GEOPT9 - AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES - REPORT ON ROUND 9 / July 2001 (OU-6 Penrhyn slate).

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Abstract

Results are presented for round nine, GeoPT9, of the international proficiency testing programme for analytical geochemistry laboratories. The sample distributed for this round was OU-6 Penrhyn slate, a sample collected and prepared by The Open University as a proficiency testing sample. In this report, contributed data are listed, together with an assessment of assigned values, z-scores and charts showing both the distribution of contributed results and the overall performance of participating laboratories.

Introduction

This ninth round of the international proficiency testing programme, GeoPT9, was conducted in a similar manner to earlier rounds. The programme is designed to be part of the routine quality assurance scheme of analytical geochemistry laboratories. The trial involves distributing a sample of established homogeneity to participating laboratories, which are required to analyse the sample using a well-characterised technique or techniques operated under routine analytical conditions. Results are then tabulated by the organisers and z-scores calculated by comparing each analysed result submitted with the value assigned to be the best estimate of the true composition. These assigned values were estimated by robust statistical analysis of all the contributed data. By examining the magnitude of the z-score, participating laboratories can decide whether the quality of their data is satisfactory in relation to both their chosen fitness-for-purpose criteria and results submitted by all the other laboratories contributing to the round and choose to take corrective action if this appears justified.

Full details of the programme have been included in reports of previous rounds, the current publication status of which is listed in Appendix 1. In this report, therefore, only the features of the present round are included and readers interested in further details are invited to review the previously published reports.

Steering Committee for Round 9: M. Thompson (Chair), P.J. Potts (Secretary), P.C Webb and J.S. Watson.

Sample: OU-6 is slate from the Penrhyn Slate Quarries, Bethesda, North Wales. (UK grid reference SH 615 643). The sample was obtained from powdered material prepared as a commercial product. The Penrhyn slate quarry is situated in a belt of well cleaved Cambrian slates that extends N-S across part of

Snowdonia. Much of the rock is a fine grained purplish grey slate. Originally deposited as a mud, the rock became recrystallised during low grade metamorphism, when the fine grained mica was aligned under the influence of Caledonian deformation to produce the slaty cleavage. However, the rock remains mineralogically homogeneous on a fine scale, except for occasional green reduction (Fe^{2+}) spots and crystals of pyrite.

The sample was tested for homogeneity by selecting at random ten of the packets prepared for distribution. Duplicate test portions from each packet were analysed by WD-XRF at the OU. For the elements that could be evaluated from these results, homogeneity was considered to be satisfactory for use in the GeoPT9 round. A breakdown of these results is listed in Appendix 2.

Timetable for GeoPT9:

Distribution of sample: March 2001.
Deadline for submission of analytical results: 15th May 2001.
Distribution of preliminary report: July 2001

Submission of results

Results were submitted by the seventy-eight laboratories in this round. All results submitted under codes J1 to J74 and listed in Table 1 contributed to the assessment of assigned values. The remaining results were not included in this assessment owing to late submission.

Assigned values

Following procedures described in earlier rounds, a robust statistical procedure was used to derive assigned value concentrations [X_a], these being judged to be the best estimates of the true composition of this sample. Data in Table 2 lists assigned values for 12 major and 41 trace elements. Values were assigned on the basis that: (i) Sufficient laboratories had contributed data for an element. (ii) The statistical assessment gave confidence that the results showed a central tendency approximating to a normal distribution. Part of this assessment involved examining a bar chart for each element to judge the distribution of results. Bar charts for elements shown in Figure 1 were judged to have satisfactory distributions, namely: SiO_2, TiO_2, Al_2O_3, Fe_2O_3T, FeO, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, LOI, As, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Ga, Gd, Hf, Ho, La, Li, Lu, Nb, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tl, Tm, U, V, Y, Yb, Zn, Zr.

Charts in Figure 2 show data for elements: H_2O^+, CO_2, B, Bi, Cd, Cl, F, Ge, Mo, W. that were not judged to be satisfactory in the statistical analysis to assign values. In the present round, values could not be assigned to these elements.

Insufficient data were available to present charts for: Ag, Au, Br, Hg I, In, PGE, Re, S, Se, Te,

The most common reasons for elements failing the assessment of assigned values were as follows:
(i) Insufficient number of contributed results.
(ii) Results showing a strong positive skew in the frequency distribution diagram, sometimes with hints of multimodality.
(iii) A robust mean clearly different from the mode, which makes the determination of a consensus impracticable.
(iv) A very wide distribution of results as judged by the sigma value, so that no matter where the consensus were placed most of the participants would receive an 'unsatisfactory' classification if z-scores were calculated.

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

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

The target precision [H_a] for each element assessed was calculated from a modified version of the Horwitz function as follows:

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

Where X_a is the concentration of the element expressed as a *fraction*, and the factor k = 0.01 for pure geochemistry labs and k = 0.02 for applied geochemistry labs.

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

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

where

X is the contributed result, X_a is the assigned value and H_a is the target precision.

Z-score results are listed in Table 3 and participating laboratories are invited to assess their performance using the following criterion:

Z-score results in the range $-2<z<2$ are considered to be satisfactory. If the z-score for any element falls outside this range, contributing laboratories are advised to examine their procedures to ensure that determinations are not subject to unsuspected analytical bias.

Participating laboratories

Laboratories that contributed data to this proficiency testing round are listed in Table 4.

Overall performance

As a summary of the overall performance of individual laboratories in this round, a multiple z-score chart is plotted in Figure 3. In this chart, 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-score values that were greater or lower than the acceptable z-score limits. These data are designed to help individual laboratories to judge their overall performance in this proficiency testing round.

Participation in future rounds

The benefit from proficiency testing arises from regular participation and laboratories are invited to contribute to the GeoPT10 round, the sample for which will be distributed during September 2001.

Acknowledgments

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Appendix 1

Publication status of proficiency testing reports

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. Submitted for publication to 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. Submitted for publication to the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

GeoPT6
Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GEOPT6 - an international proficiency test for analytical geochemistry laboratories - report on round 6 (OU-3: Nanhoron microgranite) and 6A (CAL-S: CRPG limestone). International Association of Geoanalysts: 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.

Appendix 2

GeoPT9 Homogeneity Report

Homogeneity testing was based on analysis of duplicate test portions taken from each of 12 packets, which had been selected at random. These samples were analysed in duplicate by WD-XRF at the Open University for the major and minor elements (SiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, TiO_2, LOI, Ba, Cr, Ni) on glass discs and the trace elements (As, Ba, Co, Cr, Cu, Ga, Mo, Nb, Ni, Pb, Rb, S, Sc, Sr, Th, U, V, Zn, Zr) on powder pellets, following the procedures described in the GeoPT1 report.

Statistical analysis of homogeneity data was carried out using a new sequence of tests developed by Thompson (pers. comm.) as follows:

DATATEST is the outcome of a range of tests designed to identify analytical problems and discrepancies that could mask differences in analytical results related to inhomogeneity effects. All elements listed in the Tables below, passed these tests.

CONC is the average concentration derived from the XRF results.

SIGMAP is the target value for the standard deviation derived using the same modified form of the Horwitz function that was used to calculate the target precision for pure geochemistry laboratories (data quality = 1), described above.

F is the well-known F-statistic for one way analysis of variance. When compared to the relevant critical value of 4.94 (majors) or 2.78 (traces) all elements passed the F-test, except Ba.

VARSAM is the estimated between-sample variance, which is used to calculate:

SAMRATIO, which is the ratio of the $\sqrt{}$(VARSAM) / SIGMAP. Where this ratio has a value of less than 0.3, the element data is considered to have passed the harmonised protocol ***(HP)***.

In interpreting these data, it is considered that the principal demonstrator of homogeneity is that elemental results 'pass' the classical F-test. However, this is not the ultimate arbiter of homogeneity, since the Harmonised Protocol requires that homogeneity will have an insignificant effect on the interpretation of proficiency testing results. If the within-packet variance is particularly small, the F-test may detect a significant level of between-packet variance (indicating inhomogeneity effects), which is, in fact, insignificant in relation to the target precision, against which the results from participating laboratories are evaluated. In order to test the significance of data that 'fails' the F-test, the ratio of sampling precision to target precision is calculated. If this ratio is less than 0.3, elemental results are considered to be compatible with those of a homogeneous sample, in the context of this proficiency testing programme. Barium was the only data set that did not pass the F-test, but the SAMRATIO of 0.1797 indicates that this (and all the other elements) are fit-for-purpose and compatible with criteria for acceptance in the harmonised protocol. Tables presenting these statistical parameters for both major and trace elements are listed below.

Table 1 GeoPT9

OU-6: Penrhyn Slate - Results submitted to the GeoPT9 round

Round identifier		J1	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J14	J15	J16	J17	J18	J19	J20	J21	J22
Technique codes		M	M	IR, X	X	T,X	X	IR,X	A	A,M	A,M	M	A	AA,M, T,X	A,IR, M,X	M	M	X	A,tit, X	X	tit,X	M,X	X	I	X
Test portion (g)		0.1	0.1	0.4-5	0.5	0.6-5.4	0.8	0.1-0.7	0.25	0.25	0.1	0.25	0.2	0.1-0.75	0.2-7	0.1	0.1	1.0-5	0.01-0.7	8	0.1-0.8	0.1-4	1	1.9	1
Data quality		1	2	2	1	2	2	2	1	2	2	1	2	2	2	1	2	2	1	2	2	2	2	1	2
SiO2	% m/m			57.57	57.7	56.56	57.48	58.095	62.89	58.64	57				58.84			57.05	58.12		57.36	57.6	56.37		58.19
TiO2	% m/m			1.01	1.04	0.985	0.9955	1.015	0.79	0.964	0.96		0.87		1.02			0.97	0.99		0.99	1.03	1.08		1.03
Al2O3	% m/m			20.58	20.3	20.28	20.52	20.834	14.87	20.37	20.5		20.5		20.61			20.55	20.81		20.41	20.5	20.86	20.59	19.27
Fe2O3	% m/m			9.031	8.9	8.77	9.031	9.259	5.92	9.332	9.4		9.19		8.98			9.22	9	10.2	8.92	9	9.29	8.7	9.2
Fe(II)O	% m/m					1.67													1.53		1.63				
MnO	% m/m			0.284	0.29	0.28	0.2872	0.304	0.14	0.292	0.27		0.29		0.284			0.28	0.29	0.29	0.283	0.29	0.28	0.28	0.24
MgO	% m/m			2.31	2.33	2.43	2.36	2.538	2.36	2.408	2.46		2.44		2.43			2.35	2.52		2.4	2.4	2.23		2.72
CaO	% m/m			0.74	0.76	0.742	0.7575	0.7	4.54	0.769	0.69		0.68		0.699			0.73	0.72		0.76	0.75	1.08		0.69
Na2O	% m/m			1.69	1.75	1.75	1.727	1.589		1.688	1.7		1.74		1.88			1.57	1.77		1.76	1.7	2.27	1.76	1.93
K2O	% m/m			3.08	3.11	3.03	3.049	3.107		3.005	3.01		3.21		2.98			3.25	3.1		3.05	3	2.18		2.64
P2O5	% m/m			0.117	0.11	0.095	0.1214		0.19	0.0851	0.13		0.09		0.123			0.12	0.11		0.12	0.12	0.22		
H2O+	% m/m					4.11													4.02				0.18		
CO2	% m/m			0.41				0.387							0.257				0.24						
LOI	% m/m			3.32	3.56	3.62	3.628	3.673	10.49		3.54				3.4			3.66	3.63		3.63	3.5	3.53		3.68
Ag	mg kg-1																								
As	mg kg-1			17		13									12.7				8	17.5		11		14.9	
Au	mg kg-1																							0.002	
B	mg kg-1																								
Ba	mg kg-1	486.3		491		479			354	442.3	465	485	500	450.3	457	494.3		462	530		471	460		519	
Be	mg kg-1									2.7					2.71				4			2.6			
Bi	mg kg-1			10.5												0.325			1			0.31			
Br	mg kg-1																			3.7					
Cd	mg kg-1			0.4											2.07				0						
Ce	mg kg-1	78.3		73		71.7				79.04	79	79.6		79.5	72.1	82			76		64	85		73	
Cl	mg kg-1														44				20			35			
Co	mg kg-1			31		34.2			20	27.09	26	29.4	25	29	28.6	28.69			32		29	29		28.2	
Cr	mg kg-1			54		64.6			54	62.6	65		72	71.1	75	71.29			78		70	69		73.2	
Cs	mg kg-1	7.87								7.79	7.7			8.14	7.81				7					8.3	
Cu	mg kg-1			27		35.3			23	43.6	45		45	45.8	42	41.78			39		43	32			
Dy	mg kg-1	5.05								4.77	4.9	4.99		4.95	5.07	5.354			13			5.4		5.2	
Er	mg kg-1	3.068								2.97	2.8	2.99		2.94	2.98	3.186			3			3.1			
Eu	mg kg-1	1.386								1.74	1.4	1.53		1.28	1.39	1.353			2			1.5		1.39	
F	mg kg-1																		172			600			
Ga	mg kg-1			27		25.2			18	27.33		26		25.2	24	25.14			25		23	27			
Gd	mg kg-1	5.24								5.01	5.1	5.07		5.8	5.68	5.828			7						
Ge	mg kg-1			0.7											5.7		2.622								
Hf	mg kg-1		4.59	3.5						5.16	4.7	4.83		4.17	4.47	5.1			4			3.7		4.9	
Hg	mg kg-1			0.06																					
Ho	mg kg-1	1.014								1.09	1.05	1.01		0.96	1.04	1.033			1			1.1			
I	mg kg-1																								
In	mg kg-1			0.05																				119	

Round identifier		J1	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J14	J15	J16	J17	J18	J19	J20	J21	J22
Technique codes		M	M	IR, X	X	T,X	X	IR,X	A	A,M	A,M	M	A	AA,M, T,X	A,IR, M,X	M	M	X	A,tit, X	X	tit,X	M,X	X	I	X
Test portion (g)		0.1	0.1	0.4-5	0.5	0.6-5.4	0.8	0.1-0.7	0.25	0.25	0.1	0.25	0.2	0.1-0.75	0.2-7	0.1	0.1	1.0-5	0.01-0.7	8	0.1-0.8	0.1-4	1	1.9	1
Data quality		1	2	2	1	2	2	2	1	2	2	1	2	2	2	1	2	2	1	2	2	2	2	1	2
Ir	mg kg-1																								
La	mg kg-1	33.5		66		30.3				27.9		32.6	33	33.3	34.2	35.01			24		29	37		33.3	
Li	mg kg-1												130									105			
Lu	mg kg-1	0.456								0.47	0.44	0.464		0.44	0.47	0.494						0.45		0.47	
Mo	mg kg-1										0.7				1.15				1			0.8			
N	mg kg-1																								
Nb	mg kg-1			12		12.5			12.5	13.4	12.5	16.8		11.86	12.4	15.49		17	15	14	13	16			
Nd	mg kg-1	30.55		24		21.1				26.35	30.5	29		30.6	29.5	30.91			27		30	33		32.1	
Ni	mg kg-1			45		43.5			21	38.01	38		41	39.4	38.1		42.13		43	45	38	41		50	
Os	mg kg-1																								
Pb	mg kg-1	29		19		29.9					28		23	27.6	27.9	29.66			28	32	29	31			
Pd	mg kg-1																								
Pr	mg kg-1	8.07		7						8.67	8	8.24		8.1	8.55	8.394			8			8.8			
Pt	mg kg-1																								
Rb	mg kg-1	122.3		119		126				120.46	115	113		121.6	11.6	126.1		120	123	122	122	122		128	
Re	mg kg-1																								
Rh	mg kg-1																								
Ru	mg kg-1																								
S	mg kg-1							18.80											20						
Sb	mg kg-1			2.8							0.53				0.51				1			0.6		0.73	
Sc	mg kg-1								20	23.8	22.5		23	18.4	25.7				19			25		23.91	
Se	mg kg-1			2.4																					
Sm	mg kg-1	6.1		5.6						5.49	5.9	5.89		5.92	6.36	6.19			8			6.3		6.19	
Sn	mg kg-1			4.4							2.9				2.27				4			2.5			
Sr	mg kg-1	137		131		122			96	125	128	136	137	128.8	137	138.7		130	132	137	133	130			
Ta	mg kg-1									0.91	1.05			0.92	0.97	1.071			3			2		0.31	
Tb	mg kg-1	0.841								0.65	0.84	0.885		0.86	0.92	0.86			1			0.8		0.93	
Te	mg kg-1																								
Th	mg kg-1	11.47		9.7		12.3				11.53	11.3	11.5		11.6	10.6	12.03		10	12	12.3	13	14		12.82	
Ti	mg kg-1			0.5												0.465						0.55			
Tm	mg kg-1	0.436									0.46	0.396		0.44	0.45	0.455						0.44			
U	mg kg-1	1.963		2.3							1.9	2.18		1.89	1.95	2.05			4	2.1		1.9		2.07	
V	mg kg-1			127		121			83	127	123		120	121.1	128		135.3		128		123	137		135	
W	mg kg-1			8							1.7					1.411			0			1.6		0.51	
Y	mg kg-1	26.69		26		27.1			50	29.7	27.4	28.5	31	25.3	28	28.8		28	32	28	27	27			
Yb	mg kg-1	2.993									2.96	3.16		2.85	3.32	3.092			3			3		3.08	
Zn	mg kg-1			120		115			72		105		110	104	124	123.4			115	117	109	105			
Zr	mg kg-1		175.7	169		182			192	174.5	170	165		143.2	158	193		160	181	172	172	167			

Technique codes: A: ICP-AES; AA: AAS; E=emission spectrometry; G=gravimetric; I=INAA; ign=ignition; IR= infra red detection; ISE=ion selective electrodes; M=ICP-MS; O=other; tit=titrimetry; W= wet chemistry; X=X-ray fluorescence.

