Bahnhofstraße 14 // D-37181 Hardegsen // T +49 (0)5505 94098-0
Geschäftsführer: Ralf Klaus Blecher // Amtsgericht Göttingen HRB 130263
www.crb-gmbh.de // labor@crb-gmbh.de

Analyse Service GmbH

GeoPT 4 - OU-2, Bamford Dolerite

Veranstalter: International Association of Geoanalysts and Geostandards Newsletter - GeoPT4
Ringversuchsmaterial: OU-2, Bamford Dolerite
RV geschlossen: 1999 – 4
Literatur: Geostandards Newsletter, Vol. 24, No. 1, 06/00, p. 135

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
Na_2O	2,48	2,48	0,043	
MgO	5,54	5,585	0,086	
Al_2O_3	13,82	13,801	0,186	
SiO_2	51,09	51,095	0,586	
P_2O5	0,296	0,3	0,007	
SO_3	0,03			
K_2O	0,98	0,99	0,02	
CaO	8,90	8,994	0,129	
TiO_2	2,49	2,425	0,042	
Fe_2O_3 tot	13,43	13,25	0,18	
MnO	0,173	0,17	0,004	

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
Ba	342	341,1	11,3	
Ce	69	60,2	2,6	
Co	44	44,8	2	
Cr	104	97	3,9	
Cu	56	63	2,7	
Ga	23	23,05	115	
Hf	5,1	5,29	0,33	
La	41	27,7	1,34	
Mo	3	3,05	0,21	
Nb	21	17,25	0,9	
Ni	60	51,77	2,29	
Pb	14	13,12	0,71	
Rb	28	25,44	1,35	
Sr	427	403,7	13,1	
Th	3,6	3,02	0,2	
V	344	339,2	11,3	
Y	35	30,93	1,48	
Zn	114	113	4,4	
Zr	223	200,5	7,2	

Legende

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

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GEOSTANDARDS NEWSLETTER
The Journal of Geostandards and Geoanalysis

Geo*PT4*. An International Proficiency Test for Analytical Geochemistry Laboratories - Report on Round 4 (March 1999)

Michael **Thompson** (1), Philip J. **Potts** (2)*, Jean S. **Kane** (3), Peter C. **Webb** (2) and John S. **Watson** (2)

(1) Department of Chemistry, Birkbeck College, Gordon House, London, WC1H 0PP, UK
(2) Department of Earth Sciences, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK
(3) Robert J. Kane Associates Inc., HCR 4, Box 231, Brightwood, VA 22715, USA
*Corresponding author, e-mail: p.j.potts@open.ac.uk

Results are presented from the seventy five laboratories participating in Geo*PT4*, round four of the international proficiency testing programme for analytical geochemistry laboratories. Laboratories were required to analyse the sample OU-2 (Belford dolerite) using routine methods of analysis. The sample was distributed during September 1998 with a deadline for the submission of results of 15th January 1999. In this report, contributed data are analysed and z-scores calculated. Z-score values provide participating laboratories with information concerning the quality of their results and indicate data that may be subject to unsuspected analytical bias. Laboratories are invited to examine these data and take the appropriate action.

Keywords: proficiency testing, Geo*PT*, round 4, OU-2, quality assurance.

On présente les résultats de soixante-quinze laboratoires ayant participé au GeoPT4, quatrième édition du programme international de tests de compétence destiné aux laboratoires de géochimie analytique. Les laboratoires avaient à analyser, l'échantillon OU-2 (dolérite Belford) selon leur procédure d'analyse de routine. L'échantillon a été distribué aux laboratoires courant Septembre 1998 et les résultats devaient être soumis avant le 15 Janvier 1999. Dans ce rapport, les données reçues sont analysées et les z-scores calculés. Ces z-scores fournissent aux laboratoires participants une information sur la qualité de leurs resultats et leur signalent des données biaisées qu'ils n'avaient peut-être pas suspectées. Les laboratoires sont invités à examiner ces données et à en tirer des conclusions concernant leurs procédures.

Mots-clés : test de compétence, GeoPT, quatrième édition, OU-2, assurance-qualité.

Geo*PT*, the international proficiency testing programme, has now become well-established as a standard procedure for contributing to the quality control assessment of data from 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-characterized technique or techniques operated under routine analytical conditions. Results are then tabulated by the organisers and a z-score calculated by comparing each analysed result submitted with the consensus value. By examining the magnitude of the z-score, participating laboratories can decide whether the quality of their data is satisfactory in relation to all the other laboratories contributing to the round and choose to take corrective action if this appears justified. This forth round was conducted in a similar manner to the first three rounds, full details of which were reported by Thompson *et al.* (1996, 1998, 1999). This report summarises the specific features of the present round, and presents results from participating laboratories, a listing of consensus values and the derived z-scores and bar charts showing the distribution of data for selected elements.

Organisation

Steering Committee

M. Thompson (Chair), P.J. Potts (Secretary), J.S. Kane, P.C. Webb and J.S. Watson.

Text continues on page E15

Received 17 Apr 00 — Accepted 15 Jun 00

Table 1.
GeoPT4. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	SiO_2	TiO_2	Al_2O_3	Fe_2O_3T	Fe(II)O	MnO	MgO	CaO	Na_2O
D	1	1	XRF	51.220	2.4350	13.780	13.240	-	0.1710	5.650	9.060	2.460
D	1	2	XRF	-	-	-	-	-	-	-	-	-
D	2	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	3	1	ICP-MS, XRF, AAS	51.630	2.4000	14.410	13.010	8.370	0.1600	5.620	8.430	2.460
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	49.810	2.4600	14.040	13.370	-	0.1700	5.520	9.020	2.510
D	5	1	ICP-MS, XRF	52.000	2.4200	13.900	13.300	-	0.1900	5.640	8.760	2.510
D	6	1	XRF	51.140	2.4180	13.880	13.327	-	0.1791	5.605	8.994	2.490
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF/titrimetry	51.575	2.4140	13.900	13.537	8.370	0.1750	5.463	9.197	2.042
D	8	1	XRF	51.213	2.4270	13.758	13.409	-	0.1730	5.570	9.046	2.512
D	9	2	XRF, IR	51.090	2.4900	13.820	13.430	-	0.1730	5.540	8.900	2.480
D	10	2	XRF	50.400	2.4900	13.260	13.030	-	0.1760	5.360	8.800	2.020
D	11	1	INAA	-	2.2800	-	-	-	-	-	-	-
D	11	2	INAA	-	-	14.340	13.780	-	0.1700	5.210	8.630	2.560
D	12	1	INAA	-	-	-	-	-	0.1700	-	-	2.490
D	13	1	XRF, AAS, titrimetry	51.210	2.4700	13.930	13.100	8.720	0.1800	5.630	8.950	2.570
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	49.410	2.2600	13.800	12.940	-	0.1600	5.510	9.390	1.670
D	15	2	ICP-AES, other	51.170	2.4430	13.644	13.099	-	0.1700	5.463	8.780	2.481
D	16	1	AAS, colorimetry	50.800	2.4100	13.760	13.110	-	0.1500	5.460	8.940	2.520
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	8.500	-	-	-	-
D	17	2	XRF	56.860	2.0900	12.860	9.930	-	0.1200	-	-	-
D	18	1	XRF, AAS	51.230	2.5000	13.810	13.380		0.1800	5.768	9.235	2.490
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	50.930	2.4720	13.750	13.300	-	-	-	8.988	2.380
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	0.1640	5.535	-	-
D	20	1	XRF	51.400	2.1800	13.920	13.130	-	0.1700	5.590	8.980	2.580
D	21	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	22	2	XRF	52.200	2.5400	13.700	13.200	-	0.1800	5.760	9.150	2.570
D	23	2	XRF, ICP-MS	49.640	2.4700	13.790	13.300	-	0.1600	5.550	9.690	2.650
D	24	2	ICP-AES, ICP-MS	51.100	2.4800	13.700	13.000	-	0.1700	5.890	9.000	2.500
D	25	2	XRF	51.250	2.4600	13.790	13.600	-	0.1700	5.650	9.380	2.540
D	26	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	51.400	2.4800	14.000	13.400	8.600	0.1700	5.700	9.160	2.400
D	28	1	XRF	50.500	2.4460	13.600	13.680	-	0.1710	5.460	9.030	2.460
D	28	2	XRF	-	-	-	-	-	-	-	-	-
D	29	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	30	1	ICP-AES, gravimetry	52.896	2.3630	13.679	13.928	-	0.1710	5.759	8.941	2.501
D	31	2	XRF	52.470	2.4700	13.420	13.310	-	0.1600	6.060	9.430	2.320
D	32	2	XRF, titrimetry	51.380	2.4200	13.820	13.280	8.490	0.1790	5.580	9.050	2.430
D	33	1	INAA	-	-	-	-	-	-	-	-	-
D	34	1	XRF, AAS	51.300	2.3600	13.700	13.100	-	0.1700	5.340	8.900	2.500
D	35	1	XRF	50.610	2.4000	13.680	13.030	-	0.1750	5.350	8.860	1.970
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	51.900	2.4600	13.900	13.400	-	0.1700	5.700	9.100	2.540
D	37	1	XRF	50.120	2.5200	14.070	13.790	-	0.1800	5.450	9.040	2.170
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	51.000	2.4200	13.670	13.320	-	0.1700	5.250	8.840	2.490
D	39	2	XRF, ICP-AES, INAA, AAS, other	52.000	2.4700	13.800	13.300	8.360	0.1800	5.380	8.980	2.450
D	40	1	INAA	-	-	-	-	-	-	-	-	-
D	40	2	INAA	-	-	-	12.980	-	-	-	9.420	2.450
D	41	2	wet chem (rapid)	50.450	2.2900	14.170	13.120	8.090	0.1700	5.570	8.820	2.750
D	42	1	XRF	51.040	2.2900	13.810	13.300	-	0.1600	5.660	9.170	2.450
D	43	1	ICP-AES, AAS	51.280	2.4600	13.400	13.430	-	0.1800	5.550	9.090	2.650
D	44	1	XRF	51.340	2.4200	13.850	13.070	-	0.1810	5.650	9.000	2.470
D	45	1	AAS, ICP-AES, wet chemistry	50.560	2.1400	14.590	13.090	-	0.1540	5.890	8.710	2.350
D	46	2	XRF	50.920	2.4700	13.760	13.370	-	0.1700	5.800	9.010	2.440
D	47	1	XRF	51.070	2.4500	13.710	13.060	-	0.1700	5.600	9.010	2.480
D	48	1	XRF, ICP-MS	50.870	2.4000	13.870	13.070	-	0.1700	5.650	9.020	2.520
D	49	1	XRF, titrimetry	51.000	2.4010	13.870	13.314	7.840	0.1740	5.717	9.009	2.525

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	SiO_2	TiO_2	Al_2O_3	Fe_2O_3T	Fe(II)O	MnO	MgO	CaO	Na_2O
D	50	1	XRF, ICP-AES, ICP-MS, other	51.320	2.4600	14.100	13.280	8.600	0.1700	5.670	9.110	2.490
D	51	2	XRF, ICP-AES, ICP-MS, other	51.230	2.4200	13.800	13.160	-	0.1700	5.580	8.990	2.490
D	52	2	ICP-AES, ICP-MS	50.780	2.3500	13.550	12.680	-	0.1700	5.690	8.980	2.450
D	53	1	XRF, ET-AAS, ICP-AES, AFS	51.250	2.5600	13.790	13.070	-	0.1700	5.810	9.500	2.100
D	54	2	XRF, ICP-MS	51.520	2.4300	13.850	13.360	-	0.1700	5.580	9.020	2.500
D	55	1	AAS, ET-AAS, photometric, CHNS	50.870	2.3500	13.880	14.080	8.470	0.1700	5.290	8.870	2.280
D	56	1	ICP-MS, XRF, IR	51.240	2.4600	14.370	13.320	-	0.1710	5.200	8.780	2.730
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	51.000	2.4300	13.800	13.200	-	0.1700	5.590	8.990	2.410
D	58	2	ICP-AES, AAS, ICP-MS, other	50.300	2.4900	14.000	13.200	8.500	0.1680	5.700	9.000	2.550
D	59	1	XRF	51.540	2.4600	13.830	13.430	-	0.1700	5.610	9.110	2.470
D	60	2	ICP-MS, XRF	51.100	2.5200	13.700	13.400	-	0.1700	5.790	9.050	2.560
D	61	2	XRF	51.070	2.4900	13.670	13.200	-	0.1800	5.540	8.890	2.500
D	62	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	63	2	AAS, gravimetric	50.300	2.1100	14.620	13.290	-	0.1700	5.470	8.680	2.470
D	64	2	AAS, ET-AAS, ICP-AES	51.310	2.3700	13.660	13.400	8.170	0.1740	5.530	8.770	2.330
D	65	2	ICP-AES, AAS, other	52.380	2.6300	13.550	13.530	-	0.1900	5.590	9.010	-
D	66	1	ICP-AES, FE	51.000	2.4000	13.730	13.040	8.300	0.1700	5.550	8.700	2.570
D	67	1	XRF, AAS, combustion	50.870	2.3770	13.740	13.090	-	0.1710	5.600	8.930	2.310
D	68	2	ICP-AES, ICP-MS	48.730	2.4200	13.290	12.810	-	0.1700	5.270	9.120	2.260
D	69	2	XRF, ICP-AES	51.080	2.4510	13.990	13.200	-	0.1850	5.700	9.000	2.330
D	70	2	XRF, ICP-MS	-	2.0800	-	-	-	0.1600	4.960	-	-
D	71	1	ICP-AES, titrimetry	51.500	2.4300	13.530	13.440	8.560	0.1800	5.570	9.040	2.490
D	71	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	72	1	XRF	-	2.3740	-	13.370	-	0.1650	-	8.970	
D	72	2	XRF	49.420	-	12.910	-	-	-	5.890	-	2.250
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	50.650	2.3700	14.020	13.200	8.280	0.1600	5.700	9.000	2.410
D	75	2	XRF	-	-	-	-	-	-	-	-	-

				K_2O	P_2O_5	H_2O^+	CO_2	LOI	Ag	As	Au	B
D	1	1	XRF	1.000	0.3030	-	-	0.670	-	-	-	-
D	1	2	XRF	-	-	-	-	-	-	0.00	-	-
D	2	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	3	1	ICP-MS, XRF, AAS	0.990	0.3700		-	0.890		-	-	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	1.080	0.3100	-	-	0.580	-	-	-	-
D	5	1	ICP-MS, XRF	1.010	0.3200	-	-	0.680	-	1.41	-	-
D	6	1	XRF	0.996	0.2980	-	-	-	-	-	-	-
D	6	2	XRF	-	-	-	-	1.810	-	-	-	-
D	7	1	XRF/titrimetry	0.999	0.2930	-	-	0.436	-	-	-	-
D	8	1	XRF	1.015	0.3090	-	-	0.442	-	-	-	-
D	9	2	XRF, IR	0.980	0.2960	-	0.068	0.620	-	-	-	-
D	10	2	XRF	1.060	-	-	-	0.440	-	-	-	-
D	11	1	INAA	-	-	-	-	-	-	-	-	-
D	11	2	INAA	1.000	-	-	-	-	-	-	-	-
D	12	1	INAA	-	-	-	-	-	-	0.95	0.002	-
D	13	1	XRF, AAS, titrimetry	1.010	0.3100	-	-	0.540	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	0.980	0.4100	-	-	2.380	-	24.00	-	-
D	15	2	ICP-AES, other	1.007	0.3050	-	2.246	-	-	-	-	-
D	16	1	AAS, colorimetry	1.010	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	0.3100	-	-	1.240	-	-	-	-
D	17	2	XRF	-	0.3100	-	-	-	-	-	-	-
D	18	1	XRF, AAS	0.993	0.3100	-	-	0.675	-	0.662	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	0.972	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	0.2820	-	-	1.100	0.15	3.20	0.008	5.35
D	20	1	XRF	1.010	0.2900	-	-	0.470	-	-	-	-
D	21	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	22	2	XRF	1.250	0.2800	-	-	1.460	-	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	K_2O	P_2O_5	H_2O^+	CO_2	LOI	Ag	As	Au	B
D	23	2	XRF, ICP-MS	1.020	0.2700	-	-	0.900	3.03	0.00	0.07	-
D	24	2	ICP-AES, ICP-MS	1.000	0.2900	0.810	-	0.530	-	-	-	-
D	25	2	XRF	1.060	0.3000	-	-	0.480	-	-	-	-
D	26	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	1.010	0.3000	1.400	0.200	0.500	0.16	-	-	-
D	28	1	XRF	0.990	0.3000	-	-	-	-	-	-	-
D	28	2	XRF	-	-	-	-	1.190	-	-	-	-
D	29	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	30	1	ICP-AES, gravimetry	1.000	0.2870	-	-	0.840	-	-	-	-
D	31	2	XRF	1.010	0.3100	-	-	-	-	-	-	-
D	32	2	XRF, titrimetry	1.000	0.3100	0.780	-	0.630	-	-	-	-
D	33	1	INAA	-	-	-	-	-	-	-	-	-
D	34	1	XRF, AAS	0.960	0.3000	-	-	1.210	-	1.30	-	-
D	35	1	XRF	0.980	0.3000	-	-	1.370	-	-	-	-
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	1.000	0.3000	-	-	0.390	-	-	-	-
D	37	1	XRF	0.970	-	-	-	-	-	-	-	-
D	37	2	XRF	-	0.2300	-	-	0.570	-	-	-	-
D	38	2	XRF	0.930	0.2700	-	-	1.340	-	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	1.030	-	-	-	1.220	-	-	-	-
D	40	1	INAA	-	-	-	-	-	-	-	-	-
D	40	2	INAA	0.880	-	-	-	-	-	0.72	-	-
D	41	2	wet chem (rapid)	1.050	0.3800	-	-	1.200	-	-	-	-
D	42	1	XRF	0.980	0.0300	-	-	-	-	-	-	-
D	43	1	ICP-AES, AAS	0.820	0.3300	-	-	1.230	-	-	-	-
D	44	1	XRF	0.990	0.2900	-	-	0.720	-	-	-	-
D	45	1	AAS, ICP-AES, wet chemistry	0.840	0.2990	-	-	1.310	-	-	-	-
D	46	2	XRF	1.020	0.3000	-	-	-	-	-	-	-
D	47	1	XRF	0.990	0.3000	-	-	1.080	-	-	-	-
D	48	1	XRF, ICP-MS	0.950	0.3000	-	0.190	0.760	-	-	-	-
D	49	1	XRF, titrimetry	0.975	0.3000	-	-	0.620	-	-	-	-
D	50	1	XRF, ICP-AES, ICP-MS, other	0.960	0.3000	-	0.190	1.230	2.00	-	-	-
D	51	2	XRF, ICP-AES, ICP-MS, other	0.990	0.3100	-	-	0.470	-	-	-	-
D	52	2	ICP-AES, ICP-MS	0.950	0.2500	-	-	1.280	-	-	-	-
D	53	1	XRF, ET-AAS, ICP-AES, AFS	0.870	0.2700	0.540	-	1.200	0.30	-	0.003	-
D	54	2	XRF, ICP-MS	1.000	0.3080	-	-	0.490	-	-	-	-
D	55	1	AAS, ET-AAS, photometric, CHNS	0.980	0.2900	1.130	0.020	1.080	-	-	0.004	-
D	56	1	ICP-MS, XRF, IR	0.983	0.3300	1.070	-	0.600	-	0.00	-	-
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	0.990	0.3300	-	0.070	-	0.10	3.45	-	-
D	58	2	ICP-AES, AAS, ICP-MS, other	1.030	0.2900	-	0.140	0.850	0.04	1.00	0.001	-
D	59	1	XRF	0.990	0.3000	-	-	0.420	-	-	-	-
D	60	2	ICP-MS, XRF	0.980	0.3100	-	-	1.240	-	-	-	-
D	61	2	XRF	1.000	0.3100	-	-	1.320	-	5.00	-	-
D	62	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	63	2	AAS, gravimetric	0.860	0.3100	0.620	-	0.620	-	0.22	-	-
D	64	2	AAS, ET-AAS, ICP-AES	0.928	0.3780	-	-	0.390	0.04	0.61	-	-
D	65	2	ICP-AES, AAS, other	-	-	0.360	-	0.870	-	-	-	-
D	66	1	ICP-AES, FE	1.040	0.2700	-	-	0.710	-	-	-	-
D	67	1	XRF, AAS, combustion	0.960	0.2660	-	0.103	0.870	-	0.70	-	-
D	68	2	ICP-AES, ICP-MS	0.930	0.2700	-	-	-	-	-	-	-
D	69	2	XRF, ICP-AES	1.010	0.2870	-	-	0.760	-	0.50	-	-
D	70	2	XRF, ICP-MS	-	-	-	-	-	-	-	-	-
D	71	1	ICP-AES, titrimetry	1.050	0.2900	-	-	0.910	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	72	1	XRF	0.967	-	-	-	-	-	-	-	-
D	72	2	XRF	-	0.3000	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	0.42	-	0.009	-
D	74	2	ICP-AES, ICP-MS	0.980	0.3200	1.120	0.130	1.140	0.06	0.81	-	4.00
D	75	2	XRF	-	-	-	-	-	-	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Ba	Be	Bi	Br	Cd	Ce	Cl	Co	Cr
D	1	1	XRF	367.00	-	-	-	-	-	-	-	99.00
D	1	2	XRF	-	-	-	-	-	-	-	50.00	-
D	2	1	ICP-MS	331.00	-	-	-	-	58.40	-	-	-
D	3	1	ICP-MS, XRF, AAS	343.00	1.23	-	-	-	61.00	-	46.00	99.00
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	342.00	-	-	-	-	56.00	-	46.00	92.00
D	5	1	ICP-MS, XRF	368.00	-	-	-	-	-	-	41.00	109.00
D	6	1	XRF	328.00	-	-	-	-	-	-	41.00	99.00
D	6	2	XRF	-	-	-	-	-	64.00	-	-	-
D	7	1	XRF/titrimetry	230.00	-	-	-	-	77.00	-	-	91.00
D	8	1	XRF	341.60	-	-	-	-	57.40	-	-	100.90
D	9	2	XRF, IR	342.00	-	10.00	-	-	69.00	-	44.00	34.00
D	10	2	XRF	-	-	-	-	-	-	-	-	-
D	11	1	INAA	-	-	-	-	-	60.40	-	43.60	96.60
D	11	2	INAA	354.00	-	-	-	-	-	-	-	-
D	12	1	INAA	334.00	-	-	0.40	-	59.40	-	44.10	90.00
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	90.00
D	14	2	ICP-AES	355.00	1.00	19.00	-	0.70	-	-	55.00	61.00
D	15	2	ICP-AES, other	321.10	-	-	-	-	-	-	60.29	174.30
D	16	1	AAS, colorimetry	312.00	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	290.00	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	-	-	-	-	-	-	-	46.80	-
D	18	2	XRF	357.90	-	-	-	-	-	-	-	102.70
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	380.00	1.25	-	-	0.104	66.00	-	43.70	140.00
D	20	1	XRF	355.00	-	-	-	-	56.00	-	51.00	91.00
D	21	1	ICP-MS	334.00	-	-	-	-	58.00	-	-	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-
D	23	2	XRF, ICP-MS	426.00	1.18	0.05	-	0.32	64.90	-	48.50	89.40
D	24	2	ICP-AES, ICP-MS	326.00	-	-	-	-	57.50	-	45.00	90.00
D	25	2	XRF	359.80	-	-	-	-	-	-	-	-
D	26	2	ICP-AES	334.00	-	-	-	-	65.90	-	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	340.00	0.90	-	-	-	62.00	-	62.00	110.00
D	28	1	XRF	275.00	-	-	-	-	-	-	-	103.00
D	28	2	XRF	-	-	-	-	-	74.00	-	-	-
D	29	1	ICP-MS	333.00	-	-	-	-	57.68	-	-	-
D	30	1	ICP-AES, gravimetry	293.32	-	-	-	-	-	-	51.53	68.43
D	31	2	XRF	328.00	-	-	-	-	-	-	31.00	97.00
D	32	2	XRF, titrimetry	316.00	-	-	-	-	-	-	46.00	94.00
D	33	1	INAA	349.00	-	-	-	-	60.00	-	44.50	-
D	34	1	XRF, AAS	338.00	-	-	-	-	55.00	-	38.00	85.00
D	35	1	XRF	350.00	-	-	-	-	80.00	-	47.00	100.00
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	350.00	0.97	-	-	0.30	67.00	100.00	46.00	88.00
D	37	1	XRF	328.00	-	-	-	-	47.00	-	25.00	100.00
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	320.00	-	-	-	-	61.00	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	355.00	-	-	0.70	-	54.00	-	46.00	83.80
D	40	1	INAA	-	-	-	-	-	59.86	-	-	-
D	40	2	INAA	348.00	-	-	-	-	-	-	46.20	101.00
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	-	-	-	-	57.00	-	-	102.00
D	43	1	ICP-AES, AAS	400.00	-	-	-	-	-	-	-	98.00
D	44	1	XRF	308.00	-	-	-	-	56.00	85.00	35.00	88.00
D	45	1	AAS, ICP-AES, wet chemistry	-	-	-	-	-	60.60	-	39.00	100.00
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	361.00	-	-	-	-	54.00	-	-	97.00
D	48	1	XRF, ICP-MS	346.00	-	-	-	-	57.60	-	42.50	101.00
D	49	1	XRF, titrimetry	364.00	-	-	-	-	45.00	-	-	106.00

