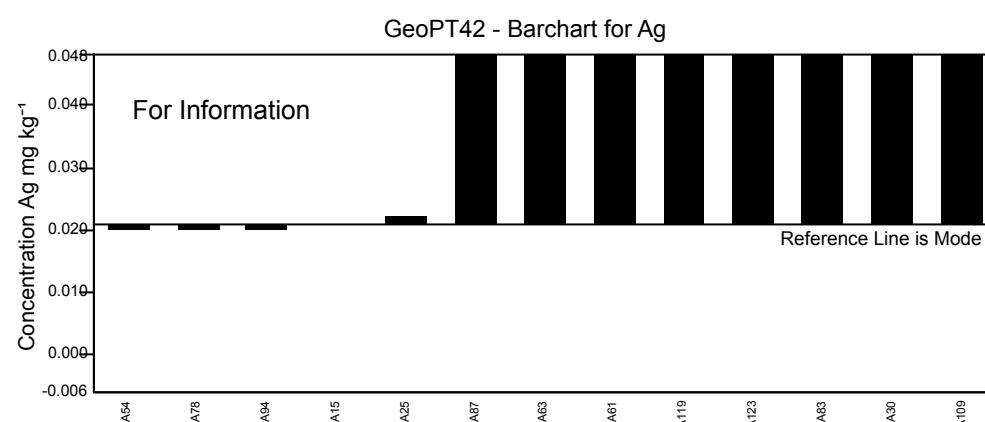
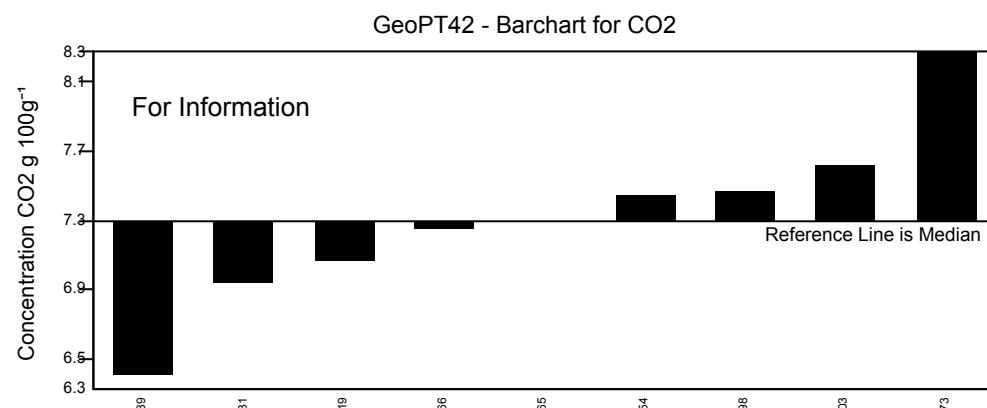
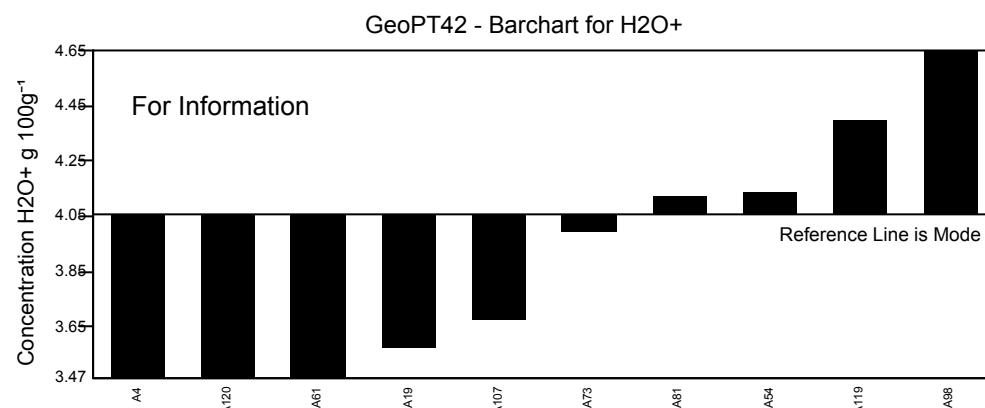
