GEOPT19 - AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES — REPORT ON ROUND 19 / July 2006 (Gabbro, MGR-N)

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Keywords: Proficiency testing, quality assurance, GeoPT, GeoPT19 round, MGR-N, gabbro

Abstract

Results are presented for GeoPT19, round nineteen of the GeoPT international proficiency testing programme for analytical geochemistry laboratories. The sample distributed for this round was MGR-N, a gabbro, supplied by B. Batjargal, 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 nineeenth round of the international proficiency testing programme, GeoPT19, 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 and the aims of the programme can be reviewed at http://www.geoanalyst.org/geopt.html. The programme is organised by the International Association of Geoanalysts and is conducted in accordance with a published protocol (http://www.geoanalyst.org/GeoPt-protocol.pdf). The overall aim of the programme is to provide participating laboratories with z-score information for each reported elemental determination, from which the laboratories can decide whether the quality of their data is satisfactory in relation to both their chosen fitness-for-purpose criterion and results submitted by all the other laboratories contributing to the round and, therefore, 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.

Steering Committee for Round 19: M. Thompson (Chair), P.J. Potts (Secretary) and P.C. Webb (Results coordinator).

Sample GeoPT19: MGR-N, a gabbro, was supplied ready packaged by B. Batjargal, (Central Geological Laboratory, Ulaanbaatar, Mongolia).

The test material was tested for homogeneity according to the revised (2006) International Harmonised Protocol (Pure Appl Chem, 2006, 78, 145-196), for the following elements (SiO_2, TiO_2, Al_2O_3, Fe_2O, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, Rb, Sr, Y, Zr, Nb, Ba,

Pb, Th, U, Sc, V, Cr, Co, Ni, Cu, Zn, Ga, Mo, As, S). No lack of 'sufficient homogeneity' was detected, and this material was therefore considered suitable for use in the GeoPT proficiency testing programme.

Timetable for GeoPT19:

Distribution of sample: March 2006.
Deadline for submission of analytical results: 15th June 2006.
Distribution of draft report: August 2006

Submission of results

Results submitted by the seventy-six laboratories that participated in this round are listed in Table 1. All of these data were used for the assessment of assigned values.

Assigned values

Following procedures described in earlier rounds, a robust statistical procedure was used to derive assigned concentration values [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 8 major components and both assigned and provisional values for 36 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 portion 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/components shown in Figure 1 were judged to have satisfactory distributions and values were assigned, namely:
SiO_2, TiO_2, Al_2O_3, Fe_2O_3T, MnO, MgO, CaO, Na_2O, As, Ba, Be, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Ga, Gd, Hf, Ho, La, Li, Lu, Nd, Ni, Pb, Pr, Sb, Sc, Sm, Sr, Tb, Tm, U, V, W, Y, Yb, Zn, and Zr.
Of these, the elements As, Cd, Cr, Li, Pb, Sb, W and Zr were assigned provisional values,

Bar charts in Figure 2 show distribution data for elements that were not judged to be sufficiently satisfactory in the statistical analysis to assign values, and z-scores are plotted for guidance only. Thus, values were not assigned to the following elements/components, despite the availability for some, of a sufficient number of analytical results:
K_2O, P_2O_5, CO_2, Fe(II)O, LOI, Ag, Bi, Ge.

Bar charts in Figure 3 are plotted for information only, for those elements/components i.e. H_2O^+, Cl, F, Mo, Nb, Rb, S, Se, Sn, Ta, Th and Tl, where the statistical analysis was sufficiently unsatisfactory to be able to assign values or insufficient data were reported to allow any assessment to be made.

Z-score analysis

As in previous rounds, laboratories were invited to choose one of two performance standards against which their analytical results would be judged:
Data quality 1 for laboratories working to a 'pure geochemistry' standard of performance, where analytical results are designed for geochemical research and where care is taken to provide data of high precision and accuracy, sometimes at the expense of a reduced sample throughput rate.
Data quality 2 for laboratories working to an 'applied geochemistry' standard of performance, where, although precision and accuracy are still important, the main objective is to provide results on large numbers of samples collected, for example, as part of geochemical mapping projects or geochemical exploration programmes.
The target standard deviation (H_a) for each element assessed was calculated from a modified form of the Horwitz function as follows:

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

Where X_a is the 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 standard deviation.

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' (in the sense that no action is called for by the participant). 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.

Overall performance

A summary of the overall performance of individual laboratories in this round is plotted in Figure 4 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-scores that exceeded the action limits. This chart is designed to help individual laboratories to judge their overall performance in this proficiency testing round.

For this sample there were a larger range of elements than usual for which no assigned value could be given. There also appear to be many higher z-scores than is usual. Initial indications are that the high Ca content of this sample may pose problems that are not usually encountered, and possibly that more elements than usual were close to detection limits for some techniques.

Participation in future rounds

The benefit from proficiency testing arises from regular participation and laboratories are invited to contribute to the GeoPT20 round, the sample for which will be distributed during September 2006.

Acknowledgements

The authors thank John Watson and Liz Lomas (OU) for valued assistance with the production of this report. The GeoPT programme is organised on behalf of the International Association of Geoanalysts.

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. Published in the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

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

GeoPT6
Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GEOPT6 - an international proficiency test for analytical geochemistry laboratories - report on round 6 (OU-3: 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., Chenery S.R., Webb, P.C. and Watson J.S. (2002)
GEOPT11 - an international proficiency test for analytical geochemistry laboratories - report on round 11 / July 2002 (OU-5 Leaton dolerite). International Association of Geoanalysts: Unpublished report.

GeoPT12
Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Batjargal B. (2003)
GEOPT12 - an international proficiency test for analytical geochemistry laboratories - report on round 12 / January 2003 (GAS Serpentinite). International Association of Geoanalysts: Unpublished report.

GeoPT13
Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Kaspar H.U. (2003)
GEOPT13 - an international proficiency test for analytical geochemistry laboratories - report on round 13 / July 2003 (Köln Loess). International Association of Geoanalysts: Unpublished report.

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

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

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

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

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

Table 1		GeoPT19 Analytical results submitted (June 2006)														
		Gabbro MGR-N			Note: There is no T4											
Round identifier		T1	T2	T3	T5	T5	T6	T7	T8	T9	T10	T11	T11	T12	T13	T13
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		1	1	2	1	2	2	1	2	1	2	1	2	2	1	2
SiO2	% m/m	43.2	43.18	43	43.305		43.71	33.4	43.9		43.36	43.03		42.62	43.33	
TiO2	% m/m	0.92	0.96	0.977	0.959		0.927	0.88	0.731		0.98	1.03		0.99	0.949	
Al2O3	% m/m	22.25	22.26	22.25	22.313		22.24	20.5	26.8	10.44	22.37	22.01		22.63	22.3	
Fe2O3	% m/m	10.6	10.84	11.06	10.593		10.55	9.88	9.72	10.94	10.96	10.82		10.87	10.91	
Fe(II)O	% m/m															
MnO	% m/m	0.09	0.1	0.106	0.107		0.11	0.1	0.135	0.0918	0.107	0.10		0.11	0.108	
MgO	% m/m	4.67	4.73	4.62	4.751		4.65	4.14		4.062	4.67	4.67		4.79	4.82	
CaO	% m/m	15.3	15.5	15.5	15.326		15.44	14.4	13.8	12.76	15.25	15.11		15.18	15.53	
Na2O	% m/m	1.39	1.44	1.31	1.359		1.34	1.12		1.141	1.39	1.37		1.31	1.34	
K2O	% m/m	0.09	0.11	0.09	0.096		0.094	0.086		0.079	0.09	0.10		0.09	0.1	
P2O5	% m/m		0.04	0.037	0.043		0.055	0.031			0.043	0.04			0.052	
H2O+	% m/m												1.314			
CO2	% m/m												0.267			
LOI	% m/m		0.88	0.77	0.88		0.88				0.88		1.01	1.02	0.86	
Ag	mg kg-1													0.33		
As	mg kg-1			1.3				0.547		3.58	8			2.1		
Au	mg kg-1															
B	mg kg-1															
Ba	mg kg-1			68		57.1		46.5	53	57.07		76		56.2	59.9	
Be	mg kg-1							0.118						0.15		
Bi	mg kg-1							0.066				0				
Br	mg kg-1											0				
Cd	mg kg-1							0.173	2.8					0.19		
Ce	mg kg-1			10				3.18	2.5	3.53		5		4.1		
Cl	mg kg-1											146				
Co	mg kg-1		37	38		32.8		32.1		45.56	28	27		38		
Cr	mg kg-1			49		41.1		28.7		35.33	43	32		40	56.6	
Cs	mg kg-1							0.356	1.2					0.29		
Cu	mg kg-1			590	607.3			494	643	599.8	605	536		597	557.1	
Dy	mg kg-1							0.805		0.867				0.66		
Er	mg kg-1							0.442		0.49				0.45		
Eu	mg kg-1							0.348						0.37		
F	mg kg-1											283				
Ga	mg kg-1			21		19.3		17.7	15			19		19.6	18.1	
Gd	mg kg-1							0.771		0.867				0.8		
Ge	mg kg-1															
Hf	mg kg-1			0.4				0.316		0.363						
Hg	mg kg-1															
Ho	mg kg-1							0.164		0.183				0.16		
I	mg kg-1															
In	mg kg-1									23.33				0.034		
Ir	mg kg-1															
La	mg kg-1							1.31	2	1.4		5				
Li	mg kg-1							3.6		3.467				2.5		
Lu	mg kg-1							0.055		0.37						
Mo	mg kg-1							0.659		0.537		1		0.42		
N	mg kg-1												140			
Nb	mg kg-1			0.2	1.1			0.421		0.257		0				
Nd	mg kg-1			8				2.46		2.81		5		2.8		
Ni	mg kg-1		20	20	24.3			19.2		29.04	19	14		17.9	15.8	
Os	mg kg-1															
Pb	mg kg-1				4.8			3.48	21	1.913	8	9		4.5		
Pd	mg kg-1															
Pr	mg kg-1							0.495		0.57						
Pt	mg kg-1															
Rb	mg kg-1		1.4	3	1.3			1.41	3			3				
Re	mg kg-1															
Rh	mg kg-1															
Ru	mg kg-1															
S	mg kg-1										440	120				
Sb	mg kg-1							0.099								
Sc	mg kg-1					42		39.6				32				48.7
Se	mg kg-1									1.52		1				
Sm	mg kg-1			2.6				0.712		0.87						
Sn	mg kg-1							0.542		0.227						
Sr	mg kg-1		776	792	799.6			891	767	754.5	837	761		833	747.6	
Ta	mg kg-1							0.869								
Tb	mg kg-1							0.133						0.13		
Te	mg kg-1															
Th	mg kg-1							0.064			4	0				
Tl	mg kg-1							0.017				0				
Tm	mg kg-1							0.06								
U	mg kg-1							0.025				3				
V	mg kg-1		463	439		452.8		419	380	328.8		402		538	340.3	
W	mg kg-1											3				
Y	mg kg-1		4.3	6	4.6			4.51	3.4	4.67		5		5.3		
Yb	mg kg-1							0.375		0.44						
Zn	mg kg-1		88	81	89.5			89.4	85	51.33	85	83		100	89.5	
Zr	mg kg-1		5.5	7	6.4				9	10.65		9		11.6	25.9	

Table 1		GeoPT19 Analytical results submitted (June 2006)														
		Gabbro MGR-N														
Round identifier		T14	T15	T16	T17	T18	T19	T20	T21	T22	T22	T23	T23	T24	T24	T25
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		2	2	1	1	1	1	1	2	1	2	1	2	1	2	1
SiO2	% m/m	44.01	42.86				43.61	43.512	44.03	43.62		43.5		43.11		43.44
TiO2	% m/m	0.945	0.937				0.95	0.984	1.016	0.95			0.913	0.96		0.93
Al2O3	% m/m	21.99	22.04				22.35	22.395	22.76	22.67		22.06		22.48		22.10
Fe2O3	% m/m	9.88	10.78		10.72		10.84	10.266	10.91	10.94			10.37	10.76		10.71
Fe(II)O	% m/m		4.99					5.1								
MnO	% m/m	0.094	0.103				0.11	0.095	0.11	0.1		0.091		0.078		0.09
MgO	% m/m	4.62	4.752				4.61	4.669	4.854	4.77			4.569	4.74		4.57
CaO	% m/m	15.71	15.223				15.32	15.165	15.6	14.99			15.87	15.28		15.39
Na2O	% m/m	1.27	1.393				1.34	1.36	1.392	1.46			1.213	1.41		1.38
K2O	% m/m	0.15	0.104				0.08	0.09	0.183	0.1			0.08	0.09		0.09
P2O5	% m/m	0.027	0.045				0.07	0.048	0.045	0.03				0.07		0.03
H2O+	% m/m															
CO2	% m/m															
LOI	% m/m	1.1	0.83				1.2	0.7		0.82		1.02		1.02		0.84
Ag	mg kg-1	0.37											1	0.31		
As	mg kg-1	1.7											4.01			
Au	mg kg-1															
B	mg kg-1															
Ba	mg kg-1	48.4	47	54.9		51.87		51.73	45.39				53.1	49.4		
Be	mg kg-1	0.16		0.15					0.7					0.126		
Bi	mg kg-1	0.14											1.01	0.057		
Br	mg kg-1															
Cd	mg kg-1	0.2												0.19		
Ce	mg kg-1	3.24	3.48	3.43	3.5	3.21		3.478	2.65				3.2	3.1		
Cl	mg kg-1	148														
Co	mg kg-1	35.6	36	37.7	36		29	37.47	33.74		30		45.5	35.6		
Cr	mg kg-1	42	44	39.4	36		38	39.53	34.38		65		50	42		
Cs	mg kg-1	0.38		0.38		0.37		0.3771	0.31					0.345		
Cu	mg kg-1	578	605	571			391	574.8	675.6	544			642	621		
Dy	mg kg-1	0.8	0.86	0.85		0.87		0.78	0.73			0.9		0.814		
Er	mg kg-1	0.43	0.43	0.46		0.45		0.436	0.4			0.5		0.429		
Eu	mg kg-1	0.38	0.42	0.42	0.41	0.38		0.38	0.37			0.42		0.37		
F	mg kg-1	263					420									
Ga	mg kg-1	18.6		19.3				18.43	17.75	20			19.5	19.5		
Gd	mg kg-1	0.85	0.8	0.91		0.85		1.392	0.72			0.91		0.832		
Ge	mg kg-1	1.1														
Hf	mg kg-1	0.4		0.33		0.28		0.345	0.24					0.337		
Hg	mg kg-1															
Ho	mg kg-1	0.16	0.18	0.19		0.17		0.1982	0.15			0.21		0.155		
I	mg kg-1															
In	mg kg-1															
Ir	mg kg-1															
La	mg kg-1	1.31	1.44	1.26	1.3	1.27		1.436	0.43			1.5		1.31		
Li	mg kg-1	4.1		3.45								4		2.96		
Lu	mg kg-1	0.05	0.06	0.05	0.07	0.06		0.0553	0.05			0.08		0.053		
Mo	mg kg-1			0.45						3				0.32		
N	mg kg-1															
Nb	mg kg-1			0.24		0.21		0.418	0.16	6			2	0.2		
Nd	mg kg-1	2.62	2.76	2.66	2.1	2.59		2.6511	2.33			2.6		2.54		
Ni	mg kg-1	19.1	22	26.5			17	22.9	17.6	22			17	18.7		
Os	mg kg-1															
Pb	mg kg-1	4.39	4	4.94		4.19	6	4.467		9			3	4.19		
Pd	mg kg-1															
Pr	mg kg-1	0.52	0.52	0.43		0.49		0.5059	0.41			0.42				
Pt	mg kg-1															
Rb	mg kg-1	1.47	5	1.92		1.33		1.7427	1.15	8			3	1.42		
Re	mg kg-1															
Rh	mg kg-1															
Ru	mg kg-1															
S	mg kg-1	455					1149								400	
Sb	mg kg-1	0.15												0.085		
Sc	mg kg-1	40		40.9	41		37	40.02	42.9	37			52	41		
Se	mg kg-1															
Sm	mg kg-1	0.73	0.82	0.72	0.72	0.74		0.749	0.66			0.8		0.725		
Sn	mg kg-1	0.36												0.25		
Sr	mg kg-1	781	795	779		778	845	807.8	828.6	809			774	798		
Ta	mg kg-1			0.044		0.018		0.049						0.014		
Tb	mg kg-1	0.13	0.11	0.145		0.13		0.1318	0.12			0.18		0.134		
Te	mg kg-1	0.06														
Th	mg kg-1			0.066		0.057		0.151	0.04					0.058		
Tl	mg kg-1	0.01												0.013		
Tm	mg kg-1	0.06	0.06	0.059		0.062		0.0606	0.06			0.11		0.058		
U	mg kg-1	0.03		0.032		0.028		0.029					2.4	0.026		
V	mg kg-1	457	455	215			382	460	454	443			470	474		
W	mg kg-1	1.8							1.51				5		2.2	
Y	mg kg-1	3.6	4	4.41		4.14		4.4292	3.24	11			4.7	3.82		
Yb	mg kg-1	0.38	0.41	0.41	0.47	0.38		0.3791	0.36			0.43		0.361		
Zn	mg kg-1	100	84	111	86		81	100.95	104.2	90			99	89.8		
Zr	mg kg-1	33	59	10.4		9.57	64	9.564	5.16	10			10	9.44		