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Ba	Be	Bi	Br	Cd	Ce	Cl	Co	Cr
D	50	1	XRF, ICP-AES, ICP-MS, other	371.00	-	-	-	-	62.12	-	42.75	104.00
D	51	2	XRF, ICP-AES, ICP-MS, other	455.00	1.31	1.30	-	-	65.40	-	43.00	89.00
D	52	2	ICP-AES, ICP-MS	342.00	0.95	-	-	-	59.00	-	39.80	81.00
D	53	1	XRF, ET-AAS, ICP-AES, AFS	319.00	1.25	-	-	1.20	-	-	33.50	97.00
D	54	2	XRF, ICP-MS	324.00	-	0.40	-	-	71.01	-	-	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	345.00	-	-	-	-	56.10	-	41.90	100.00
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	413.00	1.05	-	-	0.63	61.00	-	46.00	95.00
D	58	2	ICP-AES, AAS, ICP-MS, other	340.00	1.10	0.01	-	0.10	62.20	-	50.00	95.00
D	59	1	XRF	-	-	-	-	-	-	-	-	110.00
D	60	2	ICP-MS, XRF	-	-	-	-	-	54.00	-	-	-
D	61	2	XRF	-	-	-	-	-	-	-	42.00	76.00
D	62	1	ICP-MS	337.60	-	-	-	-	58.24	-	44.40	103.00
D	63	2	AAS, gravimetric	-	-	-	-	-	-	-	47.90	70.00
D	64	2	AAS, ET-AAS, ICP-AES	325.00	1.61	0.10	-	0.064	-	-	38.90	97.10
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	64.20	-
D	66	1	ICP-AES, FE	349.00	-	-	-	-	59.20	-	57.00	103.00
D	67	1	XRF, AAS, combustion	336.00	-	-	-	0.11	53.00	-	47.00	53.00
D	68	2	ICP-AES, ICP-MS	318.20	-	-	-	-	59.50	-	45.02	100.60
D	69	2	XRF, ICP-AES	334.00	-	-	1.70	0.20	61.00	-	32.00	84.00
D	70	2	XRF, ICP-MS	328.00	-	-	-	-	64.98	-	40.00	81.00
D	71	1	ICP-AES, titrimetry	343.00	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	0.80	-	-	-	55.00	-	56.00	87.00
D	72	1	XRF	353.00	-	-	-	-	66.00	-	46.00	80.00
D	72	2	XRF	-	-	-	-	-	-	135.00	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	328.00	1.12	-	-	0.19	58.10	84.00	43.60	102.00
D	75	2	XRF	389.00	-	-	-	-	64.00	-	43.00	60.00

				Cs	Cu	Dy	Er	Eu	F	Ga	Gd	Ge
D	1	1	XRF	-	62.00	-	-	-	-	24.00	-	-
D	1	2	XRF	-	-	-	-	-	-	-	-	-
D	2	1	ICP-MS	0.440	-	5.98	3.06	2.15	-	-	7.14	-
D	3	1	ICP-MS, XRF, AAS	0.50	-	6.40	3.13	2.24	-	-	7.20	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	65.00	-	-	-	-	-	-	-
D	5	1	ICP-MS, XRF	-	64.40	-	-	-	-	-	-	-
D	6	1	XRF	-	-	-	-	-	-	23.80	-	-
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF/titrimetry	-	-	-	-	-	-	22.00	-	-
D	8	1	XRF	-	63.60	-	-	-	-	24.20	-	-
D	9	2	XRF, IR	6.00	56.00	-	-	-	580.00	23.00	-	1.20
D	10	2	XRF	-	-	-	-	-	-	19.00	-	-
D	11	1	INAA	-	-	-	-	2.25	-	-	-	-
D	11	2	INAA	-	-	6.23	-	-	-	-	-	-
D	12	1	INAA	0.45	-	5.00	-	2.25	-	-	-	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	70.00	-	-	-	-	-	-	-
D	14	2	ICP-AES	-	76.00	-	-	-	-	-	-	-
D	15	2	ICP-AES, other	-	46.22	-	-	-	480.00	-	-	-
D	16	1	AAS, colorimetry	-	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	-	62.70	-	-	-	-	-	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	1000.0	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	63.50	-	-	-	-	-	-	1.20
D	20	1	XRF	-	74.00	-	-	-	-	24.00	-	-
D	21	1	ICP-MS	-	-	5.80	2.90	2.20	-	-	7.10	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-

Table 1 (continued).
GeoPT4. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Cs	Cu	Dy	Er	Eu	F	Ga	Gd	Ge
D	23	2	XRF, ICP-MS	0.45	62.70	6.92	3.46	2.42	-	24.20	7.97	-
D	24	2	ICP-AES, ICP-MS	0.20	62.00	5.80	2.80	2.20	-	-	6.40	-
D	25	2	XRF	-	-	-	-	-	-	23.40	-	-
D	26	2	ICP-AES	-	-	6.24	3.15	2.12	-	-	5.27	-
D	27	1	XRF, ICP-AES, ICP-MS, other	0.52	64.00	6.30	3.10	2.30	-	23.00	7.90	-
D	28	1	XRF	-	54.00	-	-	-	-	24.00	-	-
D	28	2	XRF	-	-	-	-	-	-	-	-	-
D	29	1	ICP-MS	0.44	-	6.69	3.21	2.42	-	-	7.38	-
D	30	1	ICP-AES, gravimetry	-	62.11	-	-	-	-	-	-	-
D	31	2	XRF	-	62.00	-	-	-	-	-	-	-
D	32	2	XRF, titrimetry	-	-	-	-	-	-	24.00	-	-
D	33	1	INAA	0.49	-	-	-	2.30	-	-	-	-
D	34	1	XRF, AAS	-	73.00	-	-	-	-	21.00	-	-
D	35	1	XRF	-	56.00	-	-	-	-	22.00	-	-
D	35	2	XRF	13.00	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	-	74.00	7.00	4.00	3.00	900.00	23.00	-	-
D	37	1	XRF	-	64.00	-	-	-	-	22.00	-	-
D	37	2	XRF	2.00	-	-	-	-	-	-	-	2.00
D	38	2	XRF	-	-	-	-	-	-	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	-	56.00	3.00	-	2.40	-	23.00	-	-
D	40	1	INAA	-	-	-	-	2.14	-	-	-	-
D	40	2	INAA	-	-	-	-	-	-	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	63.00	-	-	-	-	-	-	-
D	43	1	ICP-AES, AAS	-	69.00	-	-	-	-	-	-	-
D	44	1	XRF	-	63.00	-	-	-	-	24.00	-	-
D	45	1	AAS, ICP-AES, wet chemistry	-	60.00	5.78	2.92	1.97	-	-	6.96	-
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	-	-	-	-	-	22.00	-	-
D	48	1	XRF, ICP-MS	-	65.50	6.21	3.00	2.24	-	-	7.11	-
D	49	1	XRF, titrimetry	-	64.00	-	-	-	-	-	-	-
D	50	1	XRF, ICP-AES, ICP-MS, other	0.50	67.00	6.10	2.87	2.13	-	23.00	6.93	-
D	51	2	XRF, ICP-AES, ICP-MS, other	-	63.80	6.79	3.41	2.47	-	23.60	7.67	-
D	52	2	ICP-AES, ICP-MS	0.50	61.00	5.50	3.20	2.20	-	24.00	8.10	-
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	63.00	-	-	-	-	-	-	-
D	54	2	XRF, ICP-MS	-	-	7.52	3.58	2.45	-	27.50	9.64	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-	59.30	5.41	2.88	2.04	-	20.60	7.87	0.87
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	0.48	55.00	6.01	2.89	2.12	-	22.70	7.70	1.37
D	58	2	ICP-AES, AAS, ICP-MS, other	0.49	63.00	6.70	3.10	2.35	550.00	24.00	7.10	1.50
D	59	1	XRF	-	65.00	-	-	-	-	23.00	-	-
D	60	2	ICP-MS, XRF	-	-	5.40	2.50	2.00	-	-	6.30	-
D	61	2	XRF	-	63.00	-	-	-	-	-	-	-
D	62	1	ICP-MS	0.597	60.50	6.097	2.925	2.178	-	25.20	7.257	-
D	63	2	AAS, gravimetric	-	63.60	-	-	-	70.30	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	5.90	61.90	-	-	-	-	-	-	-
D	65	2	ICP-AES, AAS, other	-	80.30	-	-	-	520.00	-	-	-
D	66	1	ICP-AES, FE	-	66.00	5.31	-	1.94	-	-	6.04	-
D	67	1	XRF, AAS, combustion	-	48.00	-	-	-	-	17.00	-	-
D	68	2	ICP-AES, ICP-MS	0.39	-	6.25	3.13	2.35	-	22.31	7.08	-
D	69	2	XRF, ICP-AES	-	59.00	-	-	1.80	-	24.50	-	2.30
D	70	2	XRF, ICP-MS	0.39	60.00	6.217	3.02	2.466	-	21.98	7.97	-
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	61.00	-	-	-	-	-	-	-
D	72	1	XRF	-	46.00	-	-	-	-	22.00	-	-
D	72	2	XRF	-	-	-	-	-	549.00	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	0.52	64.10	5.870	2.74	2.180	54.00	23.70	7.11	1.43
D	75	2	XRF	-	62.00	-	-	-	-	22.00	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Hf	Hg	Ho	In	Ir	La	Li	Lu	Mo
D	1	1	XRF	-	-	-	-	-	-	-	-	-
D	1	2	XRF	-	-	-	-	-	-	-	-	1.00
D	2	1	ICP-MS	5.44	-	1.130	-	-	26.07	-	0.368	-
D	3	1	ICP-MS, XRF, AAS	5.20	-	1.20	-	-	27.40	-	0.35	3.63
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	-	-	-	-	12.00	-	-
D	5	1	ICP-MS, XRF	-	-	-	-	-	-	-	-	2.48
D	6	1	XRF	-	-	-	-	-	-	-	-	-
D	6	2	XRF	-	-	-	-	-	19.00	-	-	-
D	7	1	XRF/titrimetry	-	-	-	-	-	23.00	-	-	3.00
D	8	1	XRF	-	-	-	-	-	25.80	-	-	-
D	9	2	XRF, IR	5.10	0.40	-	-	-	41.00	-	-	3.00
D	10	2	XRF	-	-	-	-	-	-	-	-	-
D	11	1	INAA	5.19	-	-	-	-	27.80	-	0.371	-
D	11	2	INAA	-	-	-	-	-	-	-	-	-
D	12	1	INAA	5.10	-	-	-	-	25.90	-	0.39	3.20
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	-	-	-	-	-	-	-	-	6.00
D	15	2	ICP-AES, other	-	-	-	-	-	-	-	-	-
D	16	1	AAS, colorimetry	-	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	-	-	-	-	-	-	-	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	-	12.00	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	24.00	-	-	3.35
D	20	1	XRF	-	-	-	-	-	28.00	-	-	-
D	21	1	ICP-MS	5.20	-	1.20	-	-	26.00	-	0.36	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-
D	23	2	XRF, ICP-MS	6.05	-	1.30	-	-	28.40	15.80	0.41	3.54
D	24	2	ICP-AES, ICP-MS	5.00	-	1.19	-	-	26.50	-	0.35	2.00
D	25	2	XRF	-	-	-	-	-	-	-	-	-
D	26	2	ICP-AES	2.18	-	1.16	-	-	29.50	-	0.54	-
D	27	1	XRF, ICP-AES, ICP-MS, other	5.30	-	1.20	0.09	-	28.00	-	0.39	3.60
D	28	1	XRF	-	-	-	-	-	-	-	-	-
D	28	2	XRF	-	-	-	-	-	33.00	-	-	-
D	29	1	ICP-MS	5.23	-	1.29	-	-	27.81	-	0.37	-
D	30	1	ICP-AES, gravimetry	-	-	-	-	-	-	-	-	151.79
D	31	2	XRF	-	-	-	-	-	-	-	-	-
D	32	2	XRF, titrimetry	-	-	-	-	-	36.00	-	-	-
D	33	1	INAA	5.00	-	-	-	-	27.40	-	0.30	-
D	34	1	XRF, AAS	4.50	-	-	-	-	34.00	14.00	-	2.20
D	35	1	XRF	5.00	-	-	-	-	160.00	-	-	-
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	6.00	-	1.30	-	-	30.00	-	0.43	3.50
D	37	1	XRF	-	-	-	-	-	20.00	-	-	3.00
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	-	-	-	-	-	39.00	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	4.50	-	1.20	-	-	27.00	14.00	0.40	4.00
D	40	1	INAA	-	-	1.23	-	-	27.07	-	0.37	-
D	40	2	INAA	5.30	-	-	-	-	-	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	-	-	-	-	-	-	-	-
D	43	1	ICP-AES, AAS	-	-	-	-	-	-	-	-	-
D	44	1	XRF	-	-	-	-	-	27.00	-	-	-
D	45	1	AAS, ICP-AES, wet chemistry	-	-	1.37	-	-	28.51	10.00	0.36	-
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	-	-	-	-	32.00	-	-	-
D	48	1	XRF, ICP-MS	-	-	1.17	-	-	26.90	-	0.34	-
D	49	1	XRF, titrimetry	-	-	-	-	-	-	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Hf	Hg	Ho	In	Ir	La	Li	Lu	Mo
D	50	1	XRF, ICP-AES, ICP-MS, other	5.16	-	1.21	-	-	27.15	14.00	0.39	3.90
D	51	2	XRF, ICP-AES, ICP-MS, other	6.31	-	1.31	-	-	28.70	11.50	0.41	3.00
D	52	2	ICP-AES, ICP-MS	5.00	-	1.30	-	-	26.50	12.80	0.40	-
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	0.012	-	-	-	-	12.00	-	2.00
D	54	2	XRF, ICP-MS	6.38	-	1.36	-	-	28.50	-	0.38	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	4.41	-	1.07	-	-	26.00	-	0.36	3.06
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	6.13	-	1.08	0.18	-	29.70	15.00	-	2.85
D	58	2	ICP-AES, AAS, ICP-MS, other	5.25	0.01	1.20	0.09	0.001	28.00	13.20	0.36	3.10
D	59	1	XRF	-	-	-	-	-	-	-	-	2.00
D	60	2	ICP-MS, XRF	-	-	0.94	-	-	24.00	-	0.32	-
D	61	2	XRF	-	-	-	-	-	-	-	-	-
D	62	1	ICP-MS	5.697	-	1.146	-	-	26.28	-	0.3514	3.34
D	63	2	AAS, gravimetric	-	-	-	-	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	-	0.004	-	-	-	-	7.26	-	-
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	-	-	-	-	-	26.88	-	0.37	-
D	67	1	XRF, AAS, combustion	-	0.02	-	-	-	44.00	-	-	-
D	68	2	ICP-AES, ICP-MS	5.66	-	1.20	-	-	26.08	-	0.34	-
D	69	2	XRF, ICP-AES	4.50	-	-	-	-	26.00	-	-	-
D	70	2	XRF, ICP-MS	6.068	-	1.38	-	-	29.73	-	0.354	3.025
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	28.00	13.00	-	-
D	72	1	XRF	-	-	-	-	-	9.00	-	-	-
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	4.980	-	1.12	0.10	-	26.70	-	0.390	3.160
D	75	2	XRF	6.000	-	-	-	-	27.00	-	-	2.000