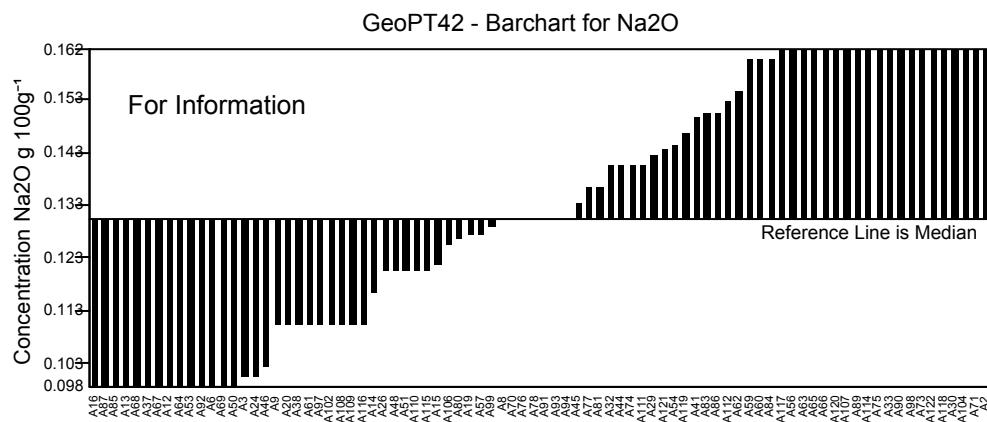
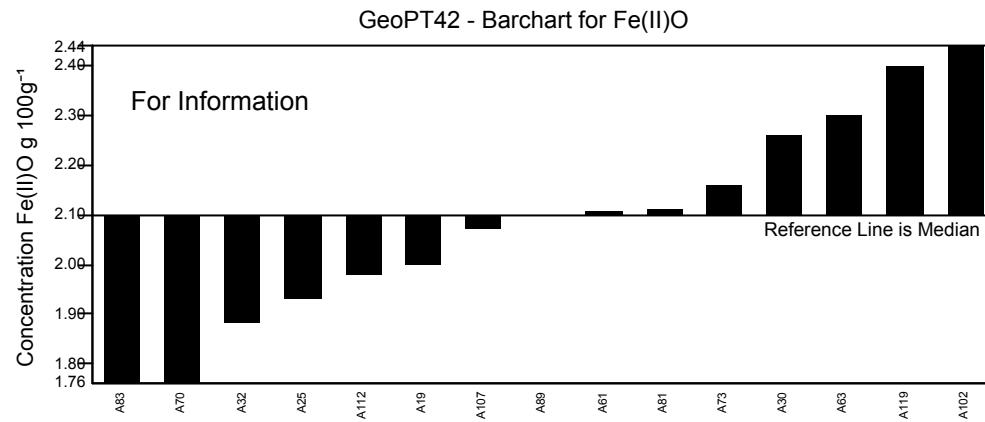