Table 1		GeoPT19 Analytical results submitted (June 2006)													
		Gabbro MGR-N													
Round identifier		T26	T26	T27	T28	T29	T30	T31	T32	T33	T34	T35	T36	T37	T38
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		1	2	2	2	1	2	1	2	2	2	2	2	1	1
SiO2	% m/m	42.70			43.59	43.25	42.92	42.91		43.240	43.539	42.59	43.7	44.02	42.02
TiO2	% m/m	0.97			0.9723	0.96	0.96	0.94		0.980	0.9945	1.0	0.95	1.01	0.9516
Al2O3	% m/m	22.45			23.46	22.86	22.26	22.66		22.071	22.062	22.18	22.70	22.63	21.56
Fe2O3	% m/m	11.05			10.12	10.88	10.8	10.75	10.1	11.155	10.894	10.38	9.75	11.05	10.13
Fe(II)O	% m/m					4				5.175					
MnO	% m/m		0.100		0.0982	0.09	0.11	0.1		0.1011	0.1055	0.104	0.11	0.106	0.0942
MgO	% m/m		4.69		4.7	4.65	4.71	4.66		5.033	4.684	4.51	4.80	4.62	4.25
CaO	% m/m	15.426			15.09	15.72	15.39	15.52		15.135	15.491	15.21	15.35	16.09	15.14
Na2O	% m/m	1.49			1.41	0.84	1.37	1.34	1.27	1.287	1.342		1.20	1.41	0.69
K2O	% m/m	0.22			0.0868	0.04	0.09	0.15		0.0918	0.0642		0.09	0.16	0.0673
P2O5	% m/m		0.04		0.0306	0.03	0.06	0.06		0.0376	0.0615		0.04	0.048	0.0377
H2O+	% m/m									0.0960		0.28			
CO2	% m/m				0.199					0.220					
LOI	% m/m		1.05		1	1.27	0.95	1.07		0.812	1.04	0.85	0.79	0.85	
Ag	mg kg-1		0.26											0.95	
As	mg kg-1								1.6		1.65	4.0		24.8	0.4
Au	mg kg-1				0.0132										
B	mg kg-1		4.4											74.6	
Ba	mg kg-1		55.0		49.5		48.9	50		78	39.50			55.1	51
Be	mg kg-1		0.14	0.142				0.13						2.6	
Bi	mg kg-1			0.06			0.235								
Br	mg kg-1											3.0			
Cd	mg kg-1		0.25											0.81	1.7
Ce	mg kg-1		3.41	3.5	3.19		3.206	3.2		3.38				8.1	11.1
Cl	mg kg-1				261					170					
Co	mg kg-1		43	33.79	35		35.67	37	34.4	35	37.50	27.0		39.3	
Cr	mg kg-1		37.7		26		42.29	36	33.2	45	22.80	51.6		39.6	42.5
Cs	mg kg-1		0.41	0.374	0.35		0.37	0.43							
Cu	mg kg-1		605		583		535.2	542			514.20	641		583.9	645.1
Dy	mg kg-1	0.77		0.76	0.84		0.822	0.79		0.81					
Er	mg kg-1		0.35	0.39	0.4		0.437	0.43		0.47					
Eu	mg kg-1	0.36		0.34	0.34		0.381	0.37	0.29	0.31					
F	mg kg-1		70												
Ga	mg kg-1	18.7		19.22	19.3		20.53	18.4		16.18	18.90	19.2		18.8	18.1
Gd	mg kg-1	0.81		0.76	0.83		0.875	0.84		0.91				1.49	
Ge	mg kg-1		1.35	1.17			1.072			0.61				10.6	
Hf	mg kg-1		0.32	0.38			0.34	0.3		1.28					
Hg	mg kg-1		0.0095												
Ho	mg kg-1	0.17		0.16	0.15		0.155	0.17		0.15				0.19	
I	mg kg-1														
In	mg kg-1						0.169								
Ir	mg kg-1														
La	mg kg-1	1.51		1.33	1.68		1.296	1.35	1.22	1.67	5.50			5.62	8.4
Li	mg kg-1	3						4.9		5.5				4.75	
Lu	mg kg-1		0.059	0.053			0.058	0.05	0.09	0.06					
Mo	mg kg-1		0.45		1.76						1.50				
N	mg kg-1														
Nb	mg kg-1		0.37	0.74	0.19		0.182	0.21			1.10	2.6			0.8
Nd	mg kg-1	2.46		2.46	2.62		2.547	2.5		2.59				12.43	
Ni	mg kg-1		25		18.6		22.44	24		20	14.90	19.6		25.1	18.2
Os	mg kg-1														
Pb	mg kg-1		3.6		3.94		3.7683	4.8		4.5	14.20	7.84		4.36	5.4
Pd	mg kg-1				0.0043										
Pr	mg kg-1	0.51		0.5	0.46		0.487	0.49		0.61				5.67	
Pt	mg kg-1				0.0021										
Rb	mg kg-1	1.97			1.53		1.593	1.92		1.93	1.50				2.3
Re	mg kg-1														
Rh	mg kg-1														
Ru	mg kg-1														
S	mg kg-1				437					210			391	450	377
Sb	mg kg-1		0.14								3.50			15.5	
Sc	mg kg-1	44.2			40			39	39.3	51	38.20			41.8	
Se	mg kg-1														
Sm	mg kg-1	0.73		0.705	0.62		0.743	0.74	0.7	0.82				2.31	
Sn	mg kg-1		0.80				0.464				0.3			10.6	1.7
Sr	mg kg-1		683		779		778.8	785		765	812.2	720		634	739.2
Ta	mg kg-1		0.1				0.017	0.02			0.5			2.5	
Tb	mg kg-1	0.13		0.126	0.12		0.13	0.13		0.11					
Te	mg kg-1														
Th	mg kg-1		0.056	0.07			0.054	0.05		0.19					1.9
Tl	mg kg-1		0.03					0.02							
Tm	mg kg-1		0.059	0.059			0.062	0.06		0.08					
U	mg kg-1	0.03						0.03							3
V	mg kg-1		472		461		446.2	418		490	445.2	370		462	404.7
W	mg kg-1		2.75	2.35	1.96		2.123								
Y	mg kg-1		4.42	4.16	4.33		4.176	4.4		4.5	6.50			4.62	4.6
Yb	mg kg-1		0.4	0.357	0.34		0.378	0.37		0.41					3.1
Zn	mg kg-1		95		110		105.2			119	99.40	90		96.8	87.5
Zr	mg kg-1		10.4	12.154	12.6		10.12	9.2		35.6	23.20				5

Table 1		GeoPT19 Analytical results submitted (June 2006)														
		Gabbro MGR-N														
Round identifier		T39	T40	T41	T42	T43	T44	T45	T46	T47	T48	T49	T50	T51	T52	T53
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		1	2	2	2	2	1	2	2	2	2	1	1	2	1	1
SiO2	% m/m	43.23	43.17	43	41.66	43.21	42.545	43.6	44.1	43.69	33.84	42.98	43.49		43.5	
TiO2	% m/m	1.00	0.967	1.03	1.16	0.92	0.9523	0.94	0.95	0.96	1.6	1.049	0.90		0.91	0.95
Al2O3	% m/m	22.65	22.33	22.4	23.01	22.53	21.980	21.7	21.75	22.45	24.31	22.21	22.13		22.06	21.75
Fe2O3	% m/m	11.01	10.7	11.2	10.83	10.86	10.780	10.7	10.66	10.67	11.31	10.85	10.29		10.49	11.0
Fe(II)O	% m/m							4.9							4.70	
MnO	% m/m	0.09	0.1045	0.108	0.09	0.11	0.1039	0.1	0.0987	0.11	0.11	0.098	0.099		0.113	0.10
MgO	% m/m	4.65	4.652	4.43	4.68	4.61	4.591	4.58	4.65	4.8		4.75	4.68		4.69	4.8
CaO	% m/m	14.4	15.17	15.3	15.65	14.92	15.150	15.1	14.86	15.58		14.42	15.85		15.48	14.56
Na2O	% m/m	1.46	1.248	1.21	1.55	1.27	1.334	1.39	1.36	1.23		1.52	1.04		1.27	1.34
K2O	% m/m	0.11	0.102	0.13	0.1	0.08	0.090	0.1	0.95	0.08		0.09	0.09		0.11	0.11
P2O5	% m/m	0.05	0.0335		0.04	0.04	0.0386	0.03	0.0249	0.03	0.01	0.051	0.038		0.033	
H2O+	% m/m						0.190	1							1.20	
CO2	% m/m							0.18	0.28				0.142		0.18	
LOI	% m/m	0.89	1.15	0.879		1.04	0.790	0.75	0.95	0.86	1.05	0.97	0.82		0.85	
Ag	mg kg-1								0.3							
As	mg kg-1							1.9	1.6						0.86	
Au	mg kg-1								0.016							
B	mg kg-1															
Ba	mg kg-1		53	184		58	49.4	50	52.8	48.8			70	49.88		
Be	mg kg-1								0.2				0.12			
Bi	mg kg-1							0.09	0.06				0.06		0.14	
Br	mg kg-1															
Cd	mg kg-1							0.22		0.22						0.3
Ce	mg kg-1			2.92		3.5	3.143	3.4	3.04	3.31			3.81	3.44	2.9	
Cl	mg kg-1							265								
Co	mg kg-1		34	33.77		35		36.2	36	33.5	71	0.0037	36		37	22
Cr	mg kg-1		33	70		43	40.6	40	21	28.2	30	0.0031	40		77	
Cs	mg kg-1			0.41			0.371	0.4	0.389	0.37			0.45	0.39		
Cu	mg kg-1			609	618	584	586.2	637	622	567	703	0.0597	552		594	580
Dy	mg kg-1			0.749		0.85	0.886	0.85	0.86	0.86			0.86	0.79	0.54	
Er	mg kg-1			0.431		0.44	0.447	0.47	0.42	0.49			0.46	0.42		
Eu	mg kg-1			0.362		0.42	0.389	0.36	0.34	0.39			0.41	0.38	0.36	
F	mg kg-1							70	134						205	
Ga	mg kg-1		19	19.59		19	19.5	19	20.1				20			
Gd	mg kg-1			0.784		0.4	0.846	0.9	0.8	0.9			0.81	0.81		
Ge	mg kg-1			1.09					1							
Hf	mg kg-1			0.308		6	0.333		0.31					0.4		
Hg	mg kg-1							10								
Ho	mg kg-1			0.167		0.2	0.178	0.18	0.16	0.18			0.18	0.16		
I	mg kg-1															
In	mg kg-1								0.04							
Ir	mg kg-1															
La	mg kg-1			1.26		1.3	1.384	1.5	1.29	1.33			1.75	1.53		
Li	mg kg-1							4	3.7				7		5	2.5
Lu	mg kg-1			0.063		0.08	0.057		0.053	0.06			0.06	0.06	0.16	
Mo	mg kg-1								0.5							
N	mg kg-1															
Nb	mg kg-1				1		0.229					0.0007		0.29	1.5	
Nd	mg kg-1			2.37		2.8	2.350	2.6	2.38	2.66			2.82	2.8	3.8	
Ni	mg kg-1		11	14.73	18	19	26.9	19.3	23	18.7	28	0.0025	44		16.0	20.0
Os	mg kg-1															
Pb	mg kg-1			4.58		0.5	4.306	5.4	6	4.52		0.0010	5.8		14.0	8.2
Pd	mg kg-1															
Pr	mg kg-1			0.474			0.451	0.54	0.475	0.52			0.55	0.56	2.6	
Pt	mg kg-1															
Rb	mg kg-1		3	1.62	3	3	1.83	1.9	1.68	1.6		0.0003	4.5	1.94		
Re	mg kg-1															
Rh	mg kg-1															
Ru	mg kg-1															
S	mg kg-1							0.05	514			0.033	0.046		516	
Sb	mg kg-1															
Sc	mg kg-1		43	47.93			39.9	42	42	35.7			34	44.19	38	
Se	mg kg-1															
Sm	mg kg-1			0.658		0.77	0.747	0.7	0.68	0.76			0.74	0.78	2.36	
Sn	mg kg-1			18.9					0.4							
Sr	mg kg-1		772	794	781	758	771.9	774	785	839		0.0793	763	799.9	771	820
Ta	mg kg-1						0.020						3.8	0.07		
Tb	mg kg-1			0.139		0.17	0.141	0.15	0.121	0.14			0.14	0.14		
Te	mg kg-1							0.48								
Th	mg kg-1			0.075	1		0.100		0.09				0.09	0.95	2.5	
Tl	mg kg-1												0.01			
Tm	mg kg-1			0.055		0.06	0.061			0.07			0.06	0.06		
U	mg kg-1						0.035			0.03			0.04	0.04		
V	mg kg-1		455	373		444	436.0	454	454	399		0.0336	447		444	360
W	mg kg-1							2.8	2.4							
Y	mg kg-1		9	4.22	6	5	4.490	4.6	3.88	4.24		0.0007	3.7	3.92	5.5	
Yb	mg kg-1			0.371		0.42	0.371	0.4	0.36	0.4			0.39	0.37	1.42	
Zn	mg kg-1		99	102.8	88	79	95.7	88	95	96.4	103	0.0087	84		101	100.0
Zr	mg kg-1		14	7.46	10	4	9.4	8.2	9.5	10.3		0.0057	7	10.43	6.5	