				N	Nb	Nd	Ni	Os	Pb	Pd	Pr	Pt
D	1	1	XRF	-	17.40	-	54.00	-	-	-	-	-
D	1	2	XRF	-	-	-	-	-	9.00	-	-	-
D	2	1	ICP-MS	-	-	31.60	-	-	11.08	-	7.873	-
D	3	1	ICP-MS, XRF, AAS	-	17.30	33.90	56.00	-	8.80	-	8.03	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	-	58.00	-	-	-	-	-
D	5	1	ICP-MS, XRF	-	-	-	52.20	-	13.90	-	-	-
D	6	1	XRF	-	20.00	-	49.00	-	-	-	-	-
D	6	2	XRF	-	-	34.00	-	-	2.00	-	-	-
D	7	1	XRF/titrimetry	-	15.00	39.00	-	-	14.00	-	-	-
D	8	1	XRF	-	17.20	-	55.90	-	11.50	-	-	-
D	9	2	XRF, IR	-	21.00	34.00	60.00	-	14.00	-	8.00	-
D	10	2	XRF	-	20.00	-	34.00	-	13.00	-	-	-
D	11	1	INAA	-	-	29.40	-	-	-	-	-	-
D	11	2	INAA	-	-	-	-	-	-	-	-	-
D	12	1	INAA	-	-	33.00	56.00	-	-	-	-	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	41.00	-	-	-	-	-
D	14	2	ICP-AES	-	64.00	-	32.00	-	65.00	-	-	-
D	15	2	ICP-AES, other	-	-	-	45.48	-	-	-	-	-
D	16	1	AAS, colorimetry	-	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	-	19.20	-	48.80	-	-	-	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	16.00	34.00	58.00	-	11.50	-	-	-
D	20	1	XRF	-	17.00	32.00	54.00	-	15.00	-	-	-
D	21	1	ICP-MS	-	16.60	33.00	-	-	14.10	-	7.60	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	N	Nb	Nd	Ni	Os	Pb	Pd	Pr	Pt
D	23	2	XRF, ICP-MS	-	18.00	34.70	52.20	-	16.40	-	8.18	0.05
D	24	2	ICP-AES, ICP-MS	-	15.00	32.30	52.00	-	13.00	-	7.55	-
D	25	2	XRF	-	14.30	-	48.50	-	-	-	-	-
D	26	2	ICP-AES	-	13.17	36.30	-	-	-	-	7.78	-
D	27	1	XRF, ICP-AES, ICP-MS, other	-	19.00	35.00	56.00	-	13.00	-	8.10	-
D	28	1	XRF	-	19.40	-	40.00	-	-	-	-	-
D	28	2	XRF	-	-	-	-	-	11.00	-	-	-
D	29	1	ICP-MS	-	18.12	30.99	-	-	13.05	-	7.06	-
D	30	1	ICP-AES, gravimetry	-	-	-	44.65	-	-	-	-	-
D	31	2	XRF	-	10.00	-	61.00	-	-	-	-	-
D	32	2	XRF, titrimetry	-	17.00	37.00	50.00	-	15.00	-	-	-
D	33	1	INAA	-	-	31.00	-	-	-	-	-	-
D	34	1	XRF, AAS	-	17.00	38.00	53.00	-	13.00	-	-	-
D	35	1	XRF	-	17.00	35.00	56.00	-	18.00	-	28.00	-
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	-	19.00	37.00	51.00	-	-	-	8.60	-
D	37	1	XRF	-	15.00	-	54.00	-	11.00	-	-	-
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	-	19.00	-	-	-	-	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	-	-	24.00	58.00	-	-	-	-	-
D	40	1	INAA	-	-	31.61	-	-	-	-	-	-
D	40	2	INAA	-	-	-	-	-	-	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	16.00	33.00	55.00	-	14.00	-	-	-
D	43	1	ICP-AES, AAS	-	22.00	-	60.00	-	35.00	-	-	-
D	44	1	XRF	-	24.00	-	50.00	-	20.00	-	-	-
D	45	1	AAS, ICP-AES, wet chemistry	-	-	33.54	40.00	-	24.00	-	8.73	-
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	17.20	-	49.00	-	11.00	-	-	-
D	48	1	XRF, ICP-MS	-	16.60	33.50	54.00	-	11.40	-	7.63	-
D	49	1	XRF, titrimetry	-	16.00	-	55.00	-	13.00	-	-	-
D	50	1	XRF, ICP-AES, ICP-MS, other	-	17.00	33.01	64.00	-	13.00	-	7.96	-
D	51	2	XRF, ICP-AES, ICP-MS, other	-	18.08	35.51	51.10	-	12.00	-	8.60	-
D	52	2	ICP-AES, ICP-MS	-	20.00	33.00	48.40	-	13.00	-	7.80	-
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	-	-	34.00	-	28.00	0.10	-	0.04
D	54	2	XRF, ICP-MS	-	18.60	35.42	-	-	-	-	9.76	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	0.16	-	0.024
D	56	1	ICP-MS, XRF, IR	-	14.90	30.30	47.10	-	12.00	-	6.89	-
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-	24.40	34.00	55.30	-	13.20	-	7.80	-
D	58	2	ICP-AES, AAS, ICP-MS, other	-	19.50	33.50	52.00	0.001	14.00	0.002	8.05	0.002
D	59	1	XRF	-	16.00	-	55.00	-	12.00	-	-	-
D	60	2	ICP-MS, XRF	-	-	30.00	-	-	-	-	7.00	-
D	61	2	XRF	-	-	-	52.00	-	13.00	-	-	-
D	62	1	ICP-MS	-	18.70	32.42	49.00	-	14.03	-	7.708	-
D	63	2	AAS, gravimetric	-	-	-	52.30	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-	-	46.40	-	13.40	-	-	-
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	-	15.00	33.46	55.00	-	-	-	-	-
D	67	1	XRF, AAS, combustion	10.00	22.00	-	87.00	-	8.90	-	-	-
D	68	2	ICP-AES, ICP-MS	-	16.84	33.67	-	-	-	-	7.45	-
D	69	2	XRF, ICP-AES	-	19.00	25.00	53.00	-	11.00	-	-	-
D	70	2	XRF, ICP-MS	-	14.40	36.59	53.00	-	-	-	8.12	-
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	30.00	31.00	46.00	-	-	-	-	-
D	72	1	XRF	-	16.00	33.00	37.00	-	8.00	-	-	-
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	0.006	-	0.033
D	74	2	ICP-AES, ICP-MS	-	15.60	33.10	51.30	-	21.00	-	7.64	-
D	75	2	XRF	-	19.00	-	52.00	-	10.00	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Rb	Rh	Ru	S	Sb	Sc	Se	Sm	Sn
D	1	1	XRF	26.10	-	-	-	-	-	-	-	-
D	1	2	XRF	-	-	-	309.00	-	28.00	-	-	-
D	2	1	ICP-MS	25.10	-	-	-	-	-	-	8.144	-
D	3	1	ICP-MS, XRF, AAS	25.60	-	-	-	-	27.00	-	9.00	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	-	696.00	-	28.00	-	-	-
D	5	1	ICP-MS, XRF	-	-	-	-	-	-	0.59	-	16.10
D	6	1	XRF	23.00	-	-	-	-	-	-	-	-
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF/titrimetry	26.00	-	-	-	-	28.00	-	-	-
D	8	1	XRF	27.50	-	-	-	-	32.40	-	-	-
D	9	2	XRF, IR	29.00	-	-	280.00	-	25.00	3.00	6.00	19.00
D	10	2	XRF	25.00	-	-	-	-	-	-	-	-
D	11	1	INAA	35.60	-	-	-	-	28.90	-	9.22	-
D	11	2	INAA	-	-	-	-	-	-	-	-	-
D	12	1	INAA	25.50	-	-	-	0.085	29.10	-	8.50	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	14.00	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	-	-	-	3000.0	-	-	-	-	-
D	15	2	ICP-AES, other	-	-	-	5710.0	-	-	-	-	-
D	16	1	AAS, colorimetry	27.00	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	24.00	-	-	284.00	-	-	-	-	-
D	18	1	XRF, AAS	29.30	-	-	-	-	-	-	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	22.00	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	41.00	-	-	18.00
D	20	1	XRF	26.00	-	-	-	-	29.00	-	-	-
D	21	1	ICP-MS	-	-	-	-	-	-	-	8.30	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-
D	23	2	XRF, ICP-MS	24.90	-	-	207.00	0.12	19.40	4.09	9.67	19.90
D	24	2	ICP-AES, ICP-MS	25.00	-	-	-	0.10	28.00	-	8.40	15.00
D	25	2	XRF	21.20	-	-	-	-	-	-	-	-
D	26	2	ICP-AES	-	-	-	-	-	26.50	-	9.16	-
D	27	1	XRF, ICP-AES, ICP-MS, other	27.00	-	-	-	-	28.00	-	9.00	19.00
D	28	1	XRF	25.00	-	-	-	-	-	-	-	-
D	28	2	XRF	-	-	-	-	-	28.00	-	-	-
D	29	1	ICP-MS	24.60	-	-	-	-	31.20	-	9.59	-
D	30	1	ICP-AES, gravimetry	-	-	-	-	-	-	-	-	-
D	31	2	XRF	17.00	-	-	-	-	-	-	-	-
D	32	2	XRF, titrimetry	27.00	-	-	-	-	-	-	-	-
D	33	1	INAA	30.00	-	-	-	-	28.50	-	8.70	-
D	34	1	XRF, AAS	22.00	-	-	-	-	-	-	-	-
D	35	1	XRF	25.00	-	-	-	-	30.00	-	7.00	-
D	35	2	XRF	-	-	-	-	-	-	-	-	19.00
D	36	2	XRF, ICP-MS	27.00	-	-	600.00	0.10	30.00	-	9.90	16.00
D	37	1	XRF	25.00	-	-	-	-	-	-	-	17.00
D	37	2	XRF	-	-	-	-	-	-	-	4.00	-
D	38	2	XRF	23.00	-	-	-	-	-	-	-	17.00
D	39	2	XRF, ICP-AES, INAA, AAS, other	27.00	-	-	600.00	0.20	29.00	-	8.70	15.00
D	40	1	INAA	-	-	-	-	-	-	-	8.77	-
D	40	2	INAA	28.80	-	-	-	-	27.96	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	27.00	-	-	-	-	25.00	-	-	-
D	43	1	ICP-AES, AAS	24.00	-	-	-	-	28.00	-	-	-
D	44	1	XRF	22.00	-	-	470.00	-	-	-	-	-
D	45	1	AAS, ICP-AES, wet chemistry	-	-	-	-	-	-	-	8.86	-
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	26.10	-	-	-	-	-	-	-	-
D	48	1	XRF, ICP-MS	26.00	-	-	600.00	-	27.20	-	8.84	18.80
D	49	1	XRF, titrimetry	25.00	-	-	-	-	-	-	-	-

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Rb	Rh	Ru	S	Sb	Sc	Se	Sm	Sn
D	50	1	XRF, ICP-AES, ICP-MS, other	29.00	-	-	500.00	-	25.00	0.20	8.92	17.00
D	51	2	XRF, ICP-AES, ICP-MS, other	25.30	-	-	570.00	-	28.00	0.00225	9.52	18.00
D	52	2	ICP-AES, ICP-MS	27.20	-	-	-	-	-	-	9.00	19.00
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	-	-	-	5.00	29.00	-	-	-
D	54	2	XRF, ICP-MS	27.50	-	-	-	-	-	-	8.63	24.00
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	22.40	-	-	560.00	-	28.00	-	8.37	14.50
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	26.20	-	-	600.00	0.07	31.60	0.20	7.90	31.40
D	58	2	ICP-AES, AAS, ICP-MS, other	26.50	0.001	0.001	550.00	0.15	27.00	0.50	9.15	18.50
D	59	1	XRF	23.00	-	-	-	-	-	-	-	-
D	60	2	ICP-MS, XRF	-	-	-	-	-	-	-	7.60	-
D	61	2	XRF	-	-	-	-	-	-	2.00	-	-
D	62	1	ICP-MS	25.60	-	-	-	0.085	28.50	-	8.837	18.00
D	63	2	AAS, gravimetric	-	-	-	815.00	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	16.10	-	-	-	0.50	-	-	-	16.70
D	65	2	ICP-AES, AAS, other	-	-	-	590.00	-	-	-	-	-
D	66	1	ICP-AES, FE	-	-	-	-	-	29.00	-	8.68	-
D	67	1	XRF, AAS, combustion	22.00	-	-	-	0.00	27.00	0.20	-	-
D	68	2	ICP-AES, ICP-MS	24.28	-	-	-	-	-	-	10.00	-
D	69	2	XRF, ICP-AES	24.80	-	-	-	-	-	-	7.00	15.10
D	70	2	XRF, ICP-MS	27.40	-	-	-	-	-	-	8.81	15.40
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	25.00	-	-	-
D	72	1	XRF	26.00	-	-	-	-	31.00	-	-	-
D	72	2	XRF	-	-	-	452.00	-	-	-	-	-
D	73	2	BrF_3 attack	-	0.011	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	25.10	-	-	65.00	-	-	0.18	8.71	34.10
D	75	2	XRF	30.00	-	-	-	-	-	-	-	-

				Sr	Ta	Tb	Te	Th	Tl	Tm	U	V
D	1	1	XRF	413.60	-	-	-	-	-	-	-	341.00
D	1	2	XRF	-	-	-	-	3.00	-	-	0.00	-
D	2	1	ICP-MS	409.00	-	1.064	-	3.03	-	0.4083	0.618	-
D	3	1	ICP-MS, XRF, AAS	413.00	1.12	1.12	-	2.93	-	0.45	0.59	355.00
D	3	2	ICP-MS	-	-	-	-	-	0.18	-	-	-
D	4	2	ICP-AES	407.00	-	-	-	-	-	-	-	338.00
D	5	1	ICP-MS, XRF	376.00	-	-	-	4.00	-	-	0.42	395.00
D	6	1	XRF	414.00	-	-	-	-	-	-	-	343.00
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF/titrimetry	407.00	-	-	-	-	-	-	3.00	361.00
D	8	1	XRF	419.90	-	-	-	2.70	-	-	-	367.60
D	9	2	XRF, IR	427.00	-	-	-	3.60	-	-	-	344.00
D	10	2	XRF	406.00	-	-	-	3.00	-	-	-	-
D	11	1	INAA	-	1.28	1.02	-	3.04	-	-	-	351.00
D	11	2	INAA	530.00	-	-	-	-	-	-	-	-
D	12	1	INAA	-	1.18	0.96	-	2.95	-	-	0.63	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	384.00	-	-	-	-	-	-	-	338.00
D	14	2	ICP-AES	358.00	-	-	-	-	-	-	-	308.00
D	15	2	ICP-AES, other	377.90	-	-	-	-	-	-	-	330.90
D	16	1	AAS, colorimetry	411.00	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	260.00	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	459.60	-	-	-	-	-	-	-	353.70
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	424.00	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	-	-	-	340.00
D	20	1	XRF	393.00	-	-	-	3.00	-	-	1.00	344.00
D	21	1	ICP-MS	-	1.16	-	-	3.00	-	-	0.61	339.00
D	22	2	XRF	-	-	-	-	-	-	-	-	-

Table 1 (continued).
GeoPT4. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Sr	Ta	Tb	Te	Th	Tl	Tm	U	V
D	23	2	XRF, ICP-MS	409.00	1.78	1.20	-	3.71	0.19	0.46	0.50	313.00
D	24	2	ICP-AES, ICP-MS	393.00	1.10	1.07	-	3.00	-	0.44	0.60	340.00
D	25	2	XRF	380.65	-	-	-	-	-	-	-	-
D	26	2	ICP-AES	387.00	4.50	-	-	2.44	-	0.39	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	397.00	1.20	1.20	-	3.20	0.17	0.45	0.66	350.00
D	28	1	XRF	401.00	-	-	-	-	-	-	-	337.00
D	28	2	XRF	-	-	-	-	3.00	-	-	-	-
D	29	1	ICP-MS	415.00	1.17	1.18	-	3.17	-	0.43	0.60	-
D	30	1	ICP-AES, gravimetry	317.84	-	-	-	-	-	-	-	517.91
D	31	2	XRF	384.00	-	-	-	-	-	-	-	368.00
D	32	2	XRF, titrimetry	400.00	-	-	-	-	-	-	-	334.00
D	33	1	INAA	-	1.06	1.09	-	3.00	-	-	0.80	-
D	34	1	XRF, AAS	423.00	-	-	-	3.80	-	-	-	308.00
D	35	1	XRF	410.00	-	-	-	-	-	-	-	340.00
D	35	2	XRF	-	-	-	-	2.50	-	-	-	-
D	36	2	XRF, ICP-MS	416.00	1.00	-	-	-	0.15	0.46	0.70	350.00
D	37	1	XRF	404.00	-	-	-	2.70	-	-	-	297.00
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	371.00	-	-	-	3.00	-	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	405.00	2.10	0.90	-	2.60	-	-	0.89	305.00
D	40	1	INAA	-	-	1.13	-	-	-	-	-	-
D	40	2	INAA	-	1.20	-	-	2.95	-	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	411.00	-	-	-	1.00	-	-	0.00	340.00
D	43	1	ICP-AES, AAS	404.00	-	-	-	-	-	-	-	468.00
D	44	1	XRF	407.00	-	-	-	-	-	-	-	317.00
D	45	1	AAS, ICP-AES, wet chemistry	393.00	-	1.08	-	-	-	0.41	-	355.00
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	407.00	-	-	-	2.00	-	-	-	313.00
D	48	1	XRF, ICP-MS	409.00	-	1.14	-	3.43	-	0.396	0.55	337.00
D	49	1	XRF, titrimetry	407.00	-	-	-	-	-	-	-	347.00
D	50	1	XRF, ICP-AES, ICP-MS, other	409.00	1.20	1.09	-	3.01	0.18	0.46	0.63	328.00
D	51	2	XRF, ICP-AES, ICP-MS, other	410.10	1.29	1.18	-	3.33	-	0.46	0.74	351.00
D	52	2	ICP-AES, ICP-MS	418.00	1.50	1.20	-	2.40	-	0.50	-	304.00
D	53	1	XRF, ET-AAS, ICP-AES, AFS	420.00	-	-	-	-	-	-	-	350.00
D	54	2	XRF, ICP-MS	406.00	1.35	1.23	-	3.53	-	0.49	0.74	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	383.00	1.06	1.09	-	3.01	-	0.39	0.62	321.00
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	420.00	1.25	1.22	-	3.21	0.12	0.38	0.63	340.00
D	58	2	ICP-AES, AAS, ICP-MS, other	410.00	1.26	1.06	0.10	3.10	0.19	0.42	0.64	340.00
D	59	1	XRF	418.00	-	-	-	4.00	-	-	-	337.00
D	60	2	ICP-MS, XRF	-	-	-	-	-	-	0.35	-	-
D	61	2	XRF	500.00	-	-	-	6.00	-	-	-	-
D	62	1	ICP-MS	396.80	1.40	1.061	-	3.455	0.167	0.4020	0.7122	363.90
D	63	2	AAS, gravimetric	-	-	-	-	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	379.40	-	-	-	-	-	-	-	328.40
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	414.00	-	-	-	-	-	-	-	345.00
D	67	1	XRF, AAS, combustion	391.00	-	-	-	-	-	-	-	366.00
D	68	2	ICP-AES, ICP-MS	398.30	1.16	1.10	-	3.28	-	-	0.70	335.50
D	69	2	XRF, ICP-AES	401.00	-	-	-	-	-	-	3.20	347.00
D	70	2	XRF, ICP-MS	396.00	1.145	1.159	-	4.70	-	0.429	0.78	284.00
D	71	1	ICP-AES, titrimetry	415.00	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	-	-		321.00
D	72	1	XRF	397.00	-	-	-	9.00	-	-	-	336.00
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	394.00	1.200	1.040	-	3.33	-	0.387	0.61	328.00
D	75	2	XRF	403.00	-	-	-	4.00	-	-	-	331.00

