GEOPT12 - AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES - REPORT ON ROUND 12 / January 2003 (GAS Serpentinite)

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Abstract

Results are presented for round twelve, GeoPT12, of the GeoPT international proficiency testing programme for analytical geochemistry laboratories. The sample distributed for this round was GAS serpentinite, a sample collected and prepared as a candidate reference material by the Central Geological Laboratory, Ulaanbaatar, Mongolia. 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 twelfth round of the international proficiency testing programme, GeoPT12, 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 12: M. Thompson (Chair), P.J. Potts (Secretary), S.R.N. Chenery, P.C Webb and B. Batjargal.

Sample: GAS is a serpentinite collected and prepared as a candidate reference material under the direction of B. Batjargal, Central Geological Laboratory, Ulaanbaatar, Mongolia.

The sample was tested for homogeneity by selecting at random twelve packets of the sample prepared for distribution. Duplicate test portions from each packet were analysed by WD-XRF at the OU. For the elements for which values could be assigned, homogeneity was considered to be satisfactory for use in the GeoPT12 round. An analysis of the results with additional comments is listed in Appendix 2.

Timetable for GeoPT12:
Distribution of sample: September 2002.
Deadline for submission of analytical results: 15th November 2002.
Distribution of preliminary report: January 2003

Submission of results
Results submitted by the seventy-four laboratories (note that laboratory code M68 is void) that participated in this round are listed in Table 1. All results listed in this Table contributed to the assessment of assigned values.

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 7 majors (of which 1 is a provisional value) and 34 trace elements (of which 10 are provisional values).

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 or provisional distributions, namely:
SiO_2, Al_2O_3, Fe_2O_3T, MnO, MgO, CaO, LOI, As, Ba, Ce, Co, Cr, Cs, Dy, Er, Eu, Gd, Ge, Hf, Hg, Ho, La, Li, Lu, Nd, Ni, Pr, Sb, Sc, Sm, Sr, Tb, Th, Tl, Tm, U, V, W, Y, Yb and Zn. Note that Ba, Ge, Hg, La, Li, Sm, Th, Tl, W and Y were assigned provisional values.

Charts in Figure 2 show distribution data for elements that were not judged to be satisfactory in the statistical analysis to assign values. In the present round, values could not be assigned to the following elements:
TiO_2, FeO, Na_2O, K_2O, P_2O_5, CO_2, H_2O^+, Be, Bi, Cd, Cu, F, Ga, Mo, Nb, Pb, Rb, S, Sn, Ta and Zr.

For other elements that are not included in either of these two lists, insufficient data was reported to allow any assessment to be made.

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 an indication of multi-modality.
(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 was 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 (with principal contacts) that contributed data to this proficiency testing round are listed in Table 4

Overall performance

A summary of the overall performance of individual laboratories in this round is plotted in Figure 3 as a multiple z-score chart. 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.

The statistical interpretation of results from this proficiency testing round suggests that this serpentinite sample was more demanding than many others distributed in previous rounds. It was not possible to assign z-scores for a number of analytes for reasons discussed elsewhere in this report, although z-score bar diagrams are presented in Figure 2 to provide laboratories with some information about the range of values reported for these elements. It is interesting to speculate whether analytical difficulties arose from interferences arising from the relatively high concentrations of Mg, Cr and Ni in this sample, the low concentrations of some major and trace elements for which determinations are routinely undertaken or the presence of refractory minerals that resist dissolution techniques. Despite these uncertainties, it is possible to offer some general guidance to laboratories in the determination of a number of groups of elements.

As guidance to laboratories participating in this round, the following observations are relevant:

(a) MnO and P_2O_5: The distribution plots for these elements (see Figures 1 and 2) contain a number of

steps corresponding to laboratories that reported exactly the same value. This effect suggests that many laboratories are over-rounding the results for these elements and should report them to one additional decimal place.

(b) Na_2O, Ga, Nb, Pb, Rb, Sn, Ta, Y: The distribution pattern for all these elements (see Figures 1 and 2) is similar, being characterised by a significant number of reported concentrations higher than the assigned value. Because of the resultant biased distribution, there is a significant difference between the values of the mean and median and in these circumstances, it is not possible to estimate the true composition with confidence. The distribution patterns for TiO_2, Eu, Hf, La, Sm, Th, Yb show a similar trends. Further work is being undertaken to contribute to an understanding of this phenomenon. However, it is noteworthy that the concentrations of these elements are all in the detection limit range of some of the techniques used by participating laboratories (especially XRF). There is concern, therefore, that some of these reported data are affected by bias in reporting an analytical result that is essentially detection limit noise. A further evaluation of these data is being undertaken to clarify this effect.

(c) Rare earth elements: Given the relatively low concentrations of the REE in this serpentinite sample, the REE distribution patterns are extremely good, confirming the generally low degree of inter-laboratory bias present in the determination of these elements. The only exception is Sm, which shows a distribution pattern similar to the elements listed in (b) above.

Participation in future rounds

The benefit from proficiency testing arises from regular participation and laboratories are invited to contribute to the GeoPT13 round, the sample for which will be distributed during March 2003.

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.

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

Appendix 2 - GeoPT12 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. Results for the following elements were available for assessment: majors - SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, LOI on glass discs and the trace elements - As, Ba, Co, Cr, Cu,, Ni, S, Sc, Sr, V, Zn, Zr on powder pellets, following the procedures described in the GeoPT1 report. Results of the evaluation of homogeneity data are listed in Tables H1 and H2.

Statistical analysis of homogeneity data was carried out using a new sequence of tests developed by Fearn and Thompson (Analyst, 2001, 126, 1414-1417) 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. Ni and Zn did not pass this test and were eliminated from further consideration in this homogeneity assessment.

CONC is the average concentration derived from the XRF results.

SIGMA 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 values, all elements except LOI and Cu passed the F-test.

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

SAMRATIO, which is the ratio of the square root (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-TEST)***. Results for TiO_2, LOI, Zr, Cu, S were found to be significant ***(SAMRATIO>0.3)***.

However, the final arbiter of homogeneity used here was the procedure ***(the TOM-TEST)*** described by Fearn and Thompson *(op. cit.)*, which is designed to overcome a disadvantage of the Harmonised Protocol in being prone to reject materials as inhomogeneous when further evaluation shows them to be satsfactory for proficiency testing. Of the elements evaluated, LOI and Cu were found to fail the ***TOM-TEST***. Careful evaluation of the source homogeneity data indicated that there was a small but significant trend in the LOI data, probably caused by the absorption of moisture after the samples had been dried and were waiting to be weighed, but before they had been ignited. Despite the small relative range between maximum and minimum values in this trend, the LOI data is not considered to be fit-for-purpose for homogeneity testing. In the case for Cu the analysed concentration is about three times the detection limit of the XRF technique, and therefore may not have provided satisfactory precision for homogeneity testing. In any case, Cu was one of the elements that could not be given an assigned value, because of the unsatisfactory distribution of data submitted by participating laboratories, and in consequence, no z-scores are presented for this element in this report. Note that the precision of XRF homogeneity results is also an issue in the analysed values for Zr, Ba, Sc due to the proximity of concentrations to the XRF detection limit. The overall conclusion of this homogeneity evaluation is that the GAS serpentinite sample is suitable for the GeoPT12 proficiency testing round, noting that a technique of better detection limit capability would have provided trace element data from which a more comprehensive evaluation of homogeneity could have been made.

A note of the approach to assessing homogeneity in the GeoPT programme.

In the typical interpretation of homogeneity data, the principal criterion is normally that elemental results 'pass' the classical F-test. However, this is not the ultimate arbiter of homogeneity, since the Harmonised Protocol requires that homogeneity should 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), that is, in fact, unimportant 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. Elements that meet this criterion are considered to have passed the Harmonised Protocol. However, further evaluation of the Harmonised Protocol test has shown that it seems to be unduly prone to the rejection of material that is in fact satisfactory. Hence the homogeneity assessment in this programme is based on the revised procedure to assess 'sufficient homogeneity' described by Fearn and Thompson and called here the 'TOM-TEST'.

Table H1 showing the results of homogeneity testing on the WD-XRF major element data and LOI.

ANAL-YTE	DATA TEST	CONC	SIGMA	SIGMASQ	VAR-AN	AN RATIO	AV-TEST	MSB	VAR-SAM	F	F-TEST	SAMR RATIO	HP-TEST	TOM	TOM-TEST
SiO2	OK	38.8379	0.44779	0.20052	0.01745	0.29504	OK	0.01067	0	0.6116	OK	0	OK	0.05156	OK
TiO2	OK	0.014	0.00053	0	2E-07	0.78832	SIG	4E-07	1E-07	2.3492	OK	0.64748	SIG	2E-07	OK
Al2O3	OK	0.4332	0.00983	9.7E-05	1.6E-05	0.40745	SIG	1.6E-05	0	0.9901	OK	0	OK	3.3E-05	OK
Fe2O3	OK	7.9427	0.11628	0.01352	0.00019	0.11975	OK	0.00045	0.00013	2.3186	OK	0.09724	OK	0.00248	OK
MnO	OK	0.084	0.00244	6E-06	2E-07	0.18338	OK	3E-07	0	1.3889	OK	0.08086	OK	1.2E-06	OK
MgO	OK	38.514	0.44461	0.19768	0.00842	0.20644	OK	0.00748	0	0.8878	OK	0	OK	0.04196	OK
CaO	OK	0.6997	0.01477	0.00022	2.6E-05	0.34807	SIG	9.4E-06	0	0.3576	OK	0	OK	6.4E-05	OK
LOI	OK	13.139	0.17833	0.0318	0.00083	0.16156	OK	0.01425	0.00671	17.1727	SIG	0.45941	SIG	0.00622	SIG
Cr	OK	0.275	0.00668	4.5E-05	9E-07	0.143	OK	9E-07	0	1.0011	OK	0.00332	OK	8.5E-06	OK
Ni	OK	0.2428	0.00601	3.6E-05	4E-07	0.10228	OK	7E-07	2E-07	1.8027	OK	0.06479	OK	6.5E-06	OK

Table H2 showing the results of homogeneity testing on the WD-XRF trace element data.

ANAL-YTE	DATA TEST	CONC	SIGMA	SIGMA-SQ	VAR-AN	AN-RATIO	AV-TEST	MSB	VAR-SAM	F	F-TEST	SAM RATIO	HP-TEST	TOM	TOM-TES
Sr	OK	6.7	0.4	0	0.1	0.80311	SIG	0	0	0.2445	OK	0	OK	0	OK
Zr	OK	3.9	0.25	0	0.2	1.52803	SIG	0.2	0.0269	1.35807	OK	0.64654	SIG	0	OK
Ba	OK	14.9	0.79	1	3.3	2.27907	SIG	3.3	0.0366	1.02234	OK	0.24085	OK	3	OK
Sc	OK	5.9	0.36	0	0.4	1.71509	SIG	0.2	0	0.51345	OK	0	OK	0	OK
V	OK	36	1.68	3	1.5	0.7364	SIG	2	0.253	1.33167	OK	0.29988	OK	2	OK
Cr	OK	2642.3	64.56	4168	448.4	0.32799	SIG	513.6	32.6072	1.14543	OK	0.08845	OK	1158	OK
Co	OK	93.7	3.78	14	0.9	0.24664	OK	0.6	0	0.69401	OK	0	OK	3	OK
Ni	BIAS	*	*	*	*	*		*	*	*		*		*	
Cu	OK	7.9	0.46	0	0.2	0.87081	SIG	0.6	0.2397	3.9274	SIG	1.05354	SIG	0	SIG
Zn	OUT	*	*	*	*	*		*	*	*		*		*	
As	OK	120.5	4.68	22	1.5	0.26183	OK	2.5	0.4738	1.6298	OK	0.14693	OK	5	OK
S	OK	143.2	5.42	29	60.6	1.43466	SIG	168.7	54.0881	2.78626	OK	1.35583	SIG	66	OK
TiO2	OK	55.9	2.44	6	48.4	2.84898	SIG	18.5	0	0.38298	OK	0	OK	50	OK
Fe2O3	OK	76017	1120.3	1255069	46907.9	0.19333	OK	41671.9	0	0.88838	OK	0	OK	259731	OK

Table 1: GeoPT12

Results submitted by laboratories to the GeoPT12 round for GAS Serpentinite.

SUBMITTED DATA Nov 2002

Round identifier		M1	M2	M3	M4	M5	M5	M6	M7	M8	M9	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		X	M	ir,X	M	M,X	M,X	X	A,M	A,M	X	X	X	X	T,X	M,T,X	X	X	M	M,X	A,AA, M,O	AA,M, T,X	X	V,X	A
Test portion (g)		0.7-5	0.25	0.1-7	0.09	0.1-10	0.1-10	1	0.25	0.1	0.5	0.5	.002-0.	75-11.2	0.1-0.8	0.1-10	0.8	1.2	0.1	1-1.5	0.2-10	0.1-0.7	1.5	0.5-7	0.05
Data quality		2	1	2	1	1	2	2	2	2	1	2	2	2	2	1	2	1	1	2	2	1	2	2	1
SiO2	% m/m	38.81		39.59		38.77		39.93	41.24	38.7	38.6		37.7	38.69	39.04	37.08	38.7	39.96		38.71	38.5	38.57	38.82	38.79	40.1
TiO2	% m/m			0.016		0.015			0.011	0.01			0.009	0.01		0.072		0.026			0.009	0		0.006	0.012
Al2O3	% m/m	0.43		0.47		0.417		0.73	0.482	0.5	0.45		1.87	0.44	0.46	0.456	0.47	0.87		0.45	0.44	0.605	0.468	0.587	0.443
Fe2O3	% m/m	7.98		8.22		7.921		9.09	8.238	7.85	8.2		7.11	8.12	8.17	7.597	8.1	8.31		7.94	8.02	8.112	8.04	8.397	8.08
Fe(II)O	% m/m														0.83	0.683					0.96	0.75		0.61	
MnO	% m/m	0.09		0.091		0.084		0.11	0.087	0.082	0.09		0.026	0.09	0.083	0.077	0.07	0.09		0.03	0.083	0.081	0.087	0.102	0.084
MgO	% m/m	37.87		39.15		38.22		41.83	38.61	37.8	38.8		42.8	37.8	38.24	32.27	38.2	37.70		38.33	38.6	38.06	38.44	38.18	37.17
CaO	% m/m	0.67		0.68		0.707		0.66	0.652	0.65	0.69		0.686	0.48	0.71	0.682	0.59	0.62		0.67	0.68	0.681	0.684	0.697	0.712
Na2O	% m/m			0.40		0.018		0.09	0.01	0.01						0.242	0	0.21			0.01	0.03			0.007
K2O	% m/m			0.014		0.013		0.01		0.01			0.006	0.04		0.01	0.01	0.02			0.01	0.004	0.011	0.017	0.008
P2O5	% m/m			0.009		0.017		0.08		0.01				0.01		0.026		0.018			0.02	0.001	0.05	0.012	0.066
H2O+	% m/m							0.89						0.51											
CO2	% m/m			1.36											1.39						1.18				
LOI	% m/m	13.31		12.90		13.22		13.72		13.1				13.44	13.02		13.5	13.26		13.62	13.04	12.67	13.11	13.13	13.04
Ag	mg kg-1					0.007										0.02									
As	mg kg-1	225					120.8						130	906		148			108	60	105				
Au	mg kg-1																								
B	mg kg-1																				65				
Ba	mg kg-1		11.3		8.44		18.8		22.5	10			8.3			10			7.82	5	8.3	13.16		9	12
Be	mg kg-1				0.006	0.021																			
Bi	mg kg-1																			0.09	0.03				
Br	mg kg-1																								
Cd	mg kg-1					0.028													0.088						
Ce	mg kg-1		0.442		0.279					0.23						0.24			0.24		0.25	0.221			
Cl	mg kg-1																								
Co	mg kg-1	176	105		98.1	98			106.4	107			350	111	110			117	95.6	85	114	103.7		118	107.8
Cr	mg kg-1	2754			2239		2604		2800	2585		3200	2710	2400	2770	3326		2981		2870	2860	2607	2970	3340	2617
Cs	mg kg-1				0.03	0.026				0.02						0.04			0.03		0.03	0.031			
Cu	mg kg-1	9			6.21	8.4			7.37	4			10						6.64		6	6.41		11	
Dy	mg kg-1				0.05	0.045				0.05						0.06			0.049		0.06	0.057			
Er	mg kg-1				0.042	0.037				0.04						0.05			0.039		0.04	0.04			
Eu	mg kg-1				0.005	0.007				0.002									0.008			0.006			
F	mg kg-1																				105				
Ga	mg kg-1		1.04		0.826		1.8		1.26					74		0.8			1.11		1	0.942			
Gd	mg kg-1				0.042					0.001						0.05			0.042		0.04	0.053			
Ge	mg kg-1					3.16								5		1.1			1.48		1				
Hf	mg kg-1				0.015	0.019				0.04									0.023		0.02	0.075			
Hg	mg kg-1																				0.04				
Ho	mg kg-1				0.014	0.011				0.01						0.01			0.011		0.01	0.013			
I	mg kg-1																								
In	mg kg-1																								
Ir	mg kg-1																				0.004				