Figure 1: GeoPT42 - Queenston shale, QS-1. Data distribution charts for elements for which values were assigned or provisional values given for guidance. Horizontal lines show the limits for $-2 < z < 2$ for pure geochemistry labs (solid lines) and $-2 < z' < 2$ for applied geochemistry labs (pecked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



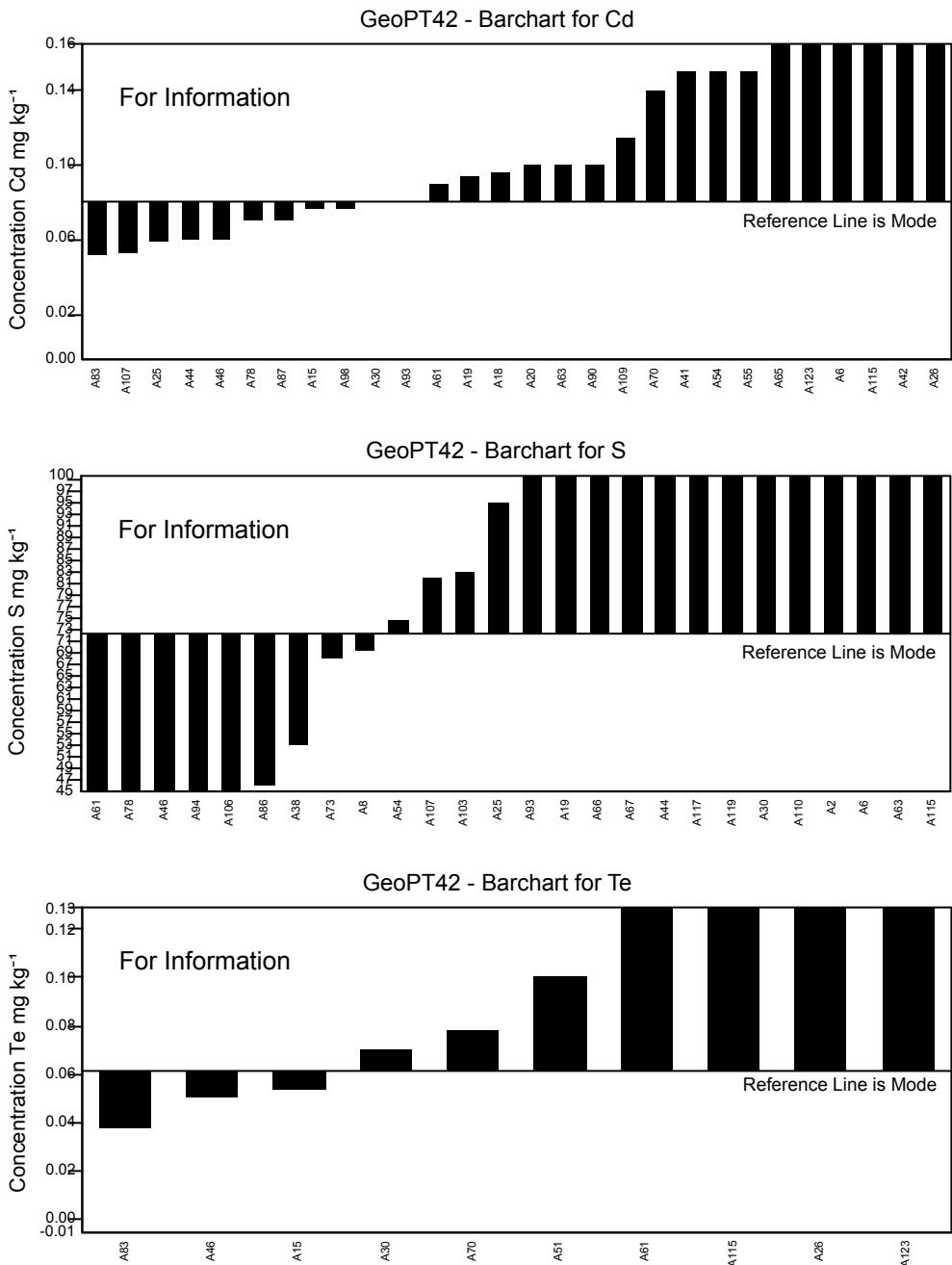
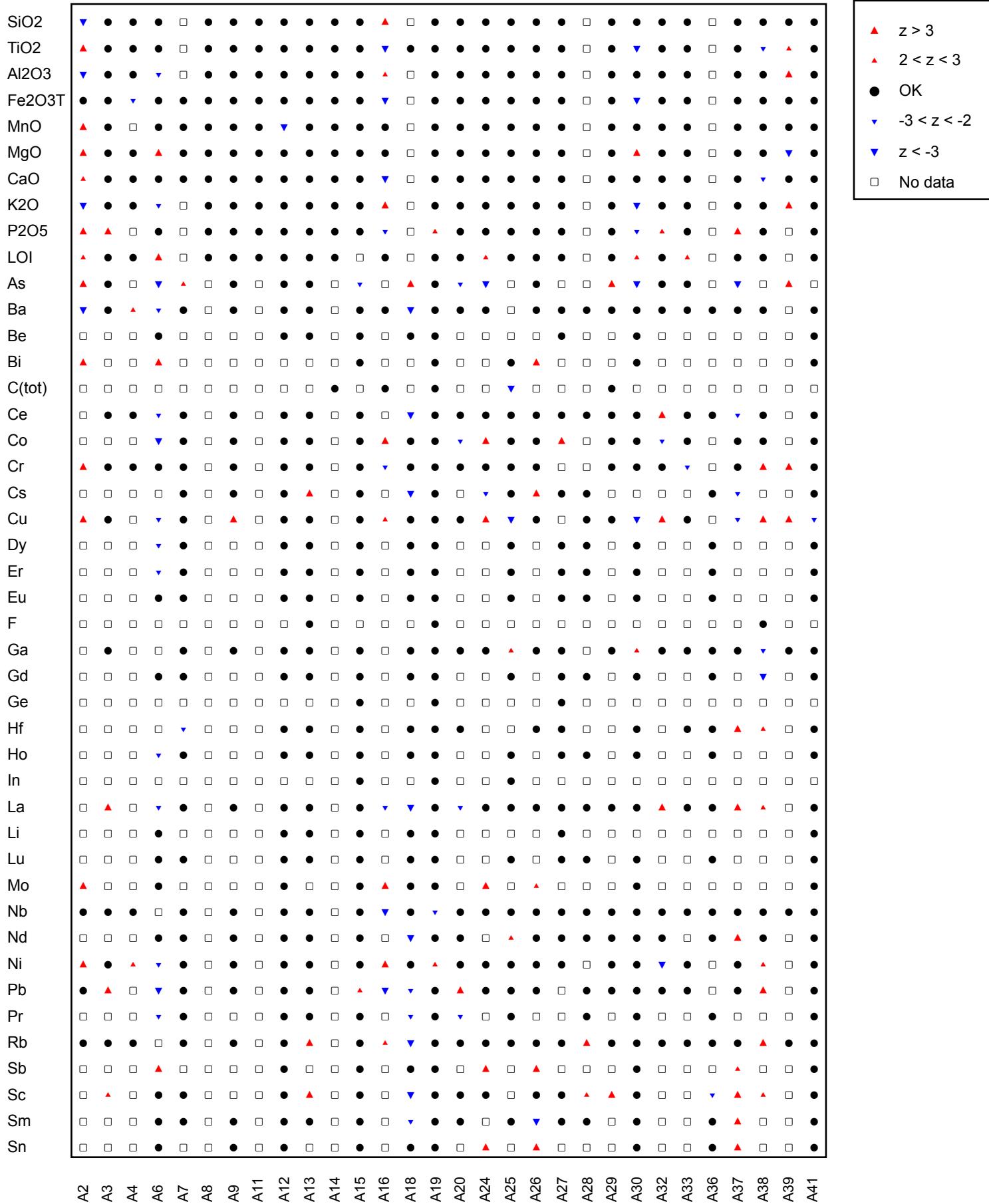