Table 1		GeoPT19 Analytical results submitted (June 2006)														
		Gabbro MGR-N														
Round identifier		T54	T54	T55	T56	T57	T58	T59	T60	T61	T62	T63	T64	T65	T66	T67
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		1	2	2	2	2	2	1	2	1	2	1	2	2	2	2
SiO2	% m/m	43.02		42.11	43.45	51.03	43.409	43.28	43.015	42.28	43.46	43.75	43.46	43.44	44	43.78
TiO2	% m/m	0.99		0.964	0.96	1.14	0.951	0.95	0.951	0.94	0.92	0.963	0.93	0.985	0.96	0.94
Al2O3	% m/m	22.09		22.34	22.42	15.5	22.683	22.25	22.179	21.8	21.6	22.62	22.32	21.95	21.5	22.45
Fe2O3	% m/m	11.18		10.8	10.78	10.41	10.613	10.67	10.683	10.56	10.93	9.85	10.93	10.990	10.8	10.89
Fe(II)O	% m/m	4.75									4.68	5		4.860		4.45
MnO	% m/m	0.11		0.103	0.11	0.09	0.109	0.104	0.1	0.1	0.11	0.098	0.1	0.096	0.1	0.11
MgO	% m/m	4.93		4.82	4.85	4.46	4.689	4.7	4.619	4.49	4.74	4.995	4.61	4.800	4.68	4.7
CaO	% m/m	15.33		15.36	15.32	13.91	15.134	15.46	15.405	15.11	15.07	15.63	15.33	15.100	15.3	15.68
Na2O	% m/m	1.42		1.51	1.41	1.72	1.274	1.39	1.367	1.32	1.49	1.14	1.34	1.360	1.18	1.37
K2O	% m/m	0.09		0.14	0.1		0.099	0.071	0.089	0.09	0.1	0.06	0.09	0.100	0.04	0.1
P2O5	% m/m	0.06		0.046	0.03	0.04	0.033	0.05	0.031	0.04	0.03	0.045	0.03	0.040	0.04	0.04
H2O+	% m/m									1.17	0.55					1.15
CO2	% m/m									0.22			0.29			0.18
LOI	% m/m	0.88				1.6	0.88	0.86	1.075	0.82	1.03	1.47		0.830	0.86	0.98
Ag	mg kg-1			0.7					0.5			0.34				
As	mg kg-1					3	1.5									
Au	mg kg-1															
B	mg kg-1													4		
Ba	mg kg-1	52.7		61			105	53	58.3	46		43.517	36	49	58	52.52
Be	mg kg-1			0.15					0.12			0.132				0.14
Bi	mg kg-1								0.069							
Br	mg kg-1															
Cd	mg kg-1			0.23								0.134				0.071
Ce	mg kg-1	3.32		3.7			1.3		4			3.928			3.93	3.18
Cl	mg kg-1		73.2													
Co	mg kg-1	31.5		39.2				29	35.8	35	32	43.648	38	33	38.4	37.24
Cr	mg kg-1	43.7		39.1		19	48.3	71	40.2	34	32	62.27	20	36	49	42.01
Cs	mg kg-1	0.44							0.369			0.352			0.38	0.381
Cu	mg kg-1	583.2		581.7		519	633.5	595	644.8	664	585	539.05	600	632	544	567
Dy	mg kg-1	0.77		0.8					0.749			0.861			0.91	0.829
Er	mg kg-1	0.44		0.42					0.406			0.454			0.44	0.459
Eu	mg kg-1	0.38		0.36					0.324			0.42			0.43	0.365
F	mg kg-1										0.054					
Ga	mg kg-1	20.1					20.3	20	20.5	17		21.683		20		19.4
Gd	mg kg-1	0.77		0.81					0.83			0.954			0.85	0.847
Ge	mg kg-1											1.408				
Hf	mg kg-1	0.39		0.31					0.362			0.337			0.4	0.3
Hg	mg kg-1															
Ho	mg kg-1	0.17		0.16					0.149			0.171			0.2	0.159
I	mg kg-1															
In	mg kg-1															
Ir	mg kg-1															
La	mg kg-1	1.41		1.6			0.5		1.53			1.48		2	1.36	1.3
Li	mg kg-1			4.1					3.01			3.219		6.800		3.83
Lu	mg kg-1	0.06		0.05					0.041			0.055			0.06	0.055
Mo	mg kg-1			0.48		1			0.36			3.645			1.72	0.79
N	mg kg-1															
Nb	mg kg-1	0.94					2.5		0.25	7		0.331			0.57	
Nd	mg kg-1	2.63		2.6					3			2.963		11.100	2.68	2.51
Ni	mg kg-1	19.0		19.7		23	20.8	19	18.5	20		29.817	12	19	45	23.84
Os	mg kg-1															
Pb	mg kg-1	4.41		4.8		16	4.8		5	6		3.806			7.1	4.3
Pd	mg kg-1															
Pr	mg kg-1	0.52		0.6					0.6			0.57			0.54	0.512
Pt	mg kg-1															
Rb	mg kg-1	2.33					4.5		2.2	3		1.486			1.81	1.69
Re	mg kg-1															
Rh	mg kg-1															
Ru	mg kg-1															
S	mg kg-1					376				350						
Sb	mg kg-1			0.12					0.1			0.127			0.18	
Sc	mg kg-1	40.9		40.9			39	42	42.5			52.599	40	38.100	44	41.64
Se	mg kg-1			11					1							
Sm	mg kg-1	0.78		0.71					0.75			0.815			0.83	0.71
Sn	mg kg-1								0.5						0.31	1.23
Sr	mg kg-1	767.0		916.6		806	800.3	786	803.3	811	737	699.98	625	788	810	841.7
Ta	mg kg-1		0.16	0.02								0.041			0.02	
Tb	mg kg-1	0.15		0.13					0.111			0.139			0.13	0.131
Te	mg kg-1											0.072				
Th	mg kg-1	0.13		0.06			5		1.05			0.062			0.1	0.06
Tl	mg kg-1											0.013				0.02
Tm	mg kg-1	0.07		0.06					0.044			0.062			0.07	0.059
U	mg kg-1	0.03		0.03			0		0.025			0.025			0.05	0.025
V	mg kg-1	431.8		549			438.3	458	450.8	459	482	492.98	410	461	478	454
W	mg kg-1								2.05			2.778			2.33	1.96
Y	mg kg-1	4.34		3.7			4.5		4.6	5		4.497		3.400	6	4.34
Yb	mg kg-1	0.40		0.36					0.375			0.389			0.4	0.39
Zn	mg kg-1	89.5		100.5		86	86.5	98	91.2	94	99	97.711	85	89	83	98.92
Zr	mg kg-1	9.96		48			12.3	23	9			11.899			13	11.1

Table 1		GeoPT19 Analytical results submitted (June 2006)										
		Gabbro MGR-N										
Round identifier		T68	T69	T69	T70	T71	T72	T73	T74	T75	T76	T77
Sample		MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Data quality		1	1	2	1	1	2	2	2	2	2	1
SiO2	% m/m				43.78	43.13	43.4		42.60	43.5	43.6	
TiO2	% m/m		0.98		0.980	0.957	0.97	0.95	0.963	0.95	0.98	
Al2O3	% m/m	22.2	21.92		22.47	22	21.9		21.88	22.5	22.3	
Fe2O3	% m/m	10.93	10.98		10.91	10.63	11	10.97	11.037	10.7	11.1	
Fe(II)O	% m/m											
MnO	% m/m	0.105	0.102		0.110	0.103	0.1	0.1	0.108	0.11	0.11	
MgO	% m/m	4.60	4.13		4.76	4.64	4.6		4.703	4.85	4.62	
CaO	% m/m		14.41		15.62	15.33	15.3	15.92	15.17	14.4	15.8	
Na2O	% m/m	1.35	1.35		1.34	1.28	1.3		1.362	1.26	1.35	
K2O	% m/m			0.084	0.09	0.08	0.09		0.089	0.080	0.09	
P2O5	% m/m				0.046	0.036	353		0.024	0.037	0.04	
H2O+	% m/m											
CO2	% m/m					0.325	0.19					
LOI	% m/m				0.73	1.02	0.82		0.710	0.92	0.81	
Ag	mg kg-1											
As	mg kg-1	1.65	1.8			1.8						
Au	mg kg-1			0.008								
B	mg kg-1											
Ba	mg kg-1				56	45	52	69	59.3		57	48.1
Be	mg kg-1					0.13						
Bi	mg kg-1											
Br	mg kg-1			0.5								
Cd	mg kg-1					0.203					0.3	
Ce	mg kg-1	3.6		3.4	16	3.07					3.4	2.98
Cl	mg kg-1		290									
Co	mg kg-1	37.1	36.7		34	36.27	36		31.1		50	35.4
Cr	mg kg-1	36.6	41		50.9	38.17	59		35.6		30	
Cs	mg kg-1					0.394						
Cu	mg kg-1			600	620	682.7	770	665	508		690	575
Dy	mg kg-1			0.9		0.717					0.9	0.73
Er	mg kg-1					0.367					0.5	0.45
Eu	mg kg-1	0.408	0.4			0.364					0.4	0.34
F	mg kg-1											
Ga	mg kg-1			17	21.3	18.23		21				18.3
Gd	mg kg-1					0.872					0.9	0.81
Ge	mg kg-1											
Hf	mg kg-1					0.334						0.255
Hg	mg kg-1											
Ho	mg kg-1					0.16						0.15
I	mg kg-1											
In	mg kg-1											
Ir	mg kg-1											
La	mg kg-1	1.33	1.38		2	1.33					1.4	1.14
Li	mg kg-1					2.97						
Lu	mg kg-1	0.05		0.08		0.061						0.05
Mo	mg kg-1								4.82			
N	mg kg-1											
Nb	mg kg-1				2.2							0.45
Nd	mg kg-1					2.49					2.7	2.43
Ni	mg kg-1				22	19.33	16	25	20.0		21	
Os	mg kg-1											
Pb	mg kg-1				4	3.67						
Pd	mg kg-1											
Pr	mg kg-1					0.457					0.6	0.43
Pt	mg kg-1											
Rb	mg kg-1				0.8	1.33		7				
Re	mg kg-1											
Rh	mg kg-1											
Ru	mg kg-1											
S	mg kg-1						520					
Sb	mg kg-1	0.08				0.105						
Sc	mg kg-1	41.2	43.9		50	42.1						
Se	mg kg-1	0.505				0.485						
Sm	mg kg-1	0.709	0.73			0.771					0.8	0.75
Sn	mg kg-1											
Sr	mg kg-1		820		819	815.3	756	807			825	772
Ta	mg kg-1					0.025						
Tb	mg kg-1			0.15		0.144						0.13
Te	mg kg-1											
Th	mg kg-1					0.073						0.1
Tl	mg kg-1											
Tm	mg kg-1					0.05						0.06
U	mg kg-1				2.5	0.025						
V	mg kg-1	453	487		482	490.3	359				480	449
W	mg kg-1		2.6			2.27						
Y	mg kg-1				4	4.83					4.2	3.69
Yb	mg kg-1	0.384	0.35			0.403					0.4	0.35
Zn	mg kg-1				88.4	103	105	98			100	
Zr	mg kg-1				23.5	7.67	20	63				7.86

Table 2 GeoPT19 Assigned values and robust statistical analysis of contributed data (Gabbro, MGR-N)

	X_a % m/m	H_a % m/m	sdm % m/m	sdm/H_a	status
SiO_2	43.29	0.491	0.063	0.129	Assigned
TiO_2	0.96	0.019	0.004	0.198	Assigned
Al_2O_3	22.25	0.279	0.047	0.167	Assigned
Fe_2O_3T	10.76	0.151	0.034	0.223	Assigned
MnO	0.10	0.003	0.001	0.304	Assigned
MgO	4.68	0.074	0.014	0.189	Assigned
CaO	15.29	0.203	0.041	0.203	Assigned
Na_2O	1.34	0.026	0.012	0.468	Assigned
	mg/kg	mg/kg	mg/kg		
As	1.75	0.129	0.133	1.031	Provisional
Ba	53.46	2.349	0.949	0.404	Assigned
Be	0.14	0.015	0.006	0.363	Assigned
Cd	0.22	0.022	0.014	0.646	Provisional
Ce	3.42	0.227	0.066	0.290	Assigned
Co	35.34	1.653	0.487	0.295	Assigned
Cr	39.77	1.827	1.274	0.697	Provisional
Cs	0.38	0.035	0.006	0.174	Assigned
Cu	593.95	18.168	6.747	0.371	Assigned
Dy	0.82	0.067	0.011	0.163	Assigned
Er	0.44	0.040	0.005	0.134	Assigned
Eu	0.38	0.035	0.005	0.155	Assigned
Ga	19.19	0.984	0.173	0.176	Assigned
Gd	0.84	0.069	0.010	0.151	Assigned

	X_a mg/kg	H_a mg/kg	sdm mg/kg	sdm/H_a	status
Hf	0.34	0.032	0.010	0.309	Assigned
Ho	0.17	0.018	0.003	0.162	Assigned
La	1.38	0.105	0.025	0.239	Assigned
Li	3.89	0.254	0.230	0.907	Provisional
Lu	0.059	0.007	0.002	0.210	Assigned
Nd	2.65	0.183	0.038	0.208	Assigned
Ni	19.65	1.004	0.458	0.456	Assigned
Pb	4.55	0.290	0.178	0.616	Provisional
Pr	0.52	0.046	0.012	0.256	Assigned
Sb	0.12	0.014	0.011	0.806	Provisional
Sc	41.30	1.887	0.503	0.267	Assigned
Sm	0.75	0.063	0.009	0.148	Assigned
Sr	786.94	23.073	4.579	0.198	Assigned
Tb	0.13	0.014	0.002	0.145	Assigned
Tm	0.061	0.007	0.001	0.074	Assigned
U	0.030	0.004	0.002	0.372	Assigned
V	452.80	14.428	3.770	0.261	Assigned
W	2.33	0.164	0.133	0.811	Provisional
Y	4.44	0.284	0.093	0.328	Assigned
Yb	0.39	0.036	0.005	0.129	Assigned
Zn	93.30	3.771	1.179	0.313	Assigned
Zr	10.00	0.566	0.478	0.844	Provisional

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)