Round identifier		M1	M2	M3	M4	M5	M5	M6	M7	M8	M9	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		X	M	ir,X	M	M,X	M,X	X	A,M	A,M	X	X	X	X	T,X	M,T,X	X	X	M	M,X	A,AA,	AA,M,	X	V,X	A
																					M,O	T,X			
Test portion (g)		0.7-5	0.25	0.1-7	0.09	0.1-10	0.1-10	1	0.25	0.1	0.5	0.5	.002-0.	75-11.	0.1-0.8	0.1-10	0.8	1.2	0.1	1-1.5	0.2-10	0.1-0.7	1.5	0.5-7	0.05
Data quality		2	1	2	1	1	2	2	2	2	1	2	2	2	2	1	2	1	1	2	2	1	2	2	1
La	mg kg-1				0.15	0.117				0.126			1.6	25		0.07			0.141	4	0.15	0.11			
Li	mg kg-1																		1.98		2.1				
Lu	mg kg-1				0.009	0.008				0.007									0.009		0.01	0.007			
Mo	mg kg-1					0.057				0.3						0.75			0.404		0.4				
N	mg kg-1																								
Nb	mg kg-1		0.14		0.028	0.021			0.31	0.03									0.037		0.11	1.006			
Nd	mg kg-1				0.136	0.107				0.125						0.14			0.121		0.14	0.118			
Ni	mg kg-1	2280			1679	2150			2388	2213		2500	2020	1683	2431	2141		2553		1810	2420	2288		2121	2246
Os	mg kg-1																								
Pb	mg kg-1	3			2.375	1.7													2.13		2	2.018		3	29
Pd	mg kg-1																				0.006				
Pr	mg kg-1				0.031					0.035						0.03			0.029	0.4	0.033	0.029			
																					0.008				
Pt	mg kg-1																								
Rb	mg kg-1				0.234	0.3			1.91	0.5				148		1.5			0.246		0.24	0.275			2.7
Re	mg kg-1																			0.4					
Rh	mg kg-1																			1	0.002				
Ru	mg kg-1																			4	0.005				
S	mg kg-1			200			129.3						196	533		230					130				
Sb	mg kg-1									12						11.5			11.9		12.3				
Sc	mg kg-1				6.21		8.1		6.7	6.5						9			6.68	4	7	6.82			
Se	mg kg-1																								
Sm	mg kg-1				0.032	0.027				0.028									0.029		0.04	0.027			
Sn	mg kg-1					0.011				0.005															
Sr	mg kg-1		7.64		6.98	6.8			9.7	8			3.7		10	7.7			7.9	85	7.62	7.65		8	9.6
Ta	mg kg-1				0.003	0.015				0.004									0.005			0.097			
Tb	mg kg-1				0.007	0.007				0.001						0.01			0.007		0.008	0.007			
Te	mg kg-1																								
Th	mg kg-1	4	0.272		0.022	0.029	0			0.03				32					0.027		0.04	0.504		1	
Tl	mg kg-1				0.005																				
Tm	mg kg-1				0.007	0.006				0.005									0.007			0.007			
U	mg kg-1		0.931		0.715	0.713	0.3			0.75				112		0.82			0.796		0.85	0.776			
V	mg kg-1				27.89		34.6			38			40		36	37			32.9	20	31	29.36		31	
W	mg kg-1									1.5									2.01		2.1				6.2
Y	mg kg-1				0.377	0.376			0.78	0.1					9				0.343		0.38	0.334		1.5	0.4
Yb	mg kg-1				0.052	0.044				0.05						0.05			0.052		0.05	0.049			
Zn	mg kg-1	40				30.7				43			43	85	42	40		51	39.9	25	34	30.42		37	
Zr	mg kg-1		1.8		0.423	3.9			2.32	1				3					0.661		0.6	2.044		1.5	

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

Results L80 to L83 were submitted too late to contribute to the assessment of assigned values.

SUBMITTED DATA N																									
Round identifier		M23	M24	M25	M26	M27	M27	M28	M29	M30	M31	M32	M33	M34	M35	M35	M36	M37	M38	M38	M39	M39	M40	M41	M42
Sample		GAS		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS			GAS	GAS	GAS
Technique codes		M,X	AA,X	A,IR, M,X	C,T,X	X	X	X	I	A,AA, I,M,X	AA,IR, T,X	A,M,X	A,AA, W,X	AA,A,O	M	M	T,X	A,O,X	A,IR, T,X	A,IR, T,X	M	M	I	X	A,IR, O,X
Test portion (g)		0.1-10	0.5-5	0.2-7	0.01-0.7	1.0-20	20	1.0-5	0.15	0.1-0.8	0.1-1	0.05-0.5	0.1-5	0.2-1	0.1	0.1	0.6-5.4	0.003-5	0.1-7.5	0.1-7.5	0.1	0.1	0.1	10	0.05-3
Data quality		1	2	2	1	1	1	1	1	1	1	1	2	1	1	2	2	2	1	2	1	2	1	2	1
SiO2	% m/m	38.61	38.54	39.29	39.33	38.41		38.79		38.7	38.38	38.76	38.59	38.91			37.87	38.62	38.56						
TiO2	% m/m	0.01	0.07	0.011	0.03	0.01		0.01			0.02	0.011	0.016				0.013	0.014		0.018					
Al2O3	% m/m	0.41	0.413	0.478	0.54	0.47		0.45		0.44	0.46	0.487	0.55				0.434	0.5	0.45						
Fe2O3	% m/m	7.89	6.72	7.93	8.04	8.06		8.21	7.61	7.983	8.02	8.12	7.98				7.804	7.42	8.24				8.02	7.07	
Fe(II)O	% m/m				0.49						1.1	0.88	0.28	0.362			0.675	0.109	1.13						
MnO	% m/m	0.085	0.075	0.086	0.09	0.09		0.08		0.09	0.09	0.074	0.08				0.083	0.085	0.085					0.078	
MgO	% m/m	38.34	38.93	39.48	35.37	38.11		38.36		38.03	38.26	38.35	38.11				37.96	38.65	38.08						40
CaO	% m/m	0.67	0.581	0.668	0.69	0.67		0.67		0.69	0.7	0.677	0.7				0.72	0.66	0.68						
Na2O	% m/m		0.01	0	0			0.12	0.82		0.04	0.012	0.02					0.02							
K2O	% m/m	0.006	0.01	0.006	0.01						0.01	0.009	0.01				0.017			0.01					
P2O5	% m/m	0.004		0.009	0	0.02		0.01			0.01	0.009					0.017	0.016	0.031						
H2O+	% m/m				11.24						12.3			12.34			12.66								
CO2	% m/m			1.14	1.17					0.865	0.72		0.63	1.04			1.19	0.57							
LOI	% m/m	13.25	13.53	13.1		13.29				13.23	13.07	12.98	13.5	13.23				13.05	13.22						
Ag	mg kg-1			<2																					
As	mg kg-1	123.9		129	128				113	114.3		118	110	107			123.3	141						139	118
Au	mg kg-1																								
B	mg kg-1																	79							
Ba	mg kg-1	5.55		9.44	26			9	9			11.2			8.29		16.7	9	15		7.59				7
Be	mg kg-1	0.033		2.11								0.026													
Bi	mg kg-1	0.035			0							0.07													
Br	mg kg-1								1.6															2.2	
Cd	mg kg-1		3.7	0.1	1							0.025													3
Ce	mg kg-1	0.243		0.31	0			8	1.1	0.375		0.33			0.245					0.32	0.228				
Cl	mg kg-1			51	21																				
Co	mg kg-1	108	113	118	117		101		107	111.7	117	103	101	106			102	91	103				106	108	105
Cr	mg kg-1	2590		2753	2831		3399		2933	2853	2737	3330	2735	2215			4344	3017	2865				2686	2600	2550
Cs	mg kg-1	0.023		0.02	0							0.034			0.03						0.03				
Cu	mg kg-1	8.5	13.6	9.41	15	10		14			30	8.1	10	9.5				10	12						6.5
Dy	mg kg-1	0.055		0.07	3							0.058			0.059						0.055				
Er	mg kg-1	0.045		0.01	0							0.043			0.044						0.041				
Eu	mg kg-1	0.008		0.01	0				0.07	0.02		0.009			0.007			0.24		0.02	0.007				
F	mg kg-1				0									100											70
Ga	mg kg-1	0.96	21	1.02	2	3						1.01					13.6			3					
Gd	mg kg-1	0.042		0.05	2							0.051			0.042						0.04				
Ge	mg kg-1			1.41																					
Hf	mg kg-1	0.014		0.09	0						3	0.027				0.015						0.017			
Hg	mg kg-1		1							0.045				0.043				0.03							
Ho	mg kg-1	0.014		0.01	1							0.013			0.014						0.013				
I	mg kg-1																								
In	mg kg-1											0.004													
Ir	mg kg-1								0.003																

Round identifier		M23	M24	M25	M26	M27	M27	M28	M29	M30	M31	M32	M33	M34	M35	M35	M36	M37	M38	M38	M39	M39	M40	M41	M42
Sample		GAS		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS			GAS	GAS	GAS
Technique codes		M,X	AA,X	A,IR, M,X	C,T,X	X	X	X	i	A,AA, I,M,X	AA,IR, T,X	A,M,X	A,AA, W,X	AA,A,O	M	M	T,X	A,O,X	A,IR, T,X	A,IR, T,X	M	M	I	X	A,IR, O,X
Test portion (g)		0.1-10	0.5-5	0.2-7	0.01-0.7	1.0-20	20	1.0-5	0.15	0.1-0.8	0.1-1	0.05-0.5	0.1-5	0.2-1	0.1	0.1	0.6-5.4	0.003-5	0.1-7.5	0.1-7.5	0.1	0.1	0.1	10	0.05-3
Data quality		1	2	2	1	1	1	1	1	1	1	1	2	1	1	2	2	2	1	2	1	2	1	2	1
La	mg kg-1	0.122		0.31	4					0.15		0.17			0.129					0.19	0.121		0.13		
Li	mg kg-1	1.45								2.57	6.6	2.55													
Lu	mg kg-1	0.01		0.01								0.009			0.01					0.007	0.009				
Mo	mg kg-1	0.131		2.18	6				0.15			0.35													
N	mg kg-1																								
Nb	mg kg-1	0.05		0.04	6	3						0.21			0.037					2					
Nd	mg kg-1	0.129		0.22	0			2		0.206		0.16			0.129						0.126				
Ni	mg kg-1	2330	2309	2382	2354	2061		2334	2285	2420	2417	2150	2318	2224			1978	2280	2254					1983	2150
Os	mg kg-1																								
Pb	mg kg-1	2.15	4	1.71	3	4					4	3.5				1.8				6		1.88		8.3	
Pd	mg kg-1																								
Pr	mg kg-1	0.031		0.05	0							0.04			0.03						0.028				
Pt	mg kg-1																								
Rb	mg kg-1	0.34		0.47	2			0	0.6			0.56			0.212						0.205				
Re	mg kg-1																								
Rh	mg kg-1																								
Ru	mg kg-1																								
S	mg kg-1			125	104		172							105						13					
Sb	mg kg-1	12.7		9.54	15				13.2	12.67		12.6					21.1	11							15
Sc	mg kg-1	6.12		6.83	9	8		7	6	7.44	7	6.91							6.68				6.8		
Se	mg kg-1																							1.8	3
Sm	mg kg-1	0.037		0.06	2					0.066		0.038			0.032					0.1	0.031		0.089		
Sn	mg kg-1	0.03	2	0.04	2							0.17													
Sr	mg kg-1	6.6		7.5	6			8		6.89	7	7.5	13		7.1	0.003	7.7	10		8	7.05			10	
Ta	mg kg-1	0.014		0.01	0							0.12													
Tb	mg kg-1	0.008		0.01	2				0.008			0.009			0.008						0.007				
Te	mg kg-1																								
Th	mg kg-1	0.026	1	0.07	0				0.04			0.06			0.03						0.027				
Tl	mg kg-1	0.004										0.005													
Tm	mg kg-1	0.008		0.01								0.008			0.007						0.008				
U	mg kg-1	0.735		0.91	0			1	0.82	0.906		0.72			0.891						0.841		0.90		
V	mg kg-1	32.4	64	37.6	37		35			27.87	31	33.6	30	30			45.9	32		37				26	24
W	mg kg-1	7.2			2				2.1			2.3													
Y	mg kg-1	0.396	3.5	0.43	3			1				0.37		0.4	0.36				0.37		0.345			0.6	
Yb	mg kg-1	0.06		0.1	0				0.024			0.054		0.07	0.053		14.8	0.3		0.017	0.053				
Zn	mg kg-1	33.5	46	47.1	39	41		38	44	37.77	41	42.3	33				34.2	41	35					37	40
Zr	mg kg-1	0.522	18	2.5	3			4			8	0.64			0.38					7		0.509			
		Te																							
		I:																							
		T:																							
		Rh																							

SUBMITTED DATA N																									
Round identifier		M42	M43	M44	M45	M46	M46	M47	M48	M48	M49	M50	M51	M52	M53	M54	M55	M56	M57	M58	M59	M60	M61	M62	M63
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		A,IR, O,X	X	X	X	T,X	X	I	I	I	A,G	M	I	AA,E, S,X	X	AA,G	AA,X	X	X	A,M, O,X	M,X	X	X	A,AA, M,X	M,X
Test portion (g)		0.05-3	1-4.5	0.4	1.2-9	0.55-6	0.55-6	2.6	1.0-10	1.0-10	0.25-0.5	0.1	0.04	0.02-5	1.0-5	0.17-1	0.15-4	0.28-6	8	0.25-2	0.2-12	1.0-6	0.8-10	0.1-2	0.2-3.5
Data quality		2	1	2	1	1	2	1	1	2	2	1	2	2	2	2	2	1	2	2	2	2	1	2	1
SiO2	% m/m	38.9	38.3	38.51	38.72	38.86					37.33			38.72	38.77	38.1	39.1	38.7		36.9	38.64	38.28	38.46	38.6	38.39
TiO2	% m/m	0.01	0.02		0.012	0.01					0.01	0.01				-	0.016	0.02			0.01	0.011	0.002		0.016
Al2O3	% m/m	0.53	0.46	0.44	0.455	0.471		0.65			0.42			0.571	0.49	0.43		0.46		0.4	0.45	0.44	0.427	0.49	0.68
Fe2O3	% m/m	8.07	8.14	8.00	7.977	7.955		7.98		7.99	8.02		8.27	8.3	8.1	8	7.9	7.93	7.77	8.2	8.05	7.97	7.894	8.12	8.132
Fe(II)O	% m/m					0.53								1.063		-								0.8	
MnO	% m/m	0.09	0.09	0.09	0.082	0.086		0.088				0.076		0.07	0.09	-	0.086	0.06	0.091	0.12	0.1	0.085	0.054	0.08	0.085
MgO	% m/m		38.33	38.38	38.58	38.78		41.37			39.33			38.35	38.23	38.4	38.53	38.85		40.9	37.7	39.14	38.24	38.89	37.78
CaO	% m/m	0.72	0.69	0.67	0.657	0.718					0.68			0.782	0.69	0.67	0.57	0.71	0.75	0.7	0.68	0.75	0.694	0.72	0.739
Na2O	% m/m	0.16	0	0.12	0.005		0	0.06			0.03		0.02			-	0.059	0.03							0.119
K2O	% m/m		0.01	0.01	0.007	0.007					1.02					-		0.01	0.095				0.005		0.017
P2O5	% m/m	0.03	0.02		0.013	0.017										-		0.02		0.02			0.008		0.016
H2O+	% m/m	11.6														-								11.7	
CO2	% m/m	0.91												1.634		-				1.35				0.9	
LOI	% m/m	13.21	13.2		13.09	12.9					13.16			13.23	13.5	13.2	13.12	13.59		13.1	12.93	13.35	13.42	12.9	13.55
Ag	mg kg-1																								
As	mg kg-1							123		116			129				120		125	108	119	77	110	117	
Au	mg kg-1							0.002																	
B	mg kg-1																			87				98	
Ba	mg kg-1		10.5		20	0						7		11.14	15		258	9			11			9	7.8
Be	mg kg-1																								
Bi	mg kg-1																								
Br	mg kg-1																				4				
Cd	mg kg-1																			3					
Ce	mg kg-1						3		0.64			0.244		0.43						0.3	0.331			0.3	0.255
Cl	mg kg-1																				185				
Co	mg kg-1		94.3					96.1		114		101	112	120				103		103	105	116	106	103	
Cr	mg kg-1		2794	2660	3100	3154		2450		3050		2595	2620	2600			2970	2588	3150	2660	2720	2798	2807	2964	2490
Cs	mg kg-1											0.027		0.03											0.032
Cu	mg kg-1		3.4		11	6.2						3.73		9.6				4			3			8.4	3.4
Dy	mg kg-1											0.053		0.08							0.067				0.053
Er	mg kg-1											0.041		0.07							0.046				0.042
Eu	mg kg-1							0.018				0.009	0.103	0.01							0.01				0.01
F	mg kg-1													0.03										96	
Ga	mg kg-1		1.6		3.4							0.815								0.8	1			0.84	3.4
Gd	mg kg-1											0.046		0.04							0.052				0.035
Ge	mg kg-1																							1.1	
Hf	mg kg-1											0.018		1.75							0.024				0.015
Hg	mg kg-1																							0.034	
Ho	mg kg-1											0.013		0.02							0.014				0.012
I	mg kg-1																								
In	mg kg-1																								
Ir	mg kg-1																								