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	W	Y	Yb	Zn	Zr
D	1	1	XRF	-	33.70	-	113.00	203.00
D	1	2	XRF	-	-	-	-	-
D	2	1	ICP-MS	-	29.50	2.476	-	210.00
D	3	1	ICP-MS, XRF, AAS	-	33.10	2.50	-	198.00
D	3	2	ICP-MS	-	-	-	-	-
D	4	2	ICP-AES	-	32.00	-	108.00	-
D	5	1	ICP-MS, XRF	-	-	-	145.00	-
D	6	1	XRF	-	33.00	-	120.00	197.00
D	6	2	XRF	-	-	-	-	-
D	7	1	XRF/titrimetry	-	32.00	-	109.00	195.00
D	8	1	XRF	-	33.90	-	112.60	205.50
D	9	2	XRF, IR	-	35.00	-	114.00	223.00
D	10	2	XRF	-	26.00	-	105.00	204.00
D	11	1	INAA	-	-	2.39	-	-
D	11	2	INAA	-	-	-	-	-
D	12	1	INAA	0.70	-	2.35	100.00	195.00
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	153.00	-
D	14	2	ICP-AES	-	18.00	-	110.00	-
D	15	2	ICP-AES, other	-	-	-	111.60	229.50
D	16	1	AAS, colorimetry	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-
D	17	2	XRF	-	-	-	-	180.00
D	18	1	XRF, AAS	-	34.80	-	119.10	212.20
D	18	2	XRF	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	0.80	30.00	2.90	117.80	193.00
D	20	1	XRF	-	31.00	-	107.00	193.00
D	21	1	ICP-MS	1.01	34.00	2.50	-	214.00
D	22	2	XRF	-	-	-	-	-
D	23	2	XRF, ICP-MS	6.27	39.40	2.96	120.00	210.00
D	24	2	ICP-AES, ICP-MS	1.50	29.50	2.40	120.00	196.00
D	25	2	XRF	-	29.80	-	-	199.05
D	26	2	ICP-AES	-	27.30	2.32	-	153.00
D	27	1	XRF, ICP-AES, ICP-MS, other	-	34.00	2.80	110.00	213.00
D	28	1	XRF	-	30.00	-	107.00	189.00
D	28	2	XRF	-	-	-	-	-
D	29	1	ICP-MS	-	33.10	2.64	-	-
D	30	1	ICP-AES, gravimetry	-	-	-	96.24	294.55
D	31	2	XRF	-	28.00	-	60.00	175.00
D	32	2	XRF, titrimetry	-	27.00	-	115.00	199.00
D	33	1	INAA	-	-	2.70	-	-
D	34	1	XRF, AAS	3.40	33.00	-	110.00	204.00
D	35	1	XRF	-	30.00	-	110.00	215.00
D	35	2	XRF	4.00	-	-	-	-
D	36	2	XRF, ICP-MS	0.60	32.00	3.00	110.00	180.00
D	37	1	XRF	-	32.00	-	104.00	198.00
D	37	2	XRF	-	-	-	-	-
D	38	2	XRF	-	28.00	-	-	178.00
D	39	2	XRF, ICP-AES, INAA, AAS, other	-	31.00	2.80	119.00	193.00
D	40	1	INAA	-	-	2.51	-	-
D	40	2	INAA	-	-	-	120.00	-
D	41	2	wet chem (rapid)	-	-	-	-	-
D	42	1	XRF	-	31.00	-	111.00	192.00
D	43	1	ICP-AES, AAS	-	35.00	-	125.00	229.00
D	44	1	XRF	-	30.00	-	116.00	201.00
D	45	1	AAS, ICP-AES, wet chemistry	-	33.10	2.51	115.00	-
D	46	2	XRF	-	-	-	-	-
D	47	1	XRF	-	29.30	-	120.00	206.00
D	48	1	XRF, ICP-MS	-	30.00	2.40	113.00	201.00
D	49	1	XRF, titrimetry	-	30.00	-	110.00	200.00

Table 1 (continued).
Geo*PT4*. Analytical results submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	W	Y	Yb	Zn	Zr
D	50	1	XRF, ICP-AES, ICP-MS, other	0.52	27.00	2.46	124.00	203.00
D	51	2	XRF, ICP-AES, ICP-MS, other	-	30.60	2.82	111.50	198.50
D	52	2	ICP-AES, ICP-MS	-	29.00	2.60	110.00	178.00
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	18.00		154.00	255.00
D	54	2	XRF, ICP-MS	-	29.90	2.87	-	195.00
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-	31.70	2.17	118.00	182.00
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-	2.47	1.22	113.00	-
D	58	2	ICP-AES, AAS, ICP-MS, other	0.60	30.50	2.55	113.00	202.00
D	59	1	XRF	-	34.00	-	116.00	201.00
D	60	2	ICP-MS, XRF	-	-	2.20	-	-
D	61	2	XRF	-	-	-	108.00	-
D	62	1	ICP-MS	-	31.24	2.521	122.00	209.90
D	63	2	AAS, gravimetric	-	-	-	134.70	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-	-	118.70	-
D	65	2	ICP-AES, AAS, other	-	-	-	124.00	-
D	66	1	ICP-AES, FE	-	31.00	2.61	121.00	194.00
D	67	1	XRF, AAS, combustion	-	27.00	-	109.00	184.00
D	68	2	ICP-AES, ICP-MS	-	33.75	2.55	-	197.43
D	69	2	XRF, ICP-AES	-	31.00	2.60	109.00	203.00
D	70	2	XRF, ICP-MS	0.70	31.30	2.58	112.00	196.00
D	71	1	ICP-AES, titrimetry	-	-	-	-	219.00
D	71	2	ICP-AES	-	29.00	-	107.00	-
D	72	1	XRF	-	37.00	-	117.00	224.00
D	72	2	XRF	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	0.46	30.10	2.52	132.00	196.00
D	75	2	XRF	-	32.00	-	106.00	203.00

Concentration units. Major elements % m/m. Trace elements $\mu g\ g^{-1}$.

Sample

The sample distributed for Geo*PT4* was OU-2 (Belford dolerite), details of which are given in Appendix 1. OU-2 was prepared from the same material collected for the WS-E proficiency testing programme (Govindaraju *et al.* 1994). Although not necessarily identical, it is expected that there will a close match in composition between the assigned values for OU-2 and the recommended values for WS-E (Govindaraju 1995). These data are compared in Table 2.

Timetable for Geo*PT4*

Distribution of sample: September 1998.
Deadline for submission of analytical results: 15th January 1999 (extended).
Distribution of preliminary report: March 1999.

Analysis of results

Contributed results

Seventy-five laboratories contributed results to the Geo*PT4* round. Elemental concentration data, submitted by these participating laboratories are listed in Table 1.

Analysis of results

A similar procedure to that followed in the previous rounds was adopted here. "Method consensus values", being robust estimates of the mean composition of the sample, were derived from the contributed data, using a statistical procedure that accommodates outliers ("Robust" statistics - Analytical Methods Committee 1989). The resultant method consensus values (listed in Table 2) were used as the assigned value for elemental compositions [X_a]. The target precision [H_a] was calculated using a modified form of the Horwitz function and laboratories were required to select whether their submitted data was designed to comply with "pure geochemistry" or "applied geochemistry" fitness-for-purpose criteria. For data designated by laboratories to meet the pure geochemistry criterion (data quality designated 1), target precision [H_a] was calculated from: $H_a = 0.01.X_a^{0.8495}$. For applied geochemistry laboratories (data quality designated 2), target precision [H_a'] was calculated from: $H_a' = 0.02.X_a^{0.8495}$. For each contributed analytical result (X), a z-score was

Text continues on page E36

Table 2.
Geo*PT4*. Assigned values and comparison with WS-E reference material data

	Geo*PT4* data				WS-E data	
	Assigned value Xa	**Target precision Ha**	**Measured precision**	**Ratio measured/target**	**Govindaraju (1994) Working value**	**95% CL**
SiO_2	51.095	0.565	0.071	0.126	50.7	0.12
TiO_2	2.425	0.042	0.008	0.197	2.4	0.02
Al_2O_3	13.801	0.186	0.025	0.135	13.78	0.06
Fe_2O_3T	13.253	0.180	0.026	0.146	13.15	0.07
Fe(II)O	8.404	0.122	0.052	0.430	8.4	0.24
MnO	0.170	0.004	0.000	0.103	0.17	0.002
MgO	5.585	0.086	0.020	0.234	5.55	0.04
CaO	8.994	0.129	0.020	0.156	8.95	0.05
Na_2O	2.480	0.043	0.009	0.203	2.47	0.03
K_2O	0.990	0.020	0.005	0.237	1	0.01
P_2O_5	0.300	0.007	0.003	0.354	0.3	0.01
H_2O^+	-	-	-	-	1.3	-
CO_2	-	-	-	-	0.12	-
LOI	-	-	-	-	0.85	-
As	-	-	-	-	1	0.3
Ba	341.1	11.3	2.8	0.247	338	6
Be	1.11	0.09	0.05	0.583	1.14	0.32
Cd	-	-	-	-	0.2	-
Ce	60.2	2.6	0.7	0.284	61	1.4
Co	44.8	2.0	0.8	0.390	44	1.4
Cr	97.0	3.9	1.2	0.302	99	2.1
Cs	0.495	0.044	0.017	0.377	0.5	0.05
Cu	63.0	2.7	0.4	0.157	65	2.4
Dy	6.09	0.37	0.12	0.323	6	0.16
Er	3.06	0.21	0.05	0.256	3	0.11
Eu	2.23	0.16	0.03	0.208	2.25	0.04
F	-	-	-	-	540	-
Ga	23.05	1.15	0.21	0.187	23	0.8
Gd	7.26	0.43	0.14	0.332	7.2	0.23
Hf	5.29	0.33	0.12	0.353	5.3	0.27
Ho	1.21	0.09	0.02	0.217	1.2	0.06
La	27.71	1.34	0.41	0.306	27	1.1
Li	12.79	0.70	0.51	0.738	13.6	0.8
Lu	0.372	0.035	0.006	0.159	0.37	0.01
Mo	3.05	0.21	0.15	0.738	3.7	0.38
Nb	17.25	0.90	0.37	0.408	18	0.6
Nd	33.35	1.57	0.37	0.234	33	0.7
Ni	51.77	2.29	0.78	0.342	55	1.6
Pb	13.12	0.71	0.44	0.615	13.8	0.6
Pr	7.92	0.46	0.12	0.249	7.8	0.4
Rb	25.44	1.25	0.34	0.273	25	1
S	-	-	-	-	500	-
Sb	-	-	-	-	0.08	-
Sc	28.21	1.36	0.35	0.255	28	1
Sm	8.70	0.50	0.13	0.253	8.8	0.3
Sn	17.73	0.92	0.47	0.511	18	1.1
Sr	403.7	13.1	2.0	0.154	410	5
Ta	1.20	0.09	0.02	0.259	1.16	0.18
Tb	1.11	0.09	0.02	0.187	1.1	0.04
Th	3.02	0.20	0.07	0.347	3	0.23
Tl	-	-	-	-	0.160	0.02
Tm	0.427	0.039	0.009	0.227	0.430	0.03
U	0.630	0.054	0.021	0.389	0.650	0.10
V	339.3	11.3	2.7	0.237	340.000	7.20
W	-	-	-	-	0.500	0.17
Y	30.93	1.48	0.38	0.259	30.400	0.76
Yb	2.52	0.18	0.03	0.184	2.500	0.10
Zn	113.0	4.4	1.0	0.223	117.000	2.40
Zr	200.5	7.2	1.8	0.256	195.000	4.00

Concentration units. Major elements % m/m. Trace elements $\mu g\ g^{-1}$. CL confidence limit.
Measured precision calculated from the Geo*PT4* data set using robust statistics.

Table 3.
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	SiO_2	TiO_2	Al_2O_3	Fe_2O_3T	Fe(II)O	MnO	MgO	CaO	Na_2O
D	1	1	XRF	0.22	0.24	-0.11	-0.07	-	0.23	0.75	0.51	-0.47
D	1	2	XRF	-	-	-	-	-	-	-	-	-
D	2	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	3	1	ICP-MS, XRF, AAS	0.95	-0.58	3.28	-1.35	-0.28	-2.25	0.41	-4.37	-0.47
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-1.14	0.41	0.64	0.33	-	0.00	-0.38	0.10	0.34
D	5	1	ICP-MS, XRF	1.60	-0.11	0.53	0.26	-	4.51	0.64	-1.81	0.68
D	6	1	XRF	0.08	-0.16	0.42	0.41	-	2.05	0.23	0.00	0.22
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF, titrimetry	0.85	-0.25	0.53	1.58	-0.28	1.13	-1.42	1.57	-10.13
D	8	1	XRF	0.21	0.05	-0.23	0.87	-	0.68	-0.17	0.40	0.73
D	9	2	XRF, IR	0.00	0.77	0.05	0.49	-	0.34	-0.26	-0.37	-0.01.
D	10	2	XRF	-0.61	0.77	-1.45	-0.62	-	0.68	-1.30	-0.75	-5.32
D	11	1	INAA	-	-3.41	-	-	-	-	-	-	-
D	11	2	INAA	-	-	1.45	1.47	-	0.00	-2.17	-1.41	0.92
D	12	1	INAA	-	-	-	-	-	0.00	-	-	0.22
D	13	1	XRF, AAS, titrimetry	0.20	1.07	0.69	-0.85	2.59	2.25	0.52	-0.34	2.07
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	-1.49	-1.94	0.00	-0.87	-	-1.13	-0.43	1.53	-9.37
D	15	2	ICP-AES, other	0.07	0.21	-0.42	-0.43	-	0.00	-0.71	-0.83	0.01
D	16	1	AAS, colorimetry	-0.52	-0.35	-0.22	-0.80	-	-4.51	-1.45	-0.42	0.91
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	0.39	-	-	-	-
D	17	2	XRF	5.10	-3.94	-2.53	-9.25	-	-5.63	-	-	-
D	18	1	XRF, AAS	0.24	1.77	0.05	0.71	-	2.25	2.12	1.86	0.22
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-0.29	1.11	-0.27	0.26	-	-	-	-0.05	-2.32
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	-0.68	-0.29	-	-
D	20	1	XRF	0.54	-5.77	0.64	-0.68	-	0.00	0.06	-0.11	2.30
D	21	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	22	2	XRF	0.98	1.36	-0.27	-0.15	-	1.13	1.01	0.60	1.03
D	23	2	XRF, ICP-MS	-1.29	0.53	-0.03	0.13	-	-1.13	-0.20	2.69	1.96
D	24	2	ICP-AES, ICP-MS	0.00	0.65	-0.27	-0.70	-	0.00	1.77	0.02	0.23
D	25	2	XRF	0.14	0.41	-0.03	0.97	-	0.00	0.38	1.49	0.69
D	26	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	0.54	1.30	1.07	0.82	1.60	0.00	1.33	1.28	-1.86
D	28	1	XRF	-1.05	0.50	-1.08	2.38	-	0.23	-1.45	0.28	-0.47
D	28	2	XRF	-	-	-	-	-	-	-	-	-
D	29	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	30	1	ICP-AES, gravimetry	3.19	-1.46	-0.66	3.76	-	0.23	2.02	-0.41	0.47
D	31	2	XRF	1.22	0.53	-1.02	0.16	-	-1.13	2.75	1.69	-1.85
D	32	2	XRF, titrimetry	0.25	-0.06	0.05	0.08	0.35	1.01	-0.03	0.22	-0.58
D	33	1	INAA	-	-	-	-	-	-	-	-	-
D	34	1	XRF, AAS	0.36	-1.53	-0.54	-0.85	-	0.00	-2.84	-0.73	0.45
D	35	1	XRF	-0.86	-0.58	-0.65	-1.24	-	1.13	-2.73	-1.04	-11.80
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	0.71	0.41	0.27	0.41	-	0.00	0.67	0.41	0.69
D	37	1	XRF	-1.72	2.24	1.45	2.99	-	2.25	-1.57	0.35	-7.18
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	-0.08	-0.06	-0.35	0.19	-	0.00	-1.94	-0.60	0.11
D	39	2	XRF, ICP-AES, INAA, AAS, other	0.80	0.53	0.00	0.13	-0.18	1.13	-1.19	-0.06	-0.35
D	40	1	INAA	-	-	-	-	-	-	-	-	-
D	40	2	INAA	-	-	-	-0.76	-	-	-	1.65	-0.35
D	41	2	wet chem (rapid)	-0.57	-1.59	0.99	-0.37	-1.29	0.00	-0.09	-0.67	3.11
D	42	1	XRF	-0.10	-3.18	0.05	0.26	-	-2.25	0.87	1.36	-0.70
D	43	1	ICP-AES, AAS	0.33	0.83	-2.16	0.99	-	2.25	-0.41	0.74	3.92
D	44	1	XRF	0.43	-0.11	0.26	-1.02	-	2.48	0.75	0.04	-0.24
D	45	1	AAS, ICP-AES, wet chemistry	-0.95	-6.71	4.24	-0.91	-	-3.60	3.54	-2.20	-3.02
D	46	2	XRF	-0.15	0.53	-0.11	0.33	-	0.00	1.25	0.06	-0.47
D	47	1	XRF	-0.04	0.59	-0.49	-1.07	-	0.00	0.17	0.12	-0.01
D	48	1	XRF, ICP-MS	-0.40	-0.58	0.37	-1.02	-	0.00	0.75	0.20	0.91
D	49	1	XRF, titrimetry	-0.17	-0.56	0.37	0.34	-4.63	0.90	1.53	0.11	1.03

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	SiO_2	TiO_2	Al_2O_3	Fe_2O_3T	Fe(II)O	MnO	MgO	CaO	Na_2O
D	50	1	XRF, ICP-AES, ICP-MS, other	0.40	0.83	1.61	0.15	1.60	0.00	0.99	0.89	0.22
D	51	2	XRF, ICP-AES, ICP-MS, other	0.12	-0.06	0.00	-0.26	-	0.00	-0.03	-0.02	0.11
D	52	2	ICP-AES, ICP-MS	-0.28	-0.88	-0.67	-1.59	-	0.00	0.61	-0.06	-0.35
D	53	1	XRF, ET-AAS, ICP-AES, AFS	0.27	3.19	-0.06	-1.02	-	0.00	2.61	3.91	-8.79
D	54	2	XRF, ICP-MS	0.38	0.06	0.13	0.30	-	0.00	-0.03	0.10	0.23
D	55	1	AAS, ET-AAS, photometric, CHNS	-0.40	-1.76	0.42	4.60	0.54	0.00	-3.42	-0.96	-4.63
D	56	1	ICP-MS, XRF, IR	0.26	0.83	3.06	0.37	-	0.23	-4.47	-1.66	5.77
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-0.17	0.12	-0.01	-0.29	-	0.00	0.06	-0.03	-1.63
D	58	2	ICP-AES, AAS, ICP-MS, other	-0.70	0.77	0.54	-0.15	0.39	-0.23	0.67	0.02	0.80
D	59	1	XRF	0.79	0.83	0.16	0.99	-	0.00	0.29	0.89	-0.24
D	60	2	ICP-MS, XRF	0.00	1.12	-0.27	0.41	-	0.00	1.19	0.22	0.92
D	61	2	XRF	-0.02	0.77	-0.35	-0.15	-	1.13	-0.26	-0.40	0.23
D	62	1	ICP-MS	-	-	-	-	-	-	-	-	-
D	63	2	AAS, gravimetric	-0.70	-3.71	2.20	0.10	-	0.00	-0.67	-1.22	-0.12
D	64	2	AAS, ET-AAS, ICP-AES	0.19	-0.65	-0.38	0.41	-0.96	0.45	-0.32	-0.87	-1.74
D	65	2	ICP-AES, AAS, other	1.14	2.42	-0.67	0.77	-	2.25	0.03	0.06	-
D	66	1	ICP-AES, FE	-0.17	-0.58	-0.38	-1.19	-0.85	0.00	-0.41	-2.28	2.07
D	67	1	XRF, AAS, combustion	-0.40	-1.13	-0.33	-0.91	-	0.23	0.17	-0.50	-3.94
D	68	2	ICP-AES, ICP-MS	-2.09	-0.06	-1.37	-1.23	-	0.00	-1.83	0.49	-2.55
D	69	2	XRF, ICP-AES	-0.01	0.31	0.51	-0.15	-	1.69	0.67	0.02	-1.74
D	70	2	XRF, ICP-MS	-	-4.06	-	-	-	-1.13	-3.62	-	-
D	71	1	ICP-AES, titrimetry	0.72	0.12	-1.46	1.04	1.28	2.25	-0.17	0.35	0.22
D	71	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	72	1	XRF	-	-1.20	-	0.65	-	-1.13	-	-0.19	
D	72	2	XRF	-1.48	-	-2.40	-	-	-	1.77	-	-2.66
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	-0.39	-0.65	0.59	-0.15	-0.51	-1.13	0.67	0.02	-0.81
D	75	2	XRF	-	-	-	-	-	-	-	-	-