Round identifier		J23	J24	J25	J26	J27	J27	J28	J29	J29	J30	J31	J32	J33	J34	J35	J36	J37	J38	J38	J39	J40	J40	J41	J42
Technique codes		X	I	M,V, X	X	A,E, X	A,E, X	M	M	M	A,AA, W	X	X	X	AA,G P,V	M	X	A,AA, O,X	X	X	A,I, M,X	X	X	M,X	A,ir, M,O,V
Test portion (g)		1.0 5	0.15	0.2-7	1-3.6	0.1-1.2	0.1-1.2	0.05	0.1	0.1	0.2-1	1.2	1	0.17	0.1-2	0.1	0.4	0.2-3	0.7-10	10	0.1-0.8	1.2-9	1.2-9	0.1-10	0.2-1
Data quality		2	1	1	1	1	2	1	1	2	2	1	1	1	1	1	2	1	1	2	1	1	2	1	2
SiO2	% m/m	60.34		56.901	60.57	56.9					56.84	57.49	56.65	56.41	56.60		57.8	57.37	57.21		57.2	57.51		57.42	57.9
TiO2	% m/m	1		1.095	0.98	1.011					1.15	0.98	1.08	1.06	0.90		1	1.09	0.985		0.995	1.043		0.98	0.97
Al2O3	% m/m	18.55		20.823	20.78	20.45					20.8	20.48	20.07	21.08	20.90		20.6	20.42	20.72		20.5	20.23		20.58	20.5
Fe2O3	% m/m	8.91	5.98	9.091	9.48	9.14					8.93	8.91	9.4	10.28	9.40		8.92	8.87	8.993		8.87	8.852		8.83	9.05
Fe(II)O	% m/m			2.11											1.81			1.45							1.7
MnO	% m/m	0.27		0.28	0.28		0.284				0.288	0.28	0.305	0.32	0.28		0.28	0.287	0.276		0.281	0.289		0.25	0.287
MgO	% m/m	2.17		2.296	2.73		2.42				2.68	2.340	2.94	2.35	2.40		2.45	2.38	2.347		2.38	2.419		2.52	2.42
CaO	% m/m	0.7		0.834	0.73	0.855					0.84	0.710	0.8	0.83	0.95		0.72	0.75	0.738		0.733	0.765		0.72	0.72
Na2O	% m/m	2.26	1.98	1.709	1.54	1.78					1.68	1.9	1.45	1.72	1.82		1.81	1.77	1.759		1.763	1.73		1.76	1.8
K2O	% m/m	3.21		3.112	3.1	3.27					3	3.09	3.16	3.12	3.05		3.13	3	3.028		3.047	3.039		3.09	3.03
P2O5	% m/m	0.13		0.125	0.12		0.116				0.17	0.13	0.15	0.104	0.105		0.11	0.113	0.123		0.055	0.122		0.12	0.12
H2O+	% m/m																	3.65							
CO2	% m/m																	0.212			0.14				0.2
LOI	% m/m			3.65			4.3				3.53	3.58	3.5	3.60	3.60			3.61	3.6		3.613	3.55		3.66	3.5
Ag	mg kg-1						0.3																		
As	mg kg-1		14.5				12.1											8.1		13.8	14.01			12.7	11
Au	mg kg-1														0.17										
B	mg kg-1						112.5																		68
Ba	mg kg-1	533	474	530			445.0	469		482.8	465	479	445			457.3		461		525.4	496.7	552.1		496	470
Be	mg kg-1						2.5	2.66										3.5			2.71			3.07	2.5
Bi	mg kg-1																	2.5			0.193				0.32
Br	mg kg-1		0.32																						
Cd	mg kg-1						0.03																		
Ce	mg kg-1	84	80.1	60.516		75.2		78	77.87		56.74	66				77.5		65.2			84.97		60	81.6	85.8
Cl	mg kg-1																								
Co	mg kg-1		28.0	36			33.0	27.4			31	29	15	42				27		23.8	30.1			31.7	29
Cr	mg kg-1	87	71	89			67.0	62			71	72	71	88				81		79.8	75.4	91.7		83.3	53
Cs	mg kg-1		7.77				7.0	8.9	7.898							7.59					7.86			8.62	8.35
Cu	mg kg-1			32			50.0				46							47	33		42.03	45.2		36.3	44
Dy	mg kg-1			3.848		4.9		5.2	4.972		4.58					4.69		4.83			5.22			5.09	5.15
Er	mg kg-1			2.113		2.7		2.97	2.91		3.08					2.99		2.56			3.03			3.09	2.95
Eu	mg kg-1		1.40	1.445		1.3		1.28	1.314		1.08					1.33		1.19			1.45			1.41	1.47
F	mg kg-1						500.0											630							600
Ga	mg kg-1					24.0						23	23							23.1	23.97	24.7		25	24.2
Gd	mg kg-1			4.679		4.7		5.1	5.194		5.15					4.85		5.33			5.71			5.34	5.35
Ge	mg kg-1						1.6				1										1.84				2.1
Hf	mg kg-1		4.87			5.2		4.04		4.44						4.38					5.55			4.58	4.4
Hg	mg kg-1						0.0																		
Ho	mg kg-1			0.749		0.9		1.06	1.008		0.9					1.02		1.13			1.035			1.07	1.03
I	mg kg-1																								
In	mg kg-1																				0.101				0.09

Round identifier		J23	J24	J25	J26	J27	J27	J28	J29	J29	J30	J31	J32	J33	J34	J35	J36	J37	J38	J38	J39	J40	J40	J41	J42
Technique codes		X	I	M,V, X	X	A,E, X	A,E, X	M	M	M	A,AA, W	X	X	X	AA,G P,V	M	X	A,AA, O,X	X	X	A,I, M,X	X	X	M,X	A,ir, M,O,V
Test portion (g)		1.0-5	0.15	0.2-7	1-3.6	0.1-1.2	0.1-1.2	0.05	0.1	0.1	0.2-1	1.2	1	0.17	0.1-2	0.1	0.4	0.2-3	0.7-10	10	0.1-0.8	1.2-9	1.2-9	0.1-10	0.2-1
Data quality		2	1	1	1	1	2	1	1	2	2	1	1	1	1	1	2	1	1	2	1	1	2	1	2
Ir	mg kg-1																								
La	mg kg-1		33.1	35.238		32.5		33.7	33.35		19.5					32.4		21.5			35.63		19.1	34.46	35.5
Li	mg kg-1					92.0		100			53							84			100				100
Lu	mg kg-1			0.296		0.4		0.428	0.452		0.34					0.485		0.47			4.95			0.46	0.44
Mo	mg kg-1		0.64				0.6														0.179			0.645	0.4
N	mg kg-1																								
Nb	mg kg-1	17		17	16		17.0	13.9		14.08	19	23	7			15.31		13	14.5		14.67	15.4		14.75	16.5
Nd	mg kg-1	35		24.633		29.5		30.8	30.94		24.18					30.53		26.8			33.83		10.3	31.75	30
Ni	mg kg-1	55	38.5	25	37		47.0	39.7			39	44	41	36				31	37.6		40.73	35.5		42.9	43
Os	mg kg-1			25																					
Pb	mg kg-1			25			26.8	28.7	27.38		11					27.43		25	28.3		30.4	40.4		28.3	29
Pd	mg kg-1														0.03										
Pr	mg kg-1			6.786		8.1		8.2	8.019		6.26					7.82		6.7			8.24			8.53	8.28
Pt	mg kg-1																								
Rb	mg kg-1	127	116.5	141	121	110.0		119	119.1			136	119			115.3		112	122.4		123	120.5		121.2	129
Re	mg kg-1																								
Rh	mg kg-1																								
Ru	mg kg-1																								
S	mg kg-1																			44					
Sb	mg kg-1		0.69																		0.309			0.61	0.54
Sc	mg kg-1	21	21.9				14.0	23.8		21.2										21.1	24.77	23.2		23.8	24
Se	mg kg-1																				0.17				
Sm	mg kg-1		6.10	4.767		6.0		6.2	6.1		5.31					5.84		6.23			6.83			6.25	6.15
Sn	mg kg-1						3.8														2.72			3.13	2.5
Sr	mg kg-1		131	161	128	136.0		129	131.5		153	144	125.5			121.3		115.1	130.9		135	128.6		135	145
Ta	mg kg-1		1.04			1.1		0.999		0.833	2					1.06					1.14			1.09	0.99
Tb	mg kg-1		0.76	0.674		0.8		0.836	0.838		0.67					0.81		1.03			0.91			0.87	0.9
Te	mg kg-1																								
Th	mg kg-1		11.52	11		11.3		11.3	11.004							11.63				12.8	11.9	9.5		11.2	12
Tl	mg kg-1							0.75													0.562			0.52	0.55
Tm	mg kg-1			0.311		0.3		0.499	0.437		0.4					0.445		0.31			0.517				0.45
U	mg kg-1	2	1.99			2.2		1.91	1.824							1.93		2		1.9	2.28			1.87	2
V	mg kg-1	148		167	125		140.0	128			114			130				126		141	129.3	170.8		133.5	129
W	mg kg-1		1.5																						1.2
Y	mg kg-1	35		43			24.0	28.8	26.27		22.63	41	20	20		29.2		24.5	28.7		28.3	30.1		26.9	27
Yb	mg kg-1		3.0	1.887		2.4		2.96	2.926		2.52					3.03		3.04			3.38			3.02	3
Zn	mg kg-1	113	118	141	106	100.0					112	105	107					110	105.4		113.7	106.5		114.6	116
Zr	mg kg-1	186	180	189	158		177.0	144		163.4	147	196	178	158				176	174.3			194.1		182.5	150

Round identifier		J43	J44	J44	J45	J45	J46	J47	J48	J49	J50	J51	J51	J52	J53	J54	J55	J55	J56	J57	J57	J58	J59	J60	J60
Technique codes		A,M, X	I	I	T,X	T,X	AA,O, tit	A,W	A	M,X	M,T, X	X	X	A,I,M, T,X	X	M,X	A,ir, M,T,X	A,ir, M,T,X	M,X	A,tit, X	A,tit, X	A,M	X	X	X
Test portion (g)		0.25-1.5	1.0-10	1.0-10	0.25-6	0.25-6	0.1-0.5	0.25-0.5	0.05-0.5	0.1-0.5	0.01-1.2	1.0-20	1.0-20	0.1-2	1.0-6	0.1-12	0.2-4	0.2-4	0.12-3.5	0.2-7.5	0.2-7.5	0.2-0.5	1.5	1.0-8	1.0-8
Data quality		2	1	2	1	2	2	1	2	1	1	1	2	2	2	2	1	2	1	1	2	2	2	1	2
SiO2	% m/m	57.5362			57.9			58.297		57.61	57.71	57.27		57.95	55.3	57.31	57.35		57.331	56.6		59.010	57.94	58.23	
TiO2	% m/m	0.98445			0.967			0.945	0.985	0.99	1.03	0.99		1.01	0.97	0.99	1		0.9911	1.002		0.96	1.01		
Al2O3	% m/m	57.5362			20.54			20.819	20.42	20.61	20.29	20.33		20.41	19.95	20.4	20.52		20.468	20.33		19.27	20.3		20.61
Fe2O3	% m/m	8.8083		9.03	8.944			8.43	8.756	9.11	8.93	9.04		8.66	8.72	8.95	8.81		9.041	9.08		8.27	8.92	9.245	
Fe(II)O	% m/m				1.69		1.65				1.85			1.6			1.63			1.62					
MnO	% m/m	0.308			0.285		0.304		0.272	0.27	0.29	0.28		0.288	0.272	0.288	0.28		0.2876	0.299		0.26	0.277	0.28	
MgO	% m/m	2.41205			2.436			2.465	2.35	2.34	2.33	2.4		2.39	2.36	2.35	2.48		2.461	2.43		2.35	2.3	2.445	
CaO	% m/m	0.71365			0.737			0.747	0.718	0.77	0.74	0.77		0.732	0.8	0.72	0.73		0.762	0.78		0.69	0.758	0.83	
Na2O	% m/m	1.74495		1.805	1.946			1.875	1.894	1.64	1.83	1.71		1.801	1.78	1.87	1.78		1.756	1.99		1.62	1.76	1.875	
K2O	% m/m	3.0413		3.34	3.041			2.948	3.078	3.06	3.01	3.09		3.081	2.92	3.05	3.22		3.059	3.01		2.85	3.02	2.89	
P2O5	% m/m	0.1239			0.121					0.12	0.12	0.12		0.122	0.115	0.12	0.11		0.1177	0.119		0.09	0.122		
H2O+	% m/m													3.61			3.73								
CO2	% m/m													0.12											
LOI	% m/m	3.83			3.57			3.685		3.52	3.66	3.61		3.51	3.69	3.57	3.6		3.573	3.71			3.59	3.6	
Ag	mg kg-1																								
As	mg kg-1	1.32		14.25								13		9.99	13	13						8.4			
Au	mg kg-1													2.6											
B	mg kg-1													77.6											
Ba	mg kg-1	114		467	497		412		411.6	491				512	512	443.9			483.9	496		489			
Be	mg kg-1	0.529								2.65	2.34			3.35		2.176		2.33		3.4					
Bi	mg kg-1										0.3														
Br	mg kg-1													51.1											
Cd	mg kg-1	2.28																							
Ce	mg kg-1		71.83			65				69.5	73.8			81	69	76.63		75.1	75.389	64.2		77			
Cl	mg kg-1												27								137				
Co	mg kg-1	2.72		28.52			30.8		31.3	30	27.3		46	29.8	30	27.48		29.37		27		24			
Cr	mg kg-1	8.04		70.77	78.5		68.9			53	64	80		88	63	60.37		64.8	66.6	79		66.0			
Cs	mg kg-1	2.18		7.89						8.23	7.58			8.81		7.911		8.3	8.93						
Cu	mg kg-1	4.35			42.9		34		33.7	37	45.2	36		39.79	37	41		49	45.4	43		41		26	
Dy	mg kg-1									4.64	5.06			5.05		4.953		4.72	5.59	5.38		4.4			
Er	mg kg-1									2.79	2.84			3.3		3.03		2.64	3.119			2.6			
Eu	mg kg-1		1.27							1.31	1.41			1.34		1.344		1.26	1.474	1.36		1.2			
F	mg kg-1													510							299				
Ga	mg kg-1									25.8	23.1	27		26.3	23	24		24.78	23.2	21		21			
Gd	mg kg-1									5.11	5.53			5.62		5.157		5	5.467	5.18		5.5			
Ge	mg kg-1													2.53		1									
Hf	mg kg-1			4.99						5.73	4.51			5.19	8	4.807		4.56	4.918	4.63					
Hg	mg kg-1																								
Ho	mg kg-1		1.23							1.03	0.99			1.01		1.01		0.97	1.116			0.8			
I	mg kg-1																								
In	mg kg-1																								

Round identifier		J43	J44	J44	J45	J45	J46	J47	J48	J49	J50	J51	J51	J52	J53	J54	J55	J55	J56	J57	J57	J58	J59	J60	J60
Technique codes		A,M, X	I	I	T,X	T,X	AA,O, tit	A,W	A	M,X	M,T, X	X	X	A,I,M, T,X	X	M,X	A,ir, M,T,X	A,ir, M,T,X	M,X	A,tit, X	A,tit, X	A,M	X	X	X
Test portion (g)		0.25-1.5	1.0-10	1.0-10	0.25-6	0.25-6	0.1-0.5	0.25-0.5	0.05-0.5	0.1-0.5	0.01-1.2	1.0-20	1.0-20	0.1-2	1.0-6	0.1-12	0.2-4	0.2-4	0.12-3.5	0.2-7.5	0.2-7.5	0.2-0.5	1.5	1.0-8	1.0-8
Data quality		2	1	2	1	2	2	1	2	1	1	1	2	2	2	2	1	2	1	1	2	2	2	1	2
Ir	mg kg-1																								
La	mg kg-1	8.25	33.23			35				30.2	30.8			36.1	38	29.89		29.91	34.546	29.5		37			
Li	mg kg-1	25.5					91.4		97.5		90.4			96.73		92.65									
Lu	mg kg-1	0.399	0.46							0.49	0.43			0.47		0.448		0.45	0.486	0.3					
Mo	mg kg-1											3		1.1	3							0.35			
N	mg kg-1																								
Nb	mg kg-1				14.9					15.3	13.1	17		19.01	15	13.36			14.954	17					
Nd	mg kg-1		31.82							30.2	27.5			33.6		28.3		29.01	29.061	29.3		27			
Ni	mg kg-1	3.63			43.2		33		31.2	51	38.2	40		39.2	43	40		37.6	41.5	40		36		39	
Os	mg kg-1																								
Pb	mg kg-1	7.02			28.6					34.9			31	26.17	26	29		28.19	31.859	24		23			
Pd	mg kg-1																								
Pr	mg kg-1									7.31	7.5			9.3		7.717		7.38	7.394		7.34	7.2			
Pt	mg kg-1																								
Rb	mg kg-1			127	121.4					96	110.4		126	118	121	120			123.74	118		107		112	
Re	mg kg-1																								
Rh	mg kg-1																								
Ru	mg kg-1																								
S	mg kg-1																								
Sb	mg kg-1			0.54										1.25		0.541		0.55							
Sc	mg kg-1			23.55						19.6	21.1			23.23		20		21.87	27.1	22					
Se	mg kg-1													1.86											
Sm	mg kg-1		6.05							5.43	5.7			6.01		5.797		5.68	6.422	5.46		5.3			
Sn	mg kg-1	0.513												2.5		2.488		2.57							
Sr	mg kg-1	29.4			131.9		113		112.4	107	131.6		143	136	131	135		136.2	134.5	141		126.0		125	
Ta	mg kg-1			1.13						1.18	1.12			1.4		1.008		0.98	1.018						
Tb	mg kg-1		0.905							0.83	0.79			0.89		0.827		0.78	0.928	0.89		0.8			
Te	mg kg-1																								
Th	mg kg-1	3.15		12.03						9.97	9.67	14		11.3	14	10.87		10.79	12.984	11					
Tl	mg kg-1										0.53			0.45		0.383		0.62							
Tm	mg kg-1									0.43	0.42			0.44		0.446			0.464		0.38				
U	mg kg-1	0.367								1.63	1.95			2.17		1.902		1.9	2.047		3				
V	mg kg-1	14.3			134					84	132.4	165		145	141	115.9		124	127.4	136		115			
W	mg kg-1													1.48											
Y	mg kg-1	5.49			29.4					28	23.1	33		26.8	29	23.98		28.58	29.921	23.4		25			
Yb	mg kg-1		3.07							3.23	2.77			3.03		3.008		2.93	2.998	2.31		2.6			
Zn	mg kg-1	11.1		120	111.1		88.6		83.1	240	80.7	115		106.9	109	118		126	107.1	94		105		107	
Zr	mg kg-1	9.14			173.3		140.8		140.2	174	156.6	193		193	180	177		175	172.4	174		166			160