Round identifier		M42	M43	M44	M45	M46	M46	M47	M48	M48	M49	M50	M51	M52	M53	M54	M55	M56	M57	M58	M59	M60	M61	M62	M63
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		A,IR,	X	X	X	T,X	X	I	I	!	A,G	M	I	AA,E,	X	AA,G	AA,X	X	X	A,M,	M,X	X	X	A,AA,	M,X
		O,X												S,X						O,X				M,X	
Test portion (g)		0.05-3	1-4.5	0.4	1.2-9	0.55-6	0.55-6	2.6	1.0-10	1.0-10	0.25-0.5	0.1	0.04	0.02-5	1.0-5	0.17-1	0.15-4	0.28-6	8	0.25-2	0.2-12	1.0-6	0.8-10	0.1-2	0.2-3.5
Data quality		2	1	2	1	1	2	1	1	2	2	1	2	2	2	2	2	1	2	2	2	2	1	2	1
La	mg kg-1						0	0.05	0.28			0.126	0.4	0.29						0.2	0.248				0.146
Li	mg kg-1																								
Lu	mg kg-1							0.008	0.012			0.009		0.02							0.009				0.009
Mo	mg kg-1																								
N	mg kg-1																								
Nb	mg kg-1		0.5			3.4						0.023		1.69				11		0.1	0.07				0.031
Nd	mg kg-1											0.136		0.17						0.2	0.213				0.126
Ni	mg kg-1		2178	2600	2250	2162		2035				2323		0.265			2604	2160	2300	2040	2217	2078	2518	2183	2159
Os	mg kg-1																								
Pb	mg kg-1		2.2			3.1						1.55		2.13							1.46		5	1.6	1.904
Pd	mg kg-1																				0.042				
Pr	mg kg-1											0.032		0.03											0.032
Pt	mg kg-1																								
Rb	mg kg-1		1.1			0.8						0.18						2		0.2	0.3	7			0.19
Re	mg kg-1													0.4											
Rh	mg kg-1																								
Ru	mg kg-1																								
S	mg kg-1																			130					
Sb	mg kg-1							12.8		11.94		12.4	14.6								10			13.2	
Sc	mg kg-1		5.8					6.33		6.88		5.84	7.1	6.8						4	8			6.1	7.57
Se	mg kg-1													0.06											
Sm	mg kg-1							0.13	0.12			0.036	0.091								0.054				0.034
Sn	mg kg-1													0.54											
Sr	mg kg-1		6.6			8.8						6.38			27		5.4	7		31	7	8	8	7.2	7.1
Ta	mg kg-1											0.004		0.07											0.002
Tb	mg kg-1											0.008		0.01							0.011				0.007
Te	mg kg-1																								
Th	mg kg-1											0.034									0.034				0.01
Tl	mg kg-1											0.004													
Tm	mg kg-1											0.007		0.01							0.009				0.007
U	mg kg-1							0.86				0.79	1	1.04						1	0.809			0.8	0.519
V	mg kg-1		29.9		36	32.1		37.7				28.4		14				44		19	31	31	38	30	30.6
W	mg kg-1											2.315	1.8												
Y	mg kg-1		1.1			1.8						0.36		0.52				3		0.3	0.39				0.39
Yb	mg kg-1								0.08			0.053		0.07							0.051				0.05
Zn	mg kg-1				39	35.1						25.7		50.2				37	20	36	34	40	28	37	39.1
Zr	mg kg-1		4.1			4.9						0.616						234			0.94	4			0.4
		T																							
		I																							
		T																							
		R																							

SUBMITTED DATA N															
Round identifier		M64	M65	M66	M67	M67	M69	M70	M70	M71	M71	M72	M73	M74	M75
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS		GAS	GAS
Technique codes		A,M,X	X	A,M	M	M	X	X	IR,M,	AA,E,	AA,E,	AA			A
									T	ISE,M,X	ISE,M,X				
Test portion (g)		0.3-0.5	10	0.2-0.25	0.1	0.1	6.8	4	0.2-0.5	0.1-1.2	0.1-1.2	1			0.5-1
Data quality		2	1	2	1	2	2	1	2	1	2	1		2	2
SiO2	% m/m	39.5	39.57	39.57			42.55	37.49		38.92		39.33	38.91	38.99	39.7
TiO2	% m/m	0.01	0.017				0.011	0.02		0.031				0.024	0.01
Al2O3	% m/m	0.48	0.449	0.59				0.45		0.56		0.35		0.842	0.52
Fe2O3	% m/m	8.24	8.002	7.95			8.042	7.93		8.1		7.08	7.38	8.04	8.12
Fe(II)O	% m/m								0.65				0.54		
MnO	% m/m	0.08	0.086				0.085	0.08			0.087	0.07		0.074	0.1
MgO	% m/m	38.2	38.85	37.27			40.07	38.28			38.279	39.25		38.23	37.07
CaO	% m/m	0.7	0.697	0.58			0.727	0.59		0.716			1.2	0.527	0.63
Na2O	% m/m		0.035					0.02		0.008					0.03
K2O	% m/m		0.016							0.0053				0.017	
P2O5	% m/m	0.01	0.008								0.022				
H2O+	% m/m								13.36						
CO2	% m/m								1.23						
LOI	% m/m	12.9	12.98					13.61			13.42		13.29	13.18	13.53
Ag	mg kg-1										0.08				
As	mg kg-1	130					131.2								112.7
Au	mg kg-1														
B	mg kg-1										68.5				
Ba	mg kg-1	8.6	10.6		7.4				7.54		10.3				10
Be	mg kg-1								0.16		1.2				
Bi	mg kg-1					0.1									
Br	mg kg-1														
Cd	mg kg-1					0.04			0.02		0.022				
Ce	mg kg-1	0.4			0.22				0.26	0.237					
Cl	mg kg-1														
Co	mg kg-1	110	104.2	107.5	107				108.5		100	106	87.1		72
Cr	mg kg-1		2805	2790		2810	2876		2873		2800	241			2432
Cs	mg kg-1								0.03						
Cu	mg kg-1	10		13	12				7.7		6		7.08		
Dy	mg kg-1					0.05			0.06	0.055					
Er	mg kg-1					0.05			0.037	0.046					
Eu	mg kg-1					0.001			0.015	0.0096					
F	mg kg-1										800				
Ga	mg kg-1		1.3		1.4				1.61	0.92					
Gd	mg kg-1					0.01			0.025	0.041					
Ge	mg kg-1					1.1					1.2				
Hf	mg kg-1					0.02			0.03						
Hg	mg kg-1										0.0625				
Ho	mg kg-1					0.012			0.01	0.014					
I	mg kg-1														
In	mg kg-1														
Ir	mg kg-1														

Round identifier		M64	M65	M66	M67	M67	M69	M70	M70	M71	M71	M72	M73	M74	M75
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS		GAS	GAS
Technique codes		A,M,X	X	A,M	M	M	X	X	IR,M,	AA,E,	AA,E,	AA			A
									T	ISE,M,X	ISE,M,X				
Test portion (g)		0.3-0.5	10	0.2-0.2	0.1	0.1	6.8	4	0.2-0.5	0.1-1.2	0.1-1.2	1			0.5-1
Data quality		2	1	2	1	2	2	1	2	1	2	1		2	2
La	mg kg-1				0.13				0.17	0.293					
Li	mg kg-1								2.45	1.6					
Lu	mg kg-1					0.009			0.01	0.01					
Mo	mg kg-1										0.94				
N	mg kg-1														
Nb	mg kg-1		0.54			0.15			0.09						4
Nd	mg kg-1					0.087			0.18	0.123					
Ni	mg kg-1	2400	2170	2310		2200	2284		2263		2600	2245	2393		1935
Os	mg kg-1														
Pb	mg kg-1		2.8		5.1				1.94		1.88				
Pd	mg kg-1														
Pr	mg kg-1					0.026			0.04	0.029					
Pt	mg kg-1														
Rb	mg kg-1		1.5		0.24				0.373	0.25					
Re	mg kg-1														
Rh	mg kg-1														
Ru	mg kg-1														
S	mg kg-1						233.2								
Sb	mg kg-1			10.65	12		12.2		11.37		1.82				
Sc	mg kg-1		7.4						6.38		2.9				
Se	mg kg-1														
Sm	mg kg-1					0.029			0.047	0.032					
Sn	mg kg-1					0.4			0.059		1.02				
Sr	mg kg-1	6.3	7.6	7.4	7.3		7.2		7.95		2.44				
Ta	mg kg-1					0.014									
Tb	mg kg-1					0.005			0.009	0.0075					
Te	mg kg-1														
Th	mg kg-1				0.027				0.03	0.015					
Tl	mg kg-1								0.009		0.105				
Tm	mg kg-1					0.007			0.007	0.0077					
U	mg kg-1	0.8	1.6		0.7				0.82	0.781					
V	mg kg-1					37	35.9		33.01	46.7					27
W	mg kg-1				16.3				1.78						
Y	mg kg-1	0.4	1.2		0.34				0.513	0.33					16
Yb	mg kg-1					0.05			0.049	0.05					
Zn	mg kg-1			46		48	36.7		36.39	41		36	42.1		47
Zr	mg kg-1		3.2			0.42			2.56		10.8				
		Te													
		I:													
		T:													
		Re													

Table 2 GeoPT 12 (GAS Serpentinite)
Assigned values and robust statistical analysis of contributed data

Element	X_a % *m/m*	H_a % *m/m*	sdm % *m/m*	H_a/s	Status	Element	X_a mg kg^{-1}	H_a mg kg^{-1}	sdm mg kg^{-1}	H_a/s	Status
SiO2	38.716	0.447	0.040	0.090	assigned	Ho	0.0120	0.0020	0.0000	0.242	assigned
Al2O3	0.460	0.010	0.005	0.513	provisional	La	0.150	0.016	0.011	0.667	provisional
Fe2O3	8.021	0.117	0.022	0.184	assigned	Li	2.28	0.16	0.15	0.962	provisional
MnO	0.0850	0.0025	0.0010	0.392	assigned	Lu	0.0092	0.0015	0.0003	0.193	assigned
MgO	38.420	0.444	0.084	0.190	assigned	Nd	0.136	0.015	0.006	0.379	assigned
CaO	0.683	0.014	0.005	0.330	assigned	Ni	2240	56	24	0.430	assigned
LOI	13.223	0.179	0.035	0.196	assigned	Pr	0.0308	0.0042	0.0007	0.172	assigned
	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}			Sb	12.29	0.67	0.35	0.515	assigned
As	121.1	4.7	2.3	0.499	assigned	Sc	6.77	0.41	0.15	0.377	assigned
Ba	9.22	0.53	0.38	0.717	provisional	Sm	0.0370	0.0050	0.0030	0.585	provisional
Ce	0.279	0.027	0.013	0.499	assigned	Sr	7.65	0.45	0.20	0.449	assigned
Co	106.4	4.2	1.1	0.264	assigned	Tb	0.0100	0.0000	0.0000	0.300	assigned
Cr	2788	68	33	0.490	assigned	Th	0.0300	0.0000	0.0000	0.730	provisional
Cs	0.0300	0.0041	0.0007	0.177	assigned	Tl	0.0052	0.0009	0.0006	0.665	provisional
Dy	0.0570	0.0070	0.0020	0.263	assigned	Tm	0.0075	0.0013	0.0003	0.215	assigned
Er	0.0421	0.0054	0.0012	0.228	assigned	U	* ~~0.001~~	0.068	0.023	0.338	assigned
Eu	0.0095	0.0015	0.0009	0.606	assigned	V	32.91	1.56	0.84	0.538	assigned
Gd	0.0420	0.0050	0.0020	0.409	provisional	W	2.10	0.15	0.11	0.734	provisional
Ge	1.200	0.093	0.099	1.058	assigned	Y	0.400	0.037	0.017	0.450	provisional
Hf	0.0200	0.0000	0.0000	0.610	assigned	Yb	0.050	0.010	0.000	0.100	assigned
Hg	0.0430	0.0055	0.0050	0.913	provisional	Zn	38.84	1.79	0.86	0.478	assigned

X_a=assigned value calculated as the robust mean of submitted data.

H_a=target precision calculated using a modified version of the Horwitz equation for Data quality 1 ($Ha=0.01Xa^{0.8495}$).

sdm=standard deviation of the mean calculated from submitted data using robust statistics.

Full=full assigned value, provisional = provisional assigned value (additional uncertainty).

* a: 0,464

Table 3

Z-scores for GeoPT12 - GAS Serpentinite

Round identifier		M1	M2	M3	M4	M5	M5	M6	M7	M8	M9	M9	M10	M11
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		X	M	ir,X	M	M,X	M,X	X	A,M	A,M	X	X	X	X
Test portion (g)		0.7-5	0.25	0.1-7	0.09	0.1-10	0.1-10	1	0.25	0.1	0.5	0.5	).002-0..75-11.2	
Data quality		2	1	2	1	1	2	2	2	2	1	2	2	2
SiO2	% m/m	0.11	*	0.98	*	0.12	*	1.36	2.83	-0.02	-0.26	*	-1.14	-0.03
Al2O3 (p)	*% m/m*	*-1.45*	*	*0.48*	*	*-4.16*	*	*13.06*	*1.06*	*1.93*	*-0.97*	*	*68.18*	*-0.97*
Fe2O3	% m/m	-0.17	*	0.85	*	-0.85	*	4.56	0.93	-0.73	1.53	*	-3.88	0.42
MnO	% m/m	1.01	*	1.22	*	-0.41	*	5.07	0.41	-0.61	2.03	*	-12.02	1.01
MgO	% m/m	-0.62	*	0.82	*	-0.46	*	3.84	0.21	-0.70	0.86	*	4.94	-0.70
CaO	% m/m	-0.44	*	-0.10	*	1.67	*	-0.79	-1.07	-1.13	0.50	*	0.11	-7.01
LOI	% m/m	0.24	*	-0.90	*	-0.01	*	1.39	*	-0.34	*	*	*	0.61
As	mg kg-1	11.05	*	*	*	*	-0.03	*	*	*	*	*	0.95	83.43
Ba (p)	*mg kg-1*	*	*3.94*	*	*-1.48*	*	*9.07*	*	*12.58*	*0.74*	*	*	*-0.87*	*
Ce	mg kg-1	*	6.03	*	0.00	*	*	*	*	-0.91	*	*	*	*
Co	mg kg-1	8.25	-0.34	*	-1.98	-2.00	*	*	-0.01	0.07	*	*	28.88	0.54
Cr	mg kg-1	-0.25	*	*	-8.12	*	-1.36	*	0.09	-1.50	*	3.05	-0.58	-2.87
Cs	mg kg-1	*	*	*	0.07	-0.98	*	*	*	-1.23	*	*	*	*
Dy	mg kg-1	*	*	*	-0.99	-1.74	*	*	*	-0.52	*	*	*	*
Er	mg kg-1	*	*	*	0.05	-0.93	*	*	*	-0.19	*	*	*	*
Eu	mg kg-1	*	*	*	-3.05	-1.74	*	*	*	-2.44	*	*	*	*
Gd (p)	*mg kg-1*	*	*	*	*-0.01*	*	*	*	*	*-3.79*	*	*	*	*
Ge	mg kg-1	*	*	*	*	20.99	*	*	*	*	*	*	*	20.35
Hf	mg kg-1	*	*	*	-1.80	-0.35	*	*	*	3.47	*	*	*	*
Hg (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	mg kg-1	*	*	*	0.72	-0.58	*	*	*	-0.63	*	*	*	*
La (p)	*mg kg-1*	*	*	*	*0.00*	*-2.07*	*	*	*	*-0.75*	*	*	*45.42*	*778*
Li (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lu	mg kg-1	*	*	*	0.08	-0.79	*	*	*	-0.73	*	*	*	*
Nd	mg kg-1	*	*	*	0.00	-1.97	*	*	*	-0.37	*	*	*	*
Ni	mg kg-1	0.35	*	*	-10.01	-1.60	*	*	1.32	-0.24	*	2.31	-1.96	-4.97
Pr	mg kg-1	*	*	*	0.00	*	*	*	*	0.50	*	*	*	*
Sb	mg kg-1	*	*	*	*	*	*	*	*	-0.22	*	*	*	*
Sc	mg kg-1	*	*	*	-1.39	*	1.63	*	-0.09	-0.34	*	*	*	*
Sm (p)	*mg kg-1*	*	*	*	*-1.06*	*-2.14*	*	*	*	*-0.97*	*	*	*	*
Sr	mg kg-1	*	-0.02	*	-1.49	-1.89	*	*	2.27	0.39	*	*	-4.38	*
Tb	mg kg-1	*	*	*	-1.09	-0.64	*	*	*	-2.65	*	*	*	*
Th (p)	*mg kg-1*	*488*	*59.50*	*	*-2.07*	*-0.22*	*-3.69*	*	*	*0.00*	*	*	*	*3930*
Tl (p)	*mg kg-1*	*	*	*	*0.16*	*	*	*	*	*	*	*	*	*
Tm	mg kg-1	*	*	*	-0.20	-1.17	*	*	*	-0.98	*	*	*	*
U	mg kg-1	*	1.47	*	-1.70	-1.73	-3.88	*	*	-0.59	*	*	*	813
V	mg kg-1	*	*	*	-3.23	*	0.54	*	*	1.64	*	*	2.28	*
W (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*-2.00*	*	*	*	*
Y (p)	*mg kg-1*	*	*	*	*-0.63*	*-0.65*	*	*	*5.17*	*-4.09*	*	*	*	*
Yb	mg kg-1	*	*	*	0.05	-1.14	*	*	*	-0.10	*	*	*	*
Zn	mg kg-1	0.33	*	*	*	-4.54	*	*	*	1.16	*	*	1.16	12.89

Data in italics are z-scores calculated from provisional values.