				K_2O	P_2O_5	Ba	Be	Ce	Co	Cr	Cs	Cu
D	1	1	XRF	0.51	0.49	2.28	-	-	-	0.51	-	-0.37
D	1	2	XRF	-	-	-	-	-	1.29	-	-	-
D	2	1	ICP-MS	-	-	-0.89	-	-0.70	-	-	-1.25	-
D	3	1	ICP-MS, XRF, AAS	0.01	9.82	0.16	1.38	0.30	0.60	0.51	0.11	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	2.27	0.73	0.04	-	-0.81	0.30	-0.64	-	0.37
D	5	1	ICP-MS, XRF	1.01	2.85	2.37	-	-	-1.88	3.08	-	0.52
D	6	1	XRF	0.31	-0.21	-1.16	-	-	-1.88	0.51	-	-
D	6	2	XRF	-	-	-	-	0.73	-	-	-	-
D	7	1	XRF, titrimetry	0.46	-0.91	-9.80	-	6.46	-	-1.54	-	-
D	8	1	XRF	1.27	1.32	0.04	-	-1.08	-	1.00	-	0.22
D	9	2	XRF, IR	-0.25	-0.24	0.04	-	1.69	-0.20	-8.08	62.54	-1.30
D	10	2	XRF	1.77	-	-	-	-	-	-	-	-
D	11	1	INAA	-	-	-	-	0.07	-0.59	-0.10	-	-
D	11	2	INAA	0.26	-	0.57	-	-	-	-	-	-
D	12	1	INAA	-	-	-0.63	-	-0.31	-0.34	-1.80	-1.02	-
D	13	1	XRF, AAS, titrimetry	1.01	1.46	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-	-	-0.90	-	1.30
D	14	2	ICP-AES	-0.25	7.69	0.61	-0.62	-	2.52	-4.62	-	2.41
D	15	2	ICP-AES, other	0.43	0.38	-0.88	-	-	3.83	9.92	-	-3.11
D	16	1	AAS, colorimetry	1.01	-	-2.57	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	0.73	-	-	-	-	-	-	-
D	17	2	XRF	-	0.73	-2.25	-	-	-	-	-	-
D	18	1	XRF, AAS	0.16	1.46	-	-	-	0.99	-	-	-0.11
D	18	2	XRF	-	-	0.74	-	-	-	0.73	-	-
D	19	1	XRF, AES, AAS, ISE	-0.90	-	-	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-1.22	1.71	0.81	1.11	-0.27	5.52	-	0.09
D	20	1	XRF	1.01	-1.32	1.22	-	-1.62	3.07	-1.54	-	4.07
D	21	1	ICP-MS	-	-	-0.63	-	-0.85	-	-	-	-
D	22	2	XRF	6.56	-1.36	-	-	-	-	-	-	-

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	K_2O	P_2O_5	Ba	Be	Ce	Co	Cr	Cs	Cu
D	23	2	XRF, ICP-MS	0.76	-2.05	3.74	0.41	0.90	0.92	-0.98	-0.51	-0.06
D	24	2	ICP-AES, ICP-MS	0.26	-0.66	-0.67	-	-0.52	0.05	-0.90	-3.35	-0.19
D	25	2	XRF	1.77	0.03	0.82	-	-	-	-	-	-
D	26	2	ICP-AES	-	-	-0.31	-	1.09	-	-	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	1.01	0.07	-0.10	-2.39	0.69	8.51	3.34	0.57	0.37
D	28	1	XRF	0.01	0.07	-5.83	-	-	-	1.54	-	-3.33
D	28	2	XRF	-	-	-	-	2.65	-	-	-	-
D	29	1	ICP-MS	-	-	-0.72	-	-0.97	-	-	-1.25	-
D	30	1	ICP-AES, gravimetry	0.51	-1.74	-4.22	-	-	3.33	-7.33	-	-0.33
D	31	2	XRF	0.51	0.73	-0.58	-	-	-3.41	0.00	-	-0.19
D	32	2	XRF, titrimetry	0.26	0.73	-1.11	-	-	0.30	-0.38	-	-
D	33	1	INAA	-	-	0.69	-	-0.08	-0.15	-	-0.11	-
D	34	1	XRF, AAS	-1.51	0.07	-0.28	-	-2.00	-3.36	-3.08	-	3.70
D	35	1	XRF	-0.50	0.07	0.78	-	7.61	1.09	0.77	-	-2.59
D	35	2	XRF	-	-	-	-	-	-	-	142.06	-
D	36	2	XRF, ICP-MS	0.26	0.03	0.39	-0.80	1.31	0.30	-1.15	-	2.04
D	37	1	XRF	-1.00	-	-1.16	-	-5.08	-9.79	0.77	-	0.37
D	37	2	XRF	-	-4.84	-15.04	-	-	-	-	17.10	-
D	38	2	XRF	-1.51	-2.05	-0.93	-	0.15	-	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	1.01	-	0.61	-	-1.19	0.30	-1.69	-	-1.30
D	40	1	INAA	-	-	-30.08	-	-0.13	-	-	-	-
D	40	2	INAA	-2.77	-	0.30	-	-	0.35	0.51	-	-
D	41	2	wet chem (rapid)	1.52	5.60	-15.04	-	-	-	-	-	-
D	42	1	XRF	-0.50	-37.53	-30.08	-	-1.23	-	1.28	-	0.00
D	43	1	ICP-AES, AAS	-8.57	4.25	5.19	-	-	-	0.26	-	2.22
D	44	1	XRF	0.01	-1.32	-2.92	-	-1.62	-4.85	-2.31	-	0.00
D	45	1	AAS, ICP-AES, wet chemistry	-7.56	-0.07	-30.08	-	0.15	-2.87	0.77	-	-1.11
D	46	2	XRF	0.76	0.03	-	-	-	-	-	-	-
D	47	1	XRF	0.01	0.07	1.75	-	-2.39	-	0.00	-	-
D	48	1	XRF, ICP-MS	-2.01	0.07	0.43	-	-1.00	-1.14	1.03	-	0.93
D	49	1	XRF, titrimetry	-0.75	0.07	2.02	-	-5.85	-	2.31	-	0.37
D	50	1	XRF, ICP-AES, ICP-MS, other	-1.51	0.07	2.63	-	0.74	-1.01	1.80	0.11	1.48
D	51	2	XRF, ICP-AES, ICP-MS, other	0.00	0.73	5.02	1.15	1.00	-0.44	-1.03	-	0.15
D	52	2	ICP-AES, ICP-MS	-1.01	-3.45	0.04	-0.91	-0.23	-1.24	-2.05	0.06	-0.37
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-6.05	-4.11	-1.95	1.61	-	-5.59	0.00	-	0.00
D	54	2	XRF, ICP-MS	0.26	0.59	-0.76	-	2.08	-	-	-	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-0.50	-1.32	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-0.35	4.25	0.34	-	-1.58	-1.43	0.77	-	-1.37
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	0.01	4.25	6.34	-0.68	0.30	0.60	-0.51	-0.34	-2.96
D	58	2	ICP-AES, AAS, ICP-MS, other	1.01	-0.66	-0.05	-0.05	0.38	1.29	-0.26	-0.06	0.00
D	59	1	XRF	0.01	0.07	-	-	-	-	3.34	-	0.74
D	60	2	ICP-MS, XRF	-0.25	0.73	-	-	-1.19	-	-	-	-
D	61	2	XRF	0.26	0.73	-	-	-	-0.69	-2.69	-	0.00
D	62	1	ICP-MS	-	-	-0.31		-0.76	-0.20	1.54	2.32	-0.93
D	63	2	AAS, gravimetric	-3.28	0.73	-	-	-	0.77	-3.46	-	0.11
D	64	2	AAS, ET-AAS, ICP-AES	-1.56	5.47	-0.71	2.87	-	-1.46	0.01	61.40	-0.20
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	4.80	-	-	3.20
D	66	1	ICP-AES, FE	2.53	-4.11	0.69	-	-0.39	6.04	1.54	-	1.11
D	67	1	XRF, AAS, combustion	-1.51	-4.67	-0.45	-	-2.77	1.09	-11.29	-	-5.55
D	68	2	ICP-AES, ICP-MS	-1.51	-2.05	-1.01	-	-0.14	0.06	0.46	-1.19	-
D	69	2	XRF, ICP-AES	0.51	-0.87	-0.31	-	0.15	-3.16	-1.67	-	-0.74
D	70	2	XRF, ICP-MS	-	-	-0.58	-	0.92	-1.19	-2.05	-1.19	-0.56
D	71	1	ICP-AES, titrimetry	3.03	-1.32	0.16	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-1.77	-1.00	2.77	-1.28	-	-0.37
D	72	1	XRF	-1.15	-	1.05	-	2.23	0.60	-4.36	-	-6.29
D	72	2	XRF	-	0.03	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	-0.25	1.43	-0.58	0.06	-0.41	-0.30	0.64	0.28	0.20
D	75	2	XRF	-	-	2.11	-	0.73	-0.44	-4.75	-	-0.19

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Dy	Er	Eu	Ga	Gd	Hf	Ho	La	Li
D	1	1	XRF	-	-	-	0.82	-	-	-	-	-
D	1	2	XRF	-	-	-	-	-	-	-	-	-
D	2	1	ICP-MS	-0.29	-0.01	-0.52	-	-0.28	0.45	-0.90	-1.22	-
D	3	1	ICP-MS, XRF, AAS	0.85	0.32	0.05	-	-0.14	-0.28	-0.15	-0.23	-
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	-	-	-	-	-	-	-0.57
D	5	1	ICP-MS, XRF	-	-	-	-	-	-	-	-	-
D	6	1	XRF	-	-	-	0.65	-	-	-	-	-
D	6	2	XRF	-	-	-	-	-	-	-	-3.24	-
D	7	1	XRF, titrimetry	-	-	-	-0.92	-	-	-	-3.50	-
D	8	1	XRF	-	-	-	1.00	-	-	-	-1.42	-
D	9	2	XRF, IR	-	-	-	-0.02	-	-0.29	-	4.95	-
D	10	2	XRF	-	-	-	-1.76	-	-	-	-	-
D	11	1	INAA	-	-	0.11	-	-	-0.31	-	0.07	-
D	11	2	INAA	0.19	-	-	-	-	-	-	-	-
D	12	1	INAA	-2.93	-	0.11	-	-	-0.59	-	-1.34	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-	-	-	-	-
D	14	2	ICP-AES	-	-	-	-	-	-	-	-	-
D	15	2	ICP-AES, other	-	-	-	-	-	-	-	-	-
D	16	1	AAS, colorimetry	-	-	-	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-	-	-	-	-	-	-
D	18	1	XRF, AAS	-	-	-	-	-	-	-	-	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	-	-	-	-1.14
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	-	-	-	-	-	-	-1.38	-
D	20	1	XRF	-	-	-	0.82	-	-	-	0.22	-
D	21	1	ICP-MS	-0.77	-0.79	-0.20	-	-0.37	-0.28	-0.15	-1.27	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-
D	23	2	XRF, ICP-MS	1.12	0.96	0.59	0.50	0.82	1.15	0.45	0.26	2.16
D	24	2	ICP-AES, ICP-MS	-0.39	-0.64	-0.10	-	-1.00	-0.45	-0.13	-0.45	-
D	25	2	XRF	-	-	-	0.15	-	-	-	-	-
D	26	2	ICP-AES	0.21	0.21	-0.35	-	-2.31	-4.72	-0.29	0.67	-
D	27	1	XRF, ICP-AES, ICP-MS, other	0.58	0.18	0.43	-0.05	1.48	0.02	-0.15	0.22	-
D	28	1	XRF	-	-	-	0.82	-	-	-	-	-
D	28	2	XRF	-	-	-	-	-	-	-	1.97	-
D	29	1	ICP-MS	1.63	0.71	1.19	-	0.28	-0.19	0.80	0.08	-
D	30	1	ICP-AES, gravimetry	-	-	-	-	-	-	-	-	-
D	31	2	XRF	-	-	-	-	-	-	-	-	-
D	32	2	XRF, titrimetry	-	-	-	0.41	-	-	-	3.09	-
D	33	1	INAA	-	-	0.43	-	-	-0.89	-	-0.23	-
D	34	1	XRF, AAS	-	-	-	-1.79	-	-2.41	-	4.68	1.73
D	35	1	XRF	-	-	-	-0.92	-	-0.89	-	98.42	-
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	1.23	2.26	2.43	-0.02	-	1.07	0.45	0.85	-
D	37	1	XRF	-	-	-	-0.92	-	-	-	-5.73	-
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	-	-	-	-	-	-	-	4.20	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	-4.16	-	0.53	-0.02	-	-1.20	-0.08	-0.26	0.87
D	40	1	INAA	-	-	-0.58	-	-	-	0.16	-0.47	-
D	40	2	INAA	-	-	-	-	-	0.01	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	-	-	-	-	-	-	-	-
D	43	1	ICP-AES, AAS	-	-	-	-	-	-	-	-	-
D	44	1	XRF	-	-	-	0.82	-	-	-	-0.52	-
D	45	1	AAS, ICP-AES, wet chemistry	-0.83	-0.69	-1.66	-	-0.70	-	1.65	0.60	-4.00
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	-	-	-0.92	-	-	-	3.20	-
D	48	1	XRF, ICP-MS	0.33	-0.30	0.05	-	-0.35	-	-0.47	-0.60	-
D	49	1	XRF, titrimetry	-	-	-	-	-	-	-	-	-

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Dy	Er	Eu	Ga	Gd	Hf	Ho	La	Li
D	50	1	XRF, ICP-AES, ICP-MS, other	0.04	-0.93	-0.64	-0.05	-0.77	-0.40	-0.05	-0.41	1.73
D	51	2	XRF, ICP-AES, ICP-MS, other	0.95	0.84	0.75	0.24	0.47	1.54	0.51	0.37	-0.93
D	52	2	ICP-AES, ICP-MS	-0.79	0.33	-0.10	0.41	0.97	-0.45	0.45	-0.45	0.01
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	-	-	-	-	-	-	-	-1.14
D	54	2	XRF, ICP-MS	1.93	1.25	0.69	1.93	2.76	1.65	0.77	0.30	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-1.82	-0.88	-1.21	-2.13	1.41	-2.68	-1.53	-1.27	-
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-0.21	-0.84	-0.71	-0.31	1.02	2.54	-1.43	1.48	3.17
D	58	2	ICP-AES, AAS, ICP-MS, other	0.83	0.09	0.37	0.41	-0.19	-0.07	-0.08	0.11	0.29
D	59	1	XRF	-	-	-	-0.05	-	-	-	-	-
D	60	2	ICP-MS, XRF	-0.93	-1.36	-0.73	-	-1.11	-	-1.45	-1.38	-
D	61	2	XRF	-	-	-	-	-	-	-	-	-
D	62	1	ICP-MS	0.03	-0.67	-0.34	1.87	-0.01	1.23	-0.73	-1.06	-
D	63	2	AAS, gravimetric	-	-	-	-	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-	-	-	-	-	-	-	-3.97
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	-2.09	-	-1.85	-	-2.83	-	-	-0.61	-
D	67	1	XRF, AAS, combustion	-	-	-	-5.27	-	-	-	12.12	-
D	68	2	ICP-AES, ICP-MS	0.22	0.16	0.37	-0.32	-0.21	0.56	-0.08	-0.60	-
D	69	2	XRF, ICP-AES	-	-	-1.37	0.63	-	-1.20	-	-0.63	-
D	70	2	XRF, ICP-MS	0.18	-0.10	0.74	-0.47	0.82	1.18	0.88	0.75	-
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	-	-	0.11	0.15
D	72	1	XRF	-	-	-	-0.92	-	-	-	-13.92	-
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	-0.29	-0.78	-0.16	0.28	-0.18	-0.48	-0.50	-0.37	-
D	75	2	XRF	-	-	-	-0.46	-	1.07	-	-0.26	-

				Lu	Mo	Nb	Nd	Ni	Pb	Pr	Rb	Sc
D	1	1	XRF	-	-	0.17	-	0.97	-	-	0.53	-
D	1	2	XRF	-	-4.97	-	-	-	-2.89	-	-	-0.08
D	2	1	ICP-MS	-0.12	-	-	-1.11	-	-2.86	-0.10	-0.27	-
D	3	1	ICP-MS, XRF, AAS	-0.64	2.83	0.06	0.35	1.85	-6.06	0.24	0.13	-0.89
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	-	-	1.36	-	-	-	-0.08
D	5	1	ICP-MS, XRF	-	-2.75	-	-	0.19	1.10	-	-	-
D	6	1	XRF	-	-	3.06	-	-1.21	-	-	-1.95	-
D	6	2	XRF	-	-	-	0.21	-	-7.81	-	-	-
D	7	1	XRF, titrimetry	-	-0.23	-2.50	3.59	-	1.24	-	0.45	-0.15
D	8	1	XRF	-	-	-0.06	-	1.80	-2.27	-	1.65	3.07
D	9	2	XRF, IR	-	-0.11	2.09	0.21	1.80	0.62	0.09	1.43	-1.18
D	10	2	XRF	-	-	1.53	-	-3.89	-0.08	-	-0.17	-
D	11	1	INAA	-0.04	-	-	-2.51	-	-	-	8.13	0.51
D	11	2	INAA	-	-	-	-	-	-	-	-	-
D	12	1	INAA	0.51	0.74	-	-0.22	1.85	-	-	0.05	0.65
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-	-	-2.36	-	-	-4.57	-
D	14	2	ICP-AES	-	7.17	26.01	-	-4.32	36.42	-	-	-
D	15	2	ICP-AES, other	-	-	-	-	-1.38	-	-	-	-
D	16	1	AAS, colorimetry	-	-	-	-	-	-	-	1.25	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-	-	-	-	-	-0.57	-
D	18	1	XRF, AAS	-	-	2.17	-	-1.30	-	-	3.09	-
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-	-	-	-	-2.75	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	0.74	-0.70	0.21	1.36	-1.14	-	-	4.68
D	20	1	XRF	-	-	-0.28	-0.86	0.97	2.64	-	0.45	0.58
D	21	1	ICP-MS	-0.36	-	-0.72	-0.22	-	1.38	-0.68	-	-
D	22	2	XRF	-	-	-	-	-	-	-	-	-