Round identifier		J61	J61	J62	J62	J63	J63	J64	J65	J65	J66	J66	J67	J68	J69	J70	J71	J72	J73	J74
Technique codes		X	X	X	X	X	X	A,AA, X	I	I	X	X	AA,X	A,X	AA	AA	A, AA	A,M, X	M,X	X
Test portion (g)		0.8-10	0.8-10	1.6	1.6	1-4.5	1-4.5	1.0-3	0.2	0.2	0.6-6	0.6-6	0.25-4	0.5-5	0.1	0.1	0.5	0.3-0.5	0.25-0.35	0.7-5
Data quality		1	2	1	2	1	2	2	1	2	1	2	2	2	1	1	1	2	2	2
SiO2	% m/m	57.24		57.29		57.29		58.2			56.95		57.57	57.1		61.78		56.39	57.43	57.74
TiO2	% m/m	0.995		0.961		1.01		1		1.04	1.01		1.02	0.997			0.95	0.977	0.99	1.01
Al2O3	% m/m	20.73		20.51		19.73		20.4	22.11		20.26		21.33	20.52		20.22		20.28	20.05	20.67
Fe2O3	% m/m	9.09		8.7		9.06		9.1	8.61		9.11		8.09	9.11	5.61	9.55	9.3	8.97	9.27	9.11
Fe(II)O	% m/m							1.94						1.55						
MnO	% m/m	0.294		0.293		0.29		0.28	0.28		0.29		0.275	0.272	0.098	0.27	0.31	0.301	0.3	0.292
MgO	% m/m	2.38		2.35		2.38		2.4		2.5	2.39		2.5	2.49	1.14	2.15	2.32	2.402	2.18	2.37
CaO	% m/m	0.77		0.73		0.75		0.7		1.05	0.73		0.43	0.77	0.85	0.74	0.84	0.741	0.69	0.73
Na2O	% m/m	3.13		1.78		1.83		1.7	1.78		1.6		1.53	1.86	2.11	1.63	1.97	1.95	1.52	1.81
K2O	% m/m	1.73		3.015		3.08		3	3.22		3.06		2.75	3.1	2.37	3.49	2.9	3.036	3.05	3.09
P2O5	% m/m	0.126		0.11		0.12		0.12			0.13		0.092	0.13			0.095	0.111	0.14	0.11
H2O+	% m/m													0.22						
CO2	% m/m							0.3						0.05						
LOI	% m/m	3.61		3.584		3.69		3.5						3.62		3.9		3.458	3.67	3.63
Ag	mg kg-1																			
As	mg kg-1	14.5						10	14.6			13		15						
Au	mg kg-1																			
B	mg kg-1							80						78			2200	88		
Ba	mg kg-1	492		421		469		444		497	500		539	485			420	390	512.8	488
Be	mg kg-1													2.4			5	1.5		
Bi	mg kg-1																			
Br	mg kg-1																			
Cd	mg kg-1	2.7											0.101				0.05			
Ce	mg kg-1	77		73.5				74	81.5		72			71				61.1		
Cl	mg kg-1				0															
Co	mg kg-1	32.3		23		32.8		31	27.5		32		31				34		27.17	26
Cr	mg kg-1	97		71		73		76	69.8		72			67					62	62
Cs	mg kg-1								8.76			10					7		8.39	
Cu	mg kg-1	33		39		33.6		51			33		96.7	37			53	37	33	37
Dy	mg kg-1									5.51				4.6				4.34		
Er	mg kg-1													3.4				2.38		
Eu	mg kg-1								1.41					1.22				1.25		
F	mg kg-1							520												
Ga	mg kg-1	25		25.5		23.6				23.5	24			25					21.8	
Gd	mg kg-1													5.2				4.6		
Ge	mg kg-1																			
Hf	mg kg-1						4.4		5.02					4.4					4.99	
Hg	mg kg-1												0.013							
Ho	mg kg-1													0.75				0.83		
I	mg kg-1																			
In	mg kg-1																			

Round identifier		J61	J61	J62	J62	J63	J63	J64	J65	J65	J66	J66	J67	J68	J69	J70	J71	J72	J73	J74
Technique codes		X	X	X	X	X	X	A,AA, X	I	I	X	X	AA,X	A,X	AA	AA	A, AA	A,M, X	M,X	X
Test portion (g)		0.8-10	0.8-10	1.6	1.6	1-4.5	1-4.5	1.0-3	0.2	0.2	0.6-6	0.6-6	0.25-4	0.5-5	0.1	0.1	0.5	0.3-0.5	0.25-0.35	0.7-5
Data quality		1	2	1	2	1	2	2	1	2	1	2	2	2	1	1	1	2	2	2
Ir	mg kg-1																			
La	mg kg-1	28		31.5				35	32.5					33				26.3		
Li	mg kg-1							85						96			52.8			
Lu	mg kg-1								0.49					0.51				0.35		
Mo	mg kg-1																3.5		0.7	
N	mg kg-1																			
Nb	mg kg-1	16		5		14.7						13	16.7	14.5					14.4	
Nd	mg kg-1									28	26			29				24.6		
Ni	mg kg-1	47.7		32.5		46		41			41		43	38			31	31	42	53
Os	mg kg-1																			
Pb	mg kg-1	30.9		36		29.4		26				39	29.3	28			10.5		31.15	30
Pd	mg kg-1																			
Pr	mg kg-1													7.5				6.52		
Pt	mg kg-1																			
Rb	mg kg-1	124		124.5		125.3			114		129		116	115			112		116	256
Re	mg kg-1																			
Rh	mg kg-1																			
Ru	mg kg-1																			
S	mg kg-1				115															
Sb	mg kg-1									0.42										
Sc	mg kg-1					20.7			23.3					21			17			
Se	mg kg-1																			
Sm	mg kg-1								6.51					5.1				4.96		
Sn	mg kg-1						4.2							3						
Sr	mg kg-1	134.8		134		130.2		113			138		132	138			110	110	125	139
Ta	mg kg-1									0.88									1.46	
Tb	mg kg-1									0.89				0.98						
Te	mg kg-1																			
Th	mg kg-1	11					13.6		11.5			12	12	10.8					11.7	10
Tl	mg kg-1																			
Tm	mg kg-1													0.4				0.350		
U	mg kg-1	1.7																	0.15	2
V	mg kg-1			120.5			128.8	118	133		134		130	120			150		135	
W	mg kg-1																		1.6	
Y	mg kg-1	30.9		26		26.5		26				28	24.3	25			18	18	27.4	55
Yb	mg kg-1								3.18					2.92				2.43		
Zn	mg kg-1	119		107.5		110.8		116		129	110		131	119			125	93	109	111
Zr	mg kg-1	191.5		168		176.6		182		179	175		186	179				90	167	

Table 2 GeoPT 9
Assigned values and robust statistical analysis of contributed data

	X_a % m/m	H_a % m/m	s % m/m	H_a/s ratio		X_a mg kg^{-1}	H_a mg kg^{-1}	s mg kg^{-1}	H_a/s ratio
SiO_2	57.513	0.625	0.095	0.153	Hf	4.70	0.30	0.09	0.290
TiO_2	0.998	0.020	0.004	0.214	Ho	1.01	0.08	0.02	0.196
Al_2O_3	20.500	0.260	0.032	0.124	La	33.00	1.56	0.51	0.325
Fe_2O_3T	9.001	0.129	0.033	0.258	Li	92.65	3.75	2.64	0.705
FeO	1.650	0.031	0.019	0.625	Lu	0.45	0.04	0.01	0.184
MnO	0.284	0.007	0.001	0.207	Nb	14.79	0.79	0.31	0.388
MgO	2.398	0.042	0.010	0.245	Nd	29.01	1.40	0.52	0.373
CaO	0.740	0.015	0.005	0.312	Ni	39.83	1.83	0.71	0.387
Na_2O	1.778	0.033	0.016	0.494	Pb	28.22	1.37	0.50	0.368
K_2O	3.051	0.052	0.012	0.235	Pr	7.80	0.46	0.13	0.293
P_2O_5	0.118	0.003	0.002	0.479	Rb	120.20	4.68	0.90	0.192
LOI	3.604	0.059	0.011	0.192	Sb	0.55	0.05	0.02	0.477
					Sc	22.10	1.11	0.43	0.389
	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}		Sm	5.92	0.36	0.08	0.222
As	13.00	0.71	0.45	0.638	Sn	2.72	0.19	0.11	0.573
Ba	477.24	15.09	4.80	0.318	Sr	130.89	5.03	1.16	0.231
Be	2.66	0.18	0.11	0.579	Ta	1.06	0.08	0.02	0.278
Ce	74.42	3.11	1.11	0.356	Tb	0.85	0.07	0.01	0.199
Co	29.11	1.40	0.48	0.341	Th	11.51	0.64	0.17	0.267
Cr	70.87	2.99	1.39	0.465	Tl	0.53	0.05	0.02	0.525
Cs	8.02	0.47	0.13	0.283	Tm	0.44	0.04	0.01	0.152
Cu	39.62	1.82	1.05	0.578	U	1.96	0.14	0.02	0.153
Dy	4.99	0.31	0.07	0.209	V	129.35	4.98	1.63	0.327
Er	2.98	0.20	0.03	0.166	Y	27.35	1.33	0.47	0.353
Eu	1.36	0.10	0.02	0.186	Yb	3.00	0.20	0.02	0.099
Ga	24.33	1.20	0.29	0.239	Zn	111.18	4.38	1.40	0.321
Gd	5.27	0.33	0.07	0.218	Zr	174.15	6.41	1.59	0.247

s=standard deviation of submitted results calculated using 'robust' statistics
H_a=target precision calculated using a modified version of the Horwitz equation

Table showing the results of homogeneity testing on the WD-XRF major element data.

ANALYTE	DATATEST	CONC	SIGMAP	F	F-TEST	SAMRAT	HP-TEST
SiO2	PASS	57.231	0.622455	2.40676	PASS	0.094268	PASS
TiO2	PASS	0.9827	0.019705	1.50444	PASS	0.090109	PASS
Al2O3	PASS	20.641	0.261736	2.09801	PASS	0.062504	PASS
Fe2O3	PASS	8.9317	0.128476	2.14943	PASS	0.035527	PASS
MnO	PASS	0.2741	0.00666	1.79085	PASS	0.106606	PASS
MgO	PASS	2.3463	0.04127	0.51039	PASS	0	PASS
CaO	PASS	0.7385	0.015458	2.27778	PASS	0.163512	PASS
Na2O	PASS	1.7845	0.032709	1.77778	PASS	0.144572	PASS
K2O	PASS	3.0097	0.050993	1.70647	PASS	0.106663	PASS
P2O5	PASS	0.1215	0.003336	1.01336	PASS	0.037047	PASS
LOI	PASS	3.664	0.060267	1.04233	PASS	0.069961	PASS
Critical level				4.94		0.3	

Table showing the results of homogeneity testing on the WD-XRF trace element data.

ANALYTE	DATATEST	CONC	SIGMA-I	VAR-SAM	F	F-TEST	SAMRATIO	HP-TEST
Rb	PASS	122.231	4.7431	0.02884	1.2425	PASS		
Sr	PASS	130.565	5.0164	0	0.99168	PASS		
Y	PASS	28.815	1.3898	0	0.93054	PASS		
Zr	PASS	174.902	6.4306	0	0.47404	PASS		
Nb	PASS	14.548	0.7777	0.00237	1.07614	PASS		
Ba	PASS	524.3	16.3412	8.62051	2.95007	NEXT STAGE	0.17967	PASS
Pb	PASS	26.044	1.2754	0	0.52275	PASS		
Th	PASS	12.194	0.6694	0	0.89863	PASS		
U	PASS	2.2	0.1563	0.0712	1.3995	PASS		
Sc	PASS	22.313	1.1184	0	0.82134	PASS		
V	PASS	138.838	5.2852	0	0.4815	PASS		
Cr	PASS	79.365	3.2865	0	0.98368	PASS		
Co	PASS	22.694	1.1346	0	0.57498	PASS		
Ni	PASS	38.725	1.7865	0	0.63923	PASS		
Cu	PASS	33.765	1.5901	2.16691	1.43481	PASS		
Zn	PASS	106.258	4.2111	0	0.83316	PASS		
Ga	PASS	22.944	1.1452	0	0.91684	PASS		
As	PASS	14.656	0.7826	0.19091	1.21084	PASS		
S	PASS	37.352	1.7325	1.79506	1.51059	PASS		
Critical leve					2.78		0.3	