Round identifier		M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	
Technique codes		T,X	M,T,X	X	X	M	M,X	A,AA, M,O	AA,M, T,X	X	V,X	A	M,X	AA,X
Test portion (g)		0.1-0.8	0.1-10	0.8	1.2	0.1	1-1.5	0.2-10	0.1-0.75	1.5	0.5-7	0.05	0.1-10	0.5-5
Data quality		2	1	2	1	1	2	2	1	2	2	1	1	2
SiO2	% m/m	0.36	-3.66	-0.02	2.79	*	-0.01	-0.24	-0.33	0.12	0.09	3.10	-0.24	-0.20
Al2O3 (p)	*% m/m*	*0.00*	*-0.39*	*0.48*	*39.65*	*	*-0.48*	*-0.97*	*14.02*	*0.39*	*6.14*	*-1.64*	*-4.84*	*-2.27*
Fe2O3	% m/m	0.64	-3.62	0.34	2.47	*	-0.35	0.00	0.78	0.08	1.60	0.50	-1.12	-5.55
MnO	% m/m	-0.41	-3.25	-3.04	2.03	*	-11.16	-0.41	-1.62	0.41	3.45	-0.32	0.00	-2.03
MgO	% m/m	-0.20	-13.86	-0.25	-1.62	*	-0.10	0.20	-0.82	0.02	-0.27	-2.82	-0.18	0.58
CaO	% m/m	0.94	-0.06	-3.21	-4.34	*	-0.44	-0.10	-0.13	0.04	0.49	2.02	-0.89	-3.52
LOI	% m/m	-0.56	*	0.77	0.21	*	1.11	-0.51	-3.08	-0.31	-0.26	-1.02	0.15	0.86
As	mg kg-1	*	5.73	*	*	-2.77	-6.49	-1.71	*	*	*	*	0.61	*
Ba (p)	*mg kg-1*	*	*1.48*	*	*	*-2.65*	*-4.00*	*-0.87*	*7.46*	*	*-0.21*	*5.27*	*-6.95*	*
Ce	mg kg-1	*	-1.44	*	*	-1.44	*	-0.54	-2.15	*	*	*	-1.33	*
Co	mg kg-1	0.42	*	*	2.50	-2.57	-2.54	0.90	-0.64	*	1.37	0.32	0.37	0.78
Cr	mg kg-1	-0.13	7.97	*	2.86	*	0.61	0.53	-2.68	1.35	4.09	-2.53	-2.93	*
Cs	mg kg-1	*	2.46	*	*	0.00	*	0.00	0.25	*	*	*	-1.72	*
Dy	mg kg-1	*	0.39	*	*	-1.21	*	0.20	-0.04	*	*	*	-0.32	*
Er	mg kg-1	*	1.47	*	*	-0.49	*	-0.19	-0.38	*	*	*	0.54	*
Eu	mg kg-1	*	*	*	*	-1.21	*	*	-2.26	*	*	*	-0.95	*
Gd (p)	*mg kg-1*	*	*1.38*	*	*	*-0.05*	*	*-0.23*	*1.93*	*	*	*	*-0.09*	*
Ge	mg kg-1	*	-1.07	*	*	3.00	*	-1.07	*	*	*	*	*	*
Hf	mg kg-1	*	*	*	*	1.04	*	0.00	19.08	*	*	*	-2.08	*
Hg (p)	*mg kg-1*	*	*	*	*	*	*	*-0.27*	*	*	*	*	*	*86.65*
Ho	mg kg-1	*	-1.26	*	*	-0.74	*	-0.63	0.30	*	*	*	0.82	*
La (p)	*mg kg-1*	*	*-5.01*	*	*	*-0.56*	*121*	*0.00*	*-2.51*	*	*	*	*-1.75*	*
Li (p)	*mg kg-1*	*	*	*	*	*-1.83*	*	*-0.54*	*	*	*	*	*-5.13*	*
Lu	mg kg-1	*	*	*	*	-0.12	*	0.28	-1.46	*	*	*	0.55	*
Nd	mg kg-1	*	0.27	*	*	-1.02	*	0.14	-1.23	*	*	*	-0.48	*
Ni	mg kg-1	1.70	-1.77	*	5.57	*	-3.83	1.60	0.85	*	-1.06	0.10	1.60	0.61
Pr	mg kg-1	*	-0.19	*	*	-0.50	44.38	0.26	-0.43	*	*	*	0.05	*
Sb	mg kg-1	*	-1.18	*	*	-0.58	*	0.00	*	*	*	*	0.60	*
Sc	mg kg-1	*	5.48	*	*	-0.23	-3.41	0.28	0.11	*	*	*	-1.61	*
Sm (p)	*mg kg-1*	*	*	*	*	*-1.81*	*	*0.25*	*-2.14*	*	*	*	*-0.10*	*
Sr	mg kg-1	2.61	0.11	*	*	0.55	85.85	-0.03	0.00	*	0.39	4.33	-2.33	*
Tb	mg kg-1	*	1.46	*	*	-0.79	*	-0.02	-0.79	*	*	*	-0.04	*
Th (p)	*mg kg-1*	*	*	*	*	*-0.74*	*	*1.23*	*117*	*	*119*	*	*-0.98*	*119*
Tl (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*-1.26*	*
Tm	mg kg-1	*	*	*	*	-0.52	*	*	-0.36	*	*	*	0.44	*
U	mg kg-1	*	-0.16	*	*	-0.51	*	0.14	-0.80	*	*	*	-1.40	*
V	mg kg-1	0.99	2.63	*	*	-0.01	-4.15	-0.61	-2.28	*	-0.61	*	-0.33	9.99
W (p)	*mg kg-1*	*	*	*	*	*-0.60*	*	*0.00*	*	*	*	*27.29*	*33.95*	*
Y (p)	*mg kg-1*	*117*	*	*	*	*-1.55*	*	*-0.27*	*-1.80*	*	*14.98*	*0.00*	*-0.11*	*42.21*
Yb	mg kg-1	*	-0.20	*	*	0.14	*	-0.10	-0.36	*	*	*	1.36	*
Zn	mg kg-1	0.88	0.65	*	6.79	0.59	-3.86	-1.35	-4.70	*	-0.51	*	-2.98	2.00

Round identifier		M25	M26	M27	M27	M28	M29	M30	M31	M32	M33	M34	M35	M35
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		A,IR, M,X	C,T,X	X	X	X	I	A,AA, I,M,X	AA,IR, T,X	A,M,X	A,AA, W,X	AA,A,C	M	M
Test portion (g)		0.2-7	0.01-0.7	1.0-20	20	1.0-5	0.15	0.1-0.8	0.1-1	0.05-0.5	0.1-5	0.2-1	0.1	0.1
Data quality		2	1	1	1	1	1	1	1	1	2	1	1	2
SiO2	% m/m	0.64	1.38	-0.68	*	0.17	*	-0.03	-0.75	0.10	-0.14	0.44	*	*
Al2O3 (p)	*% m/m*	*0.87*	*7.74*	*0.97*	*	*-0.97*	*	*-1.93*	*0.00*	*2.61*	*4.35*	*	*	*
Fe2O3	% m/m	-0.39	0.16	0.33	*	1.61	-3.50	-0.32	-0.01	0.84	-0.17	*	*	*
MnO	% m/m	0.20	2.03	2.03	*	-2.03	*	2.03	2.03	-4.47	-1.01	*	*	*
MgO	% m/m	1.20	-6.87	-0.70	*	-0.13	*	-0.87	-0.36	-0.16	-0.35	*	*	*
CaO	% m/m	-0.51	0.50	-0.89	*	-0.89	*	0.50	1.19	-0.40	0.59	*	*	*
LOI	% m/m	-0.34	*	0.38	*	*	*	0.06	-0.85	-1.35	0.77	0.04	*	*
As	mg kg-1	0.85	1.48	*	*	*	-1.71	-1.44	*	-0.65	-1.18	-2.99	*	*
Ba (p)	*mg kg-1*	*0.21*	*31.79*	*	*	*-0.42*	*-0.42*	*	*	*3.75*	*	*	*-1.76*	*
Ce	mg kg-1	0.57	-10.32	*	*	286	30.36	3.55	*	1.89	*	*	-1.26	*
Co	mg kg-1	1.37	2.50	*	-1.29	*	0.13	1.25	2.50	-0.82	-0.65	-0.10	*	*
Cr	mg kg-1	-0.26	0.64	*	9.05	*	2.15	0.97	-0.75	8.02	-0.39	-8.48	*	*
Cs	mg kg-1	-1.23	-7.38	*	*	*	*	*	*	0.98	*	*	0.00	*
Dy	mg kg-1	0.91	418	*	*	*	*	*	*	0.11	*	*	0.25	*
Er	mg kg-1	-2.96	-7.76	*	*	*	*	*	*	0.17	*	*	0.36	*
Eu	mg kg-1	0.18	-6.20	*	*	*	39.72	6.92	*	-0.30	*	*	-1.54	*
Gd (p)	*mg kg-1*	*0.69*	*358*	*	*	*	*	*	*	*1.56*	*	*	*-0.01*	*
Ge	mg kg-1	1.12	*	*	*	*	*	*	*	*	*	*	*	*
Hf	mg kg-1	12.14	-6.94	*	*	*	*	*	1034	2.43	*	*	*	-0.87
Hg (p)	*mg kg-1*	*	*	*	*	*	*	*0.36*	*	*	*	*0.00*	*	*
Ho	mg kg-1	-0.63	514	*	*	*	*	*	*	0.30	*	*	0.56	*
La (p)	*mg kg-1*	*5.01*	*241*	*	*	*	*	*0.00*	*	*1.25*	*	*	*-1.32*	*
Li (p)	*mg kg-1*	*	*	*	*	*	*	*1.83*	*26.90*	*1.71*	*	*	*	*
Lu	mg kg-1	0.28	*	*	*	*	*	*	*	-0.12	*	*	0.69	*
Nd	mg kg-1	2.86	-9.26	*	*	127	*	4.77	*	1.63	*	*	-0.48	*
Ni	mg kg-1	1.26	2.03	-3.20	*	1.67	0.80	3.20	3.15	-1.61	0.69	-0.29	*	*
Pr	mg kg-1	2.31	-7.41	*	*	*	*	*	*	2.21	*	*	-0.19	*
Sb	mg kg-1	-2.04	4.02	*	*	*	1.34	0.56	*	0.45	*	*	*	*
Sc	mg kg-1	0.07	5.48	3.02	*	0.56	-1.90	1.64	0.56	0.34	*	*	*	*
Sm (p)	*mg kg-1*	*2.29*	*399*	*	*	*	*	*5.80*	*	*0.10*	*	*	*-1.04*	*
Sr	mg kg-1	-0.17	-3.66	*	*	0.78	*	-1.69	-1.44	-0.33	5.94	*	-1.22	-8.49
Tb	mg kg-1	0.73	1497	*	*	*	-0.04	*	*	0.71	*	*	-0.42	*
Th (p)	*mg kg-1*	*4.92*	*-7.38*	*	*	*	*2.46*	*	*	*7.38*	*	*	*0.00*	*
Tl (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*-0.16*	*	*	*	*
Tm	mg kg-1	1.02	*	*	*	*	*	*	*	0.44	*	*	-0.12	*
U	mg kg-1	0.58	-12.16	*	*	2.48	-0.16	1.10	*	-1.62	*	*	0.88	*
V	mg kg-1	1.51	2.63	*	1.34	*	*	-3.24	-1.23	0.44	-0.94	-1.87	*	*
W (p)	*mg kg-1*	*	*-0.67*	*	*	*	*0.00*	*	*	*1.33*	*	*	*	*
Y (p)	*mg kg-1*	*0.41*	*70.80*	*	*	*16.34*	*	*	*	*-0.82*	*	*0.00*	*-1.09*	*
Yb	mg kg-1	3.80	-8.00	*	*	*	-4.26	*	*	0.42	*	2.91	0.26	*
Zn	mg kg-1	2.31	0.09	1.21	*	-0.47	2.88	-0.60	1.21	1.93	-1.63	*	*	*

Round identifier		M36	M37	M38	M38	M39	M39	M40	M41	M42	M42	M43	M44	M45
Sample		GAS	GAS	GAS	GAS			GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		T,X	A,O,X	A,IR, T,X	A,IR, T,X	M	M	I	X	A,IR, O,X	A,IR, O,X	X	X	X
Test portion (g)		0.6-5.4	0.003-5	0.1-7.5	0.1-7.5	0.1	0.1	0.1	10	0.05-3	0.05-3	1-4.5	0.4	1.2-9
Data quality		2	2	1	2	1	2	1	2	1	2	1	2	1
SiO2	% m/m	-0.95	-0.11	-0.35	*	*	*	*	*	*	0.21	-0.93	-0.23	0.01
Al2O3 (p)	*% m/m*	*-1.26*	*1.93*	*-0.97*	*	*	*	*	*	*	*3.39*	*0.00*	*-0.97*	*-0.48*
Fe2O3	% m/m	-0.93	-2.56	1.87	*	*	*	-0.01	-4.05	*	0.21	1.02	-0.09	-0.37
MnO	% m/m	-0.41	0.00	0.00	*	*	*	*	-1.34	*	1.01	2.03	1.01	-1.42
MgO	% m/m	-0.52	0.26	-0.77	*	*	*	*	*	3.56	*	-0.20	-0.04	0.37
CaO	% m/m	1.29	-0.79	-0.20	*	*	*	*	*	*	1.29	0.50	-0.44	-1.80
LOI	% m/m	*	-0.48	-0.01	*	*	*	*	*	*	-0.03	-0.13	*	-0.74
As	mg kg-1	0.24	2.12	*	*	*	*	*	1.91	-0.65	*	*	*	*
Ba (p)	*mg kg-1*	*7.09*	*-0.21*	*10.95*	*	*-3.09*	*	*	*	*-4.21*	*	*2.43*	*	*20.42*
Ce	mg kg-1	*	*	*	0.76	-1.89	*	*	*	*	*	*	*	*
Co	mg kg-1	-0.53	-1.83	-0.82	*	*	*	-0.10	0.19	-0.34	*	-2.88	*	*
Cr	mg kg-1	11.52	1.70	1.14	*	*	*	-1.51	-1.39	-3.52	*	0.09	-0.95	4.62
Cs	mg kg-1	*	*	*	*	-0.10	*	*	*	*	*	*	*	*
Dy	mg kg-1	*	*	*	*	-0.29	*	*	*	*	*	*	*	*
Er	mg kg-1	*	*	*	*	-0.21	*	*	*	*	*	*	*	*
Eu	mg kg-1	*	75.61	*	3.46	-1.54	*	*	*	*	*	*	*	*
Gd (p)	*mg kg-1*	*	*	*	*	*-0.49*	*	*	*	*	*	*	*	*
Ge	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	mg kg-1	*	*	*	*	*	-0.52	*	*	*	*	*	*	*
Hg (p)	*mg kg-1*	*	*-1.18*	*	*	*	*	*	*	*	*	*	*	*
Ho	mg kg-1	*	*	*	*	0.25	*	*	*	*	*	*	*	*
La (p)	*mg kg-1*	*	*	*	*1.25*	*-1.82*	*	*-1.25*	*	*	*	*	*	*
Li (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lu	mg kg-1	*	*	*	-0.73	0.08	*	*	*	*	*	*	*	*
Nd	mg kg-1	*	*	*	*	-0.68	*	*	*	*	*	*	*	*
Ni	mg kg-1	-2.34	0.35	0.24	*	*	*	*	-2.29	-1.61	*	-1.11	3.20	0.17
Pr	mg kg-1	*	*	*	*	-0.60	*	*	*	*	*	*	*	*
Sb	mg kg-1	6.53	-0.96	*	*	*	*	*	*	4.02	*	*	*	*
Sc	mg kg-1	*	*	-0.23	*	*	*	0.06	*	*	*	-2.40	*	*
Sm (p)	*mg kg-1*	*	*	*	*6.36*	*-1.30*	*	*10.48*	*	*	*	*	*	*
Sr	mg kg-1	0.06	2.61	*	0.39	-1.33	*	*	2.61	*	*	-2.33	*	*
Tb	mg kg-1	*	*	*	*	-0.94	*	*	*	*	*	*	*	*
Th (p)	*mg kg-1*	*	*	*	*	*-0.84*	*	*	*	*	*	*	*	*
Tl (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tm	mg kg-1	*	*	*	*	0.28	*	*	*	*	*	*	*	*
U	mg kg-1	*	*	*	*	0.15	*	1.01	*	*	*	*	*	*
V	mg kg-1	4.17	-0.29	*	1.31	*	*	*	-2.22	-5.73	*	-1.94	*	1.98
W (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Y (p)	*mg kg-1*	*	*	*-0.82*	*	*-1.50*	*	*	*2.72*	*	*	*19.06*	*	*
Yb	mg kg-1	1149	19.38	*	-2.67	0.23	*	*	*	*	*	*	*	*
Zn	mg kg-1	-1.29	0.60	-2.14	*	*	*	*	-0.51	0.65	*	*	*	0.09