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Lu	Mo	Nb	Nd	Ni	Pb	Pr	Rb	Sc
D	23	2	XRF, ICP-MS	0.55	1.20	0.42	0.43	0.09	2.30	0.28	-0.21	-3.23
D	24	2	ICP-AES, ICP-MS	-0.32	-2.54	-1.25	-0.33	0.05	-0.08	-0.40	-0.17	-0.08
D	25	2	XRF	-	-	-1.64	-	-0.72	-	-	-1.69	-
D	26	2	ICP-AES	2.43	-	-2.27	0.94	-	-	-0.15	-	-0.63
D	27	1	XRF, ICP-AES, ICP-MS, other	0.51	2.69	1.95	1.05	1.85	-0.17	0.39	1.25	-0.15
D	28	1	XRF	-	-	2.39	-	-5.15	-	-	-0.35	-
D	28	2	XRF	-	-	-	-	-	-1.49	-	-	-0.08
D	29	1	ICP-MS	-0.07	-	0.97	-1.50	-	-0.10	-1.85	-0.67	2.19
D	30	1	ICP-AES, gravimetry	-	721.82	-	-	-3.12	-	-	-	-
D	31	2	XRF	-	-	-4.03	-	2.02	-	-	-3.37	-
D	32	2	XRF, titrimetry	-	-	-0.14	1.16	-0.39	1.32	-	0.63	-
D	33	1	INAA	-2.09	-	-	-1.49	-	-	-	3.65	0.21
D	34	1	XRF, AAS	-	-4.11	-0.28	2.95	0.54	-0.17	-	-2.75	-
D	35	1	XRF	-	-	-0.28	1.05	1.85	6.85	43.30	-0.35	1.31
D	35	2	XRF	-	-	-	-	-	-	-	-	-
D	36	2	XRF, ICP-MS	0.84	1.10	0.97	1.16	-0.17	-	0.74	0.63	0.66
D	37	1	XRF	-	-0.23	-2.50	-	0.97	-2.98	-	-0.35	-
D	37	2	XRF	-	-	-	-	-	-	-	-	-
D	38	2	XRF	-	-	0.97	-	-	-	-	-0.97	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	0.40	2.31	-	-2.97	1.36	-	-	0.63	0.29
D	40	1	INAA	-0.07	-	-	-1.11	-	-	-	-	-
D	40	2	INAA	-	-	-	-	-	-	-	1.35	-0.09
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	-	-1.39	-0.22	1.41	1.24	-	1.25	-2.35
D	43	1	ICP-AES, AAS	-	-	5.28	-	3.60	30.72	-	-1.15	-0.15
D	44	1	XRF	-	-	7.51	-	-0.78	9.66	-	-2.75	-
D	45	1	AAS, ICP-AES, wet chemistry	-0.36	-	-	0.12	-5.15	15.27	1.75	-	-
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	-	-0.06	-	-1.21	-2.98	-	0.53	-
D	48	1	XRF, ICP-MS	-0.93	-	-0.72	0.09	0.97	-2.41	-0.62	0.45	-0.74
D	49	1	XRF, titrimetry	-	-	-1.39	-	1.41	-0.17	-	-0.35	-
D	50	1	XRF, ICP-AES, ICP-MS, other	0.51	4.14	-0.28	-0.22	5.35	-0.17	0.09	2.85	-2.35
D	51	2	XRF, ICP-AES, ICP-MS, other	0.55	-0.11	0.46	0.69	-0.15	-0.79	0.74	-0.05	-0.08
D	52	2	ICP-AES, ICP-MS	0.40	-	1.53	-0.11	-0.74	-0.08	-0.13	0.71	-
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	-5.08	-	-	-7.77	20.89	-	-	0.58
D	54	2	XRF, ICP-MS	0.11	-	0.75	0.66	-	-	1.99	0.83	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-0.36	0.06	-2.61	-1.94	-2.04	-1.57	-2.21	-2.43	-0.15
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-	-0.95	7.96	0.41	1.54	0.11	-0.25	0.61	2.48
D	58	2	ICP-AES, AAS, ICP-MS, other	-0.18	0.13	1.25	0.05	0.05	0.62	0.14	0.43	-0.44
D	59	1	XRF	-	-5.08	-1.39	-	1.41	-1.57	-	-1.95	-
D	60	2	ICP-MS, XRF	-0.76	-	-	-1.06	-	-	-0.99	-	-
D	61	2	XRF	-	-	-	-	0.05	-0.08	-	-	-
D	62	1	ICP-MS	-0.60	1.42	1.61	-0.59	-1.21	1.28	-0.45	0.13	0.21
D	63	2	AAS, gravimetric	-	-	-	-	0.11	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-	-	-	-1.18	0.20	-	-3.73	-
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	-0.07	-	-2.50	0.07	1.41	-	-	-	0.58
D	67	1	XRF, AAS, combustion	-	-	5.28	-	15.41	-5.92	-	-2.75	-0.89
D	68	2	ICP-AES, ICP-MS	-0.47	-	-0.23	0.10	-	-	-0.50	-0.46	-
D	69	2	XRF, ICP-AES	-	-	0.97	-2.65	0.27	-1.49	-	-0.25	-
D	70	2	XRF, ICP-MS	-0.26	-0.05	-1.59	1.03	0.27	-	0.22	0.79	-
D	71	1	ICP-AES, titrimetry	-	-	-	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	7.09	-0.75	-1.26	-	-	-	-1.18
D	72	1	XRF	-	-	-1.39	-0.22	-6.46	-7.19	-	0.45	2.04
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	0.26	0.27	-0.92	-0.08	-0.10	5.53	-0.30	-0.13	-
D	75	2	XRF	-	-2.54	0.97	-	0.05	-2.19	-	1.83	-

Table 3 (continued).
GeoPT4. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Sm	Sn	Sr	Ta	Tb	Th	Tm	U	V
D	1	1	XRF	-	-	0.76	-	-	-	-	-	0.15
D	1	2	XRF	-	-	-	-	-	-0.05	-	-5.83	-
D	2	1	ICP-MS	-1.10	-	0.41	-	-0.56	0.05	-0.48	-0.22	-
D	3	1	ICP-MS, XRF, AAS	0.61	-	0.71	-0.86	0.08	-0.44	0.60	-0.74	1.39
D	3	2	ICP-MS	-	-	-	-	-	-	-	-	-
D	4	2	ICP-AES	-	-	0.13	-	-	-	-	-	-0.06
D	5	1	ICP-MS, XRF	-	-1.77	-2.12	-	-	4.79	-	-3.89	4.94
D	6	1	XRF	-	-	0.79	-	-	-	-	-	0.33
D	6	2	XRF	-	-	-	-	-	-	-	-	-
D	7	1	XRF, titrimetry	-	-	0.25	-	-	-	-	43.87	1.92
D	8	1	XRF	-	-	1.24	-	-	-1.56	-	-	2.51
D	9	2	XRF, IR	-2.68	0.69	0.89	-	-	1.42	-	-	0.21
D	10	2	XRF	-	-	0.09	-	-	-0.05	-	-	-
D	11	1	INAA	1.04	-	-	0.86	-1.06	0.10	-	-	1.04
D	11	2	INAA	-	-	4.83	-	-	-	-	-	
D	12	1	INAA	-0.39	-	-	-0.21	-1.75	-0.34	-	0.00	-
D	13	1	XRF, AAS, titrimetry	-	-	-	-	-	-	-	-	-
D	13	2	XRF, AAS	-	-	-0.75	-	-	-	-	-	-0.06
D	14	2	ICP-AES	-	-	-1.75	-	-	-	-	-	-1.39
D	15	2	ICP-AES, other	-	-	-0.99	-	-	-	-	-	-0.37
D	16	1	AAS, colorimetry	-	-	0.56	-	-	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-	-	-	-	-	-
D	17	2	XRF	-	-	-5.49	-	-	-	-	-	-
D	18	1	XRF, AAS	-	-	4.27	-	-	-	-	-	1.28
D	18	2	XRF	-	-	-	-	-	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	1.55	-	-	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-	0.15	-	-	-	-	-	-	0.03
D	20	1	XRF	-	-	-0.82	-	-	-0.10	-	6.85	0.42
D	21	1	ICP-MS	-0.79	-	-	-0.43	-	-0.10	-	-0.37	-0.02
D	22	2	XRF	-	-	-	-	-	-	-	-	-
D	23	2	XRF, ICP-MS	0.97	1.18	0.20	3.11	0.50	1.69	0.43	-1.20	-1.16
D	24	2	ICP-AES, ICP-MS	-0.29	-1.48	-0.41	-0.54	-0.24	-0.05	0.17	-0.28	0.03
D	25	2	XRF	-	-	-0.88	-	-	-	-	-	-
D	26	2	ICP-AES	0.46	-	-0.64	17.67	-	-1.42	-0.47	-	-
D	27	1	XRF, ICP-AES, ICP-MS, other	0.61	1.38	-0.51	0.00	1.00	0.88	0.60	0.56	0.95
D	28	1	XRF	-	-	-0.21	-	-	-	-	-	-0.20
D	28	2	XRF	-	-	-	-	-	-0.05	-	-	-
D	29	1	ICP-MS	1.78	-	0.86	-0.32	0.77	0.73	0.08	-0.56	-
D	30	1	ICP-AES, gravimetry	-	-	-6.56	-	-	-	-	-	15.82
D	31	2	XRF	-	-	-0.75	-	-	-	-	-	1.27
D	32	2	XRF, titrimetry	-	-	-0.14	-	-	-	-	-	-0.23
D	33	1	INAA	0.01	-	-	-1.50	-0.26	-0.10	-	3.15	-
D	34	1	XRF, AAS	-	-	1.48	-	-	3.81	-	-	-2.77
D	35	1	XRF	-3.38	-	0.48	-	-	-	-	-	0.06
D	35	2	XRF	-	0.69	-	-	-	-1.27	-	-	-
D	36	2	XRF, ICP-MS	1.20	-0.94	0.47	-1.07	-	-	0.43	0.65	0.47
D	37	1	XRF	-	-0.80	0.02	-	-	-1.56	-	-	-3.74
D	37	2	XRF	-4.67	-	-	-	-	-	-	-	-
D	38	2	XRF	-	-0.40	-1.25	-	-	-0.05	-	-	-
D	39	2	XRF, ICP-AES, INAA, AAS, other	0.00	-1.48	0.05	4.82	-1.22	-1.03	-	2.41	-1.52
D	40	1	INAA	0.15	-	-	-	0.20	-	-	-	-
D	40	2	INAA	-	-	-	0.00	-	-0.17	-	-	-
D	41	2	wet chem (rapid)	-	-	-	-	-	-	-	-	-
D	42	1	XRF	-	-	0.56	-	-	-9.88	-	-11.66	0.06
D	43	1	ICP-AES, AAS	-	-	0.02	-	-	-	-	-	11.40
D	44	1	XRF	-	-	0.25	-	-	-	-	-	-1.97
D	45	1	AAS, ICP-AES, wet chemistry	0.33	-	-0.82	-	-0.38	-	-0.43	-	1.39
D	46	2	XRF	-	-	-	-	-	-	-	-	-
D	47	1	XRF	-	-	0.25	-	-	-4.99	-	-	-2.33
D	48	1	XRF, ICP-MS	0.29	1.16	0.41	-	0.31	2.00	-0.79	-1.48	-0.20
D	49	1	XRF, titrimetry	-	-	0.25	-	-	-	-	-	0.68

Table 3 (continued).
Geo*PT4*. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Sm	Sn	Sr	Ta	Tb	Th	Tm	U	V
D	50	1	XRF, ICP-AES, ICP-MS, other	0.45	-0.80	0.41	0.00	-0.26	-0.05	0.85	0.00	-1.00
D	51	2	XRF, ICP-AES, ICP-MS, other	0.82	0.15	0.25	0.48	0.38	0.76	0.43	1.02	0.52
D	52	2	ICP-AES, ICP-MS	0.30	0.69	0.55	1.61	0.50	-1.52	0.94	-	-1.56
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-	-	1.25	-	-	-	-	-	0.95
D	54	2	XRF, ICP-MS	-0.07	3.41	0.09	0.80	0.67	1.25	0.81	1.02	-
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-	-	-	-	-	-
D	56	1	ICP-MS, XRF, IR	-0.65	-3.51	-1.58	-1.50	-0.26	-0.05	-0.95	-0.19	-1.62
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-1.58	14.86	1.25	0.54	1.22	0.93	-1.21	0.00	0.06
D	58	2	ICP-AES, AAS, ICP-MS, other	0.45	0.42	0.24	0.32	-0.30	0.20	-0.09	0.09	0.03
D	59	1	XRF	-	-	1.09	-	-	4.79	-	-	-0.20
D	60	2	ICP-MS, XRF	-1.09	-	-	-	-	-	-0.99	-	-
D	61	2	XRF	-	-	3.68	-	-	7.28	-	-	-
D	62	1	ICP-MS	0.28	0.29	-0.53	2.14	-0.59	2.13	-0.64	1.52	2.18
D	63	2	AAS, gravimetric	-	-	-	-	-	-	-	-	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-0.56	-0.93	-	-	-	-	-	-0.48
D	65	2	ICP-AES, AAS, other	-	-	-	-	-	-	-	-	-
D	66	1	ICP-AES, FE	-0.03	-	0.79	-	-	-	-	-	0.51
D	67	1	XRF, AAS, combustion	-	-	-0.97	-	-	-	-	-	2.37
D	68	2	ICP-AES, ICP-MS	1.30	-	-0.21	-0.21	-0.07	0.64	-	0.65	-0.17
D	69	2	XRF, ICP-AES	-1.69	-1.43	-0.10	-	-	-	-	23.79	0.34
D	70	2	XRF, ICP-MS	0.11	-1.27	-0.29	-0.29	0.26	4.11	0.03	1.39	-2.45
D	71	1	ICP-AES, titrimetry	-	-	0.86	-	-	-	-	-	-
D	71	2	ICP-AES	-	-	-	-	-	-	-	-	-0.81
D	72	1	XRF	-	-	-0.51	-	-	29.24	-	-	-0.29
D	72	2	XRF	-	-	-	-	-	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-	-	-	-	-	-
D	74	2	ICP-AES, ICP-MS	0.01	8.90	-0.37	0.00	-0.42	0.76	-0.51	-0.19	-0.50
D	75	2	XRF	-	-	-0.03	-	-	2.40	-	-	-0.37

				Y	Yb	Zn	Zr
D	1	1	XRF	1.88	-	0.00	0.35
D	1	2	XRF	-	-	-	-
D	2	1	ICP-MS	-0.97	-0.26	-	1.32
D	3	1	ICP-MS, XRF, AAS	1.47	-0.12	-	-0.34
D	3	2	ICP-MS	-	-	-	-
D	4	2	ICP-AES	0.36	-	-0.56	-
D	5	1	ICP-MS, XRF	-	-	7.21	-
D	6	1	XRF	1.40	-	1.58	-0.48
D	6	2	XRF	-	-	-	-
D	7	1	XRF, titrimetry	0.72	-	-0.90	-0.76
D	8	1	XRF	2.01	-	-0.09	0.70
D	9	2	XRF, IR	1.38	-	0.11	1.56
D	10	2	XRF	-1.67	-	-0.90	0.24
D	11	1	INAA	-	-0.75	-	-
D	11	2	INAA	-	-	-	-
D	12	1	INAA	-	-0.97	-2.93	-0.76
D	13	1	XRF, AAS, titrimetry	-	-	-	-
D	13	2	XRF, AAS	-	-	4.51	-
D	14	2	ICP-AES	-4.38	-	-0.34	-
D	15	2	ICP-AES, other	-	-	-0.16	2.01
D	16	1	AAS, colorimetry	-	-	-	-
D	16	2	AAS, colorimetry, titrimetry	-	-	-	-
D	17	2	XRF	-	-	-	-1.42
D	18	1	XRF, AAS	2.62	-	1.37	1.63
D	18	2	XRF	-	-	-	-
D	19	1	XRF, AES, AAS, ISE	-	-	-	-
D	19	2	XRF, DC-AES, AAS, Hy-AAS	-0.32	1.08	0.54	-0.52
D	20	1	XRF	0.05	-	-1.35	-1.03
D	21	1	ICP-MS	2.08	-0.12	-	1.87
D	22	2	XRF	-	-	-	-

Table 3 (continued).
Geo*PT4*. Z scores for individual elements calculated from data submitted by participating laboratories

Year code	Lab code	Data quality	Techniques	Y	Yb	Zn	Zr
D	23	2	XRF, ICP-MS	2.87	1.25	0.79	0.66
D	24	2	ICP-AES, ICP-MS	-0.49	-0.34	0.79	-0.31
D	25	2	XRF	-0.38	-	-	-0.10
D	26	2	ICP-AES	-1.23	-0.57	-	-3.29
D	27	1	XRF, ICP-AES, ICP-MS, other	2.08	1.59	-0.68	1.74
D	28	1	XRF	-0.63	-	-1.35	-1.59
D	28	2	XRF	-	-	-	-
D	29	1	ICP-MS	1.47	0.68	-	-
D	30	1	ICP-AES, gravimetry	-	-	-3.78	13.03
D	31	2	XRF	-0.99	-	-5.97	-1.76
D	32	2	XRF, titrimetry	-1.33	-	0.23	-0.10
D	33	1	INAA	-	1.02	-	-
D	34	1	XRF, AAS	1.40	-	-0.68	0.49
D	35	1	XRF	-0.63	-	-0.68	2.01
D	35	2	XRF	-	-	-	-
D	36	2	XRF, ICP-MS	0.36	1.37	-0.34	-1.42
D	37	1	XRF	0.72	-	-2.03	-0.34
D	37	2	XRF	-	-	-	-
D	38	2	XRF	-0.99	-	-	-1.56
D	39	2	XRF, ICP-AES, INAA, AAS, other	0.02	0.80	0.68	-0.52
D	40	1	INAA	-	-0.06	-	-
D	40	2	INAA	-	-	0.79	-
D	41	2	wet chem (rapid)	-	-	-	-
D	42	1	XRF	0.05	-	-0.45	-1.17
D	43	1	ICP-AES, AAS	2.76	-	2.70	3.95
D	44	1	XRF	-0.63	-	0.68	0.07
D	45	1	AAS, ICP-AES, wet chemistry	1.47	-0.06	0.45	-
D	46	2	XRF	-	-	-	-
D	47	1	XRF	-1.11	-	1.58	0.77
D	48	1	XRF, ICP-MS	-0.63	-0.69	0.00	0.07
D	49	1	XRF, titrimetry	-0.63	-	-0.68	-0.06
D	50	1	XRF, ICP-AES, ICP-MS, other	-2.66	-0.35	2.48	0.35
D	51	2	XRF, ICP-AES, ICP-MS, other	-0.11	0.85	-0.17	-0.14
D	52	2	ICP-AES, ICP-MS	-0.65	0.23	-0.34	-1.56
D	53	1	XRF, ET-AAS, ICP-AES, AFS	-8.76	-	9.24	7.55
D	54	2	XRF, ICP-MS	-0.35	0.99	-	-0.38
D	55	1	AAS, ET-AAS, photometric, CHNS	-	-	-	-
D	56	1	ICP-MS, XRF, IR	0.52	-2.00	1.13	-2.56
D	57	1	ICP-AES, ICP-MS, XRF, AAS, other	-19.28	-7.42	0.00	-
D	58	2	ICP-AES, AAS, ICP-MS, other	-0.15	0.08	0.00	0.11
D	59	1	XRF	2.08	-	0.68	0.07
D	60	2	ICP-MS, XRF	-	-0.91	-	-
D	61	2	XRF	-	-	-0.56	-
D	62	1	ICP-MS	0.21	0.00	2.03	1.31
D	63	2	AAS, gravimetric	-	-	2.45	-
D	64	2	AAS, ET-AAS, ICP-AES	-	-	0.64	-
D	65	2	ICP-AES, AAS, other	-	-	1.24	-
D	66	1	ICP-AES, FE	0.05	0.51	1.80	-0.90
D	67	1	XRF, AAS, combustion	-2.66	-	-0.90	-2.28
D	68	2	ICP-AES, ICP-MS	0.95	0.08	-	-0.21
D	69	2	XRF, ICP-AES	0.02	0.23	-0.45	0.18
D	70	2	XRF, ICP-MS	0.12	0.17	-0.11	-0.31
D	71	1	ICP-AES, titrimetry	-	-	-	2.57
D	71	2	ICP-AES	-0.65	-	-0.68	-
D	72	1	XRF	4.11	-	0.90	3.26
D	72	2	XRF	-	-	-	-
D	73	2	BrF_3 attack	-	-	-	-
D	74	2	ICP-AES, ICP-MS	-0.28	0.00	2.14	-0.31
D	75	2	XRF	0.36	-	-0.79	0.18

z = (X-Xa)/Ha). If z › 2 or z ‹ -2, the corresponding analytical result may suffer from unsuspected analytical bias.
Data are only listed for those elements with assigned values.