Figure 2: GeoPT42 - Queenston shale, QS-1. Data distribution charts provided for information only for elements for which values could not be assigned.

Multiple Z-Score Chart for GeoPT42



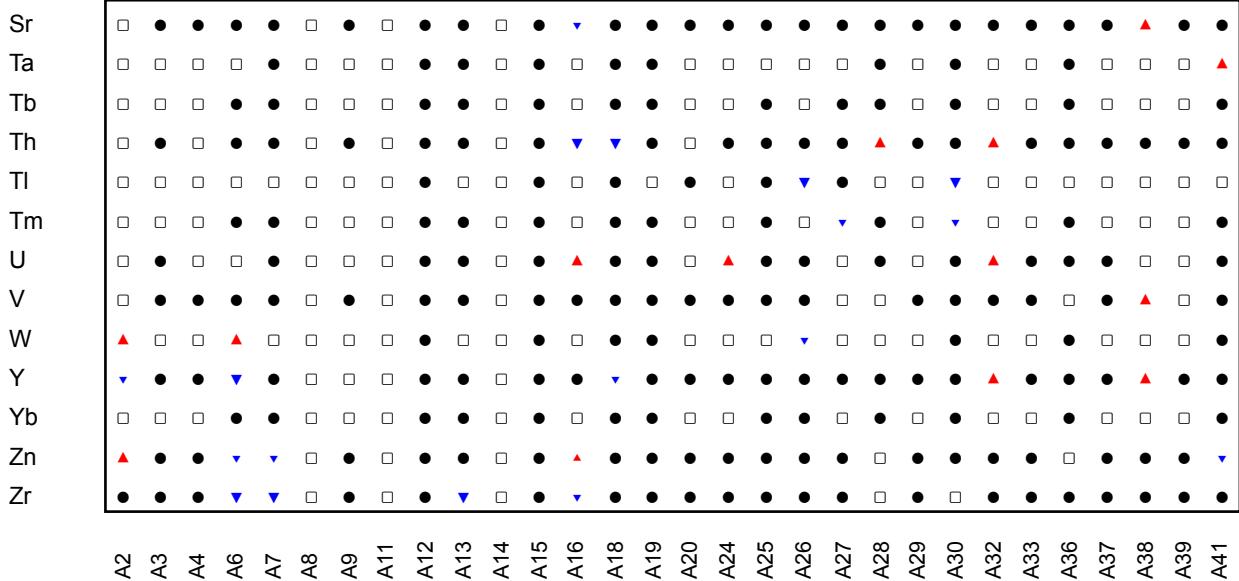
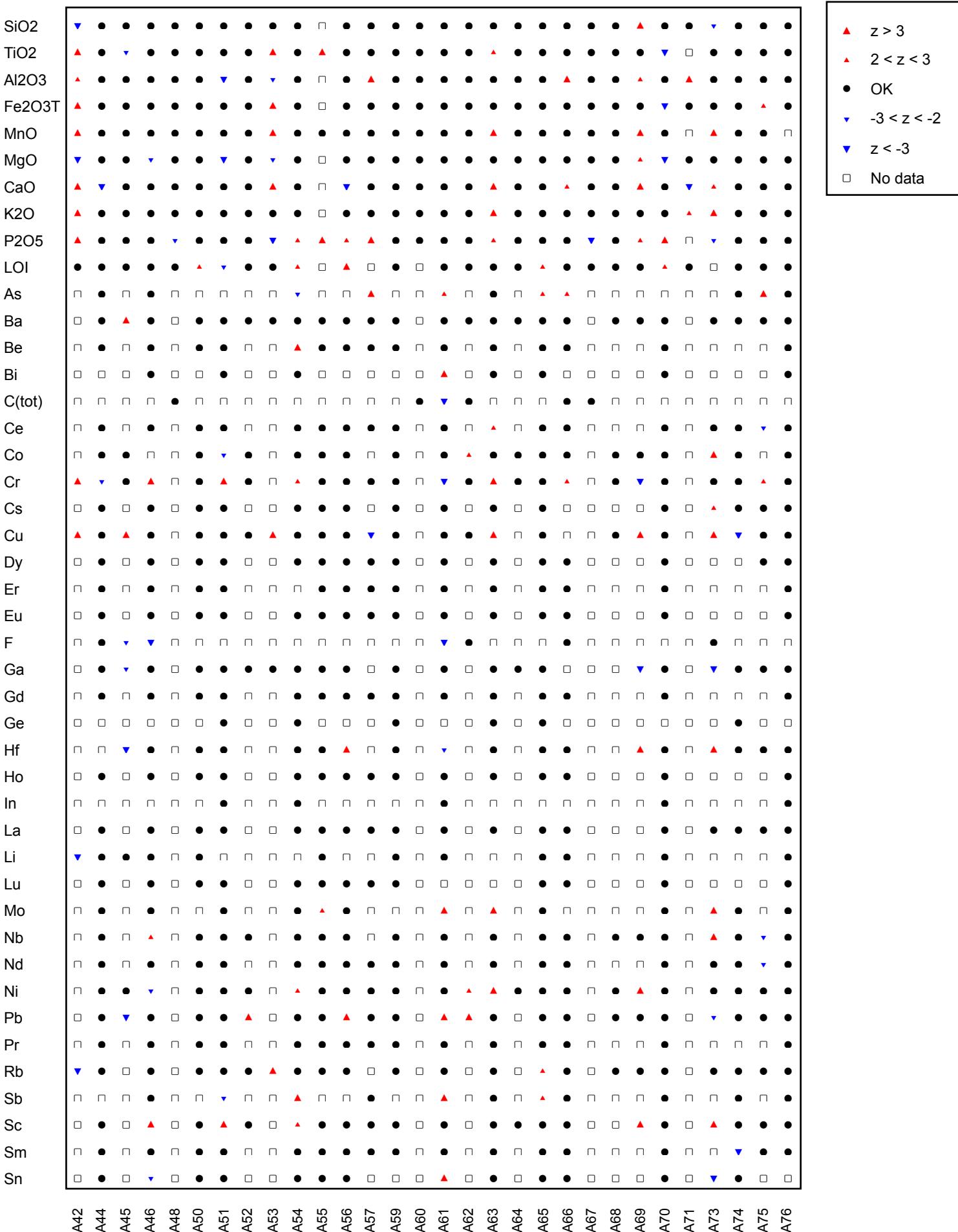