Round identifier		M46	M46	M47	M48	M48	M49	M50	M51	M52	M53	M54	M55	M56
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		T,X	X	I	I	I	A,G	M	I	AA,E, S,X	X	AA,G	AA,X	X
Test portion (g)		0.55-6	0.55-6	2.6	1.0-10	1.0-10	0.25-0.5	0.1	0.04	0.02-5	1.0-5	0.17-1	0.15-4	0.28-6
Data quality		1	2	1	1	2	2	1	2	2	2	2	2	1
SiO2	% m/m	0.32	*	*	*	*	-1.55	*	*	0.01	0.06	-0.69	0.43	-0.03
Al2O3 (p)	*% m/m*	*1.06*	*	*18.38*	*	*	*-1.93*	*	*	*5.37*	*1.45*	*-1.45*	*	*0.00*
Fe2O3	% m/m	-0.56	*	-0.35	*	-0.13	0.00	*	1.06	1.19	0.34	-0.09	-0.52	-0.78
MnO	% m/m	0.41	*	1.22	*	*	*	-3.53	*	-3.04	1.01	*	0.20	-10.15
MgO	% m/m	0.81	*	6.65	*	*	1.03	*	*	-0.08	-0.21	-0.02	0.12	0.97
CaO	% m/m	2.43	*	*	*	*	-0.10	*	*	3.43	0.25	-0.44	-3.90	1.88
LOI	% m/m	-1.80	*	*	*	*	-0.17	*	*	0.03	0.77	-0.06	-0.29	2.05
As	mg kg-1	*	*	0.41	*	-0.54	*	*	0.85	*	*	*	-0.11	*
Ba (p)	*mg kg-1*	*-17*	*	*	*	*	*	*-4.21*	*	*1.82*	*5.48*	*	*236*	*-0.42*
Ce	mg kg-1	*	50.31	*	13.35	*	*	-1.29	*	2.79	*	*	*	*
Co	mg kg-1	*	*	-2.45	*	0.90	*	-1.29	0.66	1.61	*	*	*	-0.82
Cr	mg kg-1	5.42	*	-5.00	*	1.94	*	-2.85	-1.24	-1.39	*	*	1.35	-2.96
Cs	mg kg-1	*	*	*	*	*	*	-0.74	*	0.00	*	*	*	*
Dy	mg kg-1	*	*	*	*	*	*	-0.63	*	1.62	*	*	*	*
Er	mg kg-1	*	*	*	*	*	*	-0.27	*	2.58	*	*	*	*
Eu	mg kg-1	*	*	5.61	*	*	*	-0.10	30.68	0.18	*	*	*	*
Gd (p)	*mg kg-1*	*	*	*	*	*	*	*0.55*	*	*-0.23*	*	*	*	*
Ge	mg kg-1	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	mg kg-1	*	*	*	*	*	*	-0.76	*	300	*	*	*	*
Hg (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	mg kg-1	*	*	*	*	*	*	0.20	*	1.97	*	*	*	*
La (p)	*mg kg-1*	*	*-4.70*	*-6.27*	*8.14*	*	*	*-1.50*	*7.83*	*4.39*	*	*	*	*
Li (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lu	mg kg-1	*	*	-0.79	1.90	*	*	-0.12	*	3.64	*	*	*	*
Nd	mg kg-1	*	*	*	*	*	*	0.00	*	1.16	*	*	*	*
Ni	mg kg-1	-1.40	*	-3.66	*	*	*	1.47	*	-19.96	*	*	3.24	-1.43
Pr	mg kg-1	*	*	*	*	*	*	0.34	*	-0.10	*	*	*	*
Sb	mg kg-1	*	*	0.75	*	-0.26	*	0.16	1.71	*	*	*	*	*
Sc	mg kg-1	*	*	-1.09	*	0.13	*	-2.30	0.40	0.03	*	*	*	*
Sm (p)	*mg kg-1*	*	*	*18.82*	*16.78*	*	*	*-0.41*	*5.44*	*	*	*	*	*
Sr	mg kg-1	2.55	*	*	*	*	*	-2.82	*	*	21.48	*	-2.50	-1.44
Tb	mg kg-1	*	*	*	*	*	*	0.19	*	0.73	*	*	*	*
Th (p)	*mg kg-1*	*	*	*	*	*	*	*1.01*	*	*	*	*	*	*
Tl (p)	*mg kg-1*	*	*	*	*	*	*	*-0.93*	*	*	*	*	*	*
Tm	mg kg-1	*	*	*	*	*	*	-0.44	*	1.02	*	*	*	*
U	mg kg-1	*	*	0.43	*	*	*	-0.60	1.24	1.53	*	*	*	*
V	mg kg-1	-0.52	*	3.08	*	*	*	-2.90	*	-6.08	*	*	*	7.13
W (p)	*mg kg-1*	*	*	*	*	*	*	*1.43*	*-1.00*	*	*	*	*	*
Y (p)	*mg kg-1*	*38.12*	*	*	*	*	*	*-1.09*	*	*1.63*	*	*	*	*70.80*
Yb	mg kg-1	*	*	*	4.47	*	*	0.22	*	1.46	*	*	*	*
Zn	mg kg-1	-2.09	*	*	*	*	*	-7.34	*	3.17	*	*	*	-1.03

Round identifier		M57	M58	M59	M60	M61	M62	M63	M64	M65	M66	M67	M67	M69
Sample		GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
Technique codes		X	A,M, O,X	M,X	X	X	A,AA, M,X	M,X	A,M,X	X	A,M	M	M	X
Test portion (g)		8	0.25-2	0.2-12	1.0-6	0.8-10	0.1-2	0.2-3.5	0.3-0.5	10	0.2-0.25	0.1	0.1	6.8
Data quality		2	2	2	2	1	2	1	2	1	2	1	2	2
SiO2	% m/m	*	-2.03	-0.08	-0.49	-0.57	-0.13	-0.74	0.88	1.90	0.96	*	*	4.29
Al2O3 (p)	*% m/m*	*	*-2.90*	*-0.48*	*-0.97*	*-3.19*	*1.45*	*21.28*	*0.97*	*-1.06*	*6.29*	*	*	*
Fe2O3	% m/m	-1.07	0.76	0.12	-0.22	-1.08	0.42	0.95	0.93	-0.16	-0.30	*	*	0.09
MnO	% m/m	1.22	7.10	3.04	0.00	-12.58	-1.01	0.00	-1.01	0.49	*	*	*	-0.02
MgO	% m/m	*	2.80	-0.81	0.81	-0.41	0.53	-1.44	-0.25	0.98	-1.30	*	*	1.86
CaO	% m/m	2.32	0.59	-0.10	2.32	0.77	1.29	3.88	0.59	0.98	-3.55	*	*	1.53
LOI	% m/m	*	-0.34	-0.82	0.36	1.10	-0.90	1.84	-0.90	-1.35	*	*	*	*
As	mg kg-1	0.42	-1.39	-0.22	-4.68	-2.35	-0.43	*	0.95	*	*	*	*	1.08
Ba (p)	*mg kg-1*	*	*	*1.69*	*	*	*-0.21*	*-2.69*	*-0.59*	*2.61*	*	*-3.45*	*	*
Ce	mg kg-1	*	0.39	0.96	*	*	0.39	-0.89	2.24	*	*	-2.18	*	*
Co	mg kg-1	*	-0.41	-0.17	1.13	-0.10	-0.41	*	0.42	-0.53	0.13	0.13	*	*
Cr	mg kg-1	2.68	-0.95	-0.50	0.08	0.28	1.30	-4.41	*	0.25	0.02	*	0.16	0.65
Cs	mg kg-1	*	*	*	*	*	*	0.49	*	*	*	*	*	*
Dy	mg kg-1	*	*	0.69	*	*	*	-0.60	*	*	*	*	-0.52	*
Er	mg kg-1	*	*	0.36	*	*	*	-0.01	*	*	*	*	0.73	*
Eu	mg kg-1	*	*	0.18	*	*	*	0.36	*	*	*	*	-2.77	*
Gd (p)	*mg kg-1*	*	*	*0.87*	*	*	*	*-1.37*	*	*	*	*	*-2.97*	*
Ge	mg kg-1	*	*	*	*	*	-0.54	*	*	*	*	*	-0.54	*
Hf	mg kg-1	*	*	0.69	*	*	*	-1.73	*	*	*	*	0.00	*
Hg (p)	*mg kg-1*	*	*	*	*	*	*-0.81*	*	*	*	*	*	*	*
Ho	mg kg-1	*	*	0.41	*	*	*	-0.22	*	*	*	*	-0.11	*
La (p)	*mg kg-1*	*	*1.57*	*3.07*	*	*	*	*-0.25*	*	*	*	*-1.25*	*	*
Li (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lu	mg kg-1	*	*	-0.06	*	*	*	-0.12	*	*	*	*	-0.06	*
Nd	mg kg-1	*	2.18	2.62	*	*	*	-0.68	*	*	*	*	-1.67	*
Ni	mg kg-1	0.53	-1.79	-0.21	-1.45	4.95	-0.51	-1.46	1.42	-1.25	0.62	*	-0.36	0.39
Pr	mg kg-1	*	*	*	*	*	*	0.29	*	*	*	*	-0.58	*
Sb	mg kg-1	*	*	-1.70	*	*	0.67	*	*	*	-1.22	-0.44	*	-0.07
Sc	mg kg-1	*	-3.41	1.51	*	*	-0.83	1.96	*	1.54	*	*	*	*
Sm (p)	*mg kg-1*	*	*	*1.68*	*	*	*	*-0.71*	*	*	*	*	*-0.86*	*
Sr	mg kg-1	*	25.92	-0.72	0.39	0.78	-0.50	-1.22	-1.50	-0.11	-0.28	-0.78	*	-0.50
Tb	mg kg-1	*	*	1.11	*	*	*	-0.79	*	*	*	*	-1.15	*
Th (p)	*mg kg-1*	*	*	*0.49*	*	*	*	*-4.92*	*	*	*	*-0.74*	*	*
Tl (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tm	mg kg-1	*	*	0.62	*	*	*	-0.36	*	*	*	*	-0.18	*
U	mg kg-1	*	1.24	-0.16	*	*	-0.23	-4.56	-0.23	11.26	*	-1.92	*	*
V	mg kg-1	*	-4.47	-0.61	-0.61	3.27	-0.94	-1.49	*	*	*	*	1.31	0.96
W (p)	*mg kg-1*	*	*	*	*	*	*	*	*	*	*	*94.53*	*	*
Y (p)	*mg kg-1*	*	*-1.36*	*-0.14*	*	*	*	*-0.27*	*0.00*	*21.78*	*	*-1.63*	*	*
Yb	mg kg-1	*	*	-0.02	*	*	*	-0.20	*	*	*	*	-0.10	*
Zn	mg kg-1	-5.26	-0.79	-1.35	0.33	-6.05	-0.51	0.15	*	*	2.00	*	2.56	-0.60

Round identifier		M70	M70	M71	M71	M72	M73	M74	M75
Sample		GAS	GAS	GAS	GAS	GAS		GAS	GAS
Technique codes		X	IR,M,T	AA,E,ISE,M,X	AA,E,ISE,M,X	AA			A
Test portion (g)		4	0.2-0.5	0.1-1.2	0.1-1.2	1			0.5-1
Data quality		1	2	1	2	1		2	2
SiO2	% m/m	-2.74	*	0.46	*	1.38	*	0.31	1.10
Al2O3 (p)	*% m/m*	*-0.97*	*	*9.67*	*	*-11*	*	*18.47*	*2.90*
Fe2O3	% m/m	-0.78	*	0.67	*	-8.02	*	0.08	0.42
MnO	% m/m	-2.03	*	*	0.41	-6.09	*	-2.23	3.04
MgO	% m/m	-0.31	*	*	-0.16	1.87	*	-0.21	-1.52
CaO	% m/m	-6.42	*	2.29	*	*	*	-5.39	-1.83
LOI	% m/m	2.16	*	*	0.55	*	*	-0.12	0.86
As	mg kg-1	*	*	*	*	*	*	*	-0.89
Ba (p)	*mg kg-1*	*	*-1.59*	*	*1.02*	*	*	*	*0.74*
Ce	mg kg-1	*	-0.35	-1.55	*	*	*	*	*
Co	mg kg-1	*	0.24	*	-0.76	-0.10	*	*	-4.08
Cr	mg kg-1	*	0.63	*	0.09	-37.69	*	*	-2.63
Cs	mg kg-1	*	0.00	*	*	*	*	*	*
Dy	mg kg-1	*	0.20	-0.32	*	*	*	*	*
Er	mg kg-1	*	-0.47	0.73	*	*	*	*	*
Eu	mg kg-1	*	1.82	0.10	*	*	*	*	*
Gd (p)	*mg kg-1*	*	*-1.60*	*-0.27*	*	*	*	*	*
Ge	mg kg-1	*	*	*	0.00	*	*	*	*
Hf	mg kg-1	*	1.73	*	*	*	*	*	*
Hg (p)	*mg kg-1*	*	*	*	*1.77*	*	*	*	*
Ho	mg kg-1	*	-0.63	0.82	*	*	*	*	*
La (p)	*mg kg-1*	*	*0.63*	*8.96*	*	*	*	*	*
Li (p)	*mg kg-1*	*	*0.54*	*-4.20*	*	*	*	*	*
Lu	mg kg-1	*	0.28	0.55	*	*	*	*	*
Nd	mg kg-1	*	1.50	-0.89	*	*	*	*	*
Ni	mg kg-1	*	0.20	*	3.20	0.08	*	*	-2.72
Pr	mg kg-1	*	1.11	-0.43	*	*	*	*	*
Sb	mg kg-1	*	-0.69	*	-7.77	*	*	*	*
Sc	mg kg-1	*	-0.48	*	-4.77	*	*	*	*
Sm (p)	*mg kg-1*	*	*0.97*	*-1.12*	*	*	*	*	*
Sr	mg kg-1	*	0.33	*	-5.78	*	*	*	*
Tb	mg kg-1	*	0.36	-0.42	*	*	*	*	*
Th (p)	*mg kg-1*	*	*0.00*	*-3.69*	*	*	*	*	*
Tl (p)	*mg kg-1*	*	*2.11*	*	*54.85*	*	*	*	*
Tm	mg kg-1	*	-0.18	0.20	*	*	*	*	*
U	mg kg-1	*	-0.08	-0.73	*	*	*	*	*
V	mg kg-1	*	0.03	8.86	*	*	*	*	-1.90
W (p)	*mg kg-1*	*	*-1.07*	*	*	*	*	*	*
Y (p)	*mg kg-1*	*	*1.54*	*-1.91*	*	*	*	*	*212*
Yb	mg kg-1	*	-0.18	-0.20	*	*	*	*	*
Zn	mg kg-1	*	-0.68	1.21	*	-1.58	*	*	2.28

Table 4
Laboratories and names of principal contacts that participated in the GeoPT12 proficiency testing round.