Gabbro MGR-N Note: There is no T4

Labcode	T1	T2	T3	T5	T5	T6	T7	T8	T9	T10	T11	T11	T12	T13	T13
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	1	1	2	1	2	2	1	2	1	2	1	2	2	1	2
SiO_2	-0.18	-0.22	-0.30	0.03	*	0.43	-20.14	0.62	*	0.07	-0.53	*	-0.68	0.08	*
TiO_2	-2.14	-0.07	0.41	-0.12	*	-0.89	-4.20	-5.95	*	0.48	3.55	*	0.74	-0.64	*
Al_2O_3	0.01	0.04	0.00	0.23	*	-0.01	-6.27	8.16	-42.33	0.22	-0.85	*	0.69	0.19	*
Fe_2O_3	-1.06	0.54	1.00	-1.10	*	-0.69	-5.84	-3.45	1.20	0.67	0.41	*	0.37	1.00	*
MnO	-4.37	-0.91	0.58	1.52	*	1.28	-0.91	5.60	-3.74	0.76	-0.91	*	1.28	1.86	*
MgO	-0.11	0.70	-0.39	0.98	*	-0.19	-7.25	*	-8.31	-0.05	-0.11	*	0.75	1.91	*
CaO	0.07	1.06	0.53	0.20	*	0.38	-4.37	-3.66	-12.45	-0.09	-0.86	*	-0.26	1.21	*
Na_2O	2.04	3.99	-0.54	0.83	*	0.04	-8.51	*	-7.69	1.02	1.26	*	-0.54	0.08	*
As	*	*	-1.75	*	*	*	-9.35	*	14.22	24.29	*	*	1.36	*	*
Ba	*	*	3.10	*	0.78	*	-2.96	-0.10	1.54	*	9.60	*	0.58	2.74	*
Be	*	*	*	*	*	*	-1.67	*	*	*	*	*	0.21	*	*
Cd	*	*	*	*	*	*	-2.13	58.37	*	*	*	*	-0.68	*	*
Ce	*	*	14.46	*	*	*	-1.06	-2.03	0.47	*	6.94	*	1.49	*	*
Co	*	1.00	0.80	*	-0.77	*	-1.96	*	6.18	-2.22	-5.05	*	0.80	*	*
Cr	*	*	2.53	*	0.36	*	-6.06	*	-2.43	0.88	-4.25	*	0.06	9.21	*
Cs	*	*	*	*	*	*	-0.73	11.60	*	*	*	*	-1.30	*	*
Cu	*	*	-0.11	0.73	*	*	-5.50	1.35	0.32	0.30	-3.19	*	0.08	-2.03	*
Dy	*	*	*	*	*	*	-0.16	*	0.76	*	*	*	-1.16	*	*
Er	*	*	*	*	*	*	0.06	*	1.27	*	*	*	0.13	*	*
Eu	*	*	*	*	*	*	-0.82	*	*	*	*	*	-0.10	*	*
Ga	*	*	0.92	*	0.05	*	-1.52	-2.13	*	*	-0.20	*	0.21	-1.11	*
Gd	*	*	*	*	*	*	-1.02	*	0.37	*	*	*	-0.30	*	*
Hf	*	*	0.88	*	*	*	-0.85	*	0.61	*	*	*	*	*	*
Ho	*	*	*	*	*	*	-0.30	*	0.77	*	*	*	-0.26	*	*
La	*	*	*	*	*	*	-0.70	2.92	0.15	*	34.30	*	*	*	*
Li	*	*	*	*	*	*	-1.14	*	-1.67	*	*	*	-2.74	*	*
Lu	*	*	*	*	*	*	-0.52	*	43.26	*	*	*	*	*	*
Nd	*	*	14.59	*	*	*	-1.06	*	0.85	*	12.80	*	0.40	*	*
Ni	*	0.35	0.17	4.63	*	*	-0.45	*	9.35	-0.32	-5.63	*	-0.87	-3.83	*
Pb	*	*	*	0.86	*	*	-3.69	28.39	-9.10	5.95	15.36	*	-0.09	*	*
Pr	*	*	*	*	*	*	-0.48	*	1.16	*	*	*	*	*	*
Sb	*	*	*	*	*	*	-1.81	*	*	*	*	*	*	*	*
Sc	*	*	*	*	0.19	*	-0.90	*	*	*	-4.93	*	*	*	1.96
Sm	*	*	14.75	*	*	*	-0.62	*	1.90	*	*	*	*	*	*
Sr	*	-0.47	0.11	0.55	*	*	4.51	-0.43	-1.41	1.08	-1.12	*	1.00	-1.71	*
Tb	*	*	*	*	*	*	-0.06	*	*	*	*	*	-0.13	*	*
Tm	*	*	*	*	*	*	-0.07	*	*	*	*	*	*	*	*
U	*	*	*	*	*	*	-1.23	*	*	*	730.20	*	*	*	*
V	*	0.71	-0.48	*	0.00	*	-2.34	-2.52	-8.59	*	-3.52	*	2.95	-7.80	*
W	*	*	*	*	*	*	*	*	*	*	4.08	*	*	*	*
Y	*	-0.48	2.76	0.58	*	*	0.26	-1.83	0.83	*	1.99	*	1.52	*	*
Yb	*	*	*	*	*	*	-0.37	*	1.45	*	*	*	*	*	*
Zn	*	-1.41	-1.63	-1.01	*	*	-1.03	-1.10	-11.13	-1.10	-2.73	*	0.89	-1.01	*
Zr	*	-7.96	-2.65	-6.37	*	*	*	-0.88	1.15	*	-1.77	*	1.41	28.11	*

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)

Gabbro MGR-N

Labcode	T14	T15	T16	T17	T18	T19	T20	T21	T22	T22	T23	T23	T24	T24	T25
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	2	2	1	1	1	1	1	2	1	2	1	2	1	2	1
SiO_2	0.73	-0.44	*	*	*	0.65	0.45	0.75	0.67	*	0.43	*	-0.37	*	0.31
TiO_2	-0.42	-0.63	*	*	*	-0.58	1.17	1.41	-0.58	*	*	-1.25	-0.07	*	-1.62
Al_2O_3	-0.46	-0.37	*	*	*	0.37	0.53	0.92	1.51	*	-0.67	*	0.83	*	-0.53
Fe_2O_3	-2.92	0.07	*	-0.26	*	0.54	-3.28	0.50	1.20	*	*	-1.29	0.01	*	-0.33
MnO	-1.49	0.07	*	*	*	2.55	-2.64	1.28	-0.91	*	-4.02	*	-8.52	*	-4.37
MgO	-0.39	0.50	*	*	*	-0.92	-0.12	1.19	1.24	*	*	-0.74	0.83	*	-1.46
CaO	1.05	-0.15	*	*	*	0.17	-0.59	0.78	-1.46	*	*	1.44	-0.03	*	0.52
Na_2O	-1.32	1.08	*	*	*	0.08	0.87	1.06	4.77	*	*	-2.44	2.82	*	1.65
As	-0.19	*	*	*	*	*	*	*	*	*	*	8.78	*	*	*
Ba	-1.08	-1.37	0.61	*	-0.68	*	-0.74	-1.72	*	*	*	-0.08	-1.73	*	*
Be	0.53	*	0.41	*	*	*	*	18.07	*	*	*	*	-1.15	*	*
Cd	-0.45	*	*	*	*	*	*	*	*	*	*	*	-1.36	*	*
Ce	-0.40	0.13	0.03	0.34	-0.93	*	0.25	-1.70	*	*	*	-0.49	-1.42	*	*
Co	0.08	0.20	1.43	0.40	*	-3.84	1.29	-0.48	*	-1.62	*	3.07	0.16	*	*
Cr	0.61	1.16	-0.20	-2.06	*	-0.97	-0.13	-1.47	*	6.90	*	2.80	1.22	*	*
Cs	-0.02	*	-0.05	*	-0.33	*	-0.13	-1.01	*	*	*	*	-1.04	*	*
Cu	-0.44	0.30	-1.26	*	*	-11.17	-1.05	2.25	-2.75	*	*	1.32	1.49	*	*
Dy	-0.12	0.33	0.51	*	0.80	*	-0.53	-0.64	*	*	1.25	*	-0.03	*	*
Er	-0.12	-0.12	0.51	*	0.26	*	-0.09	-0.50	*	*	1.52	*	-0.26	*	*
Eu	0.05	0.62	1.24	0.96	0.10	*	0.10	-0.10	*	*	1.24	*	-0.19	*	*
Ga	-0.30	*	0.11	*	*	*	-0.78	-0.73	0.82	*	*	0.16	0.31	*	*
Gd	0.06	-0.30	0.99	*	0.12	*	7.97	-0.88	*	*	0.99	*	-0.14	*	*
Hf	0.88	*	-0.41	*	-1.96	*	0.05	-1.60	*	*	*	*	-0.19	*	*
Ho	-0.26	0.30	1.17	*	0.04	*	1.63	-0.55	*	*	2.30	*	-0.81	*	*
La	-0.35	0.27	-1.18	-0.80	-1.08	*	0.49	-4.53	*	*	1.10	*	-0.70	*	*
Li	0.41	*	-1.73	*	*	*	*	*	*	*	0.44	*	-3.67	*	*
Lu	-0.61	0.09	-1.21	1.57	0.18	*	-0.48	-0.61	*	*	2.96	*	-0.80	*	*
Nd	-0.09	0.29	0.03	-3.02	-0.35	*	-0.01	-0.88	*	*	-0.29	*	-0.62	*	*
Ni	-0.27	1.17	6.82	*	*	-2.64	3.24	-1.02	2.34	*	*	-1.32	-0.95	*	*
Pb	-0.28	-0.95	1.35	*	-1.24	5.00	-0.29	*	15.36	*	*	-2.68	-1.24	*	*
Pr	0.03	0.03	-1.90	*	-0.59	*	-0.24	-1.17	*	*	-2.12	*	*	*	*
Sb	0.98	*	*	*	*	*	*	*	*	*	*	*	-2.85	*	*
Sc	-0.34	*	-0.21	-0.16	*	-2.28	-0.68	0.42	-2.28	*	*	2.84	-0.16	*	*
Sm	-0.17	0.55	-0.49	-0.49	-0.17	*	-0.03	-0.72	*	*	0.79	*	-0.41	*	*
Sr	-0.13	0.17	-0.34	*	-0.39	2.52	0.90	0.90	0.96	*	*	-0.28	0.48	*	*
Tb	-0.13	-0.82	0.77	*	-0.26	*	-0.14	-0.48	*	*	3.19	*	0.01	*	*
Tm	-0.03	-0.03	-0.20	*	0.20	*	0.01	-0.03	*	*	6.70	*	-0.34	*	*
U	0.00	*	0.49	*	-0.49	*	-0.25	*	*	*	*	291.34	-0.98	*	*
V	0.15	0.08	-16.48	*	*	-4.91	0.50	0.04	-0.68	*	*	0.60	1.47	*	*
W	-1.62	*	*	*	*	*	*	-2.50	*	*	*	8.14	*	-0.40	*
Y	-1.47	-0.77	-0.09	*	-1.04	*	-0.02	-2.11	23.15	*	*	0.47	-2.17	*	*
Yb	-0.11	0.30	0.61	2.28	-0.23	*	-0.25	-0.39	*	*	1.17	*	-0.76	*	*
Zn	0.89	-1.23	4.69	-1.94	*	-3.26	2.03	1.45	-0.88	*	*	0.76	-0.93	*	*
Zr	20.33	43.32	0.71	*	-0.76	95.48	-0.77	-4.28	0.00	*	*	0.00	-0.99	*	*

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)
Gabbro MGR-N

Labcode	T26	T26	T27	T28	T29	T30	T31	T32	T33	T34	T35	T36	T37	T38	T39
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	1	2	2	2	1	2	1	2	2	2	2	2	1	1	1
SiO_2	-1.20	*	*	0.31	-0.08	-0.38	-0.77	*	-0.05	0.25	-0.71	0.42	1.49	-2.59	-0.12
TiO_2	0.45	*	*	0.28	-0.07	-0.03	-1.10	*	0.48	0.86	1.00	-0.29	2.52	-0.50	2.00
Al_2O_3	0.73	*	*	2.17	2.20	0.02	1.48	*	-0.32	-0.33	-0.12	0.81	1.37	-2.47	1.44
Fe_2O_3	1.93	*	*	-2.12	0.80	0.14	-0.06	-2.19	1.32	0.45	-1.26	-3.35	1.93	-4.18	1.67
MnO	*	-0.45	*	-0.76	-4.37	1.28	-0.91	*	-0.26	0.50	0.24	1.28	1.17	-2.91	-4.37
MgO	*	0.08	*	0.15	-0.38	0.22	-0.24	*	2.39	0.04	-1.13	0.82	-0.78	-5.77	-0.38
CaO	0.69	*	*	-0.48	2.14	0.26	1.16	*	-0.37	0.51	-0.19	0.16	3.97	-0.72	-4.37
Na_2O	5.94	*	*	1.41	-19.44	0.63	0.08	-1.32	-0.99	0.08	*	-2.69	2.82	-25.30	4.77
As	*	*	*	*	*	*	*	-0.58	*	-0.39	8.74	*	179.15	-10.49	*
Ba	*	0.33	*	-0.84	*	-0.97	-1.47	*	5.22	-2.97	*	*	0.70	-1.05	*
Be	*	-0.12	-0.06	*	*	*	-0.89	*	*	*	*	*	159.61	*	*
Cd	*	0.68	*	*	*	*	*	*	*	*	*	*	26.70	66.97	*
Ce	*	-0.03	0.17	-0.51	*	-0.48	-0.98	*	-0.09	*	*	*	20.57	33.76	*
Co	*	2.32	-0.47	-0.10	*	0.10	1.00	-0.28	-0.10	0.65	-2.52	*	2.40	*	*
Cr	*	-0.57	*	-3.77	*	0.69	-2.06	-1.80	1.43	-4.64	3.24	*	-0.09	1.50	*
Cs	*	0.40	-0.11	-0.45	*	-0.16	1.37	*	*	*	*	*	*	*	*
Cu	*	0.30	*	-0.30	*	-1.62	-2.86	*	*	-2.19	1.29	*	-0.55	2.82	*
Dy	-0.68	*	-0.42	0.18	*	0.05	-0.39	*	-0.04	*	*	*	*	*	*
Er	*	-1.13	-0.62	-0.50	*	-0.03	-0.24	*	0.38	*	*	*	*	*	*
Eu	-0.48	*	-0.53	-0.53	*	0.06	-0.19	-1.24	-0.96	*	*	*	*	*	*
Ga	-0.50	*	0.01	0.05	*	0.68	-0.81	*	-1.53	-0.15	0.00	*	-0.40	-1.11	*
Gd	-0.46	*	-0.59	-0.08	*	0.24	-0.02	*	0.50	*	*	*	9.39	*	*
Hf	*	-0.36	0.57	*	*	-0.05	-1.34	*	14.52	*	*	*	*	*	*
Ho	0.04	*	-0.26	-0.55	*	-0.41	0.04	*	-0.55	*	*	*	1.17	*	*
La	1.20	*	-0.26	1.40	*	-0.42	-0.32	-0.78	1.36	19.52	*	*	40.18	66.56	*
Li	-3.51	*	*	*	*	*	3.98	*	3.18	*	*	*	3.39	*	*
Lu	*	0.02	-0.40	*	*	-0.05	-1.21	2.17	0.09	*	*	*	*	*	*
Nd	-1.06	*	-0.53	-0.09	*	-0.29	-0.84	*	-0.17	*	*	*	53.35	*	*
Ni	*	2.66	*	-0.52	*	1.39	4.33	*	0.17	-2.37	-0.02	*	5.43	-1.44	*
Pb	*	-1.64	*	-1.05	*	-1.35	0.86	*	-0.09	16.65	5.68	*	-0.66	2.93	*
Pr	-0.15	*	-0.19	-0.62	*	-0.33	-0.59	*	1.02	*	*	*	112.85	*	*
Sb	*	0.61	*	*	*	*	*	*	*	124.76	*	*	1136.3	*	*
Sc	1.54	*	*	-0.34	*	*	-1.22	-0.53	2.57	-0.82	*	*	0.27	*	*
Sm	-0.33	*	-0.36	-1.04	*	-0.06	-0.17	-0.40	0.55	*	*	*	24.87	*	*
Sr	*	-2.25	*	-0.17	*	-0.18	-0.08	*	-0.48	0.55	-1.45	*	-6.63	-2.07	*
Tb	-0.26	*	-0.27	-0.48	*	-0.13	-0.26	*	-0.82	*	*	*	*	*	*
Tm	*	-0.10	-0.10	*	*	0.10	-0.07	*	1.32	*	*	*	*	*	*
U	0.00	*	*	*	*	*	0.00	*	*	*	*	*	*	730.20	*
V	*	0.67	*	0.28	*	-0.23	-2.41	*	1.29	-0.26	-2.87	*	0.64	-3.33	*
W	*	1.28	0.06	-1.13	*	-0.63	*	*	*	*	*	*	*	*	*
Y	*	-0.03	-0.49	-0.19	*	-0.46	-0.13	*	0.11	3.64	*	*	0.65	0.58	*
Yb	*	0.16	-0.44	-0.67	*	-0.14	-0.51	*	0.30	*	*	*	*	75.74	*
Zn	*	0.23	*	2.21	*	1.58	*	*	3.41	0.81	-0.44	*	0.93	-1.54	*
Zr	*	0.35	1.90	2.30	*	0.11	-1.41	*	22.63	11.67	*	*	*	-8.84	*

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)