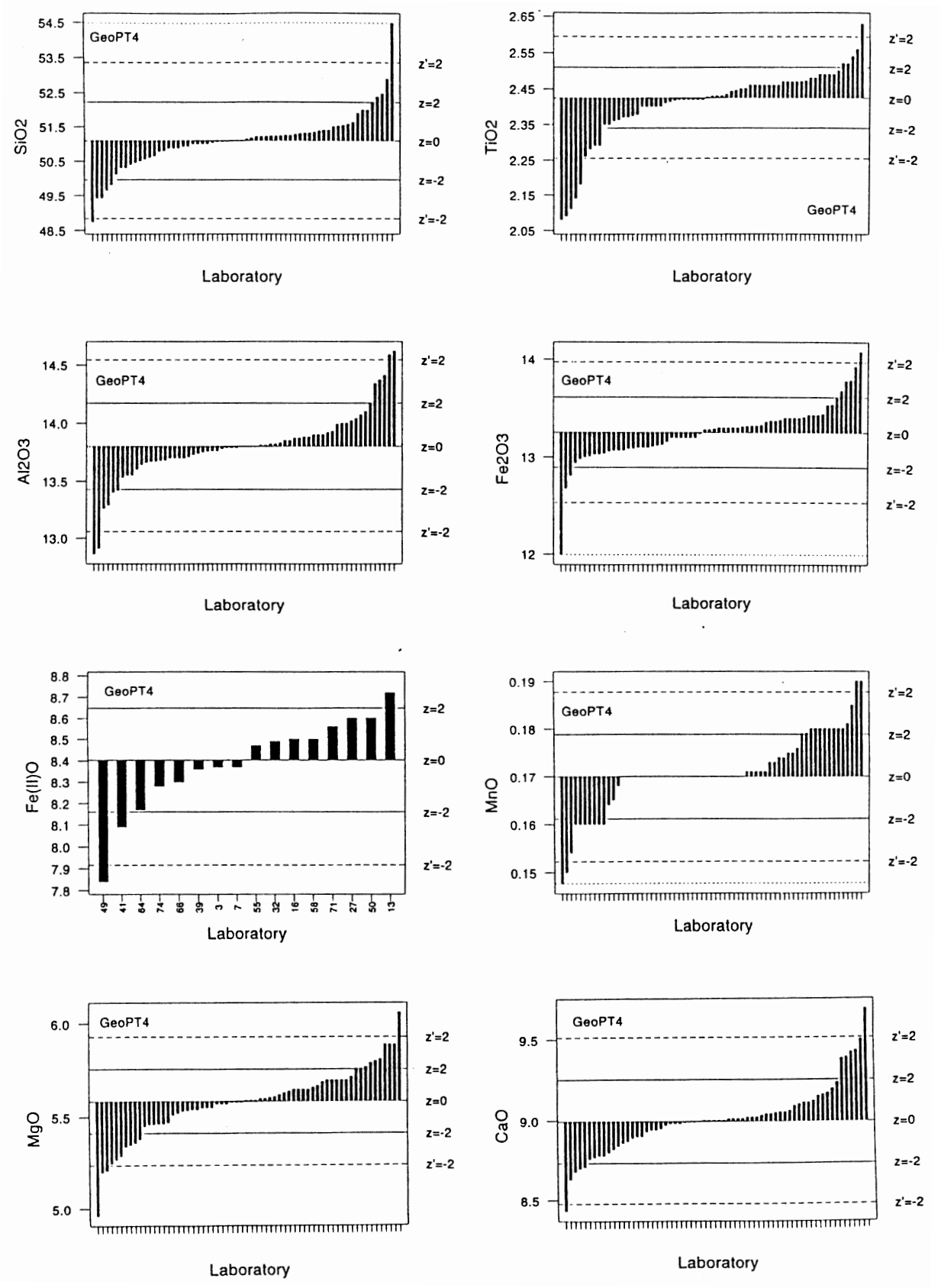

Figure 1. Z-score bar charts for the major elements (% m/m) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

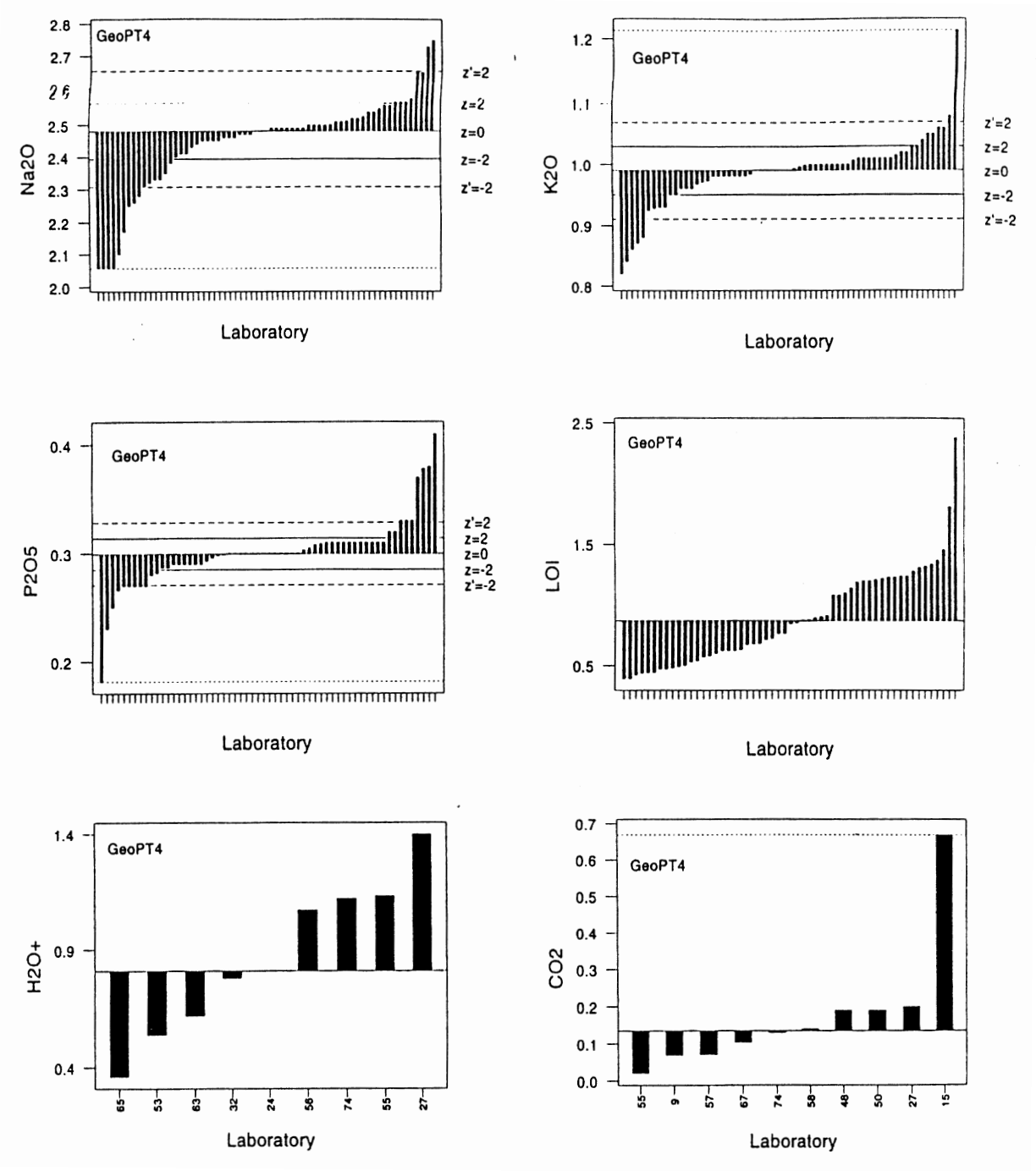

Figure 1 (continued). Z-score bar charts for the major elements (% m/m) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