Dr Nikolla Civici, Institute of Nuclear Physics, Tirana, Albania.
J. Pyke, Australian Geological Survey Organisation, Canberra City, ACT, Australia.
H. Waldron, Becquerel Laboratories Pty Ltd., Menai, NSW, Australia.
Michael Lawrence, University of Queensland, St Lucia, Queensland, Australia.
Dr Phil Robinson, University of Tasmania, Australia.
T.K. Chan, Genalysis Laboratory Services Pty Ltd., Maddington, WA, Australia.
Dr Andrzej Markowicz Head, IAEA Laboratories, Seibersdorf, Austria.
Dr J. Enzweiler and Maria Aparecida V. Penereiro UNICAMP, Campinas, SP, Brazil.
Ana Maria Graciano Figueiredo, Instituto de Pesquisas Energeticas e Nucleares, Cidade Universitaria, Sao Paulo, Brazil.
Horstpeter H. G. J. Ulbrich, Universidade de São Paulo, Cidade Universitaria, São Paulo - SP, Brazil.
Dr B. Caughlin, A.L.S. Chemex, North Vancouver, BC, Canada.
Dr Hugh de Souza, XRAL Laboratories, Don Mills, Ontario, Canada.
Diane Wingett, Lakefield Research Ltd., Lakefield, Ontario, Canada.
J. Schweyer, Geoscience Laboratories, Sudbury, Ontario, Canada.
Dr L. Paul Bedard, Université du Quebec à Chicoutimi, Quebec, Canada.
Prof Yin Ming, National Research Centre for Geoanalysis, Beijing, P.R.China.
Qi Liang , Institute of Geochemistry, Guiyang, Guizhou Province, P.R.China
Zheng Cunjiang, Xian Comprehensive Mineral and Rock, Xian, Shaanxi Province, P.R.China
Prof Chunan Tong, Chengdu University of Technology, Chengdu, Sichuan, P.R.China.
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S. Grundvig, Aarhus University, Aarhus, Denmark.
Jorgen Kystol, Geological Survey of Denmark and Greenland, Copenhagen, Denmark.
Kirsten Theisen, F.L.Smidth, Valby, Denmark.
Tarmo Kiipli, Geological Survey of Estonia, Tallinn, Estonia.
Juha Virtasalo, Geological Survey of Finland, Rovaniemi, Finland.
J-L. Joron, Laboratoire Pierre Süe, CE / Saclay, Gif sur Yvette, France.
Mr Jean-Louis Bodinier, Université de Montpellier II, Montpellier, France.
F. Augustin, BRGM, Orleans, France.
Jean Samuel, Centre de Géochimie de la Surface, Strasbourg, France.
Prof Mireille Polvé, Université Toulouse 3, Toulouse, France.
Paul Capiez, Universite Claude Bernard Lyon 1, Villeurbanne, France.
Dr Thomas Fockenberg, Ruhr-Universität Bochum, Bochum, Germany.
J. Kühnel, Lurgi Umwelt GmbH, Frankfurt am Main, Germany.
Dr. H. Mueller-Sigmund, Universitat Frieburg, Frieburg, Germany.
Drs U. Rast and A. Andres, Bayerisches Geologisches Landesamt, München, Germany.
Dr Peter Dulski, Geoforschungs Zentrum Potsdam, Potsdam, Germany.
Dr Friedrich Gruener, Universitaet Stuttgart, Stuttgart, Germany.
Dr William Kwarteng, Huk Umweltlabor GmbH, Wenden, Germany.
M. D'Orazio, Centro di Studio per la Geologia Strutturale e Dinamica dell'Appennino, Pisa, Italy.
Byoung-Ouk Kim, HANKUK Glass Industies, Inc., Gunsan, Jeonbuk, Korea.
Manager of Analysis Team, Central Research Institute, Kamgang Korea Chemical Co. Ltd., Kyunggi-do Korea, Korea.
Rufino Lozano Instituto de Geologia, UNAM, Ciudad Universitaria, D.F., Mexico.
B. Batjargal, Central Geological Laboratory, Ulaanbaatar, Mongolia
A. Boussetta, Reminex - Centre de Recherche, Medina - Marrakech, Morocco.
Mari-Ann Storeide, A/S Olivin, Åheim, Norway.
Børre Davidsen, Geological Survey of Norway, Trondheim, Norway.
E. Popiolek, Polish Geological Institute, Warsaw, Poland.
Maria Eugénia Moreira, Laboratio do Instituto Geologico e Mineiro, S. Mamede de Infesta, Portugal.
Dr Maria Carlos Figueiredo, Centro Technógico da Cerâmica e do Vidro, Coimbra, Portugal.
Dr Anatoly Revenko, Institute of the Earth's Crust, Irkutsk, Russia.
Dr L. Petrov, Institute of Geochemistry, Irkutsk, Russia.
Dr I. Borine, VSEGEI - All Russia Geological Research Institute, St Petersburg, Russia.
Pavol Lucivansky, Geological Survey of Slovak Republic, Spisská Nová Ves, Slovakia.
Dr Peter Kump, J. Stefan Institute, Lubljana, Slovenia.

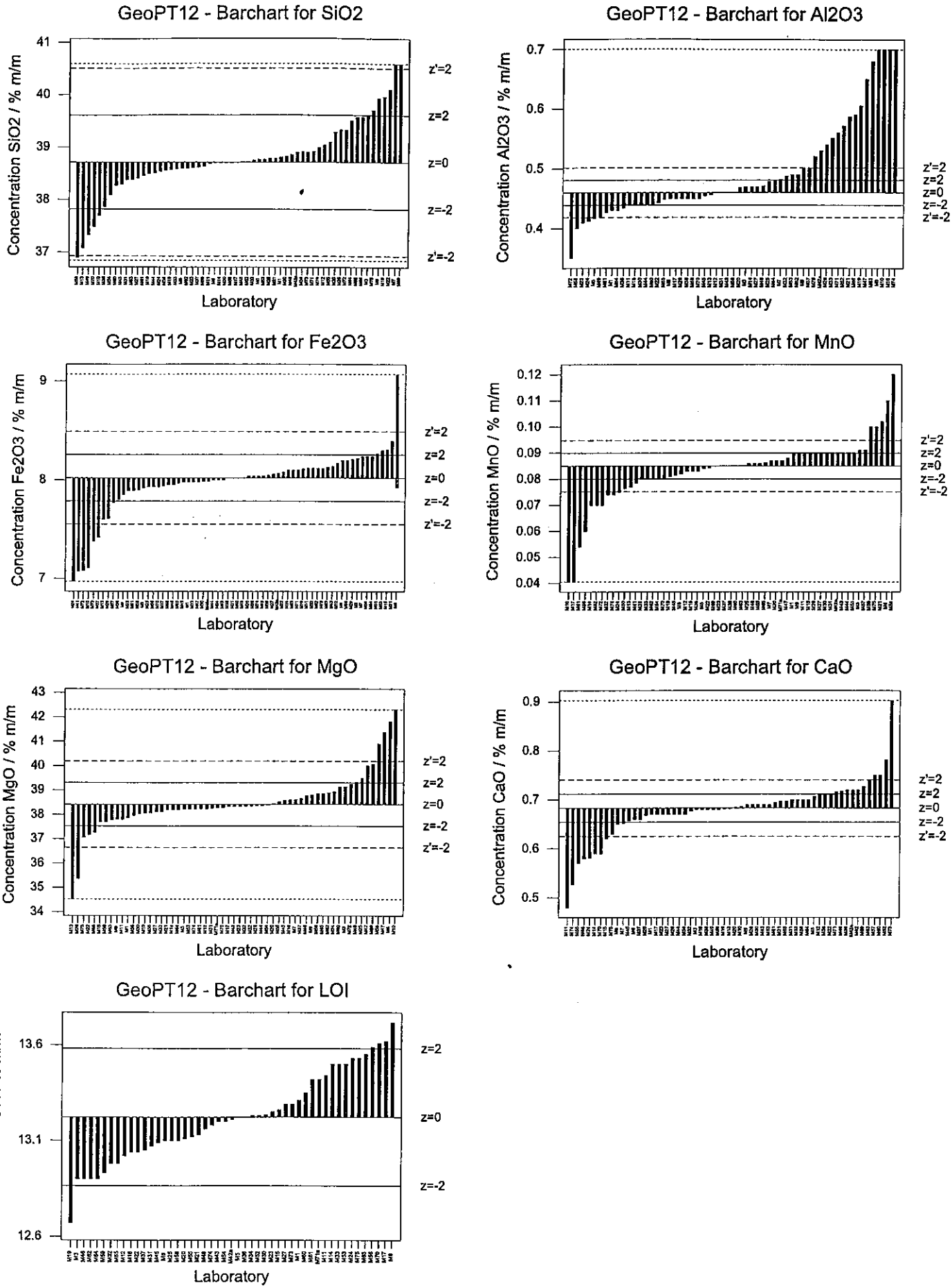
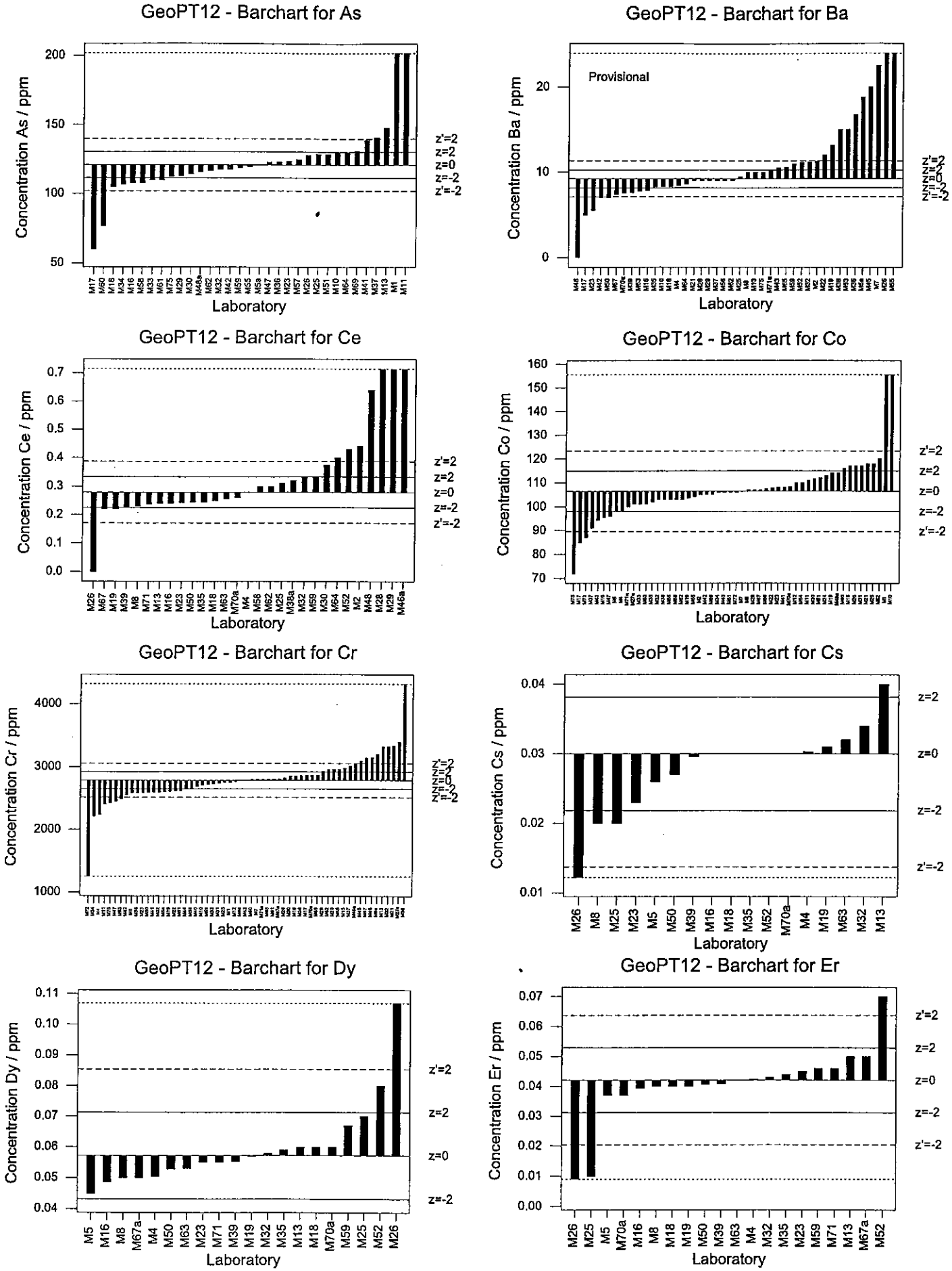


Figure 1

GeoPT12 –GAS Serpentinite: 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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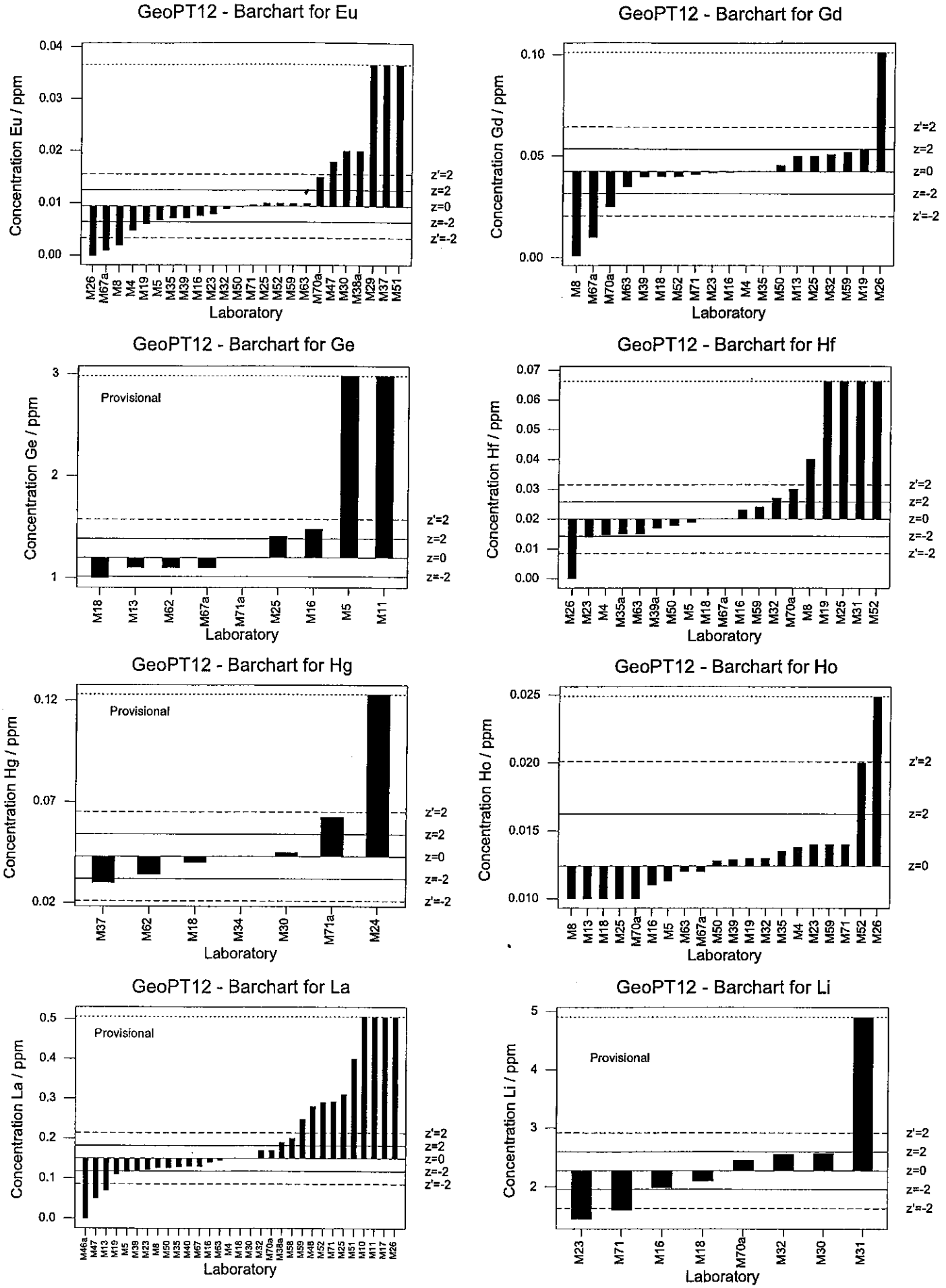

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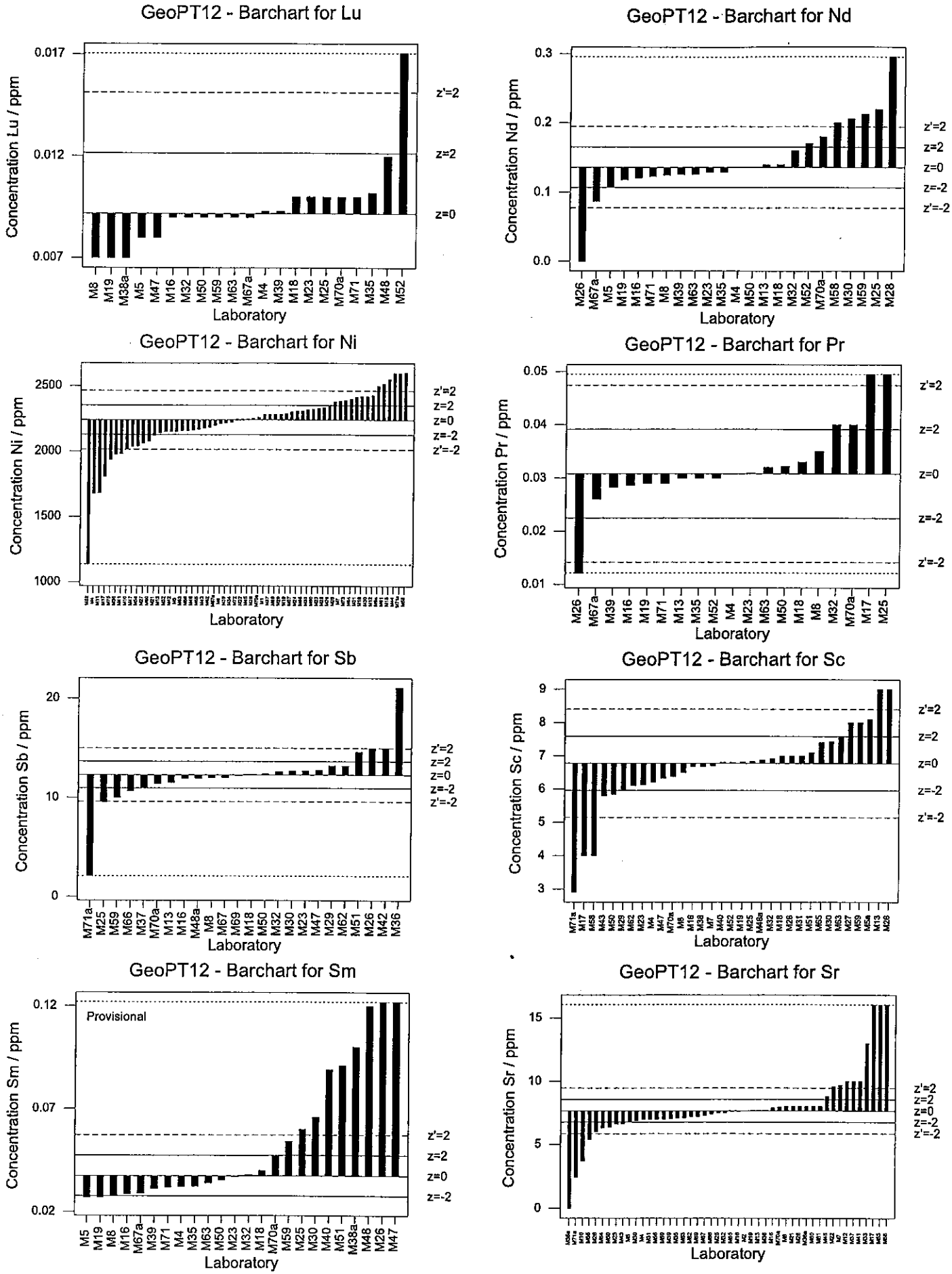