Table 3 GeoPT9

OU-6: Penrhyn Slate: Z-scores calculated for the GeoPT9 round

Round identifier		J1	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14
Technique codes		M	M	IR, X	X	T,X	X	IR,X	A	A,M	A,M	M	A	AA,M, T,X	A,IR, M,X	M
Test portion (g)		0.1	0.1	0.4-5	0.5	0.6-5.4	0.8	0.1-0.7	0.25	0.25	0.1	0.25	0.2	0.1-0.75	0.2-7	0.1
Data quality		1	2	2	1	2	2	2	1	2	2	1	2	2	2	1
SiO2	% m/m	*	*	0.05	0.30	-0.76	-0.03	0.47	8.60	0.90	-0.41	*	*	*	1.06	*
TiO2	% m/m	*	*	0.31	2.13	-0.32	-0.05	0.44	-10.40	-0.84	-0.94	*	-3.20	*	0.56	*
Al2O3	% m/m	*	*	0.15	-0.77	-0.42	0.03	0.64	-21.64	-0.25	0.00	*	0.00	*	0.21	*
Fe2O3	% m/m	*	*	0.12	-0.78	-0.89	0.12	1.00	-23.82	1.28	1.54	*	0.73	*	-0.08	*
Fe(II)O	% m/m	*	*	*	*	0.33	*	*	*	*	*	*	*	*	*	*
MnO	% m/m	*	*	0.00	0.87	-0.29	0.23	1.45	-20.98	0.58	-1.02	*	0.43	*	0.00	*
MgO	% m/m	*	*	-1.05	-1.62	0.38	-0.45	1.66	-0.91	0.12	0.74	*	0.50	*	0.38	*
CaO	% m/m	*	*	-0.02	1.26	0.05	0.55	-1.31	245.23	0.92	-1.63	*	-1.95	*	-1.34	*
Na2O	% m/m	*	*	-1.35	-0.85	-0.43	-0.78	-2.90	*	-1.38	-1.19	*	-0.58	*	1.57	*
K2O	% m/m	*	*	0.28	1.14	-0.21	-0.02	0.54	*	-0.45	-0.40	*	1.54	*	-0.69	*
P2O5	% m/m	*	*	-0.18	-2.50	-3.63	0.50	*	22.05	-5.07	1.82	*	-4.32	*	0.74	*
LOI	% m/m	*	*	-2.39	-0.74	0.14	0.21	0.58	115.89	*	-0.54	*	*	*	-1.71	*
As	mg kg-1	*	*	2.83	*	0.00	*	*	*	*	*	*	*	*	-0.21	*
B	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	mg kg-1	0.60	*	0.46	*	0.06	*	*	-8.17	-1.16	-0.41	0.52	0.75	-0.89	-0.67	1.13
Be	mg kg-1	*	*	*	*	*	*	*	*	0.12	*	*	*	*	0.15	*
Ce	mg kg-1	1.25	*	-0.23	*	-0.44	*	*	*	0.74	0.74	1.67	*	0.82	-0.37	2.44
Co	mg kg-1	*	*	0.67	*	1.82	*	*	-6.50	-0.72	-1.11	0.21	-1.47	-0.04	-0.18	-0.30
Cr	mg kg-1	*	*	-2.83	*	-1.05	*	*	-5.65	-1.39	-0.98	*	0.19	0.04	0.69	0.14
Cs	mg kg-1	-0.31	*	*	*	*	*	*	*	-0.24	-0.34	*	*	0.13	-0.22	*
Cu	mg kg-1	*	*	-3.46	*	-1.19	*	*	-9.12	1.09	1.48	*	1.48	1.70	0.65	1.19
Dy	mg kg-1	0.19	*	*	*	*	*	*	*	-0.35	-0.14	0.00	*	-0.06	0.13	1.16
Er	mg kg-1	0.46	*	*	*	*	*	*	*	-0.01	-0.43	0.07	*	-0.09	0.01	1.04
Eu	mg kg-1	0.23	*	*	*	*	*	*	*	1.81	0.18	1.61	*	-0.40	0.13	-0.10
Ga	mg kg-1	*	*	1.11	*	0.36	*	*	-5.26	1.24	*	1.38	*	0.36	-0.14	0.67
Gd	mg kg-1	-0.08	*	*	*	*	*	*	*	-0.39	-0.25	-0.60	*	0.81	0.63	1.71
Hf	mg kg-1	*	-0.19	-2.02	*	*	*	*	*	0.77	0.00	0.43	*	-0.89	-0.39	1.33
Ho	mg kg-1	0.06	*	*	*	*	*	*	*	0.50	0.26	0.01	*	-0.30	0.19	0.30
La	mg kg-1	0.32	*	10.58	*	-0.87	*	*	*	-1.64	*	-0.26	0.00	0.10	0.38	1.29
Li	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	4.98	*	*	*
Lu	mg kg-1	0.13	*	*	*	*	*	*	*	0.24	-0.13	0.32	*	-0.13	0.24	1.07
Nb	mg kg-1	*	*	-1.77	*	-1.45	*	*	-2.91	-0.88	-1.45	2.54	*	-1.86	-1.52	0.88
Nd	mg kg-1	1.10	*	-1.79	*	-2.83	*	*	*	-0.95	0.53	-0.01	*	0.57	0.18	1.36
Ni	mg kg-1	*	*	1.41	*	1.00	*	*	-10.29	-0.50	-0.50	*	0.32	-0.12	-0.47	*
Pb	mg kg-1	0.57	*	-3.38	*	0.61	*	*	*	*	-0.08	*	-1.91	-0.23	-0.12	1.05
Pr	mg kg-1	0.58	*	-0.88	*	*	*	*	*	0.94	0.21	0.95	*	0.32	0.81	1.29
Rb	mg kg-1	0.45	*	-0.13	*	0.62	*	*	*	0.03	-0.56	-1.54	*	0.15	-11.61	1.25
Sb	mg kg-1	*	*	23.37	*	*	*	*	*	*	-0.21	*	*	*	-0.42	*
Sc	mg kg-1	*	*	*	*	*	*	*	-1.90	0.76	0.18	*	0.40	-1.67	1.62	*
Sm	mg kg-1	0.49	*	-0.44	*	*	*	*	*	-0.60	-0.03	-0.09	*	0.00	0.60	0.74
Sn	mg kg-1	*	*	4.49	*	*	*	*	*	*	0.48	*	*	*	-1.20	*
Sr	mg kg-1	1.22	*	0.01	*	-0.88	*	*	-6.94	-0.59	-0.29	1.02	0.61	-0.21	0.61	1.55
Ta	mg kg-1	*	*	*	*	*	*	*	*	-0.87	-0.03	*	*	-0.81	-0.51	0.19
Tb	mg kg-1	-0.16	*	*	*	*	*	*	*	-1.45	-0.09	0.47	*	0.06	0.49	0.12
Th	mg kg-1	-0.07	*	-1.42	*	0.62	*	*	*	0.01	-0.17	-0.02	*	0.07	-0.72	0.80
Tl	mg kg-1	*	*	-0.30	*	*	*	*	*	*	*	*	*	*	*	-1.34
Tm	mg kg-1	-0.06	*	*	*	*	*	*	*	*	0.27	-1.07	*	0.02	0.14	0.41
U	mg kg-1	0.00	*	1.19	*	*	*	*	*	*	-0.22	1.53	*	-0.26	-0.05	0.61
V	mg kg-1	*	*	-0.24	*	-0.84	*	*	-9.31	-0.24	-0.64	*	-0.94	-0.83	-0.14	*
Y	mg kg-1	-0.50	*	-0.51	*	-0.09	*	*	17.04	0.88	0.02	0.87	1.37	-0.77	0.24	1.09
Yb	mg kg-1	-0.03	*	*	*	*	*	*	*	*	-0.10	0.79	*	-0.37	0.79	0.45
Zn	mg kg-1	*	*	1.01	*	0.44	*	*	-8.95	*	-0.71	*	-0.13	-0.82	1.47	2.79
Zr	mg kg-1	*	0.12	-0.40	*	0.61	*	*	2.79	0.03	-0.32	-1.43	*	-2.42	-1.26	2.95

Technique codes: A: ICP-AES; AA: AAS; E=emission spectrometry; G=gravimetric; I=INAA; ign=ignition; IR= infra red detection; ISE=ion selective electrodes; M=ICP-MS; O=other; tit=titrimetry; W= wet chemistry; X=X-ray fluorescence.

Round identifier		J14	J15	J16	J17	J18	J19	J20	J21	J22	J23	J24	J25	J26	J27	J27	J28
Technique codes		M	X	A,tit, X	X	tit,X	M,X	X	I	X	X	I	M,V, X	X	A,E, X	A,E, X	M
Test portion (g)		0.1	1.0-5	0.01-0.7	8	0.1-0.8	0.1-4	1	1.9	1	1.0-5	0.15	0.2-7	1-3.6	0.1-1.2	0.1-1.2	0.05
Data quality		2	2	1	2	2	2	2	1	2	2	1	1	1	1	2	1
SiO2	% m/m	*	-0.37	0.97	*	-0.12	0.07	-0.91	*	0.54	2.26	*	-0.98	4.89	-0.98	*	*
TiO2	% m/m	*	-0.69	-0.38	*	-0.19	0.81	2.06	*	0.81	0.06	*	4.88	-0.88	0.67	*	*
Al2O3	% m/m	*	0.10	1.19	*	-0.17	0.00	0.69	0.35	-2.36	-3.75	*	1.24	1.08	-0.19	*	*
Fe2O3	% m/m	*	0.85	-0.01	4.64	-0.31	0.00	1.12	-2.33	0.77	-0.35	-23.36	0.70	3.70	1.08	*	*
Fe(II)O	% m/m	*	*	-3.92	*	-0.33	*	*	*	*	*	*	15.03	*	*	*	*
MnO	% m/m	*	-0.29	0.87	0.43	-0.08	0.43	-0.29	-0.59	-3.21	-1.02	*	-0.59	-0.59	*	0.00	*
MgO	% m/m	*	-0.57	2.90	*	0.02	0.02	-2.00	*	3.83	-2.71	*	-2.43	7.89	*	0.26	*
CaO	% m/m	*	-0.34	-1.32	*	0.63	0.31	10.96	*	-1.63	-1.31	*	6.04	-0.68	7.39	*	*
Na2O	% m/m	*	-3.19	-0.24	*	-0.27	-1.19	7.55	-0.55	2.33	7.39	6.20	-2.11	-7.29	0.07	*	*
K2O	% m/m	*	1.93	0.95	*	-0.01	-0.50	-8.44	*	-3.99	1.54	*	1.18	0.95	4.24	*	*
P2O5	% m/m	*	0.28	-2.50	*	0.28	0.28	15.63	*	*	1.82	*	2.10	0.57	*	-0.33	*
LOI	% m/m	*	0.47	0.44	*	0.22	-0.87	-0.62	*	0.64	*	*	0.78	*	*	5.86	*
As	mg kg-1	*	*	-7.07	3.18	*	-1.41	*	2.69	*	*	2.12	*	*	*	-0.64	*
B	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4.91	*
Ba	mg kg-1	*	-0.51	3.50	*	-0.21	-0.57	*	2.77	*	1.85	-0.22	3.50	*	*	-1.07	-0.55
Be	mg kg-1	*	*	7.34	*	*	-0.15	*	*	*	*	*	*	*	*	-0.42	0.03
Ce	mg kg-1	*	*	0.51	*	-1.67	1.70	*	-0.46	*	1.54	1.83	-4.47	*	0.25	*	1.15
Co	mg kg-1	*	*	2.06	*	-0.04	-0.04	*	-0.65	*	*	-0.79	4.92	*	*	1.39	-1.22
Cr	mg kg-1	*	*	2.39	*	-0.15	-0.31	*	0.78	*	2.70	0.04	6.07	*	*	-0.65	-2.97
Cs	mg kg-1	*	*	-2.17	*	*	*	*	0.61	*	*	-0.52	*	*	*	-1.08	1.89
Cu	mg kg-1	*	*	-0.34	*	0.93	-2.09	*	*	*	*	*	-4.18	*	*	2.85	*
Dy	mg kg-1	*	*	25.57	*	*	0.66	*	0.67	*	*	*	-3.64	*	-0.16	*	0.67
Er	mg kg-1	*	*	0.12	*	*	0.31	*	*	*	*	*	-4.27	*	-1.61	*	-0.02
Eu	mg kg-1	*	*	6.13	*	*	0.66	*	0.26	*	*	0.36	0.79	*	-0.22	*	-0.79
Ga	mg kg-1	*	*	0.55	*	-0.55	1.11	*	*	*	*	*	*	*	-0.28	*	*
Gd	mg kg-1	*	*	5.28	*	*	*	*	*	*	*	*	-1.79	*	-1.67	*	-0.51
Hf	mg kg-1	*	*	-2.36	*	*	-1.68	*	0.66	*	*	0.56	*	*	1.67	*	-2.22
Ho	mg kg-1	*	*	-0.11	*	*	0.57	*	*	*	*	*	-3.22	*	-1.10	*	0.63
La	mg kg-1	*	*	-5.77	*	-1.28	1.28	*	0.19	*	*	0.06	1.44	*	-0.32	*	0.45
Li	mg kg-1	*	*	*	*	*	1.65	*	*	*	*	*	*	*	-0.17	*	1.96
Lu	mg kg-1	*	*	*	*	*	-0.01	*	0.47	*	*	*	-3.81	*	-1.99	*	-0.56
Nb	mg kg-1	*	1.40	0.26	-0.50	-1.14	0.76	*	*	*	1.40	*	2.80	1.53	*	1.40	-1.13
Nd	mg kg-1	*	*	-1.44	*	0.36	1.43	*	2.21	*	2.14	*	-3.13	*	0.35	*	1.28
Ni	mg kg-1	0.63	*	1.74	1.41	-0.50	0.32	*	5.56	*	4.15	-0.72	-8.10	-1.54	*	1.96	-0.07
Pb	mg kg-1	*	*	-0.16	1.38	0.28	1.02	*	*	*	*	*	-2.36	*	*	-0.52	0.35
Pr	mg kg-1	*	*	0.43	*	*	1.09	*	*	*	*	*	-2.22	*	0.60	*	0.86
Rb	mg kg-1	*	-0.02	0.60	0.19	0.19	0.19	*	1.67	*	0.73	-0.79	4.45	0.17	-2.18	*	-0.26
Sb	mg kg-1	*	*	9.35	*	*	0.52	*	3.74	*	*	2.91	*	*	*	*	*
Sc	mg kg-1	*	*	-2.80	*	*	1.31	*	1.63	*	-0.50	-0.18	*	*	*	-3.65	1.53
Sm	mg kg-1	*	*	5.73	*	*	0.52	*	0.74	*	*	0.49	-3.19	*	0.13	*	0.77
Sn	mg kg-1	*	*	6.84	*	*	-0.59	*	*	*	*	*	*	*	*	2.75	*
Sr	mg kg-1	*	-0.09	0.22	0.61	0.21	-0.09	*	*	*	*	0.02	5.99	-0.57	1.02	*	-0.38
Ta	mg kg-1	*	*	23.24	*	*	5.64	*	-8.90	*	*	-0.18	*	*	0.42	*	-0.67
Tb	mg kg-1	*	*	2.12	*	*	-0.37	*	1.12	*	*	-1.32	-2.55	*	-1.32	*	-0.23
Th	mg kg-1	*	-1.19	0.76	0.62	1.16	1.95	*	2.05	*	*	0.01	-0.81	*	-0.34	*	-0.34
Tl	mg kg-1	*	*	*	*	*	0.24	*	*	*	*	*	*	*	*	*	4.79
Tm	mg kg-1	*	*	*	*	*	0.02	*	*	*	*	*	-3.21	*	-2.48	*	1.52
U	mg kg-1	*	*	14.36	0.48	*	-0.22	*	0.75	*	0.13	0.19	*	*	1.32	*	-0.37
V	mg kg-1	0.60	*	-0.27	*	-0.64	0.77	*	1.14	*	1.87	*	7.57	-0.87	*	1.07	-0.27
Y	mg kg-1	*	0.24	3.50	0.24	-0.13	-0.13	*	*	*	2.88	*	11.77	*	*	-1.26	1.09
Yb	mg kg-1	*	*	0.00	*	*	0.00	*	0.39	*	*	0.00	-5.47	*	-2.75	*	-0.20
Zn	mg kg-1	*	*	0.87	0.67	-0.25	-0.71	*	*	*	0.21	1.56	6.82	-1.18	-2.55	*	*
Zr	mg kg-1	*	-1.10	1.07	-0.17	-0.17	-0.56	*	*	*	0.93	0.91	2.32	-2.52	*	0.22	-4.71

Round identifier		J29	J29	J30	J31	J32	J33	J34	J35	J36	J37	J38	J38	J39	J40	J40	J41
Technique codes		M	M	A,AA, W	X	X	X	AA,G P,V	M	X	A,AA, O,X	X	X	A,I, M,X	X	X	M,X
Test portion (g)		0.1	0.1	0.2-1	1.2	1	0.17	0.1-2	0.1	0.4	0.2-3	0.7-10	10	0.1-0.8	1.2-9	1.2-9	0.1-10
Data quality		1	2	2	1	1	1	1	1	2	1	1	2	1	1	2	1
SiO2	% m/m	*	*	-0.54	-0.04	-1.38	-1.76	-1.46	*	0.23	-0.23	-0.48	*	-0.50	-0.01	*	-0.15
TiO2	% m/m	*	*	3.82	-0.88	4.13	3.13	-4.89	*	0.06	4.63	-0.63	*	-0.13	2.28	*	-0.88
Al2O3	% m/m	*	*	0.58	-0.08	-1.65	2.23	1.54	*	0.19	-0.31	0.83	*	0.00	-1.03	*	0.31
Fe2O3	% m/m	*	*	-0.27	-0.70	3.09	9.89	3.09	*	-0.31	-1.01	-0.06	*	-1.01	-1.15	*	-1.32
Fe(II)O	% m/m	*	*	*	*	*	*	5.23	*	*	-6.54	*	*	*	*	*	*
MnO	% m/m	*	*	0.29	-0.59	3.05	5.24	-0.59	*	-0.29	0.43	-1.17	*	-0.44	0.72	*	-4.96
MgO	% m/m	*	*	3.35	-1.38	12.89	-1.14	0.05	*	0.62	-0.43	-1.21	*	-0.43	0.50	*	2.90
CaO	% m/m	*	*	3.21	-1.97	3.84	5.78	13.52	*	-0.66	0.61	-0.16	*	-0.48	1.58	*	-1.32
Na2O	% m/m	*	*	-1.50	3.75	-10.05	-1.77	1.29	*	0.49	-0.24	-0.58	*	-0.45	-1.47	*	-0.55
K2O	% m/m	*	*	-0.50	0.75	2.11	1.33	-0.02	*	0.76	-0.99	-0.45	*	-0.08	-0.24	*	0.75
P2O5	% m/m	*	*	7.95	3.64	9.77	-4.34	-4.04	*	-1.25	-1.58	1.49	*	-19.38	1.30	*	0.57
LOI	% m/m	*	*	-0.62	-0.40	-1.74	-0.06	-0.06	*	*	0.11	-0.06	*	0.16	-0.90	*	0.95
As	mg kg-1	*	*	*	*	*	*	*	*	*	-6.93	*	0.57	1.43	*	*	-0.42
B	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	mg kg-1	*	0.18	-0.41	0.12	-2.14	*	*	-1.32	*	-1.08	*	1.60	1.29	4.96	*	1.24
Be	mg kg-1	*	*	*	*	*	*	*	*	*	4.61	*	*	0.30	*	*	2.26
Ce	mg kg-1	1.11	*	-2.84	-2.71	*	*	*	0.99	*	-2.96	*	*	3.39	*	-2.32	2.31
Co	mg kg-1	*	*	0.67	-0.08	-10.06	9.20	*	*	*	-1.50	*	-1.89	0.71	*	*	1.85
Cr	mg kg-1	*	*	0.02	0.38	0.04	5.74	*	*	*	3.39	*	1.50	1.52	6.98	*	4.16
Cs	mg kg-1	-0.25	*	*	*	*	*	*	-0.91	*	*	*	*	0.33	*	*	1.29
Cu	mg kg-1	*	*	1.75	*	*	*	*	*	*	4.05	-3.63	*	1.32	3.06	*	-1.82
Dy	mg kg-1	-0.06	*	-0.65	*	*	*	*	-0.96	*	-0.51	*	*	0.74	*	*	0.32
Er	mg kg-1	-0.32	*	0.26	*	*	*	*	0.07	*	-2.06	*	*	0.27	*	*	0.57
Eu	mg kg-1	-0.47	*	-1.36	*	*	*	*	-0.31	*	-1.66	*	*	0.84	*	*	0.46
Ga	mg kg-1	*	*	*	-1.11	-1.11	*	*	*	*	*	*	-0.51	-0.30	0.30	*	0.55
Gd	mg kg-1	-0.22	*	-0.18	*	*	*	*	-1.27	*	0.19	*	*	1.35	*	*	0.22
Hf	mg kg-1	*	-0.44	*	*	*	*	*	-1.08	*	*	*	*	2.84	*	*	-0.41
Ho	mg kg-1	-0.01	*	-0.68	*	*	*	*	0.14	*	1.50	*	*	0.32	*	*	0.76
La	mg kg-1	0.22	*	-4.33	*	*	*	*	-0.38	*	-7.37	*	*	1.69	*	-4.46	0.94
Li	mg kg-1	*	*	-5.29	*	*	*	*	*	*	-2.31	*	*	1.96	*	*	*
Lu	mg kg-1	0.03	*	-1.36	*	*	*	*	0.84	*	0.47	*	*	110.66	*	*	0.22
Nb	mg kg-1	*	-0.45	2.67	10.40	-9.88	*	*	0.65	*	-2.28	-0.37	*	-0.16	0.77	*	0.06
Nd	mg kg-1	1.38	*	-1.73	*	*	*	*	1.09	*	-1.58	*	*	3.45	*	-6.69	1.96
Ni	mg kg-1	*	*	-0.23	2.28	0.64	-2.09	*	*	*	-4.82	-1.22	*	0.49	-2.36	*	1.68
Pb	mg kg-1	-0.62	*	-6.31	*	*	*	*	-0.58	*	-2.36	0.06	*	1.59	8.92	*	0.06
Pr	mg kg-1	0.47	*	-1.69	*	*	*	*	0.03	*	-2.41	*	*	0.95	*	*	1.58
Rb	mg kg-1	-0.24	*	*	3.38	-0.26	*	*	-1.05	*	-1.75	0.47	*	0.60	0.07	*	0.21
Sb	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	-5.01	*	*	1.25
Sc	mg kg-1	*	-0.41	*	*	*	*	*	*	*	*	*	-0.45	2.40	0.99	*	1.53
Sm	mg kg-1	0.49	*	-0.84	*	*	*	*	-0.23	*	0.85	*	*	2.50	*	*	0.90
Sn	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	0.00	*	*	2.19
Sr	mg kg-1	0.12	*	2.20	2.61	-1.07	*	*	-1.91	*	-3.14	0.00	*	0.82	-0.46	*	0.82
Ta	mg kg-1	*	-1.33	5.64	*	*	*	*	0.06	*	*	*	*	1.02	*	*	0.42
Tb	mg kg-1	-0.20	*	-1.30	*	*	*	*	-0.60	*	2.55	*	*	0.83	*	*	0.26
Th	mg kg-1	-0.80	*	*	*	*	*	*	0.18	*	*	*	1.01	0.60	-3.16	*	-0.49
Tl	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	0.74	*	*	-0.16
Tm	mg kg-1	-0.04	*	-0.48	*	*	*	*	0.16	*	-3.24	*	*	1.98	*	*	*
U	mg kg-1	-0.98	*	*	*	*	*	*	-0.23	*	0.26	*	-0.22	2.23	*	*	-0.66
V	mg kg-1	*	*	-1.54	*	*	0.13	*	*	*	-0.67	*	1.17	-0.01	8.33	*	0.83
Y	mg kg-1	-0.81	*	-1.78	10.27	-5.53	-5.53	*	1.39	*	-2.14	1.02	*	0.71	2.07	*	-0.34
Yb	mg kg-1	-0.36	*	-1.18	*	*	*	*	0.15	*	0.20	*	*	1.87	*	*	0.10
Zn	mg kg-1	*	*	0.09	-1.41	-0.95	*	*	*	*	-0.27	-1.32	*	0.57	-1.07	*	0.78
Zr	mg kg-1	*	-0.84	-2.12	3.41	0.60	-2.52	*	*	*	0.29	0.02	*	*	3.11	*	1.30