Figure 3: GeoPT42 - Queenston shale, QS-1. Multiple z-score charts for laboratories participating in the GeoPT42 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

Multiple Z-Score Chart for GeoPT42



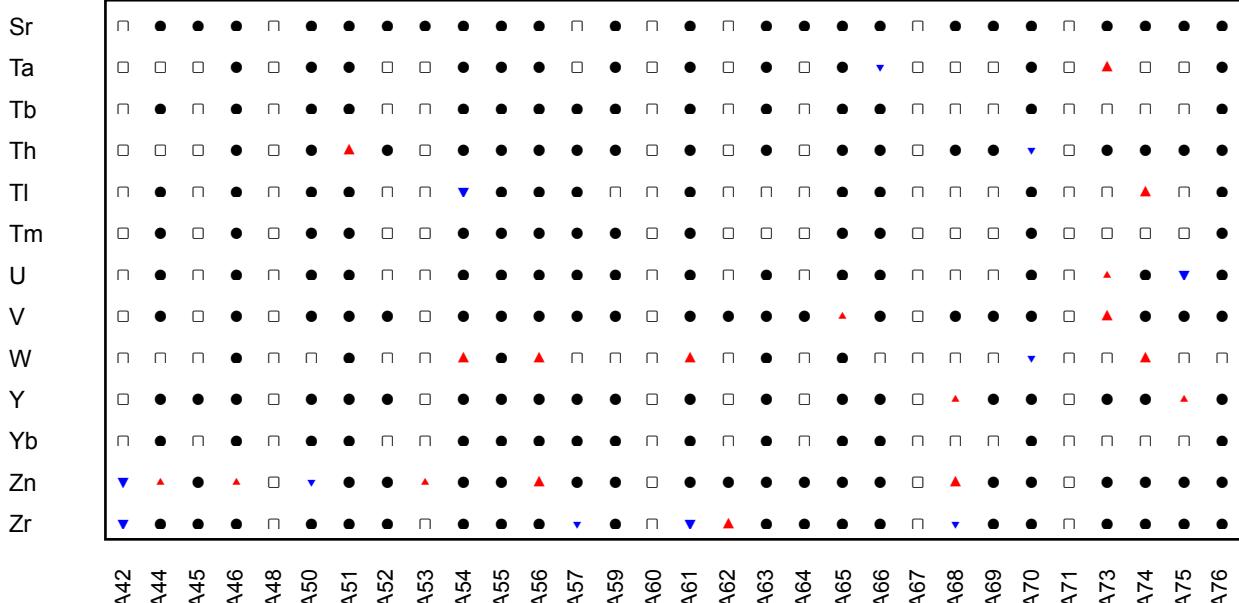
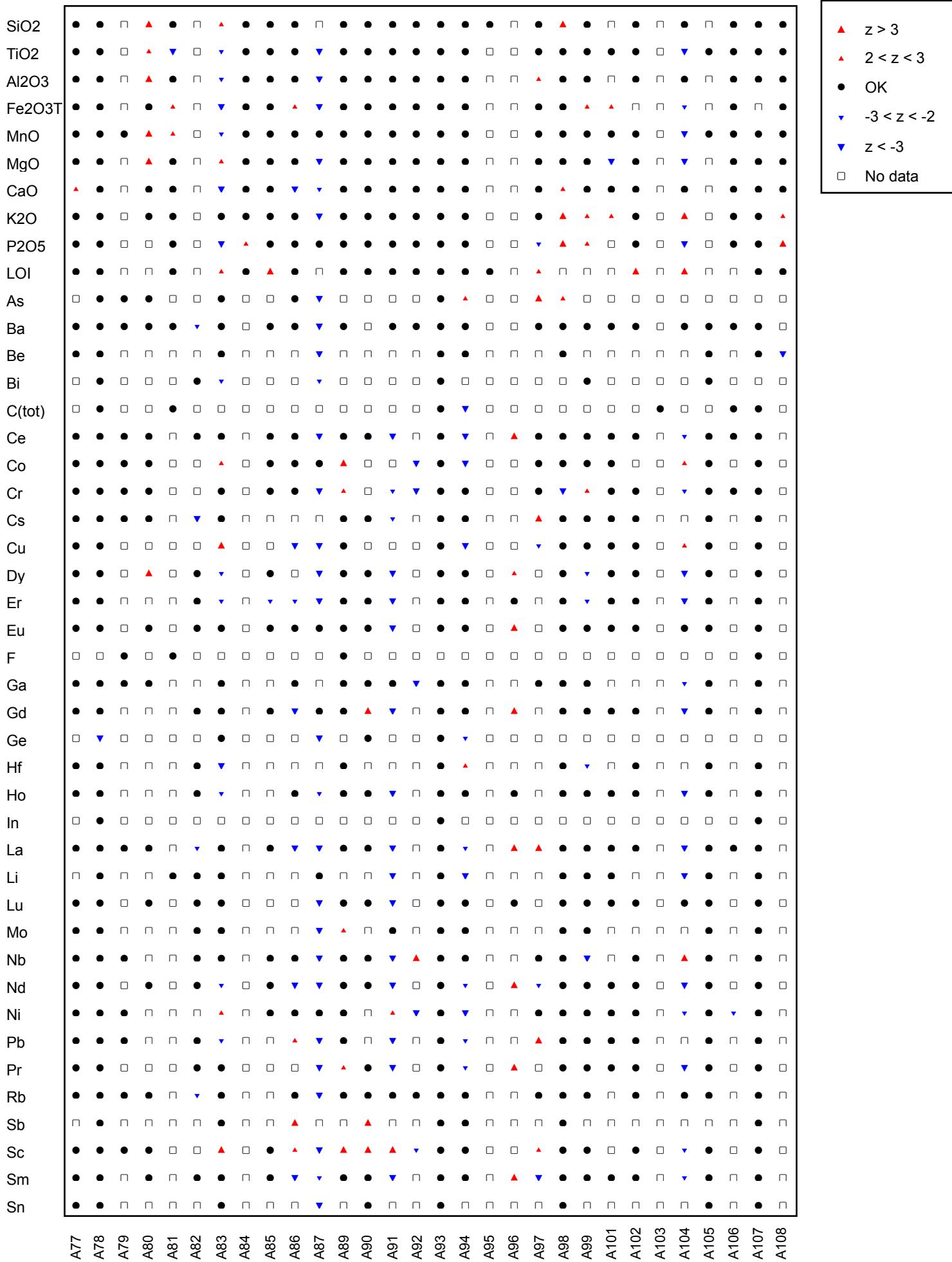


Figure 3: GeoPT42 - Queenston shale, QS-1. Multiple z-score charts for laboratories participating in the GeoPT42 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