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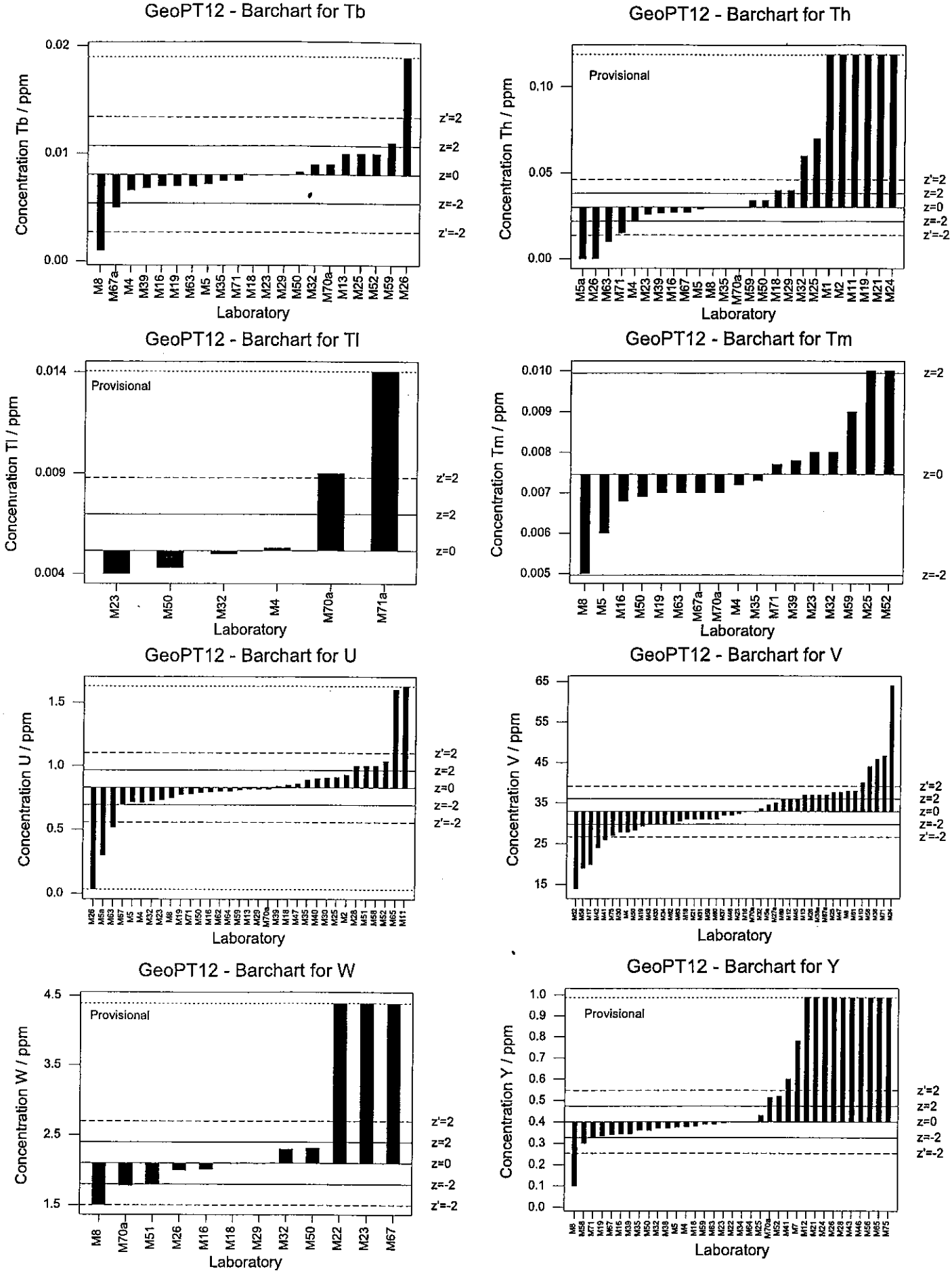

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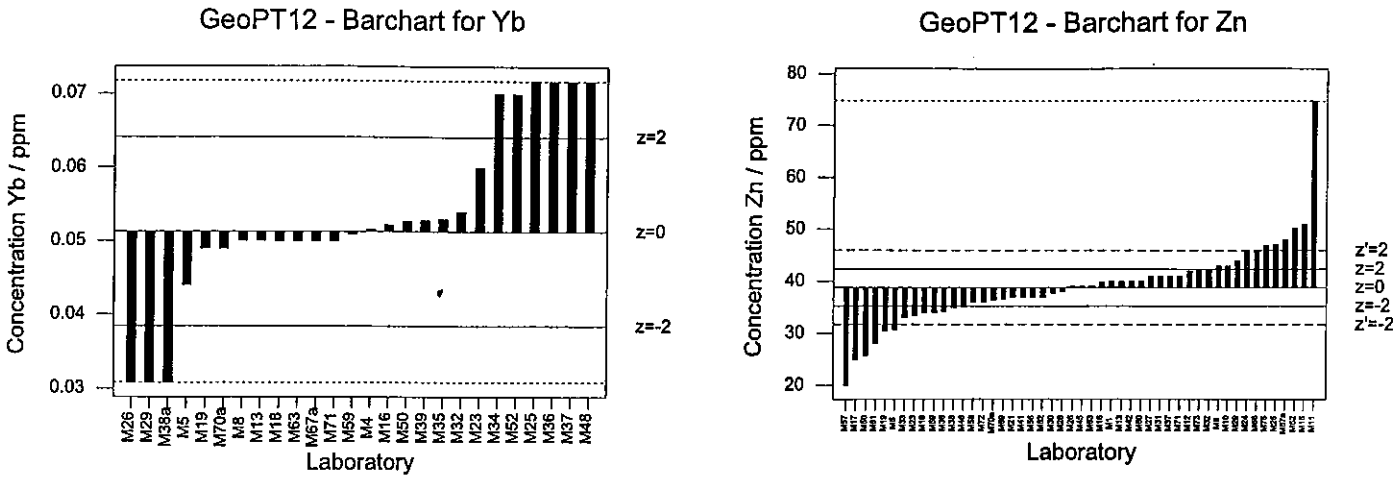

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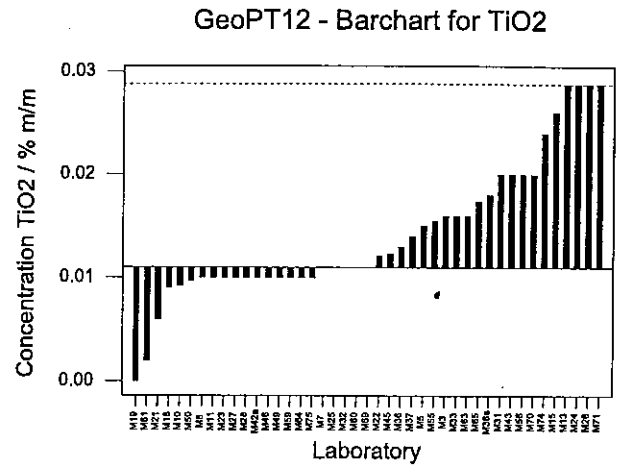
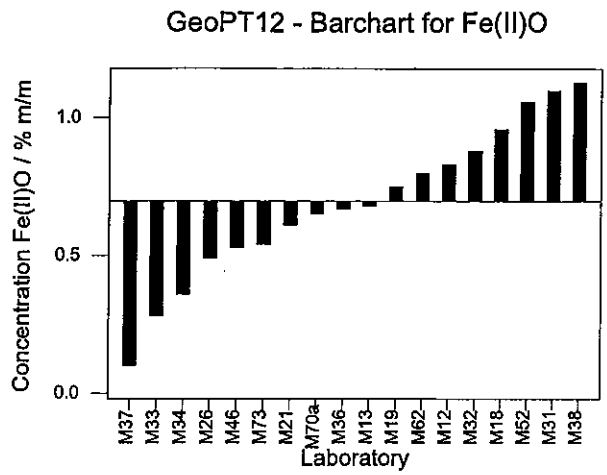
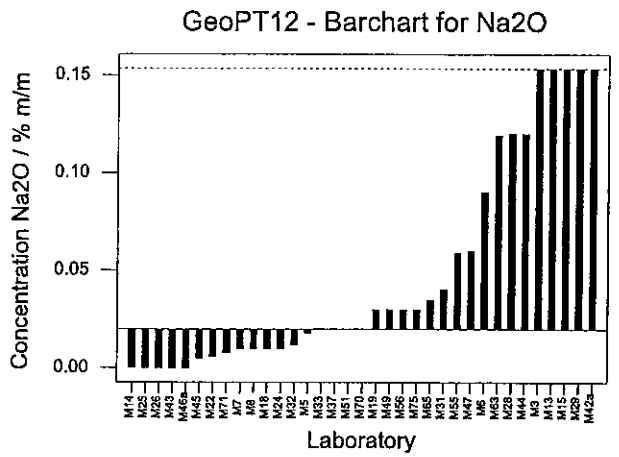
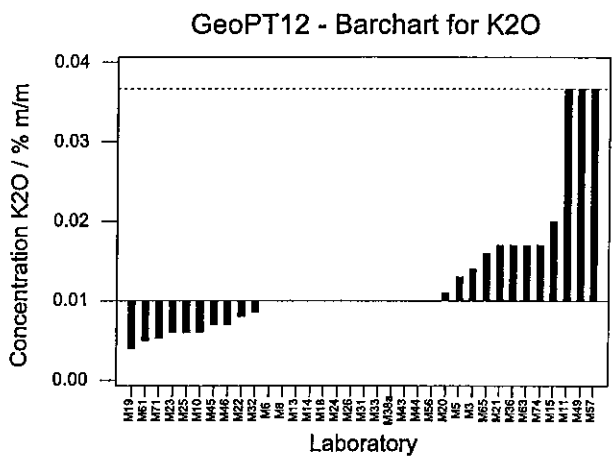
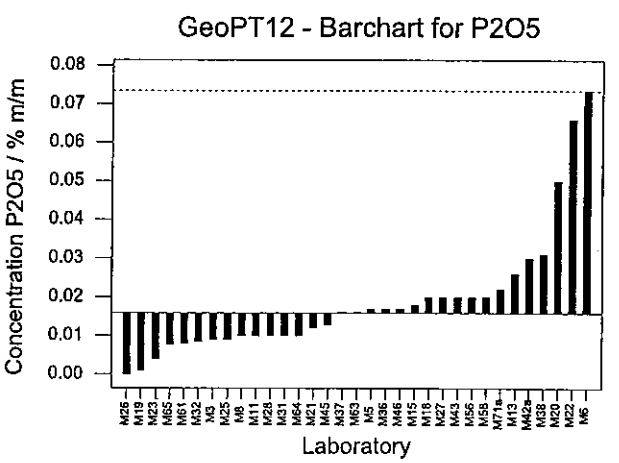
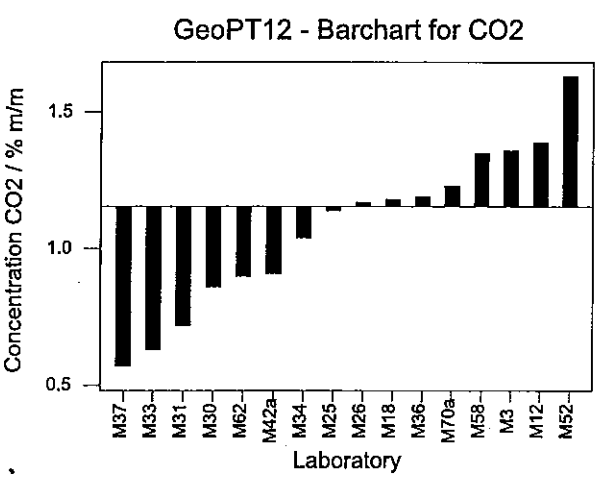












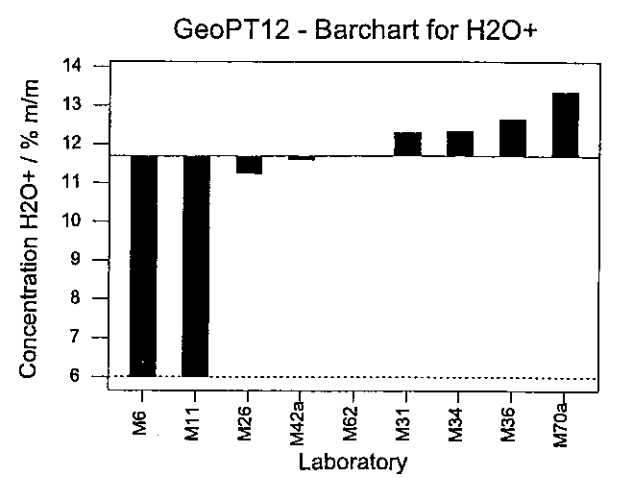
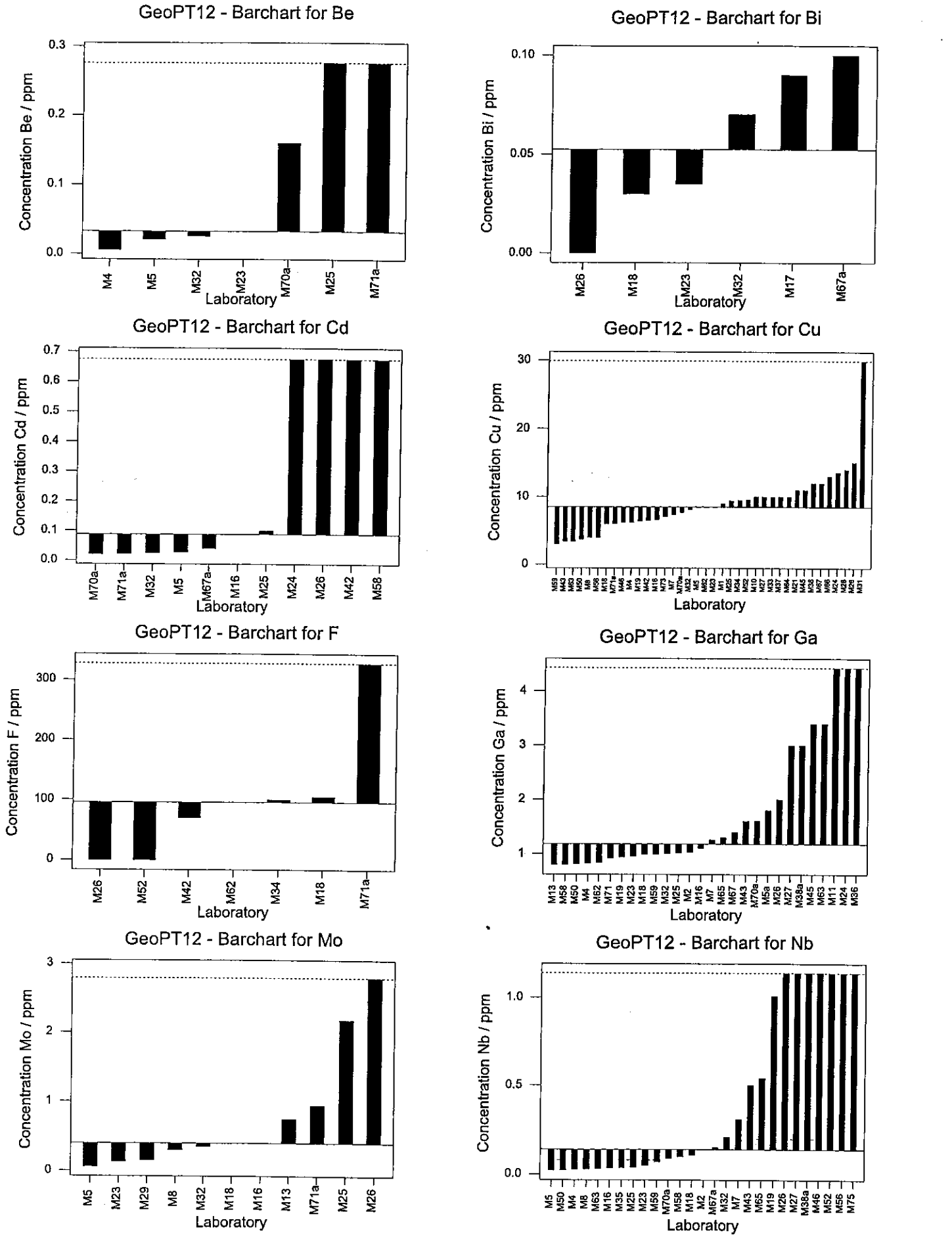


Figure 2
GeoPT12 –GAS Serpentinite: Data distribution charts for elements for which values were not assigned.