Round identifier		J42	J43	J44	J44	J45	J45	J46	J47	J48	J49	J50	J51	J51	J52	J53	J54
Technique codes		A,ir, M,O,V	A,M, X	I	I	T,X	T,X	AA,O, tit	A,W	A	M,X	M,T, X	X	X	A,I,M, T,X	X	M,X
Test portion (g)		0.2-1	0.25-1.5	1.0-10	1.0-10	0.25-6	0.25-6	0.1-0.5	0.25-0.5	0.05-0.5	0.1-0.5	0.01-1.2	1.0-20	1.0-20	0.1-2	1.0-6	0.1-12
Data quality		2	2	1	2	1	2	2	1	2	1	1	1	2	2	2	2
SiO2	% m/m	0.31	0.02	*	*	0.62	*	*	1.25	*	0.16	0.32	-0.39	*	0.35	-1.77	-0.16
TiO2	% m/m	-0.69	-0.33	*	*	-1.53	*	*	-2.63	-0.32	-0.38	1.62	-0.38	*	0.31	-0.69	-0.19
Al2O3	% m/m	0.00	71.16	*	*	0.13	*	*	1.23	-0.15	0.42	-0.81	-0.65	*	-0.17	-1.06	-0.19
Fe2O3	% m/m	0.19	-0.74	*	0.11	-0.44	*	*	-4.38	-0.95	0.84	-0.55	0.30	*	-1.32	-1.09	-0.20
Fe(II)O	% m/m	0.82	*	*	*	1.31	*	0.00	*	*	*	6.54	*	*	-0.82	*	*
MnO	% m/m	0.22	1.74	*	*	0.11	*	1.45	*	-0.88	-2.05	0.87	-0.59	*	0.29	-0.88	0.31
MgO	% m/m	0.26	0.17	*	*	0.90	*	*	1.59	-0.57	-1.38	-1.62	0.05	*	-0.10	-0.45	-0.57
CaO	% m/m	-0.66	-0.87	*	*	-0.23	*	*	0.42	-0.73	1.90	-0.03	1.90	*	-0.27	1.92	-0.66
Na2O	% m/m	0.34	-0.50	*	0.42	5.16	*	*	2.98	1.78	-4.23	1.60	-2.08	*	0.36	0.03	1.41
K2O	% m/m	-0.21	-0.10	*	2.80	-0.20	*	*	-2.00	0.26	0.17	-0.80	0.75	*	0.29	-1.27	-0.01
P2O5	% m/m	0.28	0.88	*	*	0.87	*	*	*	*	0.57	0.57	0.57	*	0.59	-0.48	0.28
LOI	% m/m	-0.87	1.91	*	*	-0.57	*	*	1.37	*	-1.41	0.95	0.11	*	-0.79	0.73	-0.28
As	mg kg-1	-1.41	-8.26	*	0.88	*	*	*	*	*	*	*	0.00	*	-2.13	0.00	0.00
B	mg kg-1	-1.81	*	*	*	*	*	*	*	*	*	*	*	*	-0.36	*	*
Ba	mg kg-1	-0.24	-12.04	*	-0.34	1.31	*	-2.16	*	-2.18	0.91	*	*	*	1.15	1.15	-1.11
Be	mg kg-1	-0.42	-5.80	*	*	*	*	*	*	*	-0.03	-1.72	*	*	1.90	*	-1.31
Ce	mg kg-1	1.83	*	-0.83	*	*	-1.51	*	*	*	-1.58	-0.20	*	*	1.06	-0.87	0.35
Co	mg kg-1	-0.04	-9.41	*	-0.21	*	*	0.60	*	0.78	0.64	-1.29	*	6.02	0.25	0.32	-0.58
Cr	mg kg-1	-2.99	-10.52	*	-0.02	2.56	*	-0.33	*	*	-5.99	-2.30	3.06	*	2.87	-1.32	-1.76
Cs	mg kg-1	0.36	-6.23	*	-0.13	*	*	*	*	*	0.46	-0.93	*	*	0.85	*	-0.11
Cu	mg kg-1	1.20	-9.68	*	*	1.80	*	-1.54	*	-1.62	-1.44	3.06	-1.99	*	0.05	-0.72	0.38
Dy	mg kg-1	0.26	*	*	*	*	*	*	*	*	-1.11	0.23	*	*	0.10	*	-0.06
Er	mg kg-1	-0.06	*	*	*	*	*	*	*	*	-0.92	-0.67	*	*	0.80	*	0.13
Eu	mg kg-1	0.52	*	-0.89	*	*	*	*	*	*	-0.51	0.46	*	*	-0.11	*	-0.09
Ga	mg kg-1	-0.06	*	*	*	*	*	*	*	*	1.22	-1.02	2.21	*	0.82	-0.55	-0.14
Gd	mg kg-1	0.13	*	*	*	*	*	*	*	*	-0.48	0.80	*	*	0.54	*	-0.17
Hf	mg kg-1	-0.51	*	*	0.48	*	*	*	*	*	3.45	-0.65	*	*	0.82	5.53	0.18
Ho	mg kg-1	0.13	*	2.74	*	*	*	*	*	*	0.26	-0.23	*	*	0.01	*	0.01
La	mg kg-1	0.80	-7.94	0.15	*	*	0.64	*	*	*	-1.80	-1.41	*	*	0.99	1.60	-1.00
Li	mg kg-1	0.98	-8.96	*	*	*	*	-0.17	*	0.65	*	-0.60	*	*	0.54	*	0.00
Lu	mg kg-1	-0.13	-0.64	0.22	*	*	*	*	*	*	0.96	-0.51	*	*	0.24	*	-0.04
Nb	mg kg-1	1.08	*	*	*	0.13	*	*	*	*	0.64	-2.15	2.80	*	2.67	0.13	-0.91
Nd	mg kg-1	0.36	*	2.01	*	*	*	*	*	*	0.85	-1.08	*	*	1.64	*	-0.25
Ni	mg kg-1	0.87	-9.89	*	*	1.84	*	-1.87	*	-2.36	6.11	-0.89	0.10	*	-0.17	0.87	0.05
Pb	mg kg-1	0.28	-7.76	*	*	0.28	*	*	*	*	4.89	*	*	1.02	-0.75	-0.81	0.28
Pr	mg kg-1	0.52	*	*	*	*	*	*	*	*	-1.08	-0.66	*	*	1.63	*	-0.10
Rb	mg kg-1	0.94	*	*	0.73	0.26	*	*	*	*	-5.18	-2.10	*	0.62	-0.24	0.09	-0.02
Sb	mg kg-1	-0.10	*	*	-0.10	*	*	*	*	*	*	*	*	*	7.27	*	-0.10
Sc	mg kg-1	0.85	*	*	0.65	*	*	*	*	*	-2.26	-0.91	*	*	0.51	*	-0.95
Sm	mg kg-1	0.31	*	0.35	*	*	*	*	*	*	-1.36	-0.61	*	*	0.12	*	-0.17
Sn	mg kg-1	-0.59	-5.90	*	*	*	*	*	*	*	*	*	*	*	-0.59	*	-0.62
Sr	mg kg-1	1.40	-10.09	*	*	0.20	*	-1.78	*	-1.84	-4.75	0.14	*	1.21	0.51	0.01	0.41
Ta	mg kg-1	-0.39	*	*	0.45	*	*	*	*	*	1.49	0.78	*	*	2.06	*	-0.28
Tb	mg kg-1	0.34	*	0.76	*	*	*	*	*	*	-0.31	-0.89	*	*	0.27	*	-0.18
Th	mg kg-1	0.38	-6.56	*	0.40	*	*	*	*	*	-2.42	-2.89	3.90	*	-0.17	1.95	-0.50
Tl	mg kg-1	0.24	*	*	*	*	*	*	*	*	*	0.05	*	*	-0.83	*	-1.55
Tm	mg kg-1	0.14	*	*	*	*	*	*	*	*	-0.21	-0.47	*	*	0.02	*	0.10
U	mg kg-1	0.13	-5.63	*	*	*	*	*	*	*	-2.35	-0.09	*	*	0.73	*	-0.22
V	mg kg-1	-0.04	-11.56	*	*	0.93	*	*	*	*	-9.11	0.61	7.16	*	1.57	1.17	-1.35
Y	mg kg-1	-0.13	-8.22	*	*	1.54	*	*	*	*	0.49	-3.20	4.25	*	-0.21	0.62	-1.27
Yb	mg kg-1	0.00	*	0.34	*	*	*	*	*	*	1.13	-1.13	*	*	0.07	*	0.02
Zn	mg kg-1	0.55	-11.43	*	1.01	-0.02	*	-2.58	*	-3.21	29.44	-6.96	0.87	*	-0.49	-0.25	0.78
Zr	mg kg-1	-1.89	-12.88	*	*	-0.13	*	-2.60	*	-2.65	-0.02	-2.74	2.94	*	1.47	0.46	0.22

Round identifier		J55	J55	J56	J57	J57	J58	J59	J60	J60	J61	J61	J62	J62	J63	J63	J64
Technique codes		A,ir, M,T,X	A,ir, M,T,X	M,X	A,tit, X	A,tit, X	A,M	X	X	X	X	X	X	X	X	X	A,AA, X
Test portion (g)		0.2-4	0.2-4	0.12-3.5	0.2-7.5	0.2-7.5	0.2-0.5	1.5	1.0-8	1.0-8	0.8-10	0.8-10	1.6	1.6	1-4.5	1-4.5	1.0-3
Data quality		1	2	1	1	2	2	2	1	2	1	2	1	2	1	2	2
SiO2	% m/m	-0.26	*	-0.29	-1.46	*	1.20	0.34	1.15	*	-0.44	*	-0.36	*	-0.36	*	0.55
TiO2	% m/m	0.12	*	-0.32	0.22	*	-0.94	0.31	*	*	-0.13	*	-1.83	*	0.62	*	0.06
Al2O3	% m/m	0.08	*	-0.12	-0.65	*	-2.36	-0.38	*	0.20	0.88	*	0.02	*	-2.96	*	-0.19
Fe2O3	% m/m	-1.48	*	0.31	0.61	*	-2.83	-0.31	1.89	*	0.69	*	-2.33	*	0.46	*	0.38
Fe(II)O	% m/m	-0.65	*	*	-0.98	*	*	*	*	*	*	*	*	*	*	*	4.74
MnO	% m/m	-0.59	*	0.52	2.18	*	-1.75	-0.51	-0.59	*	1.45	*	1.23	*	0.87	*	-0.29
MgO	% m/m	1.95	*	1.50	0.76	*	-0.57	-1.17	1.12	*	-0.43	*	-1.14	*	-0.43	*	0.02
CaO	% m/m	-0.68	*	1.39	2.55	*	-1.63	0.57	5.78	*	1.90	*	-0.68	*	0.61	*	-1.31
Na2O	% m/m	0.07	*	-0.67	6.51	*	-2.42	-0.27	2.98	*	41.47	*	0.07	*	1.60	*	-1.19
K2O	% m/m	3.27	*	0.15	-0.80	*	-1.95	-0.30	-3.13	*	-25.61	*	-0.70	*	0.56	*	-0.50
P2O5	% m/m	-2.50	*	-0.14	0.26	*	-4.32	0.59	*	*	2.41	*	-2.66	*	0.57	*	0.28
LOI	% m/m	-0.06	*	-0.52	1.79	*	*	-0.12	-0.06	*	0.11	*	-0.33	*	1.45	*	-0.87
As	mg kg-1	*	*	*	*	*	-3.25	*	*	*	2.12	*	*	*	*	*	-2.12
B	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0.00
Ba	mg kg-1	*	*	0.44	1.24	*	0.39	*	*	*	0.98	*	-3.73	*	-0.55	*	-1.10
Be	mg kg-1	*	-0.89	*	4.06	*	*	*	*	*	*	*	*	*	*	*	*
Ce	mg kg-1	*	0.11	0.31	-3.28	*	0.42	*	*	*	0.83	*	-0.29	*	*	*	-0.07
Co	mg kg-1	*	0.09	*	-1.50	*	-1.82	*	*	*	2.28	*	-4.36	*	2.63	*	0.67
Cr	mg kg-1	*	-1.02	-1.43	2.72	*	-0.82	*	*	*	8.75	*	0.04	*	0.71	*	0.86
Cs	mg kg-1	*	0.30	1.95	*	*	*	*	*	*	*	*	*	*	*	*	*
Cu	mg kg-1	*	2.58	3.17	1.86	*	0.38	*	-7.48	*	-3.63	*	-0.34	*	-3.30	*	3.12
Dy	mg kg-1	*	-0.43	1.92	1.25	*	-0.94	*	*	*	*	*	*	*	*	*	*
Er	mg kg-1	*	-0.83	0.71	*	*	-0.93	*	*	*	*	*	*	*	*	*	*
Eu	mg kg-1	*	-0.49	1.07	-0.02	*	-0.78	*	*	*	*	*	*	*	*	*	*
Ga	mg kg-1	*	0.19	-0.94	-2.77	*	-1.38	*	*	*	0.55	*	0.97	*	-0.61	*	*
Gd	mg kg-1	*	-0.41	0.61	-0.26	*	0.36	*	*	*	*	*	*	*	*	*	*
Hf	mg kg-1	*	-0.24	0.72	-0.24	*	*	*	*	*	*	*	*	*	*	-0.51	*
Ho	mg kg-1	*	-0.24	1.33	*	*	-1.30	*	*	*	*	*	*	*	*	*	*
La	mg kg-1	*	-0.99	0.99	-2.24	*	1.28	*	*	*	-3.21	*	-0.96	*	*	*	0.64
Li	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	-1.02
Lu	mg kg-1	*	-0.01	0.86	-3.71	*	*	*	*	*	*	*	*	*	*	*	*
Nb	mg kg-1	*	*	0.20	2.80	*	*	*	*	*	1.53	*	-12.42	*	-0.12	*	*
Nd	mg kg-1	*	0.00	0.04	0.21	*	-0.72	*	*	*	*	*	*	*	*	*	*
Ni	mg kg-1	*	-0.61	0.92	0.10	*	-1.05	*	-0.45	*	4.30	*	-4.00	*	3.38	*	0.32
Pb	mg kg-1	*	-0.01	2.66	-3.09	*	-1.91	*	*	*	1.96	*	5.69	*	0.86	*	-0.81
Pr	mg kg-1	*	-0.46	-0.90	*	-0.51	-0.66	*	*	*	*	*	*	*	*	*	*
Rb	mg kg-1	*	*	0.76	-0.47	*	-1.41	*	-1.75	*	0.81	*	0.92	*	1.09	*	*
Sb	mg kg-1	*	0.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sc	mg kg-1	*	-0.11	4.50	-0.09	*	*	*	*	*	*	*	*	*	-1.27	*	*
Sm	mg kg-1	*	-0.33	1.38	-1.28	*	-0.86	*	*	*	*	*	*	*	*	*	*
Sn	mg kg-1	*	-0.40	*	*	*	*	*	*	*	*	*	*	*	*	3.95	*
Sr	mg kg-1	*	0.53	0.72	2.01	*	-0.49	*	-1.17	*	0.78	*	0.62	*	-0.14	*	-1.78
Ta	mg kg-1	*	-0.45	-0.44	*	*	*	*	*	*	*	*	*	*	*	*	*
Tb	mg kg-1	*	-0.52	1.09	0.55	*	-0.37	*	*	*	*	*	*	*	*	*	*
Th	mg kg-1	*	-0.57	2.30	-0.81	*	*	*	*	*	-0.81	*	*	*	*	1.64	*
Tl	mg kg-1	*	1.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tm	mg kg-1	*	*	0.64	*	-0.74	*	*	*	*	*	*	*	*	*	*	*
U	mg kg-1	*	-0.22	0.59	*	3.66	*	*	*	*	-1.85	*	*	*	*	*	*
V	mg kg-1	*	-0.54	-0.39	1.34	*	-1.44	*	*	*	*	*	-1.78	*	*	-0.06	-1.14
Y	mg kg-1	*	0.46	1.93	-2.97	*	-0.88	*	*	*	2.67	*	-1.02	*	-0.64	*	-0.51
Yb	mg kg-1	*	-0.17	-0.01	-3.39	*	-0.98	*	*	*	*	*	*	*	*	*	*
Zn	mg kg-1	*	1.69	-0.93	-3.93	*	-0.71	*	-0.95	*	1.79	*	-0.84	*	-0.09	*	0.55
Zr	mg kg-1	*	0.07	-0.27	-0.02	*	-0.64	*	*	-1.10	2.71	*	-0.96	*	0.38	*	0.61