Gabbro MGR-N

Labcode	T40	T41	T42	T43	T44	T45	T46	T47	T48	T49	T50	T51	T52	T53	T54
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	2	2	2	2	1	2	2	2	2	1	1	2	1	1	1
SiO_2	-0.12	-0.30	-1.66	-0.08	-1.52	0.32	0.83	0.41	-9.62	-0.63	0.41	*	0.43	*	-0.55
TiO_2	0.15	1.78	5.14	-1.07	-0.47	-0.55	-0.29	-0.03	16.51	4.53	-3.17	*	-2.65	-0.58	1.48
Al_2O_3	0.15	0.27	1.37	0.51	-0.96	-0.98	-0.89	0.36	3.70	-0.14	-0.42	*	-0.67	-1.78	-0.57
Fe_2O_3	-0.20	1.47	0.24	0.34	0.14	-0.20	-0.33	-0.30	1.83	0.60	-3.12	*	-1.79	1.60	2.80
MnO	0.33	0.93	-2.18	1.28	0.44	-0.45	-0.68	1.28	1.28	-1.60	-1.25	*	3.59	-0.91	2.55
MgO	-0.18	-1.67	0.01	-0.46	-1.17	-0.66	-0.19	0.82	*	0.97	0.03	*	0.16	1.64	3.40
CaO	-0.28	0.04	0.90	-0.90	-0.67	-0.46	-1.05	0.73	*	-4.27	2.78	*	0.96	-3.58	0.22
Na_2O	-1.75	-2.50	4.14	-1.32	-0.15	1.02	0.43	-2.11	*	7.11	-11.63	*	-2.65	0.08	3.21
As	*	*	*	*	*	0.58	-0.58	*	*	*	*	*	-6.92	*	*
Ba	-0.10	27.78	*	0.97	-1.73	-0.74	-0.14	-0.99	*	*	7.04	-0.76	*	*	-0.32
Be	*	*	*	*	*	*	1.83	*	*	*	-1.54	*	*	*	*
Cd	*	*	*	*	*	0.00	*	0.00	*	*	*	*	*	3.62	*
Ce	*	-1.10	*	0.17	-1.23	-0.05	-0.84	-0.25	*	*	1.71	0.04	-2.30	*	-0.45
Co	-0.41	-0.47	*	-0.10	*	0.26	0.20	-0.56	10.79	-21.38	0.40	*	1.00	-8.07	-2.32
Cr	-1.85	8.27	*	0.88	0.46	0.06	-5.14	-3.17	-2.67	-21.76	0.13	*	20.38	*	2.15
Cs	*	0.40	*	*	-0.30	0.26	0.10	-0.16	*	*	1.94	0.12	*	*	1.65
Cu	*	0.41	0.66	-0.27	-0.43	1.18	0.77	-0.74	3.00	-32.69	-2.31	*	0.00	-0.77	-0.59
Dy	*	-0.50	*	0.25	1.04	0.25	0.33	0.33	*	*	0.66	-0.19	-4.10	*	-0.68
Er	*	-0.11	*	0.01	0.19	0.38	-0.25	0.63	*	*	0.51	-0.25	*	*	0.01
Eu	*	-0.21	*	0.62	0.35	-0.24	-0.53	0.19	*	*	0.96	0.05	-0.48	*	0.10
Ga	-0.10	0.20	*	-0.10	0.31	-0.10	0.46	*	*	*	0.82	*	*	*	0.92
Gd	*	-0.42	*	-3.20	0.06	0.42	-0.30	0.42	*	*	-0.46	-0.23	*	*	-1.04
Hf	*	-0.55	*	87.70	-0.32	*	-0.52	*	*	*	*	0.88	*	*	1.45
Ho	*	-0.07	*	0.87	0.49	0.30	-0.26	0.30	*	*	0.60	-0.26	*	*	0.04
La	*	-0.59	*	-0.40	0.00	0.55	-0.45	-0.26	*	*	3.47	0.69	*	*	0.25
Li	*	*	*	*	*	0.22	-0.37	*	*	*	12.27	*	4.38	-5.48	*
Lu	*	0.30	*	1.48	-0.24	*	-0.40	0.09	*	*	0.18	0.09	14.07	*	0.18
Nd	*	-0.77	*	0.40	-1.66	-0.15	-0.75	0.02	*	*	0.91	0.40	6.26	*	-0.13
Ni	-4.31	-2.45	-0.82	-0.32	7.22	-0.17	1.67	-0.47	4.16	-19.57	24.25	*	-3.64	0.35	-0.65
Pb	*	0.05	*	-6.99	-0.84	1.47	2.50	-0.05	*	-15.70	4.31	*	32.62	12.60	-0.48
Pr	*	-0.47	*	*	-1.44	0.25	-0.46	0.03	*	*	0.73	0.47	45.62	*	0.07
Sb	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sc	0.45	1.76	*	*	-0.74	0.19	0.19	-1.48	*	*	-3.87	0.77	-1.75	*	-0.21
Sm	*	-0.74	*	0.15	-0.06	-0.40	-0.56	0.07	*	*	-0.17	0.23	25.67	*	0.47
Sr	-0.32	0.15	-0.13	-0.63	-0.65	-0.28	-0.04	1.13	*	-34.10	-1.04	0.28	-0.69	1.43	-0.86
Tb	*	0.18	*	1.25	0.50	0.56	-0.44	0.21	*	*	0.43	0.21	*	*	1.12
Tm	*	-0.37	*	-0.03	0.07	*	*	0.64	*	*	-0.07	-0.03	*	*	1.29
U	*	*	*	*	1.23	*	*	0.00	*	*	2.46	1.23	*	*	0.00
V	0.08	-2.77	*	-0.31	-1.16	0.04	0.04	-1.86	*	-31.38	-0.40	*	-0.61	-6.43	-1.46
W	*	*	*	*	*	1.43	0.21	*	*	*	*	*	*	*	*
Y	8.05	-0.38	2.76	1.00	0.19	0.29	-0.98	-0.34	*	-15.64	-2.59	-0.91	3.75	*	-0.34
Yb	*	-0.24	*	0.44	-0.48	0.16	-0.39	0.16	*	*	0.05	-0.25	28.82	*	0.33
Zn	0.76	1.26	-0.70	-1.90	0.64	-0.70	0.23	0.41	1.29	-24.74	-2.47	*	2.04	1.78	-1.01
Zr	3.54	-2.25	0.00	-5.30	-1.06	-1.59	-0.44	0.27	*	-17.67	-5.30	0.38	-6.19	*	-0.07

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)

Gabbro MGR-N

Labcode	T54	T55	T56	T57	T58	T59	T60	T61	T62	T63	T64	T65	T66	T67	T68
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	2	2	2	2	2	1	2	1	2	1	2	2	2	2	1
SiO_2	*	-1.20	0.16	7.88	0.12	-0.02	-0.28	-2.06	0.17	0.94	0.17	0.15	0.72	0.50	*
TiO_2	*	0.07	-0.03	4.62	-0.27	-0.58	-0.27	-1.10	-1.07	0.09	-0.81	0.61	-0.03	-0.55	*
Al_2O_3	*	0.17	0.31	-12.10	0.78	0.01	-0.12	-1.60	-1.16	1.33	0.13	-0.53	-1.34	0.36	-0.17
Fe_2O_3	*	0.14	0.07	-1.16	-0.49	-0.59	-0.25	-1.32	0.57	-6.04	0.57	0.77	0.14	0.44	1.14
MnO	*	0.07	1.28	-2.18	1.10	0.48	-0.45	-0.91	1.28	-1.60	-0.45	-1.14	-0.45	1.28	0.82
MgO	*	0.96	1.16	-1.47	0.07	0.30	-0.40	-2.54	0.42	4.27	-0.46	0.82	0.01	0.15	-1.05
CaO	*	0.18	0.09	-3.39	-0.37	0.86	0.30	-0.86	-0.53	1.70	0.11	-0.46	0.04	0.97	*
Na_2O	*	3.36	1.41	7.46	-1.25	2.04	0.57	-0.70	2.97	-7.73	0.04	0.43	-3.08	0.63	0.48
As	*	*	*	4.86	-0.97	*	*	*	*	*	*	*	*	*	-0.78
Ba	*	1.61	*	*	10.97	-0.19	1.03	-3.17	*	-4.23	-3.72	-0.95	0.97	-0.20	*
Be	*	0.21	*	*	*	*	-0.77	*	*	-0.76	*	*	*	-0.12	*
Cd	*	0.23	*	*	*	*	*	*	*	-3.89	*	*	*	-3.37	*
Ce	*	0.61	*	*	-4.67	*	1.27	*	*	2.22	*	*	1.12	-0.53	0.78
Co	*	1.17	*	*	*	-3.84	0.14	-0.21	-1.01	5.03	0.80	-0.71	0.93	0.57	1.06
Cr	*	-0.18	*	-5.68	2.33	17.09	0.12	-3.16	-2.13	12.32	-5.41	-1.03	2.53	0.61	-1.73
Cs	*	*	*	*	*	*	-0.18	*	*	-0.84	*	*	-0.02	-0.01	*
Cu	*	-0.34	*	-2.06	1.09	0.06	1.40	3.86	-0.25	-3.02	0.17	1.05	-1.37	-0.74	*
Dy	*	-0.12	*	*	*	*	-0.50	*	*	0.67	*	*	0.70	0.10	*
Er	*	-0.25	*	*	*	*	-0.42	*	*	0.36	*	*	0.01	0.24	*
Eu	*	-0.24	*	*	*	*	-0.75	*	*	1.24	*	*	0.76	-0.17	0.90
Ga	*	*	*	*	0.56	0.82	0.66	-2.23	*	2.53	*	0.41	*	0.11	*
Gd	*	-0.23	*	*	*	*	-0.08	*	*	1.63	*	*	0.06	0.04	*
Hf	*	-0.52	*	*	*	*	0.29	*	*	-0.19	*	*	0.88	-0.67	*
Ho	*	-0.26	*	*	*	*	-0.58	*	*	0.09	*	*	0.87	-0.29	*
La	*	1.02	*	*	-4.19	*	0.69	*	*	0.91	*	2.92	-0.11	-0.40	-0.51
Li	*	0.41	*	*	*	*	-1.73	*	*	-2.64	*	5.74	*	-0.12	*
Lu	*	-0.61	*	*	*	*	-1.23	*	*	-0.52	*	*	0.09	-0.26	-1.21
Nd	*	-0.15	*	*	*	*	0.94	*	*	1.69	*	23.05	0.07	-0.39	*
Ni	*	0.02	*	1.67	0.57	-0.65	-0.57	0.35	*	10.13	-3.81	-0.32	12.63	2.09	*
Pb	*	0.43	*	19.76	0.43	*	0.78	5.00	*	-2.57	*	*	4.40	-0.43	*
Pr	*	0.91	*	*	*	*	0.91	*	*	1.16	*	*	0.25	-0.05	*
Sb	*	-0.13	*	*	*	*	-0.87	*	*	0.26	*	*	2.09	*	-3.21
Sc	*	-0.11	*	*	-0.61	0.37	0.32	*	*	5.99	-0.34	-0.85	0.72	0.09	-0.05
Sm	*	-0.32	*	*	*	*	-0.01	*	*	1.03	*	*	0.63	-0.32	-0.67
Sr	*	2.81	*	0.41	0.29	-0.04	0.35	1.04	-1.08	-3.77	-3.51	0.02	0.50	1.19	*
Tb	*	-0.13	*	*	*	*	-0.79	*	*	0.36	*	*	-0.13	-0.10	*
Tm	*	-0.03	*	*	*	*	-1.12	*	*	0.20	*	*	0.64	-0.10	*
U	*	0.00	*	*	-3.69	*	-0.62	*	*	-1.23	*	*	2.46	-0.62	*
V	*	3.33	*	*	-0.50	0.36	-0.07	0.43	1.01	2.79	-1.48	0.28	0.87	0.04	0.01
W	*	*	*	*	*	*	-0.85	*	*	2.73	*	*	0.00	-1.13	*
Y	*	-1.30	*	*	0.11	*	0.29	1.99	*	0.22	*	-1.83	2.76	-0.17	*
Yb	*	-0.39	*	*	*	*	-0.18	*	*	0.02	*	*	0.16	0.02	-0.12
Zn	*	0.95	*	-0.97	-0.90	1.25	-0.28	0.19	0.76	1.17	-1.10	-0.57	-1.37	0.75	*
Zr	*	33.59	*	*	2.03	22.98	-0.88	*	*	3.36	*	*	2.65	0.97	*

Table 3 GeoPT19 Z-scores for analytical results submitted (June 2006)
Gabbro MGR-N

Labcode	T69	T69	T70	T71	T72	T73	T74	T75	T76	T77
Sample	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N	MGR-N
Quality	1	2	1	1	2	2	2	2	2	1
SiO_2	*	*	1.00	-0.33	0.11	*	-0.70	0.21	0.32	*
TiO_2	0.97	*	0.97	-0.22	0.22	-0.29	0.04	-0.29	0.48	*
Al_2O_3	-1.17	*	0.80	-0.89	-0.62	*	-0.66	0.45	0.09	*
Fe_2O_3	1.47	*	1.00	-0.86	0.80	0.70	0.92	-0.20	1.13	*
MnO	-0.21	*	2.55	0.13	-0.45	-0.45	0.93	1.28	1.28	*
MgO	-7.39	*	1.10	-0.51	-0.53	*	0.17	1.16	-0.39	*
CaO	-4.32	*	1.65	0.22	0.04	1.56	-0.28	-2.18	1.27	*
Na_2O	0.48	*	0.08	-2.26	-0.74	*	0.47	-1.52	0.24	*
As	0.39	*	*	0.39	*	*	*	*	*	*
Ba	*	*	1.08	-3.60	-0.31	3.31	1.24	*	0.75	-2.28
Be	*	*	*	-0.89	*	*	*	*	*	*
Cd	*	*	*	-0.77	*	*	*	*	1.81	*
Ce	*	-0.05	55.30	-1.55	*	*	*	*	-0.05	-1.94
Co	0.82	*	-0.81	0.56	0.20	*	-1.28	*	4.43	0.04
Cr	0.67	*	6.09	-0.87	5.26	*	-1.14	*	-2.67	*
Cs	*	*	*	0.35	*	*	*	*	*	*
Cu	*	0.17	1.43	4.88	4.85	1.96	-2.37	*	2.64	-1.04
Dy	*	0.62	*	-1.47	*	*	*	*	0.62	-1.28
Er	*	*	*	-1.82	*	*	*	*	0.76	0.26
Eu	0.67	*	*	-0.36	*	*	*	*	0.33	-1.05
Ga	*	-1.11	2.14	-0.98	*	0.92	*	*	*	-0.91
Gd	*	*	*	0.44	*	*	*	*	0.42	-0.46
Hf	*	*	*	-0.29	*	*	*	*	*	-2.74
Ho	*	*	*	-0.53	*	*	*	*	*	-1.09
La	-0.04	*	5.84	-0.51	*	*	*	*	0.08	-2.31
Li	*	*	*	-3.63	*	*	*	*	*	*
Lu	*	1.48	*	0.32	*	*	*	*	*	-1.21
Nd	*	*	*	-0.89	*	*	*	*	0.13	-1.22
Ni	*	*	2.34	-0.32	-1.82	2.66	0.17	*	0.67	*
Pb	*	*	-1.90	-3.04	*	*	*	*	*	*
Pr	*	*	*	-1.31	*	*	*	*	0.91	-1.90
Sb	*	*	*	-1.37	*	*	*	*	*	*
Sc	1.38	*	4.61	0.43	*	*	*	*	*	*
Sm	-0.33	*	*	0.32	*	*	*	*	0.39	-0.01
Sr	1.43	*	1.39	1.23	-0.67	0.43	*	*	0.82	-0.65
Tb	*	0.56	*	0.70	*	*	*	*	*	-0.26
Tm	*	*	*	-1.42	*	*	*	*	*	-0.07
U	*	*	607.27	-1.23	*	*	*	*	*	*
V	2.37	*	2.02	2.60	-3.25	*	*	*	0.94	-0.26
W	1.65	*	*	-0.37	*	*	*	*	*	*
Y	*	*	-1.54	1.39	*	*	*	*	-0.42	-2.63
Yb	-1.07	*	*	0.41	*	*	*	*	0.16	-1.07
Zn	*	*	-1.30	2.57	1.55	0.62	*	*	0.89	*
Zr	*	*	23.87	-4.12	8.84	46.85	*	*	*	-3.78