Multiple Z-Score Chart for GeoPT42



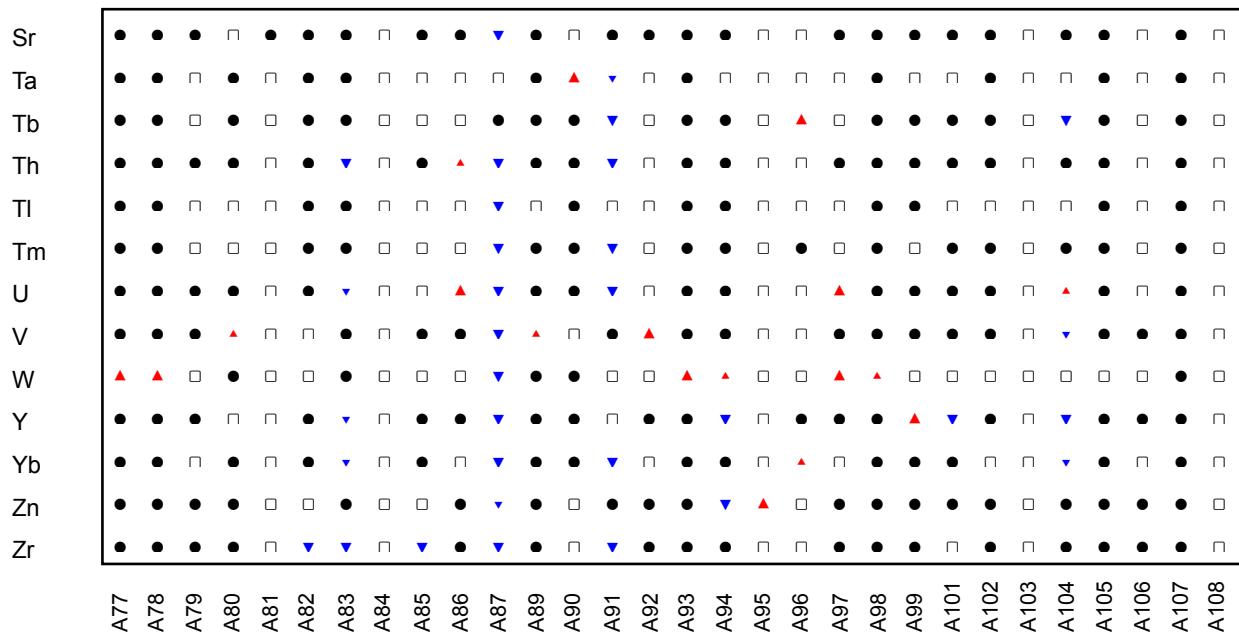
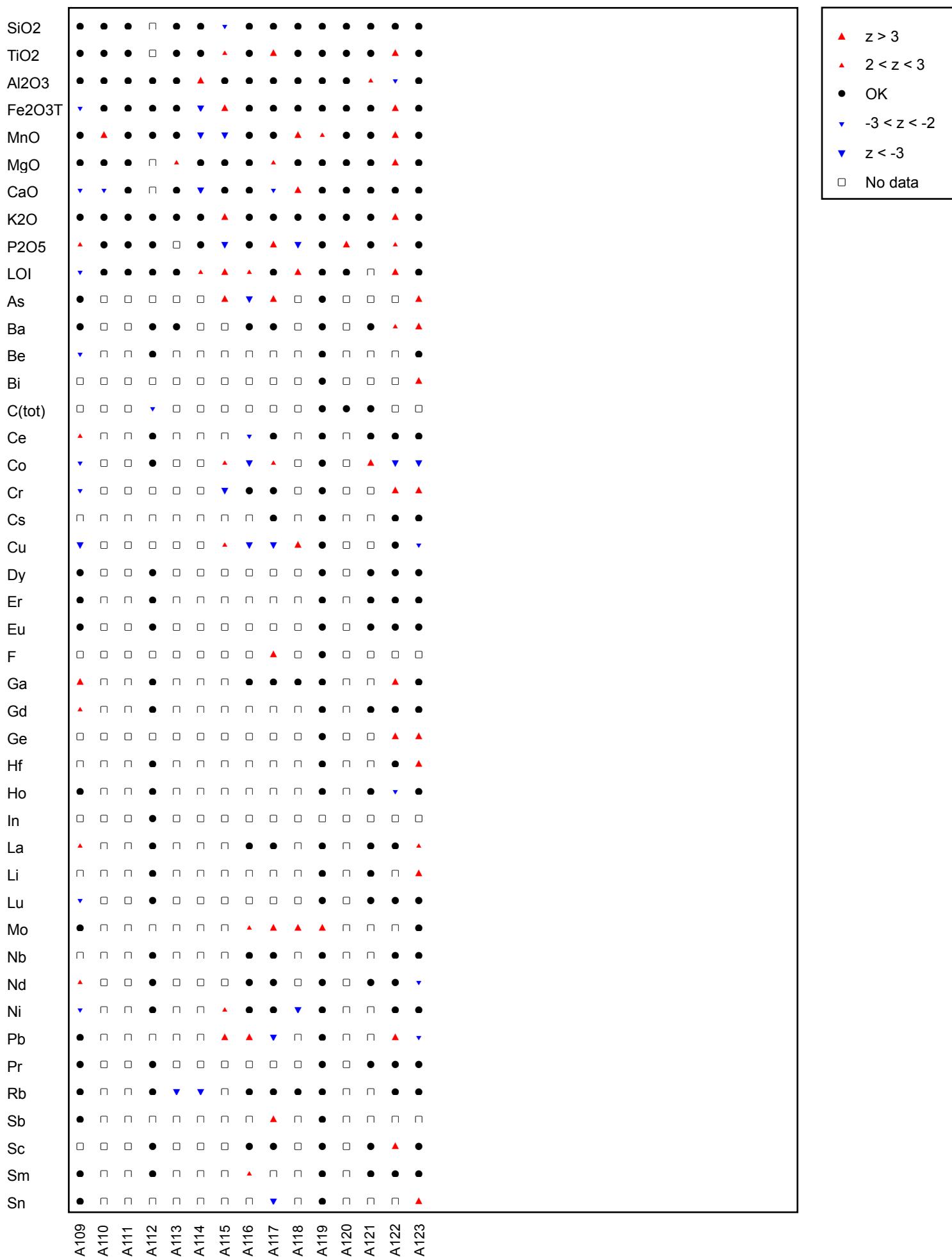