Round identifier		J65	J65	J66	J66	J67	J68	J69	J70	J71	J72	J73	J74
Technique codes		I	I	X	X	AA,X	A,X	AA	AA	A, AA	A,M, X	M,X	X
Test portion (g)		0.2	0.2	0.6-6	0.6-6	0.25-4	0.5-5	0.1	0.1	0.5	0.3-0.5	0.25-0.35	0.7-5
Data quality		1	2	1	2	2	2	1	1	1	2	2	2
SiO2	% m/m	*	*	-0.90	*	0.05	-0.33	*	6.83	*	-0.90	-0.07	0.18
TiO2	% m/m	*	1.06	0.62	*	0.56	-0.01	*	*	-2.38	-0.52	-0.19	0.31
Al2O3	% m/m	6.19	*	-0.92	*	1.59	0.04	*	-1.08	*	-0.42	-0.86	0.33
Fe2O3	% m/m	-3.02	*	0.84	*	-3.52	0.42	-26.22	4.25	2.31	-0.12	1.04	0.42
Fe(II)O	% m/m	*	*	*	*	*	-1.63	*	*	*	*	*	*
MnO	% m/m	-0.59	*	0.87	*	-0.66	-0.88	-27.10	-2.05	3.78	1.23	1.16	0.58
MgO	% m/m	*	1.21	-0.19	*	1.21	1.09	-29.92	-5.90	-1.86	0.05	-2.60	-0.33
CaO	% m/m	*	9.99	-0.68	*	-10.02	0.95	7.07	-0.03	6.42	0.02	-1.67	-0.34
Na2O	% m/m	0.07	*	-5.45	*	-3.80	1.26	10.19	-4.53	5.89	2.64	-3.95	0.49
K2O	% m/m	3.27	*	0.17	*	-2.92	0.47	-13.20	8.51	-2.93	-0.15	-0.01	0.38
P2O5	% m/m	*	*	3.64	*	-4.01	1.82	*	*	-7.11	-1.10	3.30	-1.25
LOI	% m/m	*	*	*	*	*	0.14	*	4.99	*	-1.23	0.56	0.22
As	mg kg-1	2.26	*	*	0.00	*	1.41	*	*	*	*		*
B	mg kg-1	*	*	*	*	*	-0.30	*	*	640.71	1.21	*	*
Ba	mg kg-1	*	0.66	1.51	*	2.05	0.26	*	*	-3.79	-2.89	1.18	0.36
Be	mg kg-1	*	*	*	*	*	-0.70	*	*	12.79	-3.15	*	*
Ce	mg kg-1	2.28	*	-0.78	*	*	-0.55	*	*	*	-2.14	*	*
Co	mg kg-1	-1.15	*	2.06	*	0.67	*	*	*	3.49	*	-0.69	-1.11
Cr	mg kg-1	-0.36	*	0.38	*	*	-0.65	*	*	*	*	-1.49	-1.49
Cs	mg kg-1	1.59	*	*	2.12	*	*	*	*	-2.17	*	0.40	*
Cu	mg kg-1	*	*	-3.63	*	15.67	-0.72	*	*	7.35	-0.72	-1.82	-0.72
Dy	mg kg-1	*	0.83	*	*	*	-0.62	*	*	*	-1.04		*
Er	mg kg-1	*	*	*	*	*	1.05	*	*	*	-1.47	*	*
Eu	mg kg-1	0.46	*	*	*	*	-0.69	*	*	*	-0.54	*	*
Ga	mg kg-1	*	-0.35	-0.28	*	*	0.28	*	*	*	*	-1.05	*
Gd	mg kg-1	*	*	*	*	*	-0.10	*	*	*	-1.02	*	*
Hf	mg kg-1	1.06	*	*	*	*	-0.51	*	*	*	*	0.48	*
Ho	mg kg-1	*	*	*	*	*	-1.61	*	*	*	-1.11	*	*
La	mg kg-1	-0.32	*	*	*	*	0.00	*	*	*	-2.15	*	*
Li	mg kg-1	*	*	*	*	*	0.45	*	*	-10.63	*	*	*
Lu	mg kg-1	0.96	*	*	*	*	0.73	*	*	*	-1.24	*	*
Nb	mg kg-1	*	*	*	-1.14	1.21	-0.19	*	*	*	*	-0.25	*
Nd	mg kg-1	*	-0.36	-2.15	*	*	0.00	*	*	*	-1.58		*
Ni	mg kg-1	*	*	0.64	*	0.87	-0.50	*	*	-4.82	-2.41	0.59	3.60
Pb	mg kg-1	*	*	*	3.95	0.39	-0.08	*	*	-12.98	*	1.07	0.65
Pr	mg kg-1	*	*	*	*	*	-0.33	*	*	*	-1.40	*	*
Rb	mg kg-1	-1.33	*	1.88	*	-0.45	-0.56	*	*	-1.75	*	-0.45	14.52
Sb	mg kg-1	*	-1.35	*	*	*	*	*	*	*	*		*
Sc	mg kg-1	1.08	*	*	*	*	-0.50	*	*	-4.60	*		*
Sm	mg kg-1	1.62	*	*	*	*	-1.13	*	*	*	-1.33		*
Sn	mg kg-1	*	*	*	*	*	0.75	*	*	*	*		*
Sr	mg kg-1	*	*	1.42	*	0.11	0.71	*	*	-4.16	-2.08	-0.59	0.81
Ta	mg kg-1	*	-1.05	*	*	*	*	*	*	*	*	2.42	*
Tb	mg kg-1	*	0.27	*	*	*	0.92	*	*	*	*	*	*
Th	mg kg-1	-0.02	*	*	0.38	0.38	-0.56	*	*	*	*	0.15	-1.19
Tl	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*
Tm	mg kg-1	*	*	*	*	*	-0.48	*	*	*	-1.11	*	*
U	mg kg-1	*	*	*	*	*	*	*	*	*	*	-6.39	0.13
V	mg kg-1	0.73	*	0.93	*	0.07	-0.94	*	*	4.15	*	0.57	*
Y	mg kg-1	*	*	*	0.24	-1.15	-0.88	*	*	-7.03	-3.52	0.02	10.40
Yb	mg kg-1	0.89	*	*	*	*	-0.20	*	*	*	-1.40	*	*
Zn	mg kg-1	*	2.04	-0.27	*	2.27	0.89	*	*	3.16	-2.08	-0.25	-0.02
Zr	mg kg-1	*	0.38	0.13	*	0.93	0.38	*	*	*	-6.57	*	*

Table 4
Analysts and laboratories participating in the GeoPT9 proficiency testing round.

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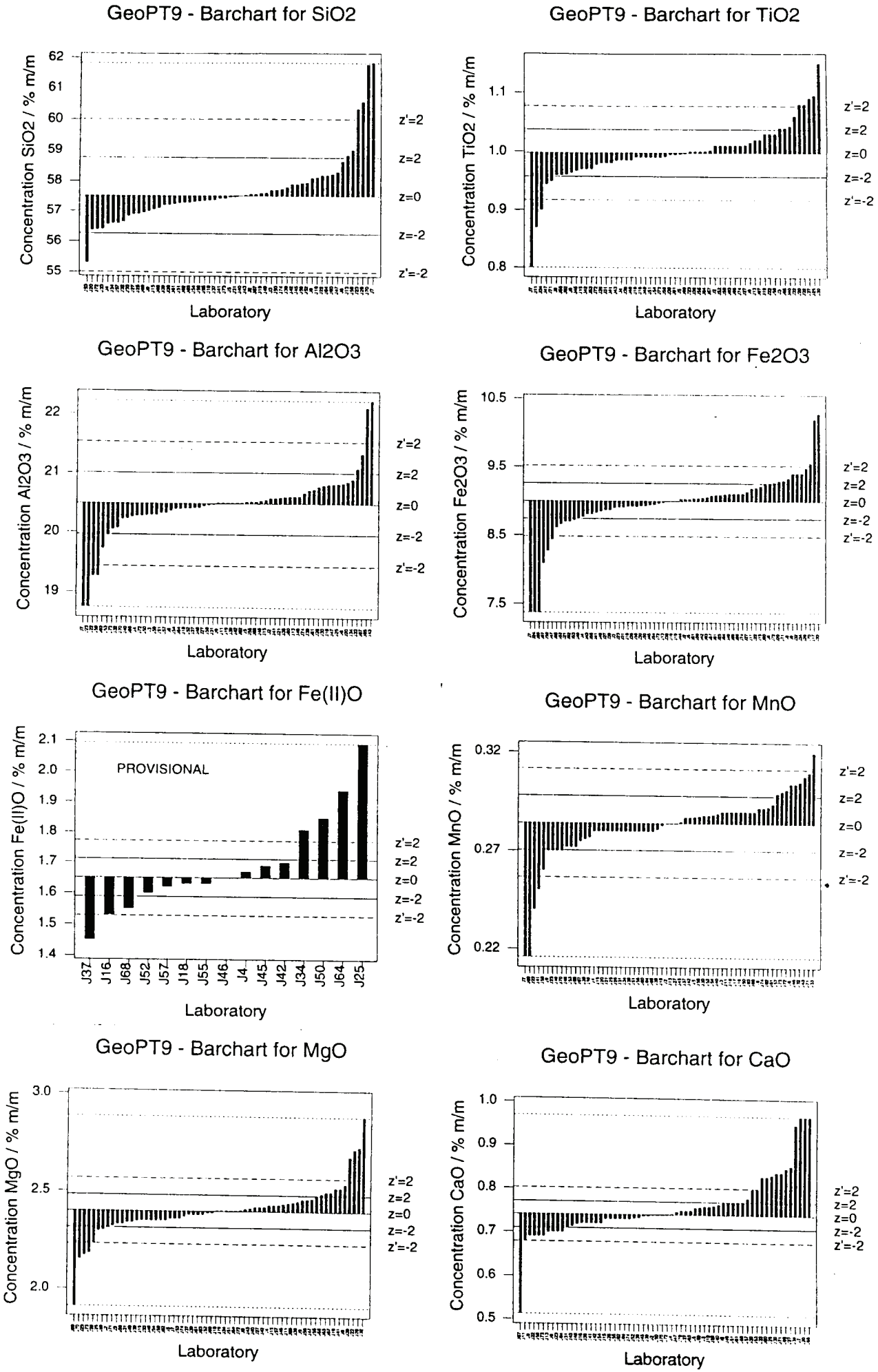
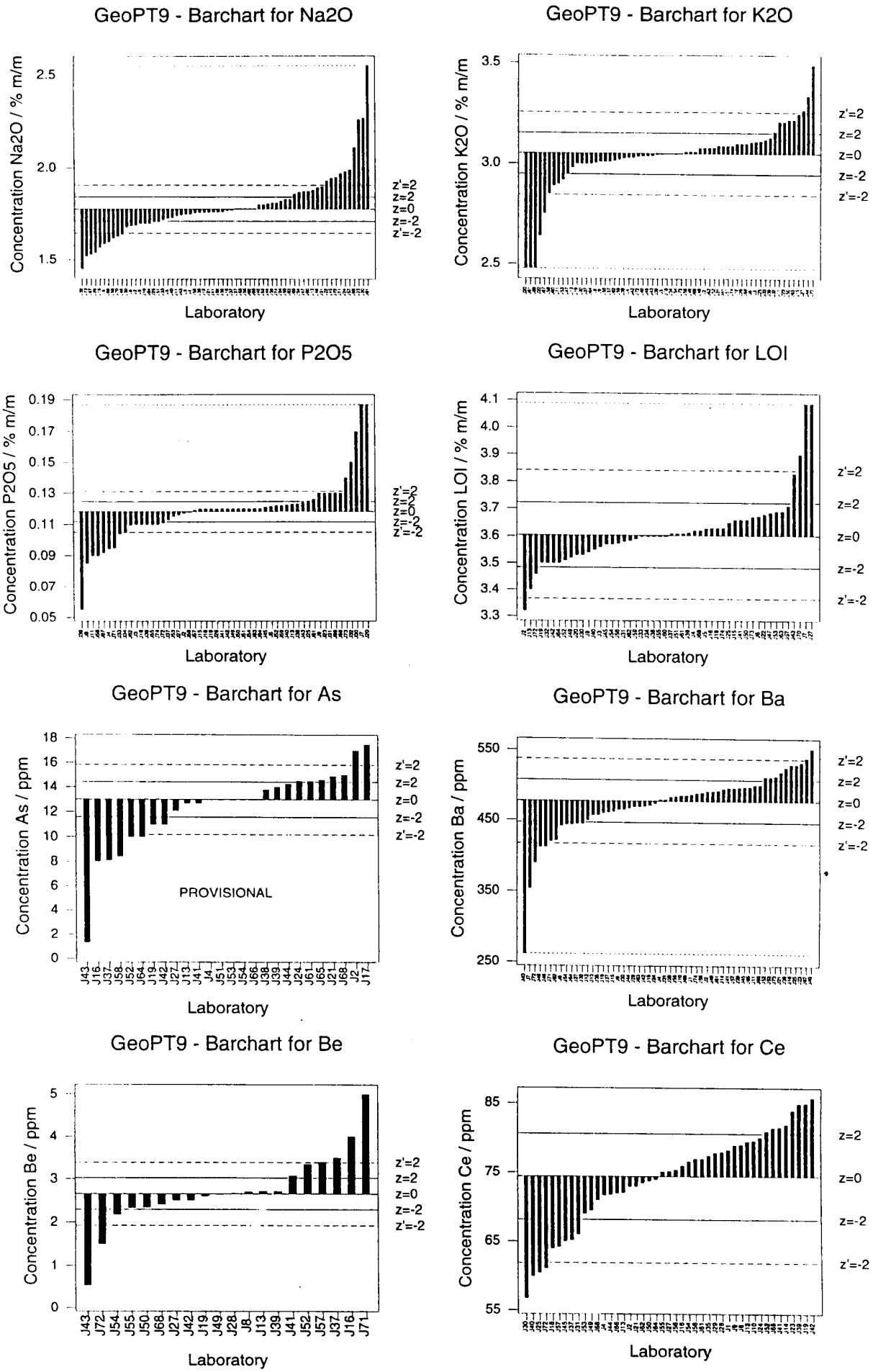


Figure 1 GeoPT9 - OU-6 Penrhyn slate: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines)