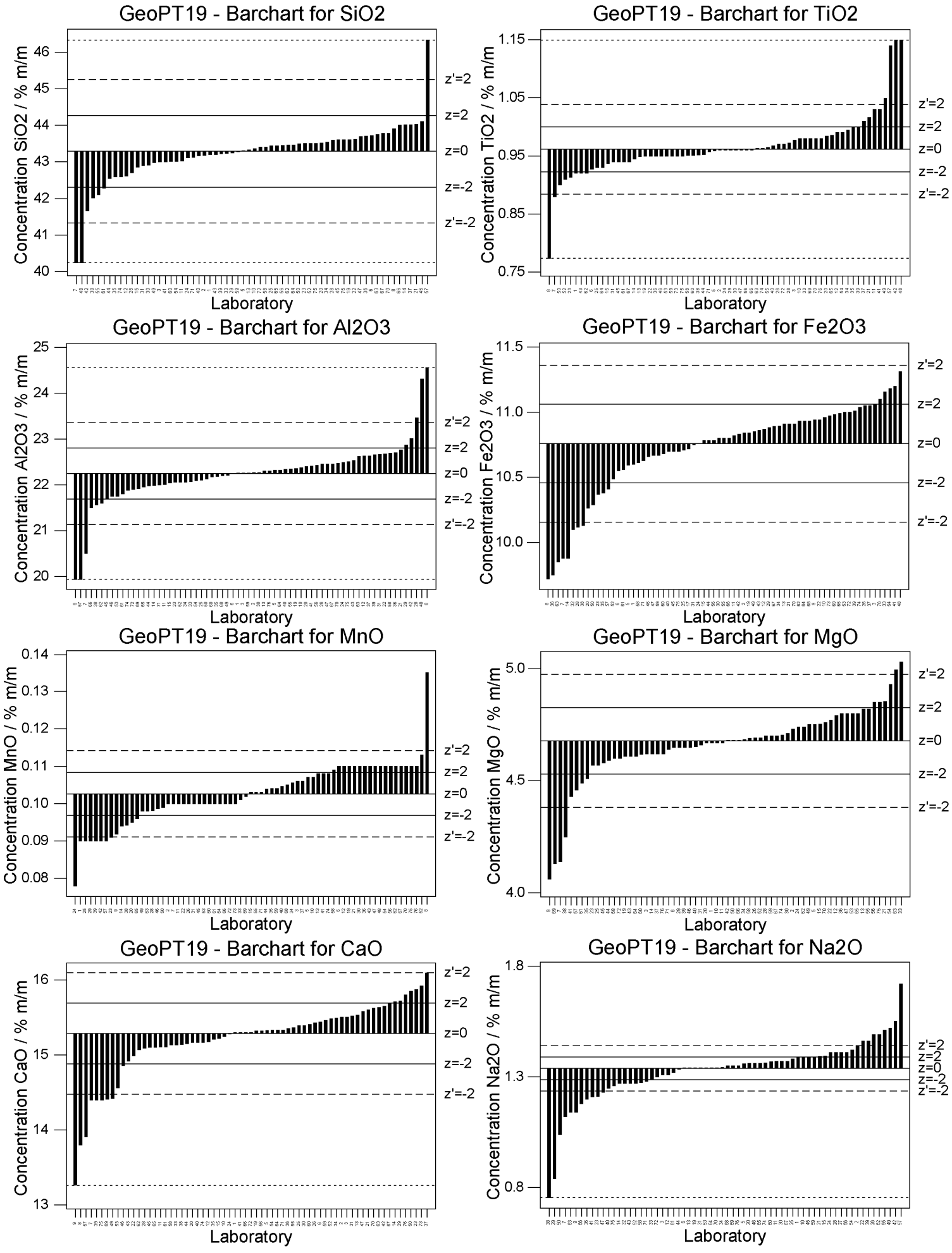
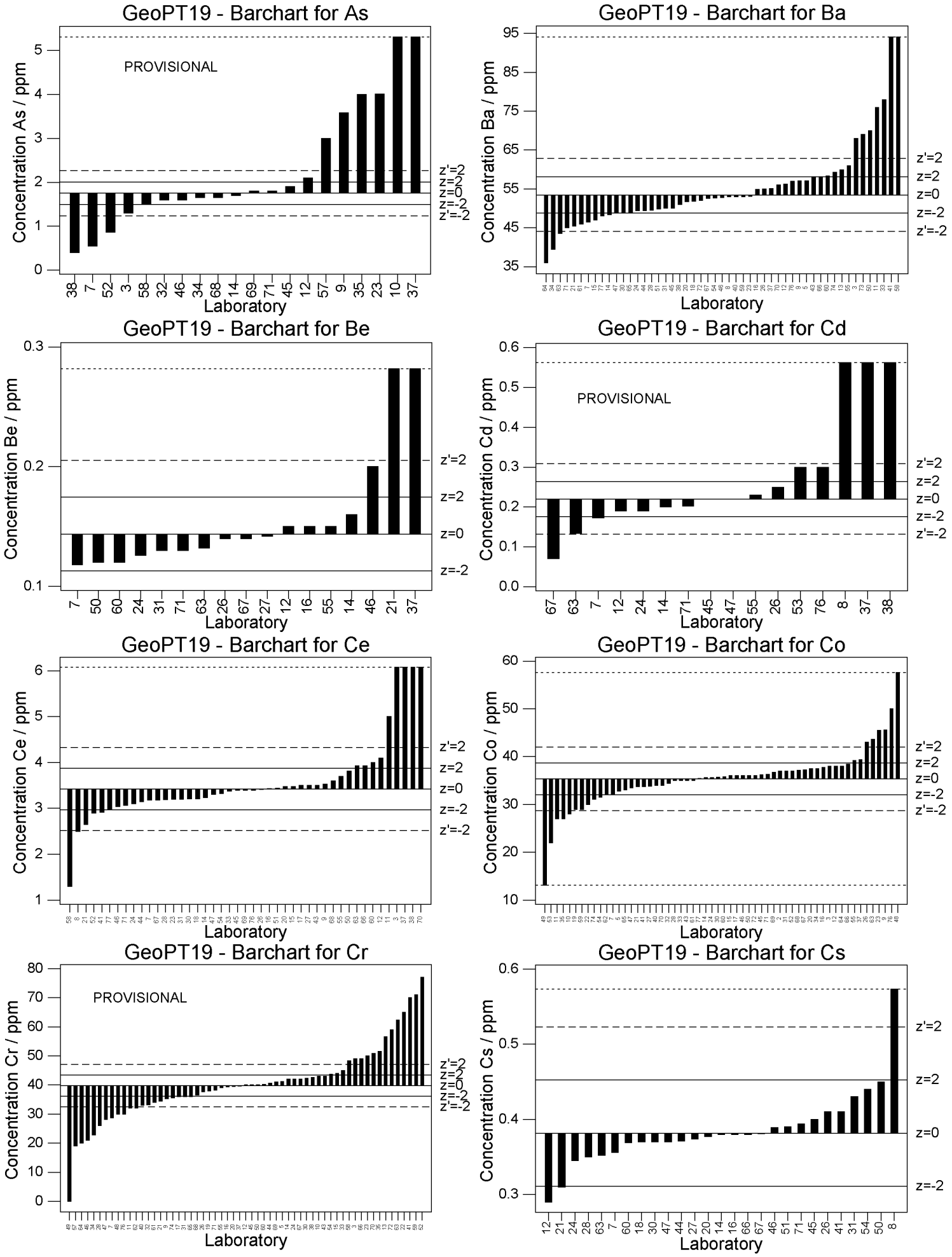


Figure 1: GeoPT19 – Gabbro MGR-N. Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).



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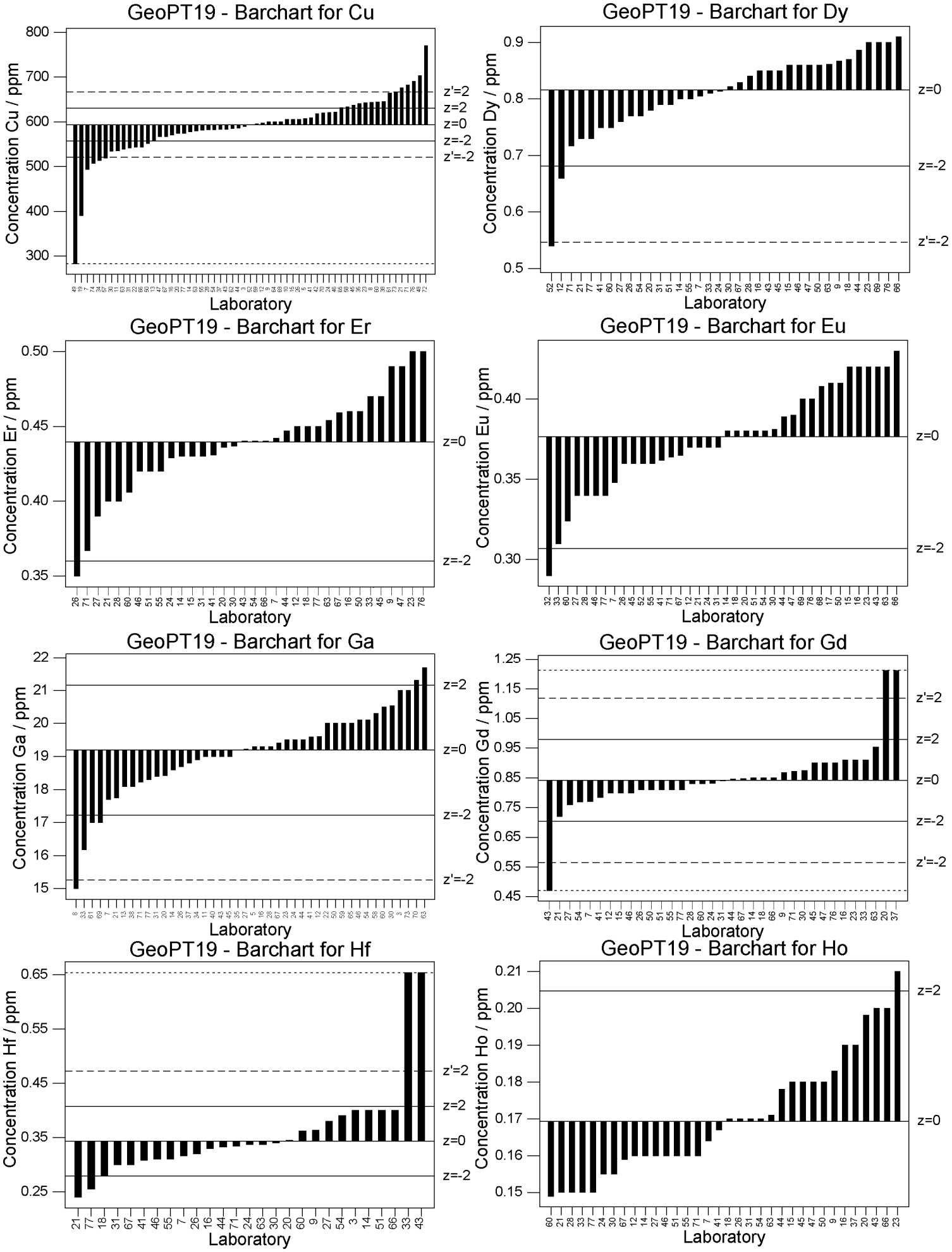

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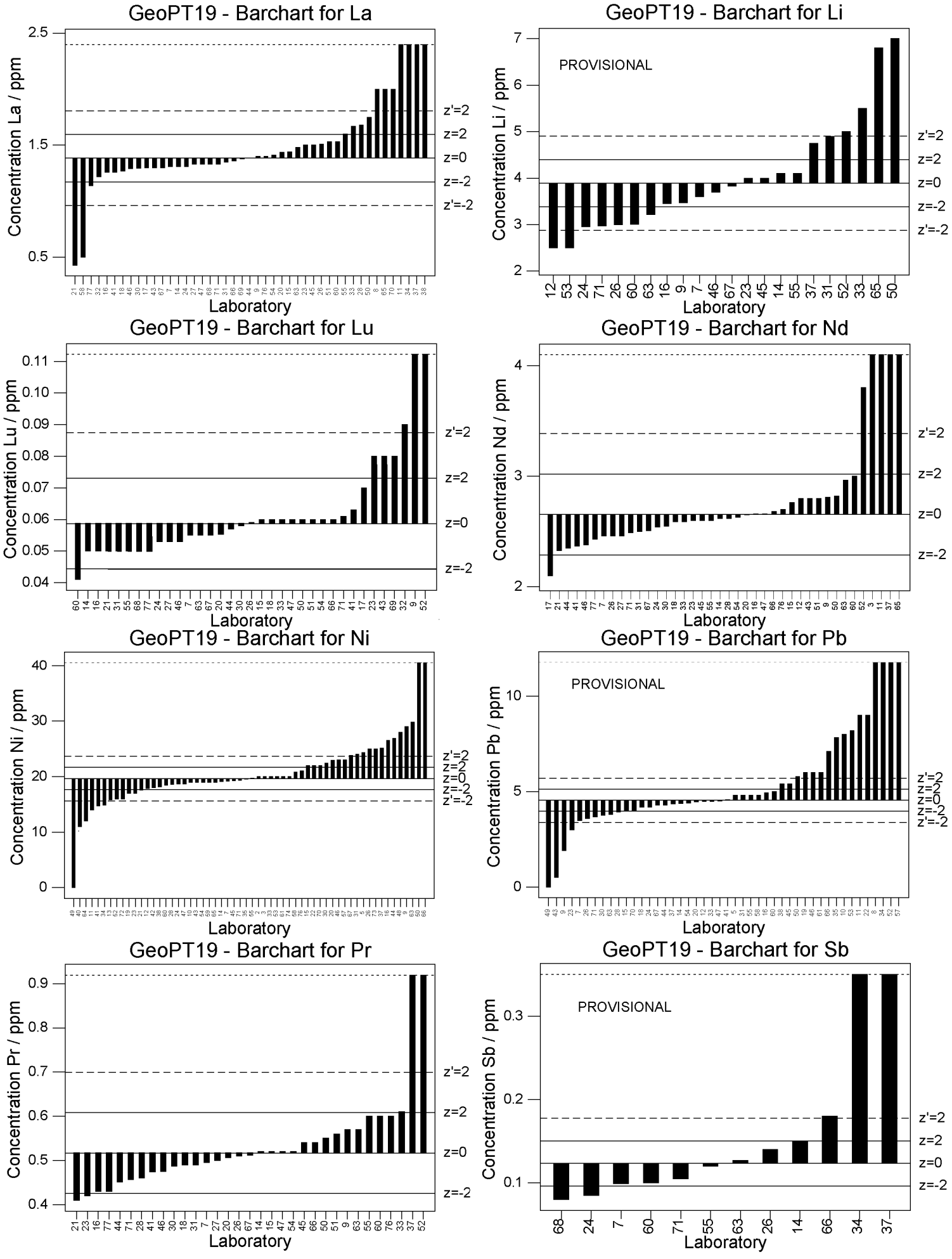