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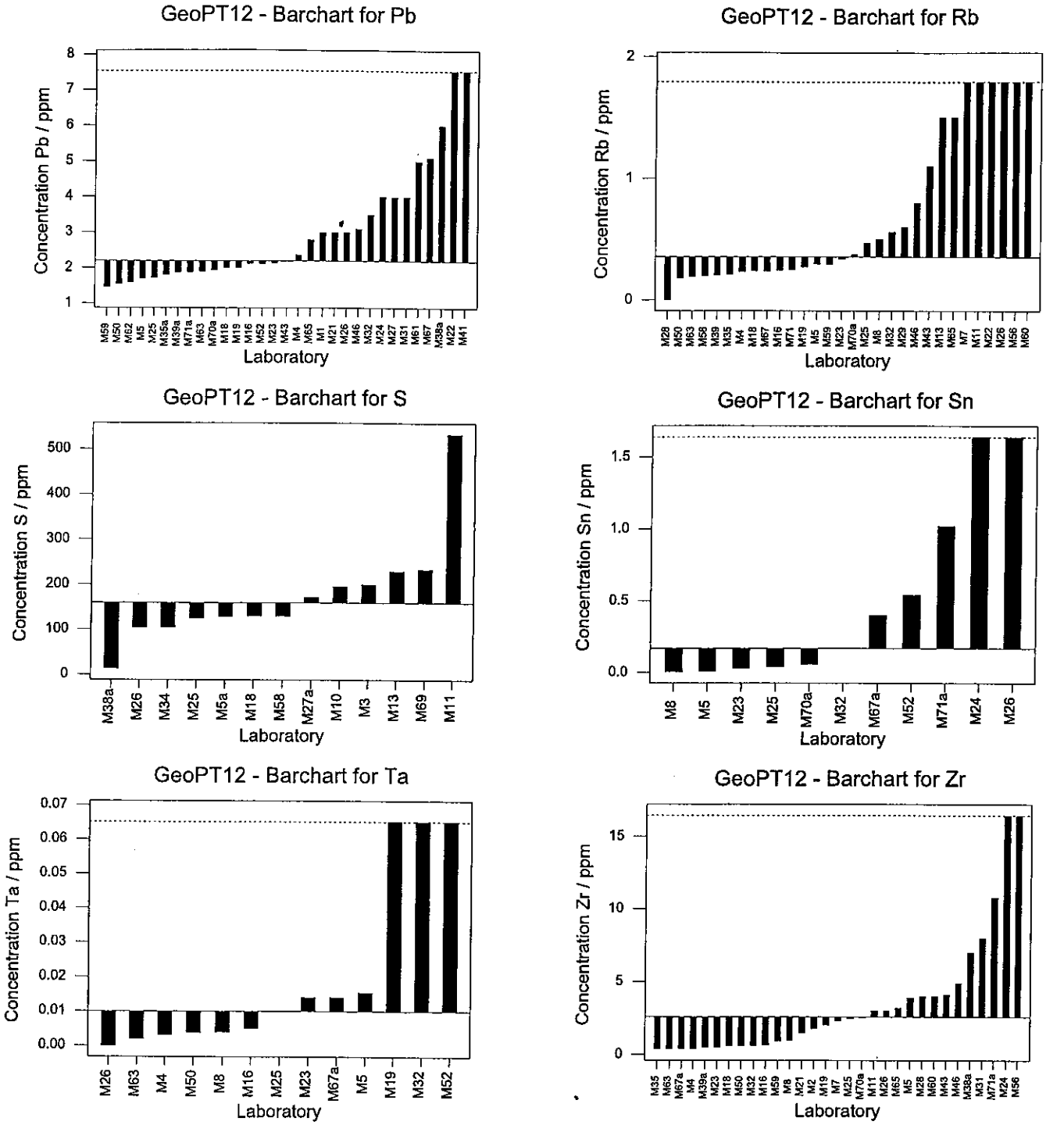
GeoPT12 –GAS Serpentinite: Data distribution charts for elements for which values were not assigned.



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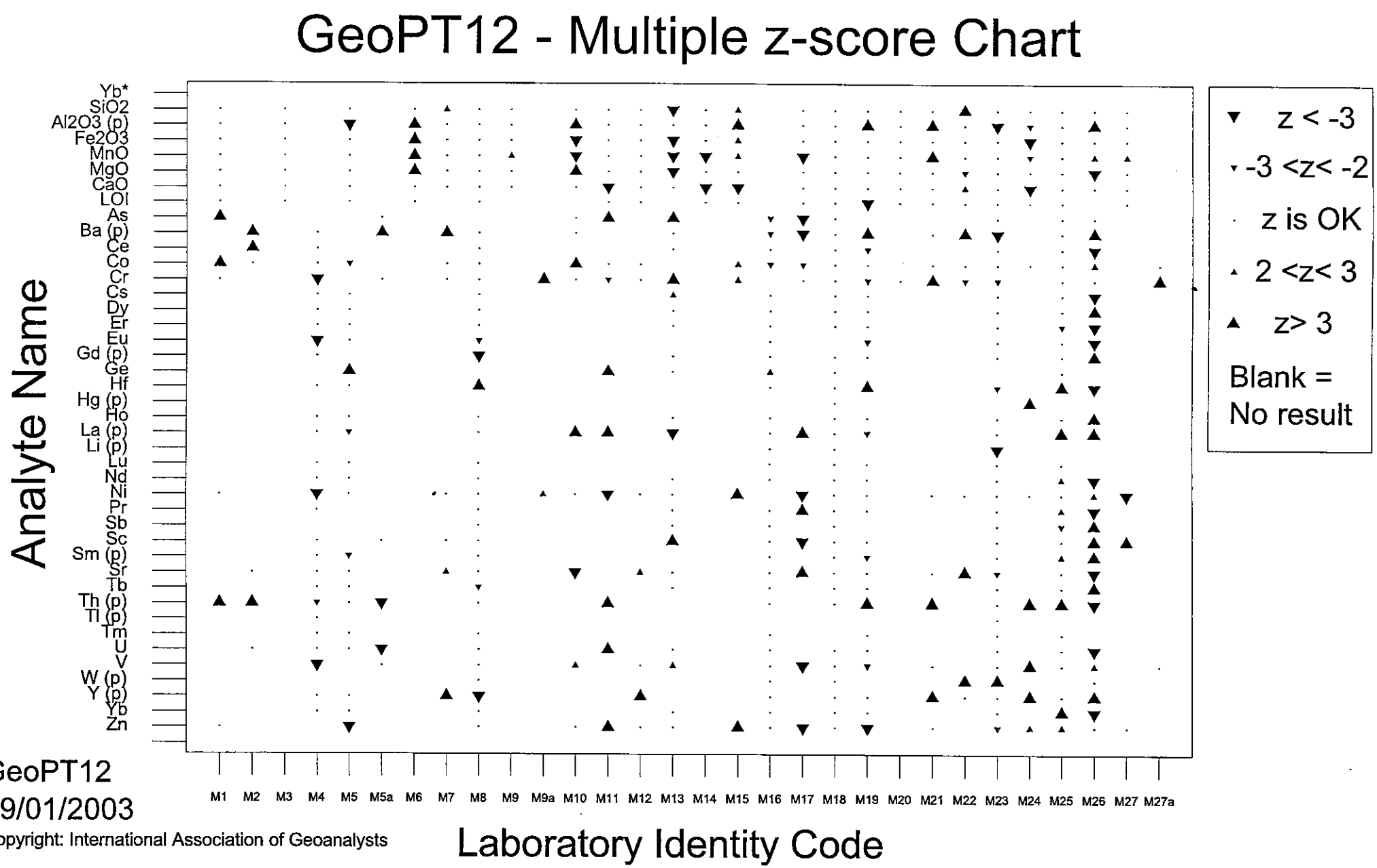
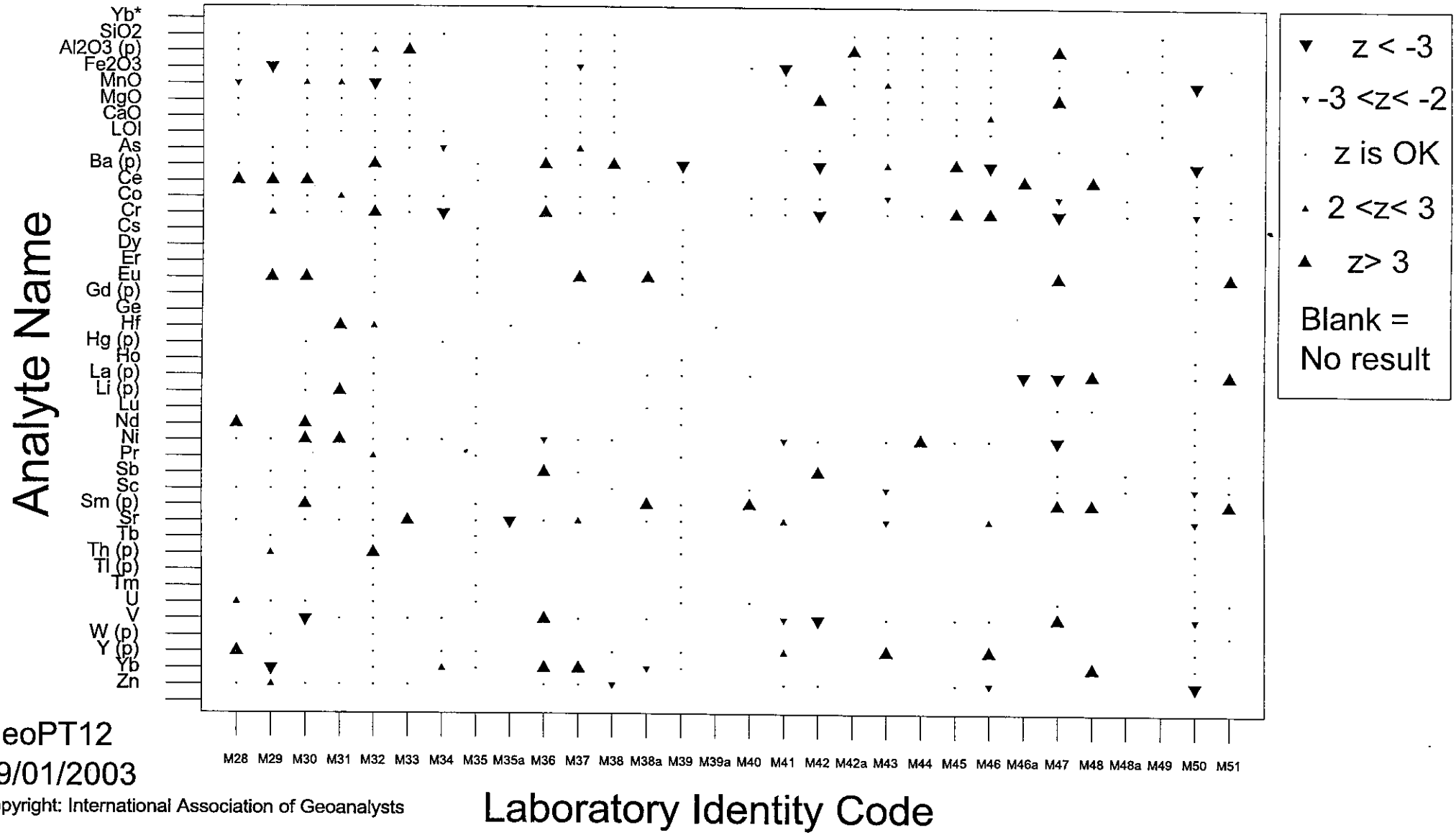


Figure 3

GeoPT12 –GAS Serpentinite: Multiple z-score charts for laboratories participating in the GeoPT12 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteri Satisfactory data are plotted as '.'). Data other categories are plotted as follows: z<-3 (t), -3<z<-2 (t), +2<z<+3 (s), Z>+3 (s).

GeoPT12 - Multiple z-score Chart



GeoPT12
09/01/2003

Figure 3
GeoPT12 –GAS Serpentinite: Multiple z-score charts for laboratories participating in the GeoPT12 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 (t), -3<z<-2 (t), +2<z<+3 (s), Z>+3 (s).

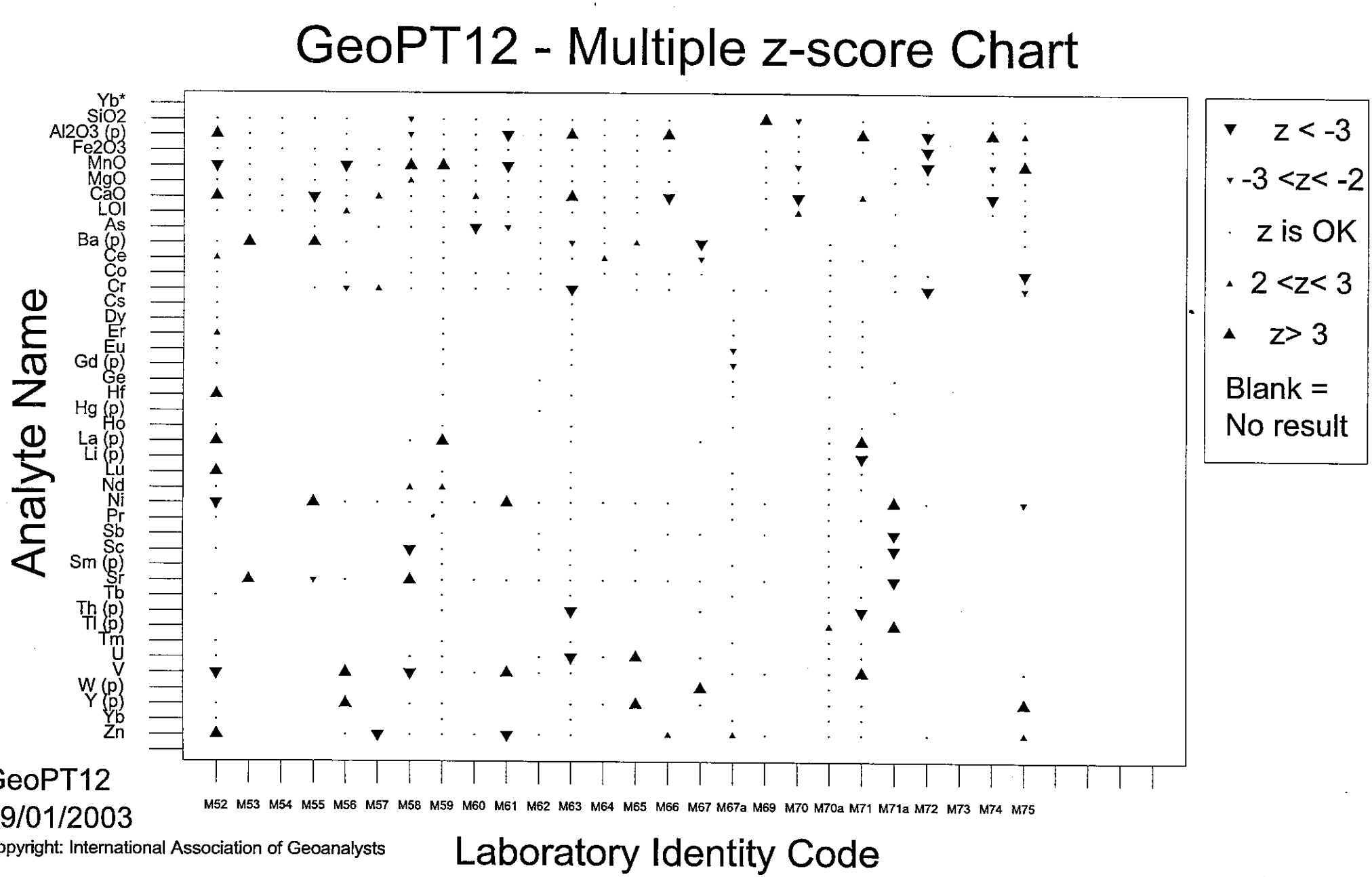


Figure 3

GeoPT12 –GAS Serpentinite: Multiple z-score charts for laboratories participating in the GeoPT12 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 (t), -3<z<-2 (t), +2<z<+3 (s), Z>+3 (s).