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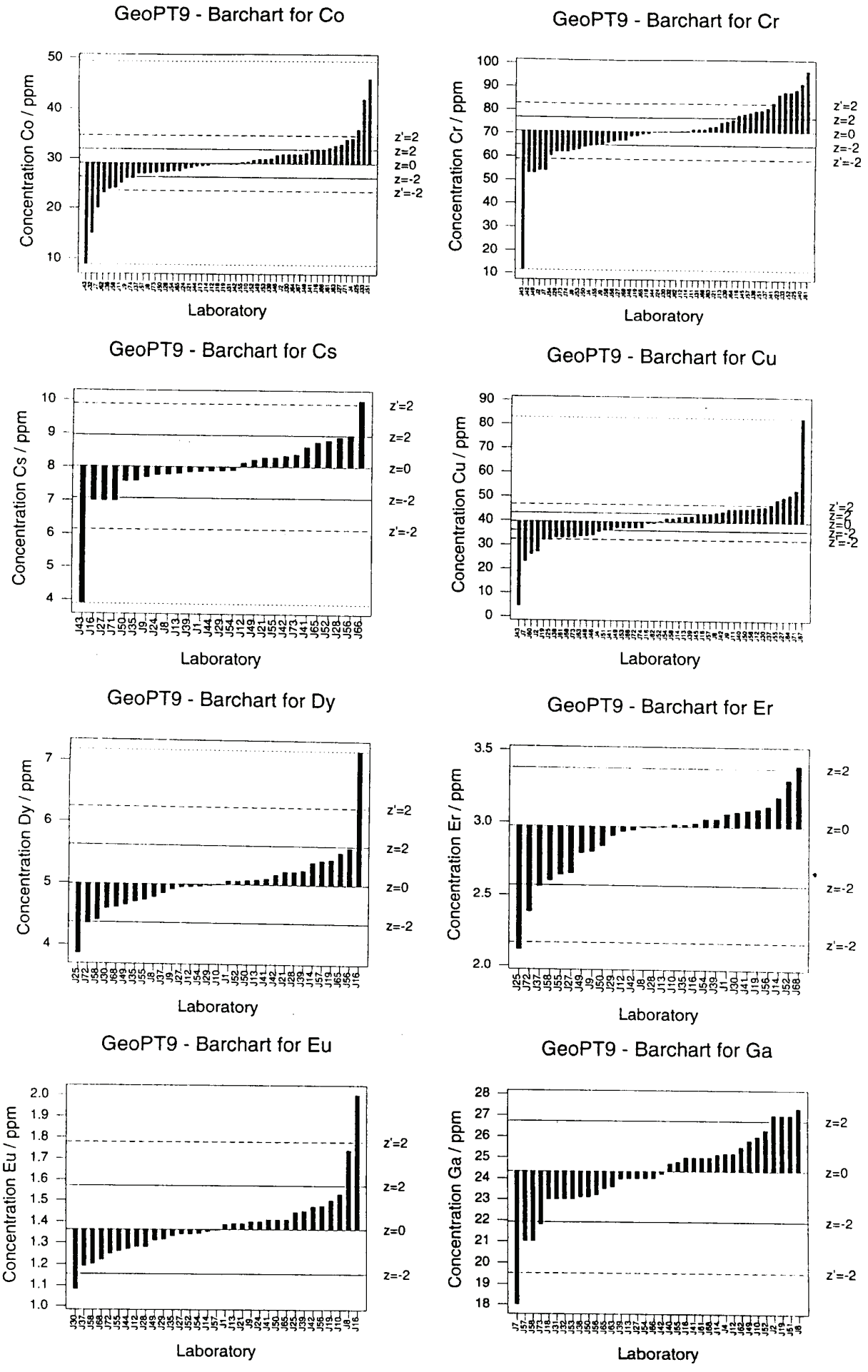

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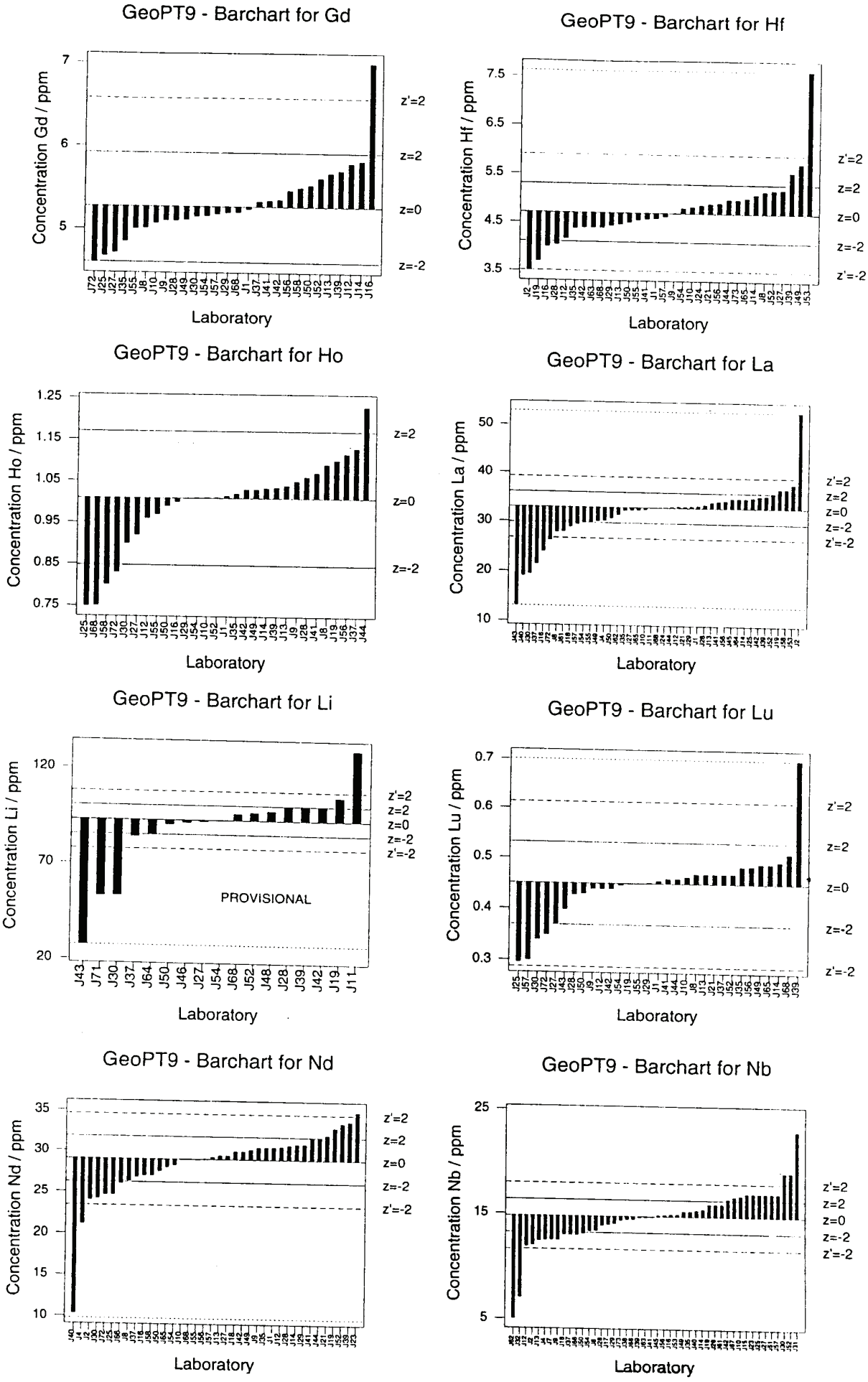

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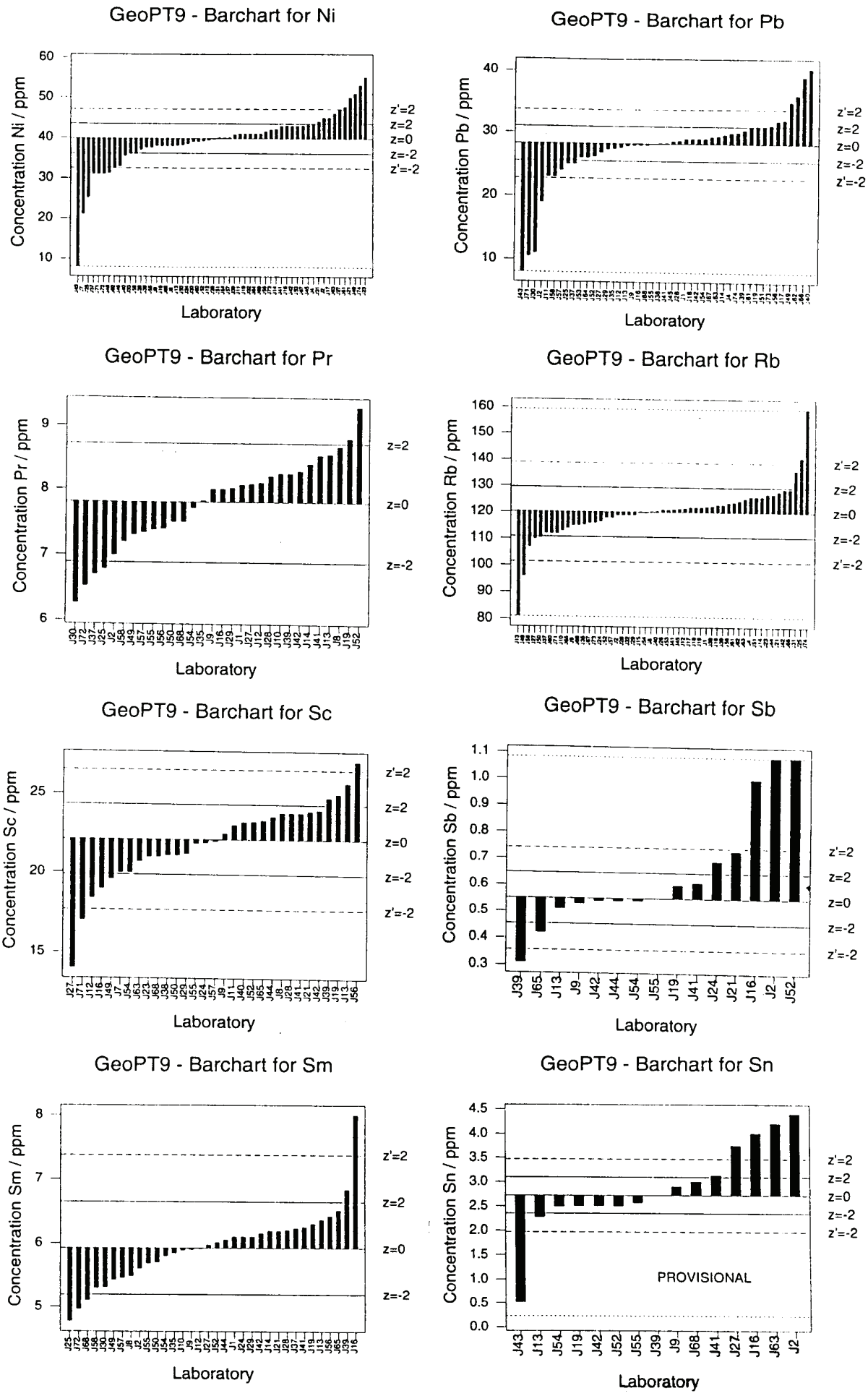

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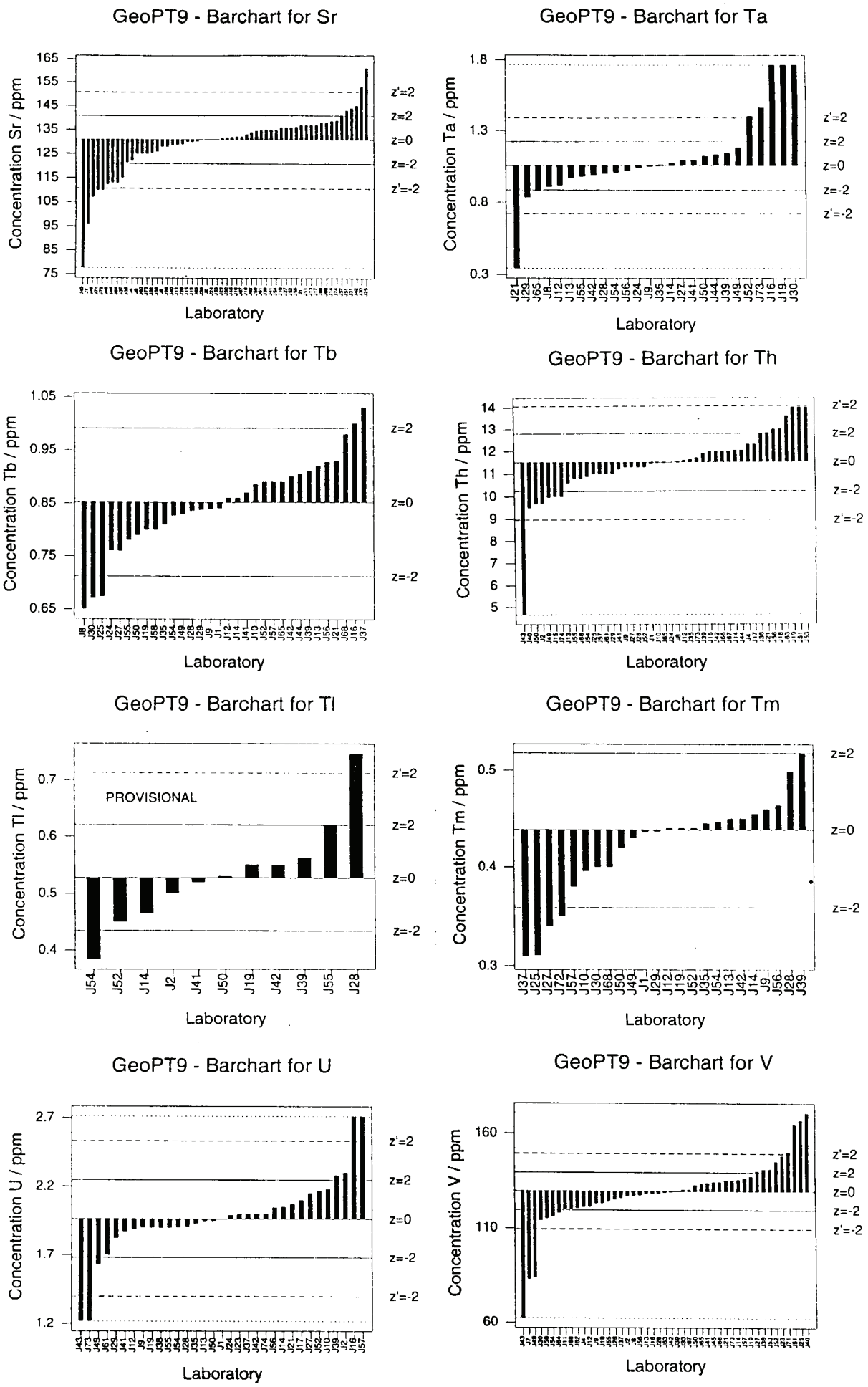

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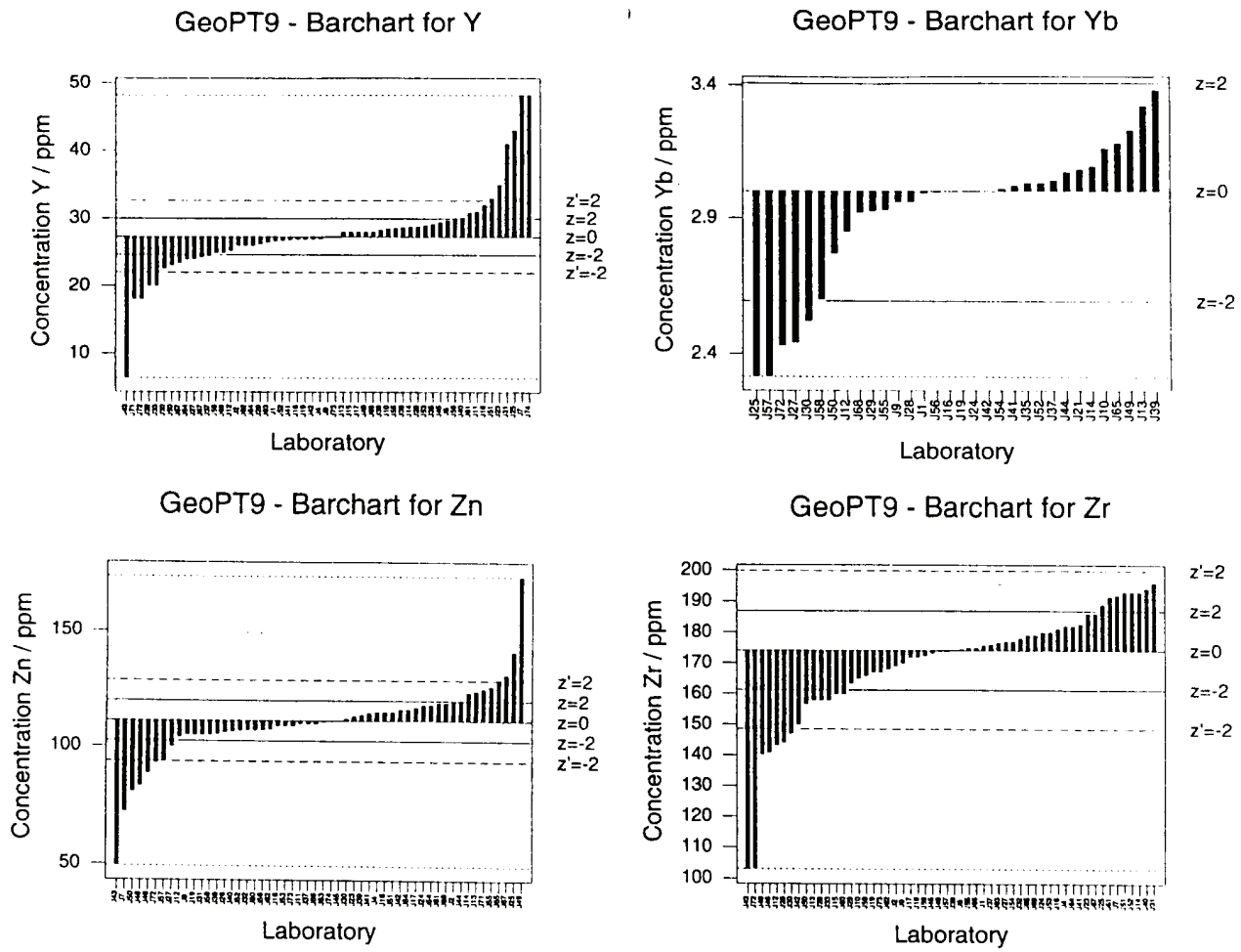