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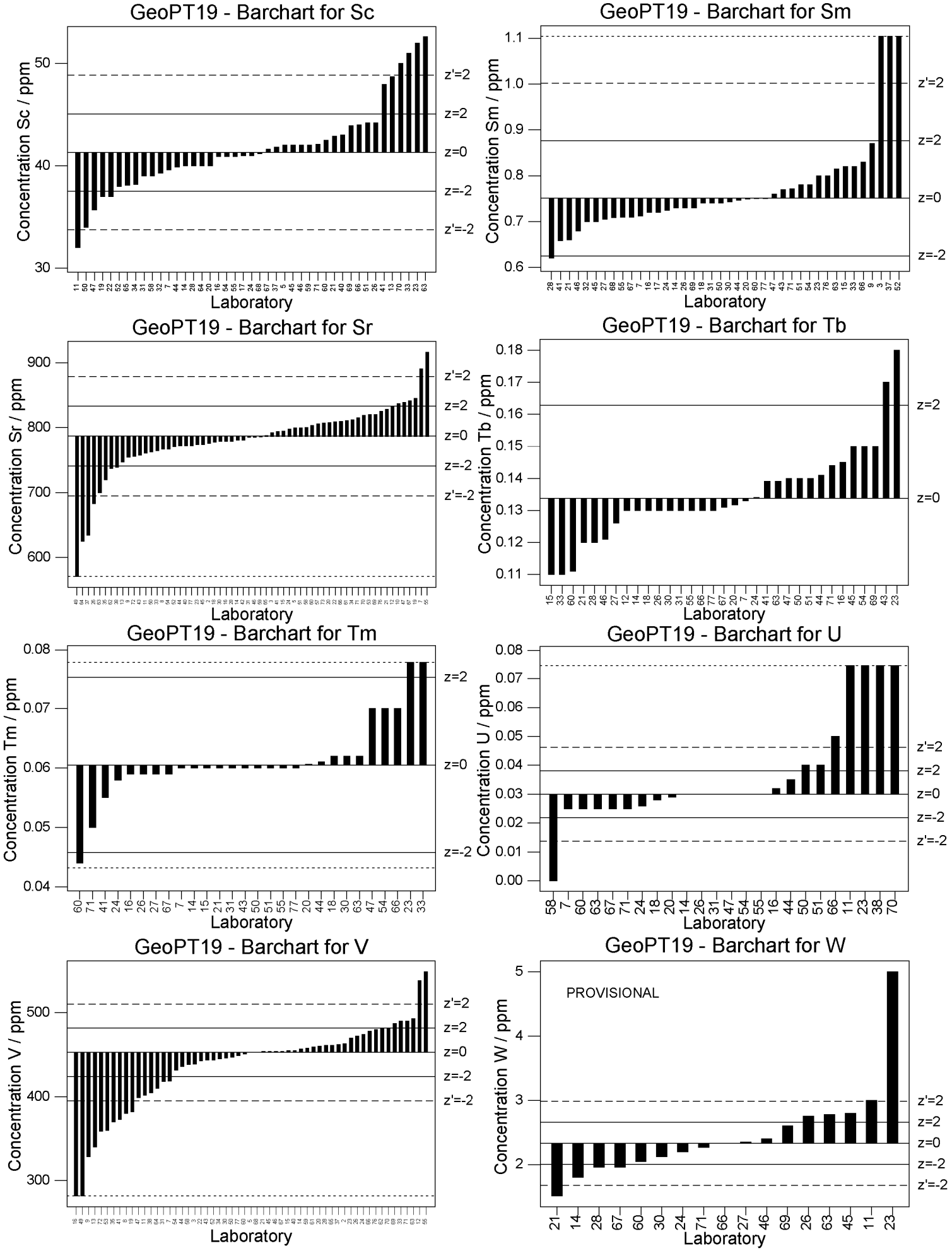

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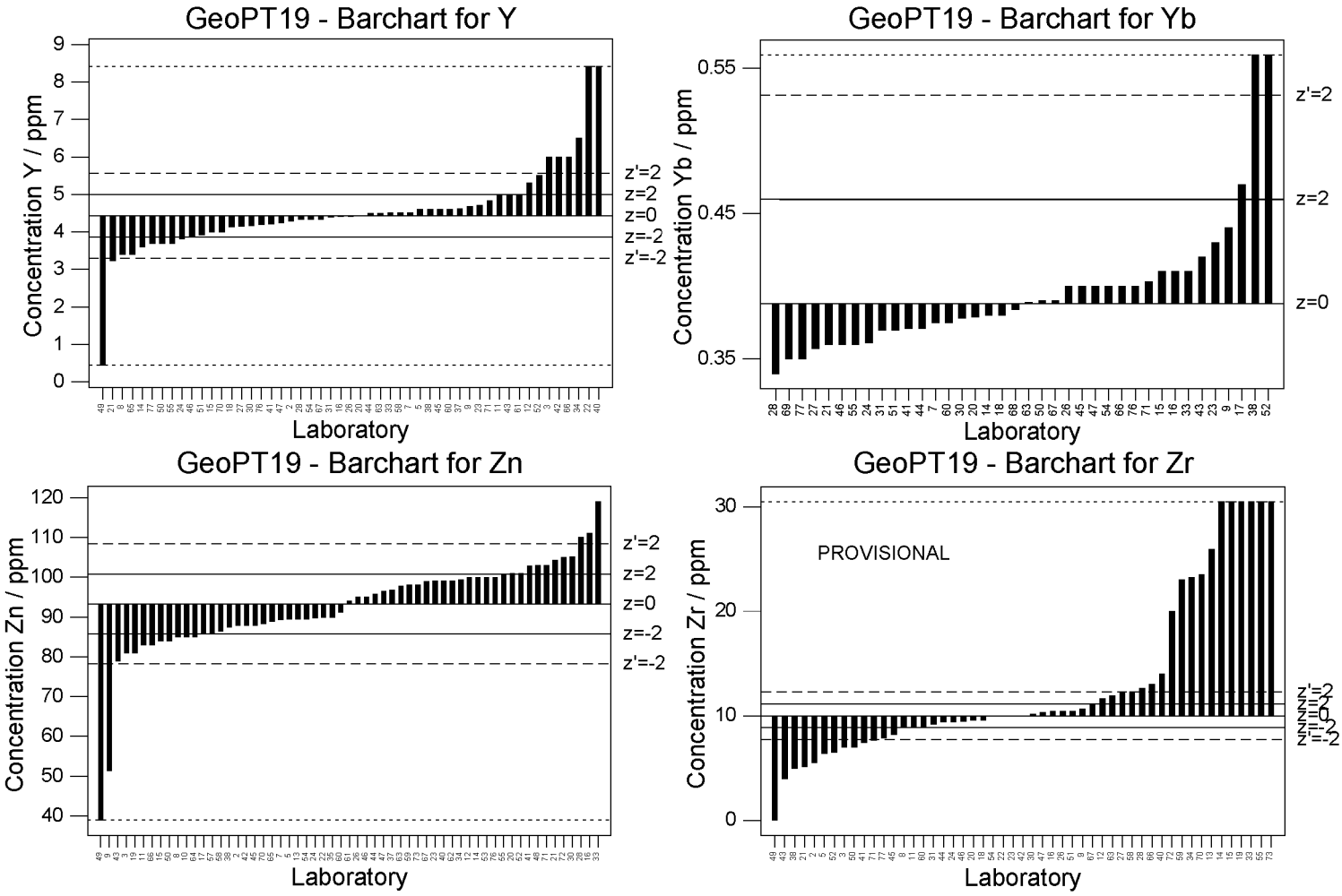

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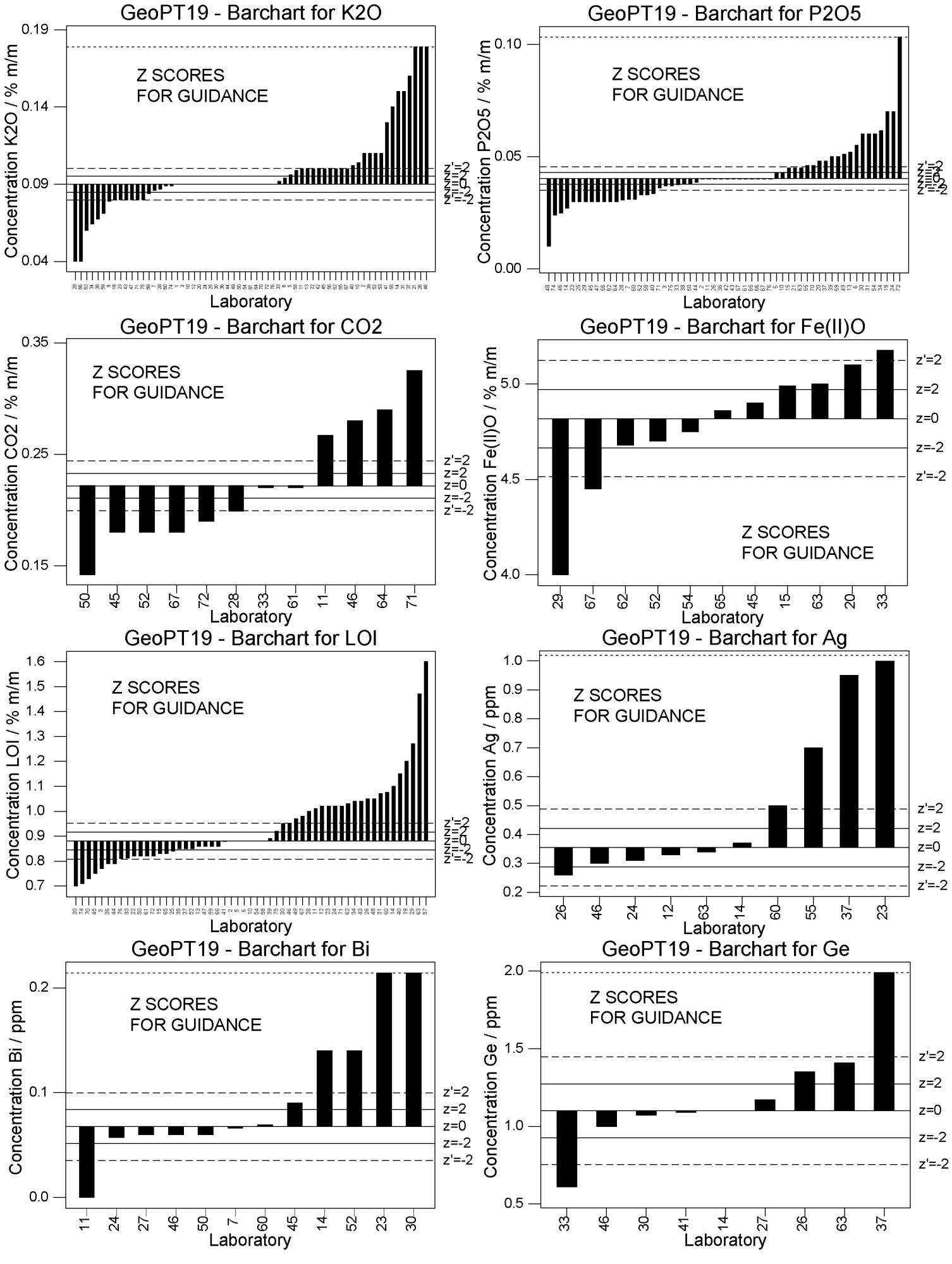


Figure 2: GeoPT19 – Gabbro MGR-N. Data distribution charts for elements for which z scores are shown for guidance only.
Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

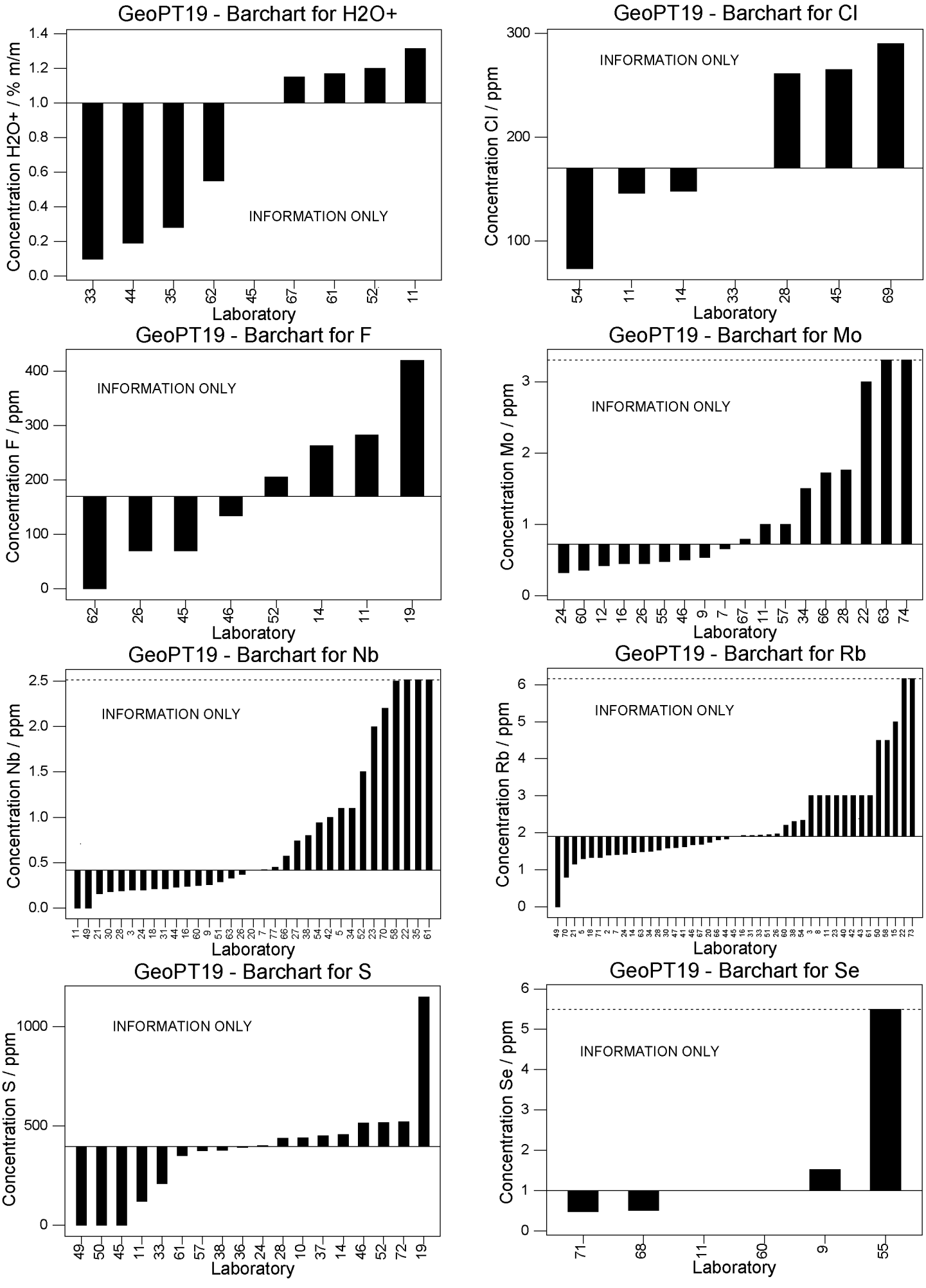
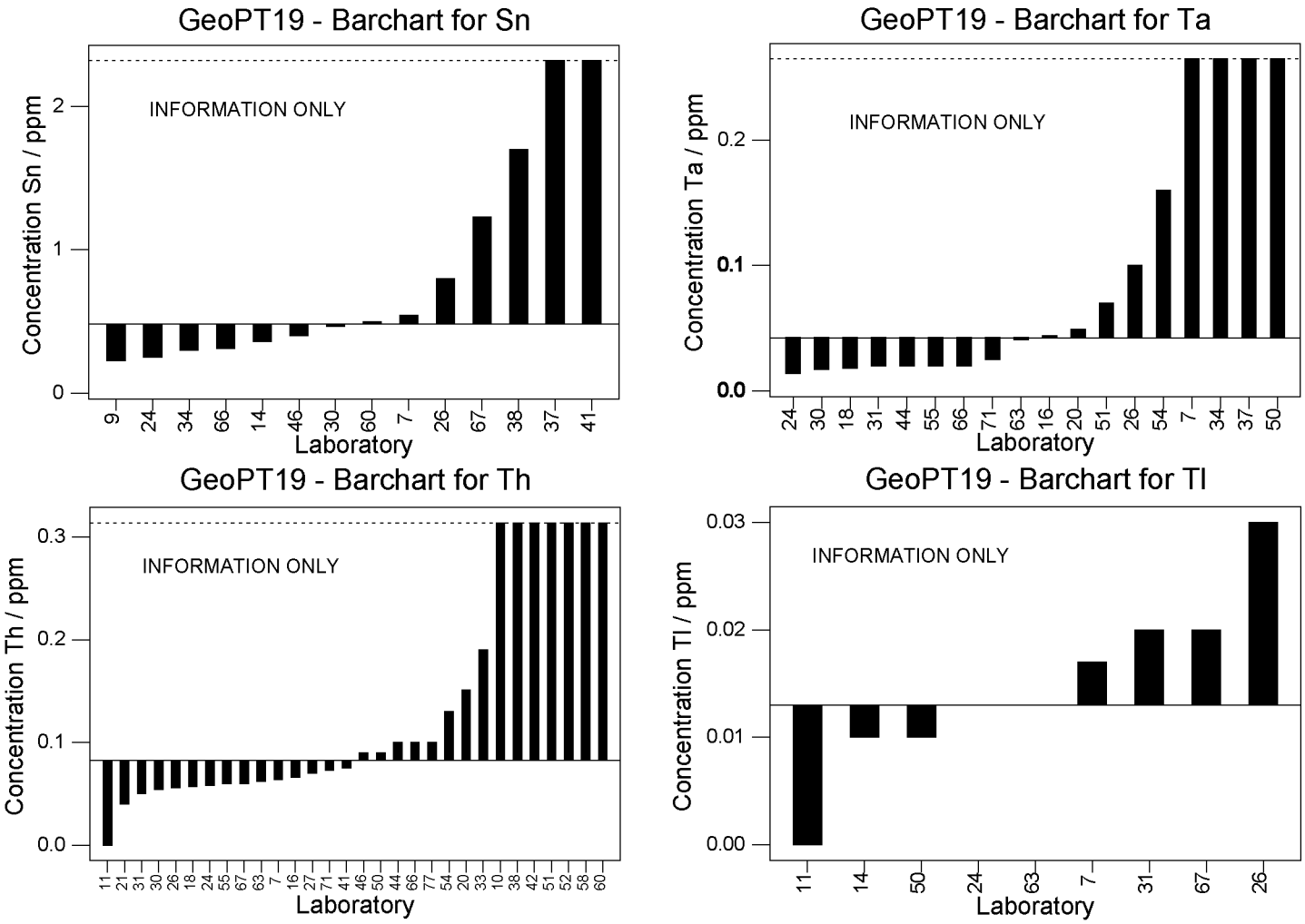