Figure 3: GeoPT42 - Queenston shale, QS-1. Multiple z-score charts for laboratories participating in the GeoPT42 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).

Multiple Z-Score Chart for GeoPT42



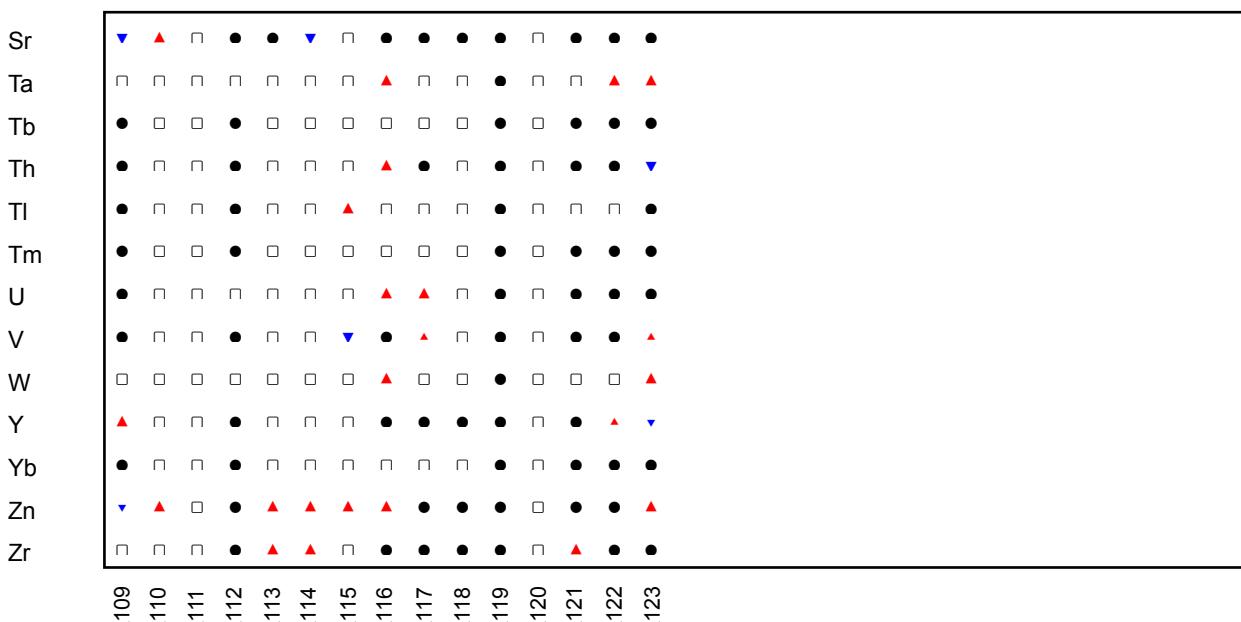


Figure 3: GeoPT42 - Queenston shale, QS-1. Multiple z-score charts for laboratories participating in the GeoPT42 round. Symbols indicate whether or not an elemental result complies with the $-2 < z < +2$ criteria (see key).