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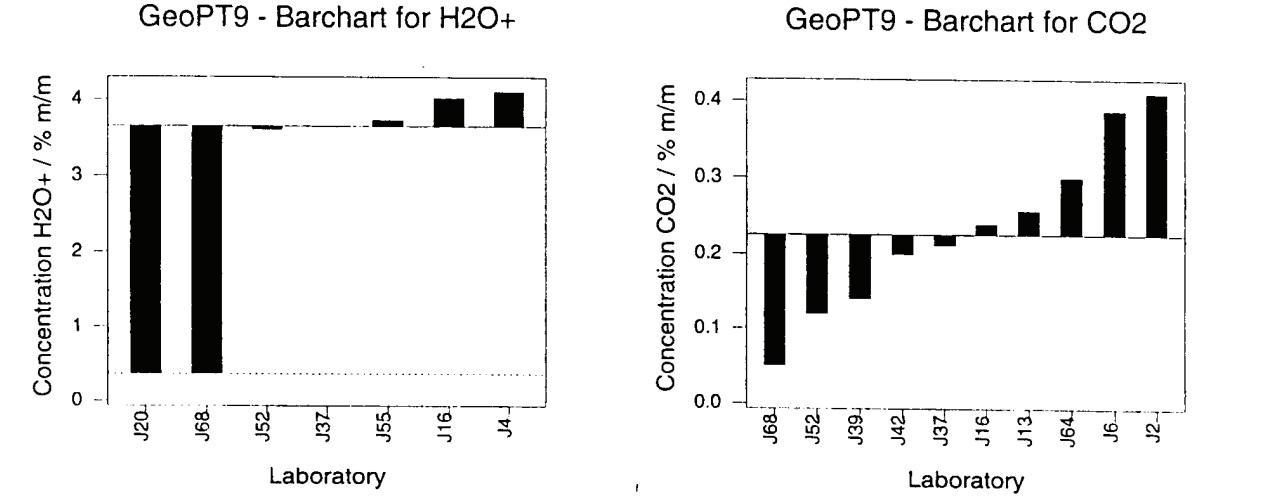
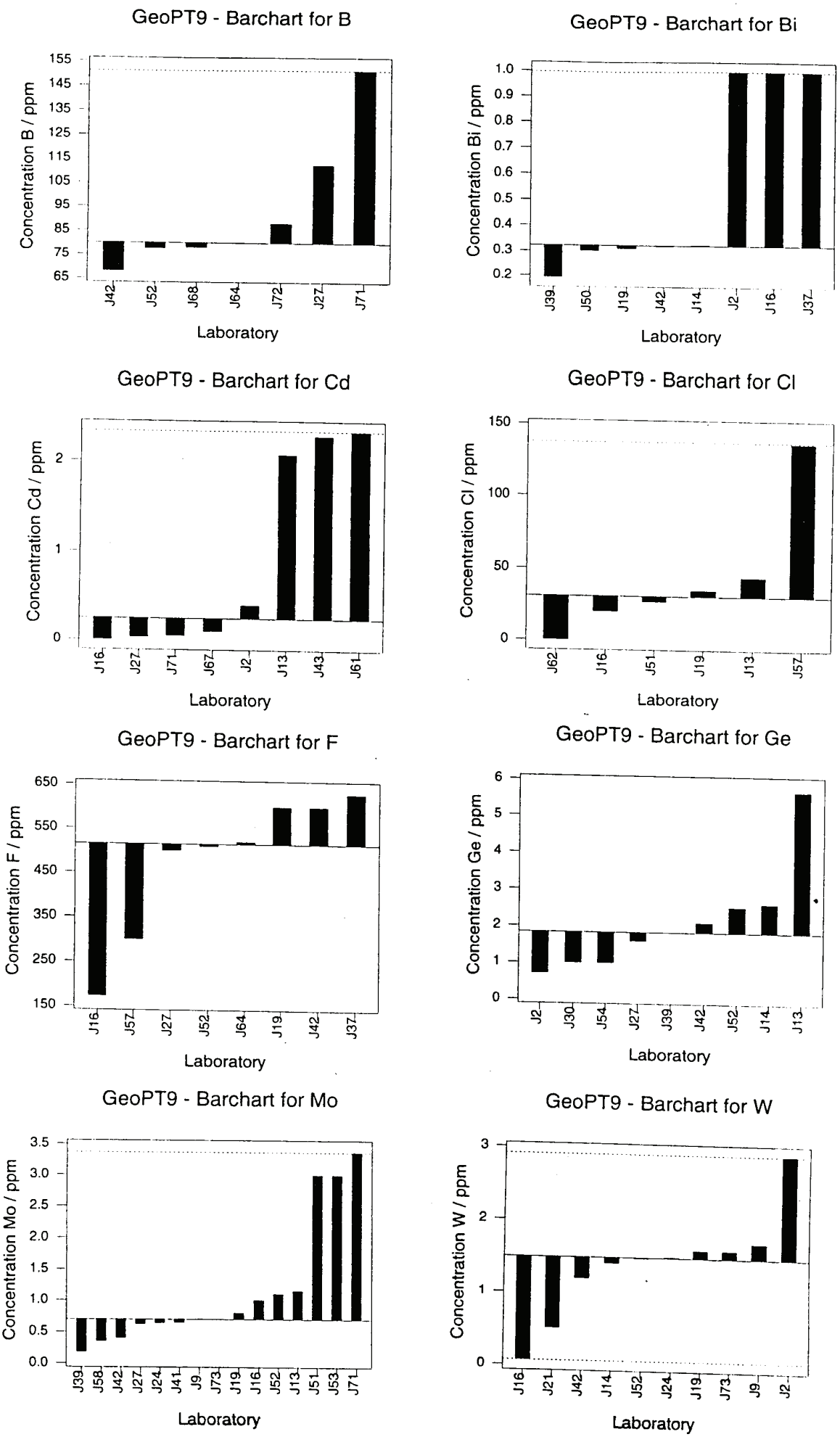


Figure 2 GeoPT9 - OU-6 Penrhyn slate: Data distribution charts for elements for which values were not assigned.



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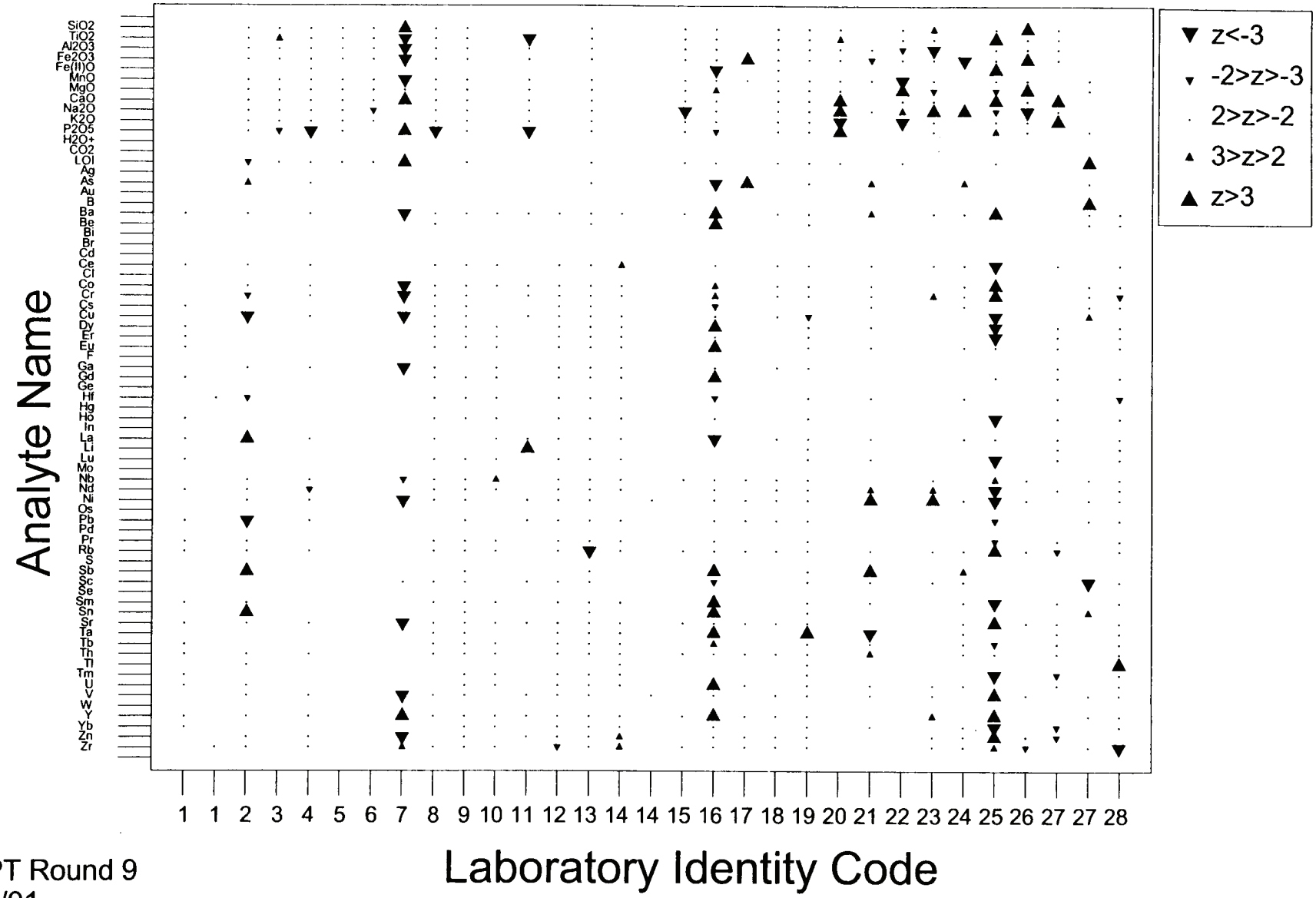
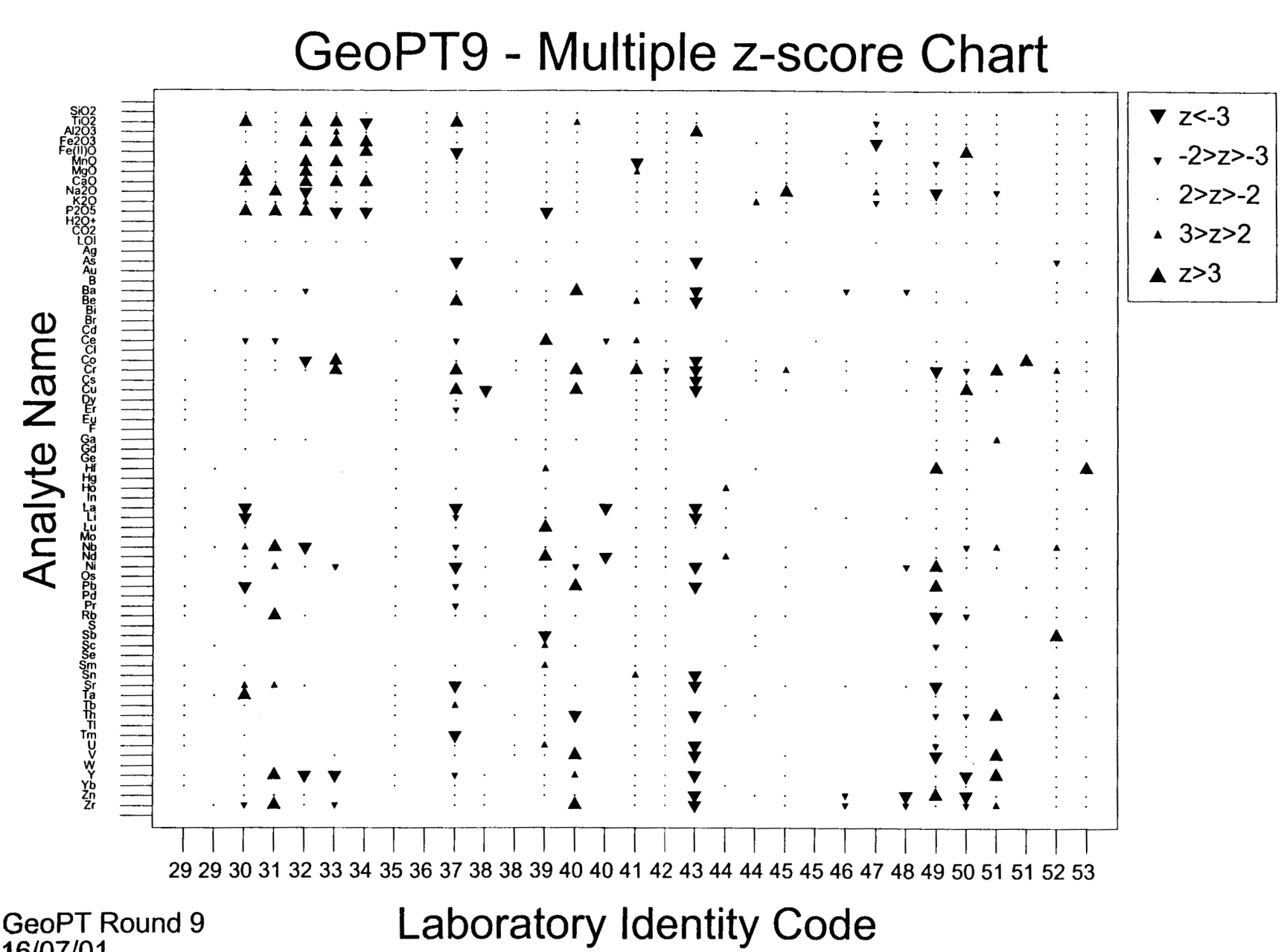


GeoPT Round 9
16/07/01

Figure 3 GeoPT9 - OU-6 Penrhyn slate: Multiple z-score charts for laboratories participating in the GeoPT9 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria Satisfactory data are plotted as '.'). Data for other categories are plotted as follows: z<-3 (▼), -3<z<-2 (▼), +2<z<+3 (▲), , Z>+3 (▲).



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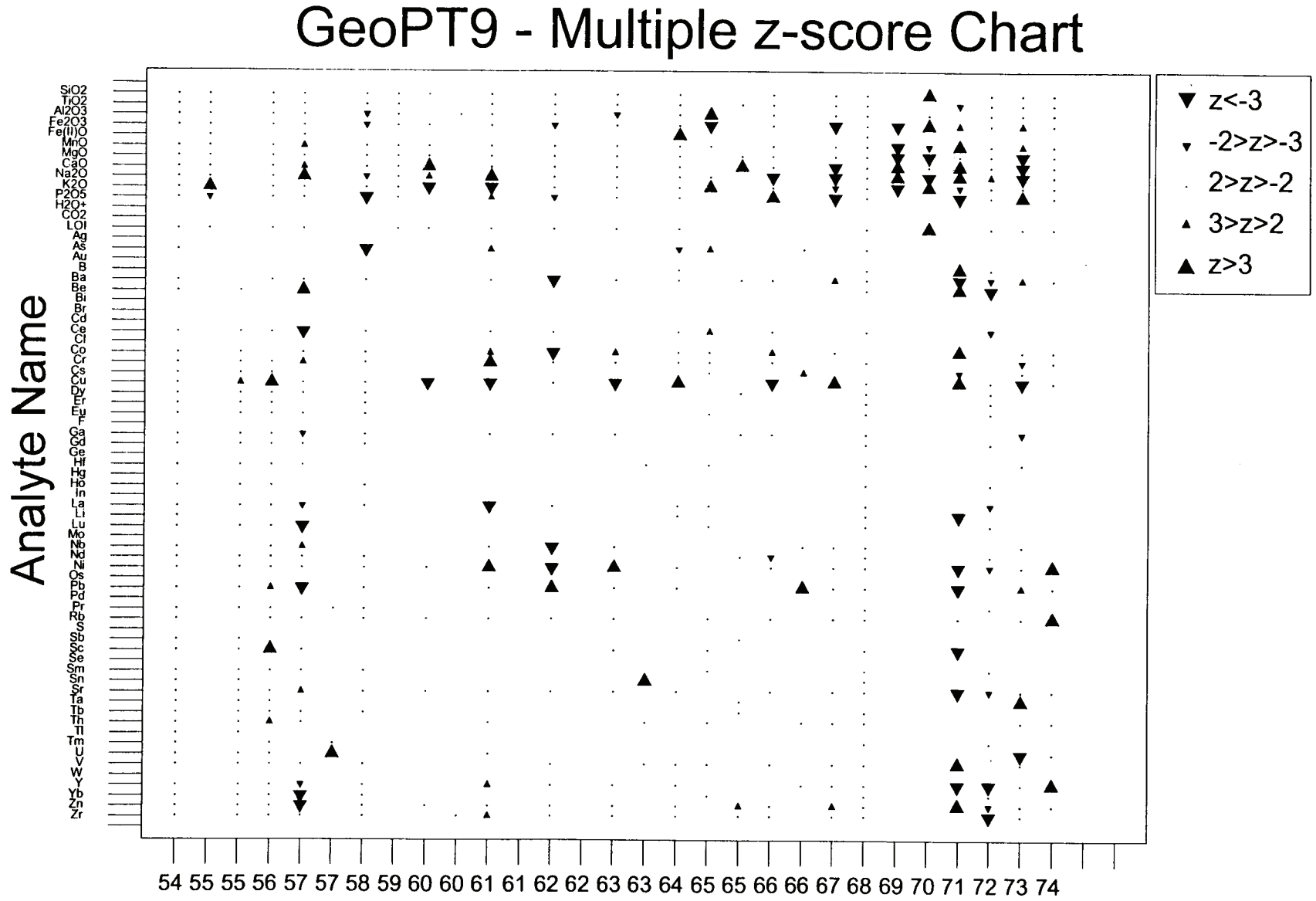

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