Figure 3: GeoPT19 – Gabbro MGR-N. Data distribution charts for information only for elements for which values could not be assigned.



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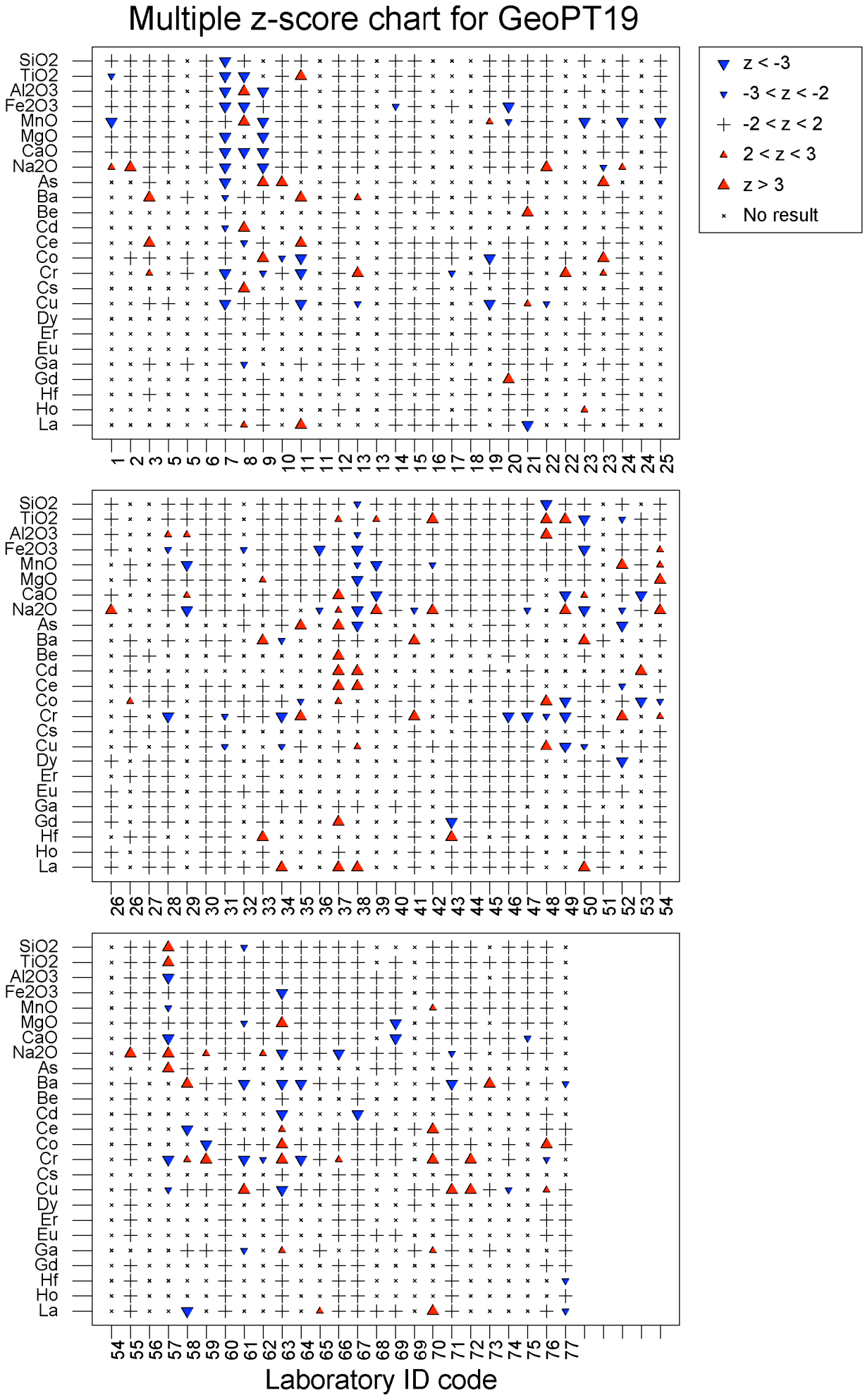
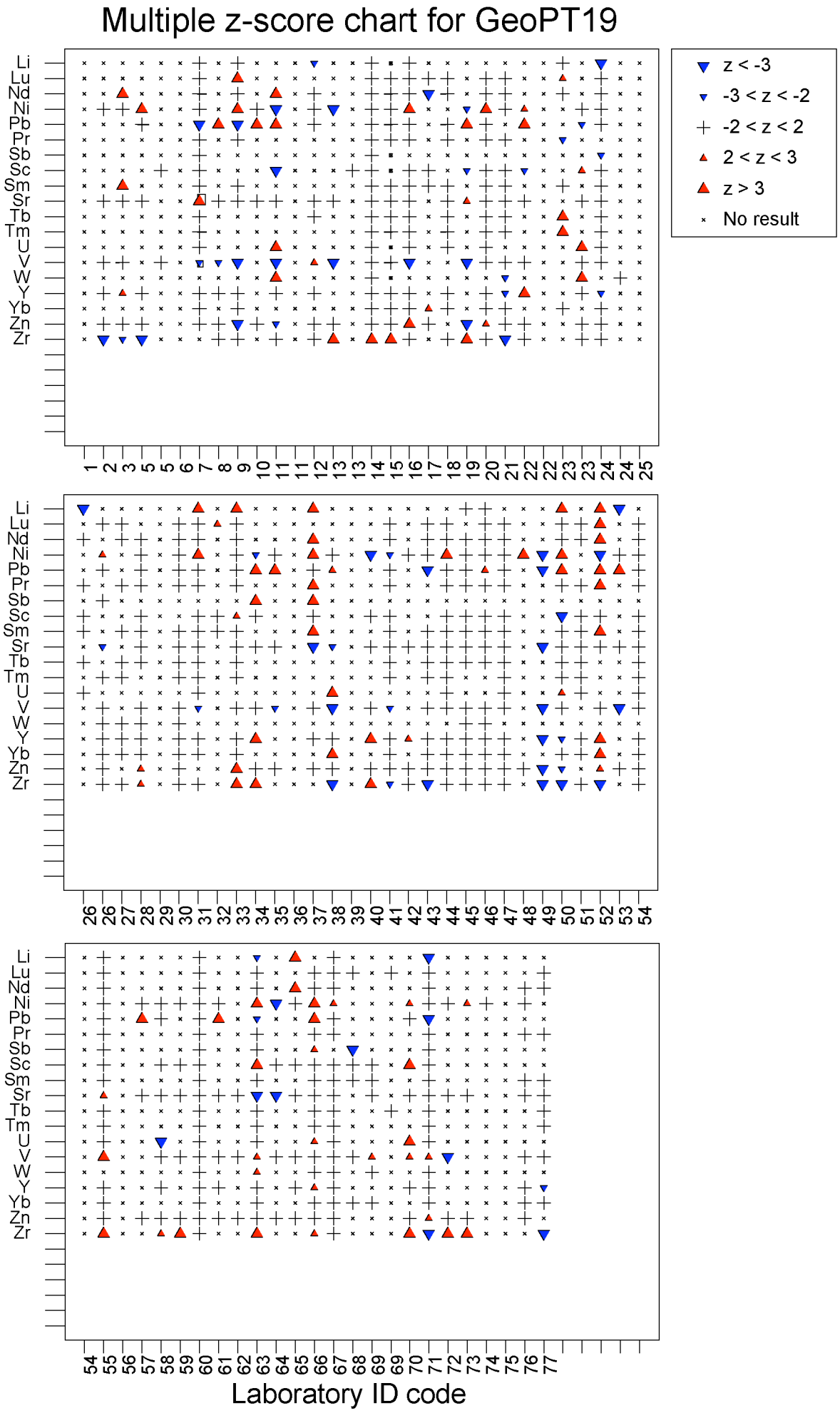


Figure 4: GeoPT19 – Gabbro MGR-N. Multiple z-score charts for laboratories participating in the GeoPT19 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria. Satisfactory data are plotted as '+'. Data for other categories are plotted as follows: z<-3 (▼), -3<z<-2 (▾), +2<z<+3 (▴), Z>+3 (▲).



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Errata for GeoPT19 - An international proficiency test for geochemical laboratories — Report on Round 19 / July 2006 (Gabbro, MGR-N)

Table 1		GeoPT19 Analytical results submitted (June 2006) Gabbro MGR-N			
Round identifier		T74 **(our error)**	T75 **(our error)**	T49submitted	T49revised
Sample		MGR-N	MGR-N	MGR-N	MGR-N
Data quality		2	2	1	1
SiO_2	% m/m	42.60	43.5	42.98	42.98
TiO_2	% m/m	0.963	0.95	1.049	1.049
Al_2O_3	% m/m	21.88	22.5	22.21	22.21
Fe_2O_3	% m/m	11.037	10.7	10.85	10.85
Fe(II)O	% m/m				
MnO	% m/m	0.108	0.11	0.098	0.098
MgO	% m/m	4.703	4.85	4.75	4.75
CaO	% m/m	15.17	14.4	14.42	14.42
Na_2O	% m/m	1.362	1.26	1.52	1.52
K_2O	% m/m	0.089	0.080	0.09	0.09
P_2O_5	% m/m	0.024	0.037	0.051	0.051
H_2O^+	% m/m				
CO_2	% m/m				
LOI	% m/m	0.710	0.92	0.97	0.97
Ag	mg kg-1				
As	mg kg-1				
Au	mg kg-1				
B	mg kg-1				
Ba	mg kg-1	-	**59.3**		
Be	mg kg-1				
Bi	mg kg-1				
Br	mg kg-1				
Cd	mg kg-1				
Ce	mg kg-1				
Cl	mg kg-1				
Co	mg kg-1	-	**31.1**	0.0037	37
Cr	mg kg-1	-	**35.6**	0.0031	31
Cs	mg kg-1				
Cu	mg kg-1	-	**508**	0.0597	597
Dy	mg kg-1				
Er	mg kg-1				
Eu	mg kg-1				
F	mg kg-1				
Ga	mg kg-1				
Gd	mg kg-1				
Ge	mg kg-1				
Hf	mg kg-1				
Hg	mg kg-1				
Ho	mg kg-1				
I	mg kg-1				
In	mg kg-1				
Ir	mg kg-1				
La	mg kg-1				
Li	mg kg-1				
Lu	mg kg-1				
Mo	mg kg-1	-	**4.82**		
N	mg kg-1				
Nb	mg kg-1			0.0007	7
Nd	mg kg-1				
Ni	mg kg-1	-	**20.0**	0.0025	25
Os	mg kg-1				
Pb	mg kg-1			0.0010	10
Pd	mg kg-1				
Pr	mg kg-1				
Pt	mg kg-1				
Rb	mg kg-1			0.0003	3
Re	mg kg-1				
Rh	mg kg-1				
Ru	mg kg-1				
S	mg kg-1			0.033	330
Sb	mg kg-1				
Sc	mg kg-1				
Se	mg kg-1				
Sm	mg kg-1				
Sn	mg kg-1				
Sr	mg kg-1			0.0793	793
Ta	mg kg-1				
Tb	mg kg-1				
Te	mg kg-1				
Th	mg kg-1				
Tl	mg kg-1				
Tm	mg kg-1				
U	mg kg-1				
V	mg kg-1			0.0336	336
W	mg kg-1				
Y	mg kg-1			0.0007	7
Yb	mg kg-1				
Zn	mg kg-1			0.0087	87
Zr	mg kg-1			0.0057	57

Table 3	GeoPT19 Z-scores for analytical results submitted Gabbro MGR-N (June 2006)			
Labcode	T74 **(our error)**	T75 **(our error)**	T49submitted	T49revised
Sample	MGR-N	MGR-N	MGR-N	MGR-N
Quality	2	2	1	1
SiO_2	-0.70	0.21	-0.63	-0.63
TiO_2	0.04	-0.29	4.53	4.53
Al_2O_3	-0.66	0.45	-0.14	-0.14
Fe_2O_3	0.92	-0.20	0.60	0.60
MnO	0.93	1.28	-1.60	-1.60
MgO	0.17	1.16	0.97	0.97
CaO	-0.28	-2.18	-4.27	-4.27
Na_2O	0.47	-1.52	7.11	7.11
As	*	*	*	*
Ba	*	**1.24**	*	*
Be	*	*	*	*
Cd	*	*	*	*
Ce	*	*	*	*
Co	*	**-1.28**	-21.38	1.00
Cr	*	**-1.14**	-21.76	-4.80
Cs	*	*	*	*
Cu	*	**-2.37**	-32.69	0.17
Dy	*	*	*	*
Er	*	*	*	*
Eu	*	*	*	*
Ga	*	*	*	*
Gd	*	*	*	*
Hf	*	*	*	*
Ho	*	*	*	*
La	*	*	*	*
Li	*	*	*	*
Lu	*	*	*	*
Nd	*	*	*	*
Ni	*	**0.17**	-19.57	5.33
Pb	*	*	-15.70	18.81
Pr	*	*	*	*
Sb	*	*	*	*
Sc	*	*	*	*
Sm	*	*	*	*
Sr	*	*	-34.10	0.26
Tb	*	*	*	*
Tm	*	*	*	*
U	*	*	*	*
V	*	*	-31.38	-8.10
W	*	*	*	*
Y	*	*	-15.64	9.05
Yb	*	*	*	*
Zn	*	*	-24.74	-1.67
Zr	*	*	-17.67	83.10