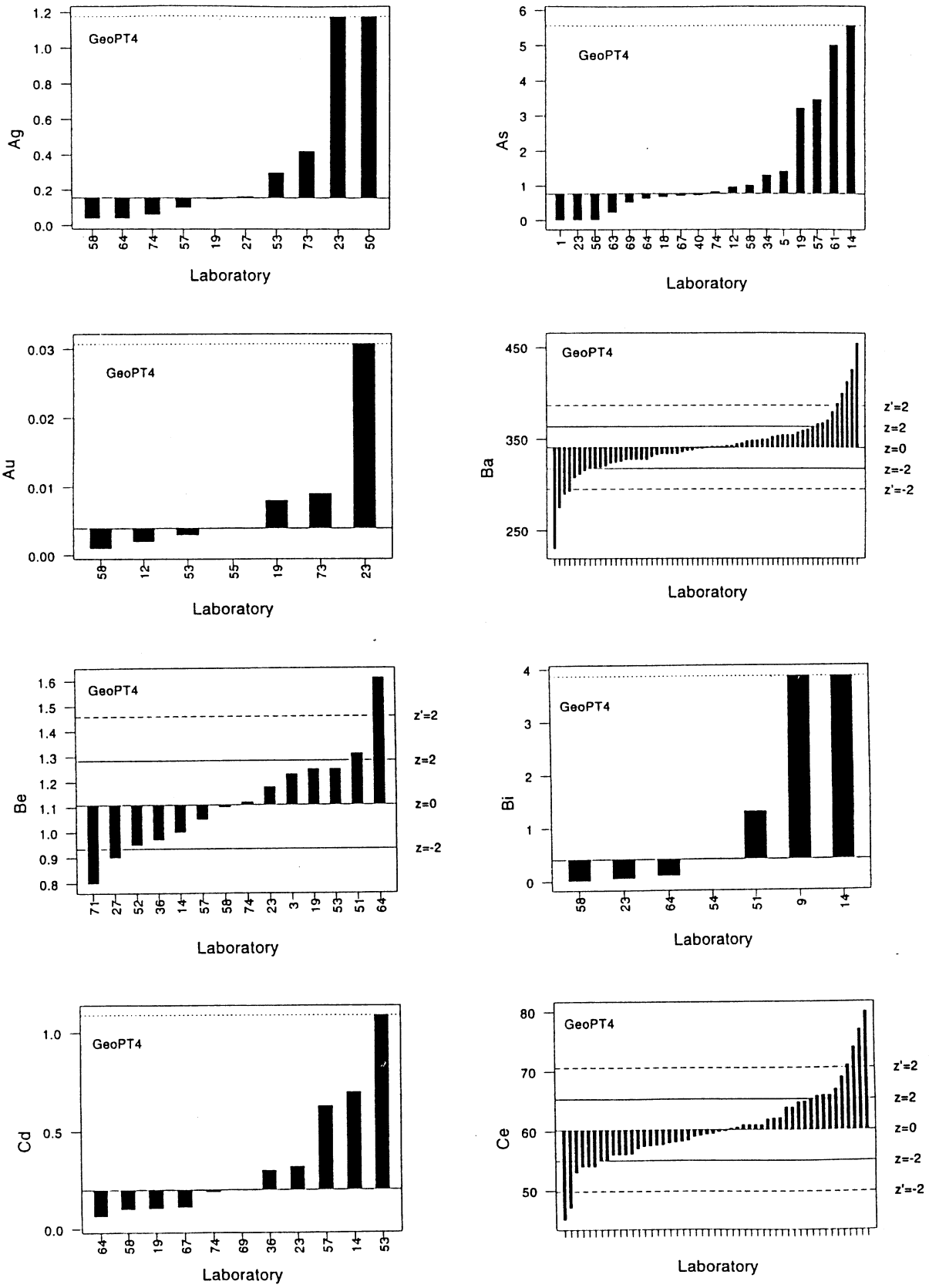

Figure 2. Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

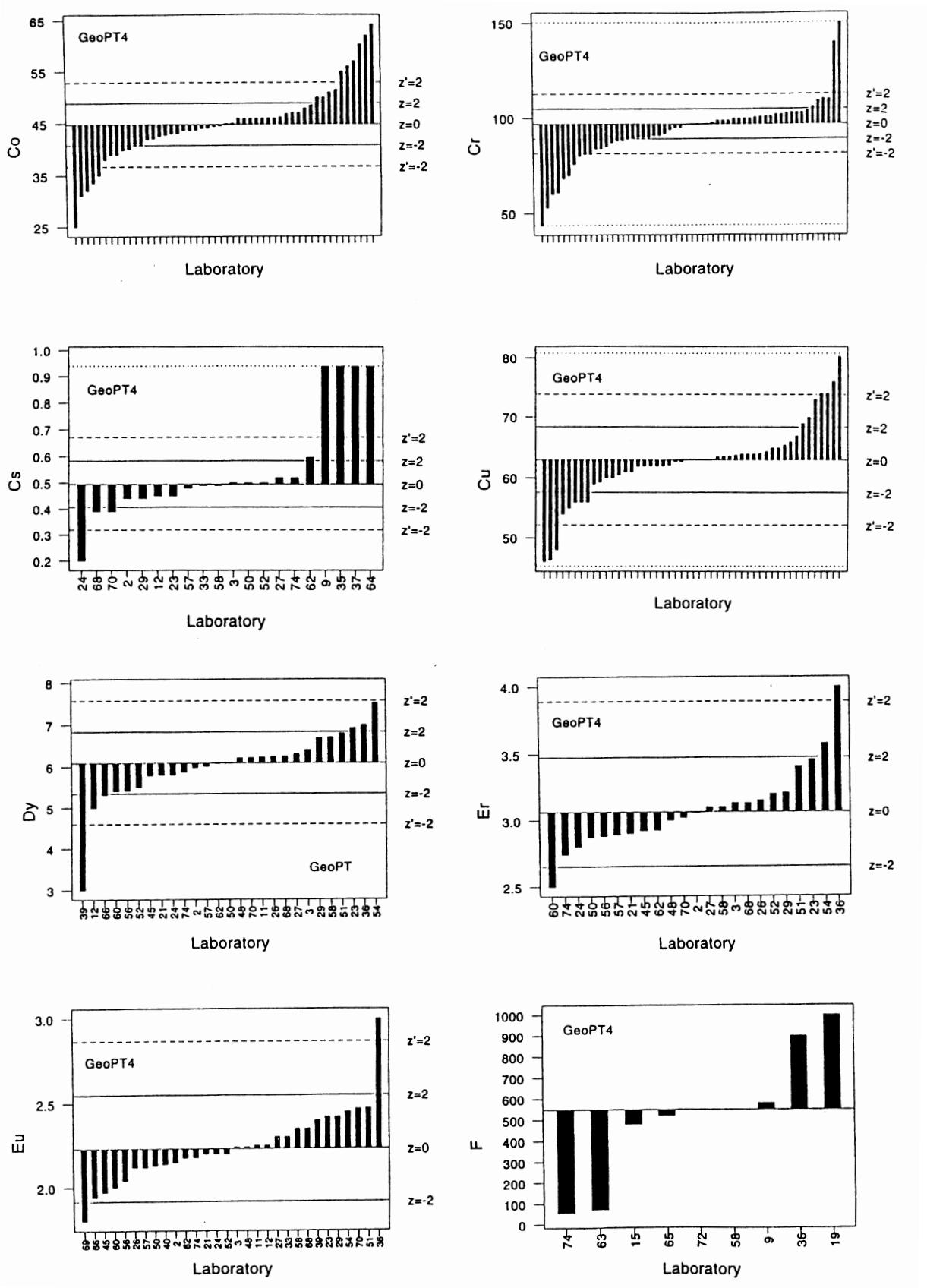

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

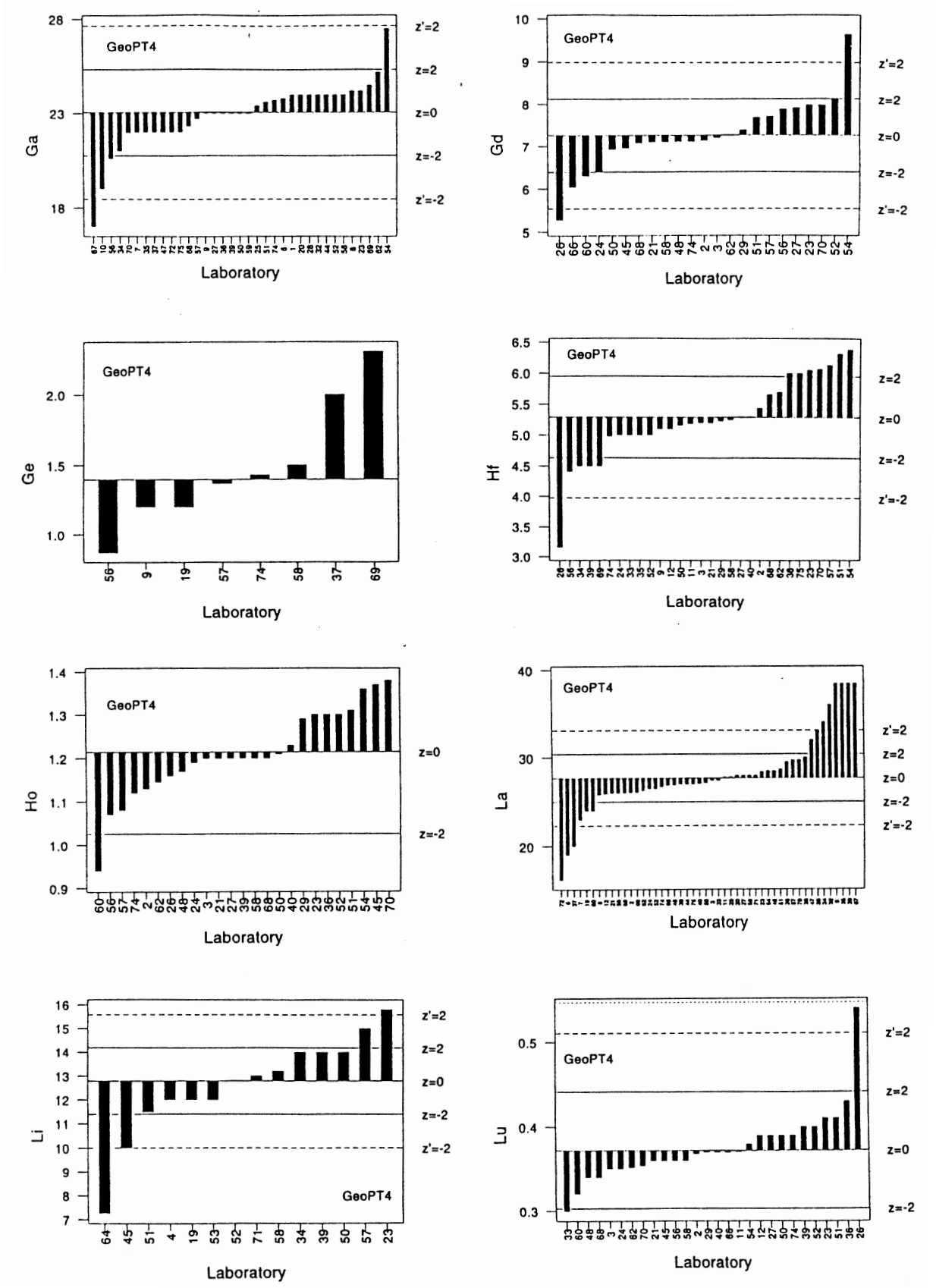

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

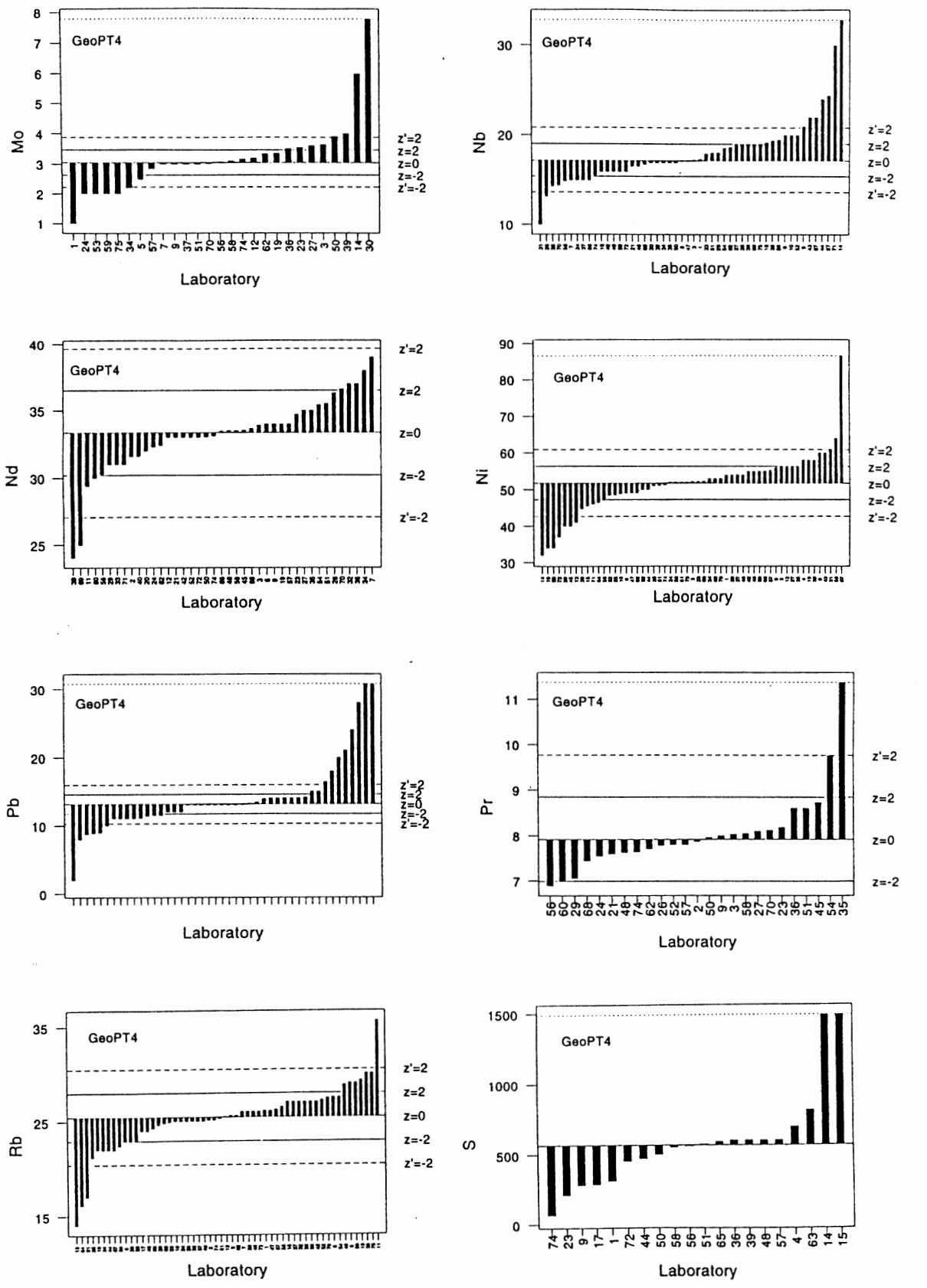

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

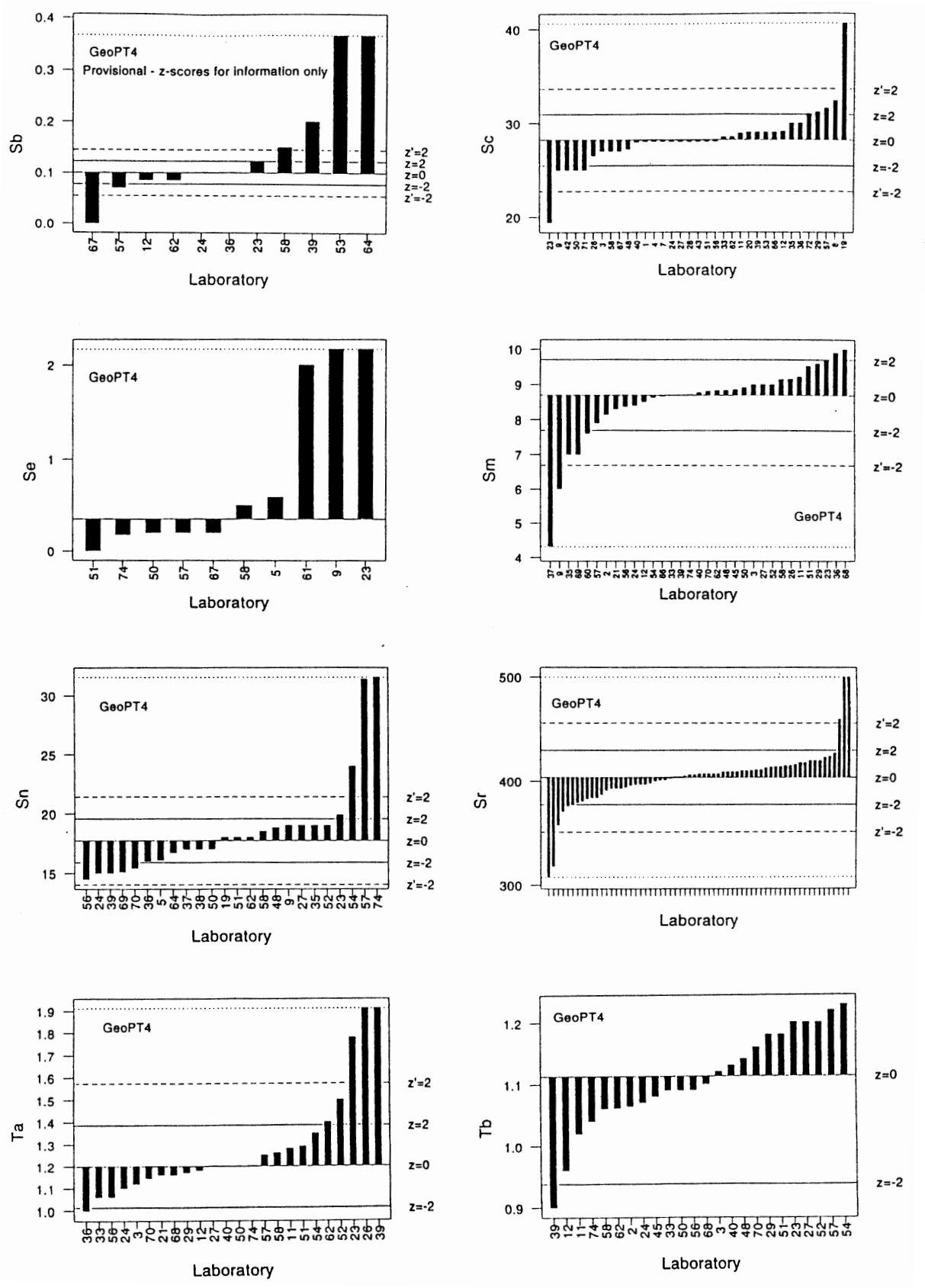

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

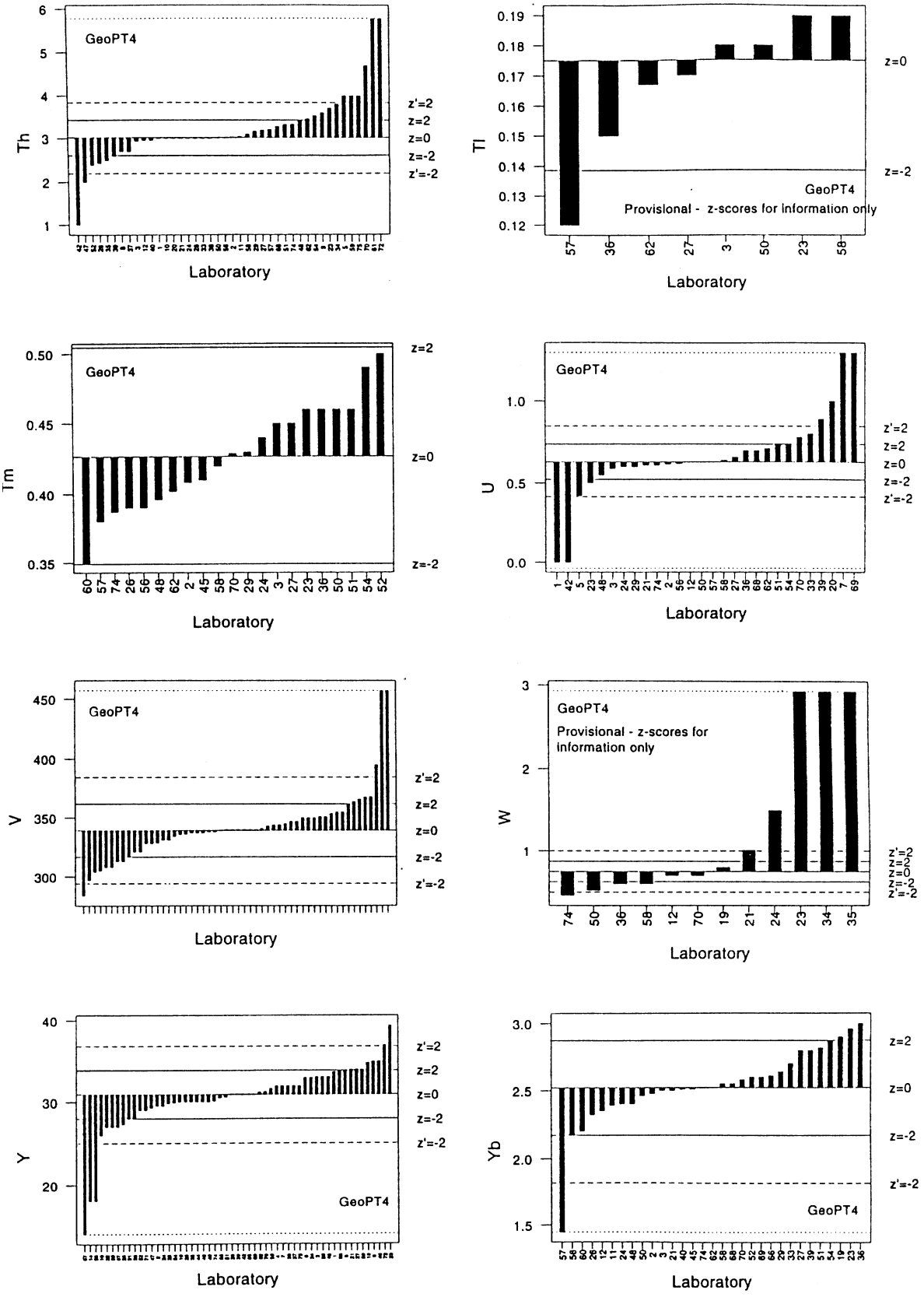

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z′ range is appropriate for results designated to meet the applied geochemistry criterion.

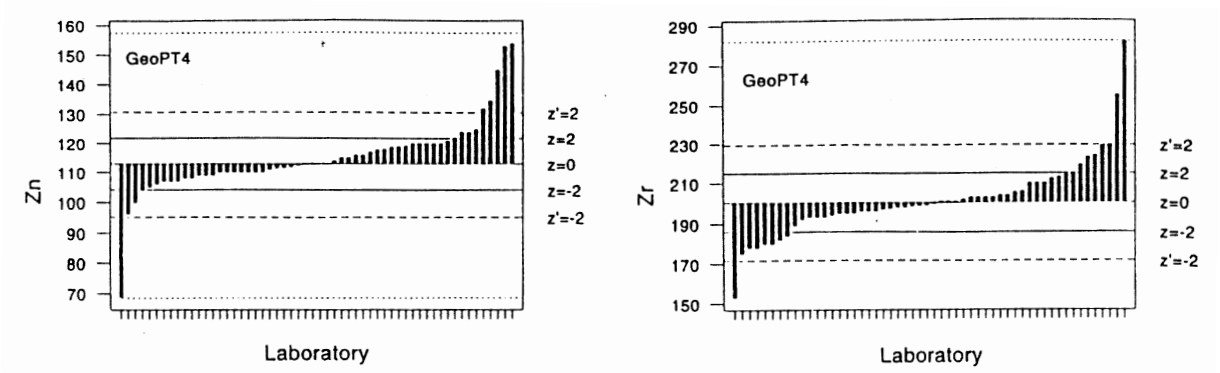

Figure 2 (continued). Z-score bar charts for trace elements (μg g^{-1}) for which consensus or provisional values were assigned. The ± 2z limits represent the acceptable range of results that meet the pure geochemistry fitness-for-purpose criterion; the ± 2z' range is appropriate for results designated to meet the applied geochemistry criterion.

Table 4.
Geo*PT4*. Participating analysts and laboratories

D.M. Hill, ANSTO, Menai, New South Wales, Australia.

Helen Waldron, Becquerel Laboratories Pty Ltd., Menai, New South Wales, Australia.

Dr. Phil Robinson, School of Earth Sciences, University of Tasmania, Hobart, Tasmania, Australia.

John M. Flynn, Genalysis Laboratory Services Pty Ltd., Maddington, WA, Australia.

M. Hart, Division of Exploration & Mining, CSIRO, Wembley, Western Australia, Australia.

Dr. Peter Spindler, Arsenal Research, Division of the Environment, Vienna, Austria.

Guy Bologne, Laboratoires associés de Géologie, Pétrologie et Géochimie, Université de Liège, Sart Tilman, Belgium.

Luc André, Section de Minéralogie-Pétrographie-Géochimie, Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

Dr. Jacinta Enzweiler/Maria Aparecida V. Penereiro, Instituto De Geociências, UNICAMP, Campinas, Brazil.

A.M.G. Figueiredo, Instituto de Pesquisas Energeticas e Nucleares, Cidade Universitaria, Butanta, Sao Paulo, Brazil.

Horstpeter H.G.J. Ulbrich/Paulo Ernesto Mori, Instituto de Geociências, Universidade de São Paulo, Brazil.

Dr. Brenda Caughlin, Chemex Labs Limited, North Vancouver, BC, Canada.

Quality Assurance Manager, Lakefield Research Ltd., Lakefield, Ontario, Canada.

D. Conrad Grégoire, Analytical Chemistry Laboratories, Geological Survey of Canada, Ottawa, Ontario, Canada.

Ron Hartree, Department of Earth Sciences, University of Ottawa, Ottawa, Ontario, Canada.

James Schweyer, Geoscience Laboratories, Sudbury, Ontario, Canada.

Marc Bisson, Centre de Recherche Minérale, Sainte-Foy, Québec, Canada.

Sidsel Grundvig, Department of Geology, Aarhus University, Aarhus, Denmark.

Jorgen Kystol, Geological Survey of Denmark and Greenland, Copenhagen, Denmark.

Tarmo Kiipli, Institute of Geology of TTU, Tallinn, Estonia.

Jean Claude Germanique, Laboratoire Petrologie Magmatique, CEREGE . CNRS, Université Aix-Marseille III, Aix-en-Provence, France.

Jean Louis Joron, Laboratoire Pierre Süe, CE / Saclay, Gif-sur-Yvette, France.

Jean Samuel, Centre de Géochimie de la Surface, CNRS, Strasbourg, France.

Jean Carignan, CRPG, BP 20, Vandoeuvre-lès-Nancy, France.

Paul Capiez, Université Claude Bernard Lyon 1, Villeurbanne, France.

Juha Virtasalo, Geological Survey of Finland, Rovaniemi, Finland.

Dr. Guenter Matheis, Applied Geochemistry Laboratory, Technical University of Berlin, Berlin, Germany.

R. Klingel, Geologisches Institut, Universitat Bonn, Bonn, Germany.

Prof. Dr. Ulrich Schreiber, Geologie, Universität GH Essen, Essen, Germany.

J. Kühnel, Lurgi Umwelt GmbH, Frankfurt-am-Main, Germany.

Dr. Stefan Pierdzig, CRB Analyse Service GmbH, Hardegsen, Germany.

Table 4 (continued).
Geo*PT4*. Participating analysts and laboratories

Dr. Carl-Dieter Garbe-Schönberg, Geologische Institut, Universität Kiel, Kiel, Germany.

Drs U. Rast and A. Andres, Bayerisches Geologisches Landesamt, München, Germany.

Dr. P. Dulski, Geoforschungs Zentrum Potsdam, Potsdam, Germany.

Dr. M. Schünemann, Geologisches Landesamt Mecklenburg Vorpommern, Schwerin, Germany.

P. Krishnamurthy, Atomic Minerals Directorate for Exploration and Research, Begumpet, Hyderabad, India.

Dr. Aurelio Mario Giaretta, C.N.R. Centro di Studio per la Geodinamica Alpina, Padova, Italy.

Massimo D'Orazio, Dipartimento di Scienze della Terra, Universita di Pisa, Pisa, Italy.

Manager of Analysis Team, Central Research Institute, Korea Chemical Co. Ltd., Kyunggi-do, Korea.

A. Boussetta, Reminex - Centre de Recherche, Medina, Marakech, Maroc.

John Wilmshurst, Department of Geology, University of Auckland, Auckland, New Zealand.

Ewa Popiolek, Polish Geological Institute, Central Chemical Laboratory, Warsaw, Poland.

Dr. Fernando Castro, Tecminho-Laboratorio de Analises Quimicas, Campus de Azurem da Universidade do Minho, Guimaraes, Portugal.

Maria Eugénia Moreira/Maria Rita Afonso, Laboratio do Instituto Geologico e Mineiro, S. Mamede de Infesta, Portugal.

Ing. Daniela Mackovych, Geological Survey of Slovak Republic, Geoanalytical Laboratories, Spisská Nová Ves, Slovakia.

Dr. Lev Petrov,m Institute of Geochemistry, Siberian Department of the Russian Academy of Sciences, Irkutsk, Russia.

Dr. Evelina M. Sedykh and Dr. Irma A. Rostchina, Central Analytical Laboratory, Vernadsky Institute of Geochemistry of the Russian Academy of Sciences, Moscow, Russia.

Prof. Galina M. Varshal, Laboratory of Geochemistry and Analytical Chemistry, Vernadsky Institute of Geochemistry of the Russian Academy of Sciences, Moscow, Russia.

Dr. Valentin Mitkin, Institute of Inorganic Chemistry, Russian Academy of Sciences - Siberian Branch, Novosibirsk, Russia.

Regional Analytical Centre 'Mekhanobr-Analyt' Ltd., St Petersburg, Russia.

Miloslava Lopasovská, Geological Survey of Slovak Republic, Bratislava, Slovakia.

Ing. Ema Blahutová, Ekologické a veterinárne laboratóiá, Spisská Nová Ves, Slovakia.

Dipl. Ing. Tibor Erhardt, GeoEcology Laboratories, Teplice, Slovakia.

Anna M. Uttley, Department of Geology, University of Stellenbosch, Stellenbosch, South Africa.

Sunung Choi, Research Center, Samsung Corning Ltd., Kyunggi-Do, South Korea.

Thea G. van Meerten, Interfacultair Reactor Instituut, Delft, The Netherlands.

Frans Vermeulen, Netherlands Institute of Applied Geosciences TNO, National Geological Survey, Haarlem, The Netherlands.

T.G. Dije-Kwee, Faculty of Earth Sciences, University of Utrecht, Utrecht, The Netherlands.

Dr. Trevor Emmett, Department of Geology, Anglia Polytechnic University, Cambridge, UK.

Dr. David S. Wray, School of Earth and Environmental Sciences, The University of Greenwich, Chatham Maritime, Kent, UK.

Dr. Timothy S. Brewer, Department of Geology, University of Leicester, Leicester, UK.

P.C. Webb / J.S. Watson, Department of Earth Sciences, The Open University, Milton Keynes, UK.

Dr. C.J.B. Gowing, Analytical and Regional Geochemistry Group, British Geological Survey, Keyworth, Nottingham, UK.

Derek Weights, School of Earth, Environmental and Physical Sciences, University of Portsmouth, Portsmouth, UK.

Rick Sanzolone, U.S. Geological Survey, Denver, Colorado, USA.

Dr. J.M. Rhodes, Department of Geosciences, University of Massachusetts, Amherst, MA, USA.

Henry E. Francis, Kentucky Geological Survey, University of Kentucky, Lexington, KY, USA.

Dr. Philip R. Kyle / Mr Chris McKee, Department of Earth & Environmental Science, New Mexico Tech, Socorro, NM, USA.

R.M. Kroc, Minerals Technologies, Inc, Easton, PA, USA.

Arthur R. Jurgensen, Savannah River Site, Aiken, SC, USA.

Diane M. Johnson/Charles Knaack, Department of Geology, Washington State University, Pullman, WA, USA.

Dr. Trinh Thi Le Thu, Analytical Experimental Center for Geology, Thanh Xuan, Hanoi, Socialist Republic of Vietnam.

calculated from $z = [X - X_a] / H_a$. Z-scores in the range $-2 < z < 2$ can be considered to be satisfactory in meeting a laboratory's selected fitness-for-purpose standard. 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.

A full z-score assessment was made for the major elements SiO_2, TiO_2, Al_2O_3, Fe_2O_3T, Fe(II)O, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5 and the trace elements Ba, Be, Bi, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Ga, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Ni, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb, Zn, Zr. For other elements, either insufficient data was contributed to the round to derive an assigned value or the contributed data showed a large or significantly skewed distribution from which an estimate of the composition could not be made with sufficient confidence. Data for the components/elements H_2O^+, CO_2, LOI, Ag, As, Au, Bi, Cd, F, Ge, S, Se, Tl and W fell into this category.

Z-score results are listed in Table 3 and contributed data are plotted as numeric histograms relative to the assigned value in Figure 1 (major elements) and Figure 2 (trace elements). In these diagrams, lines representing the acceptable range of z-scores are plotted as ± 2z (for pure geochemistry labs) and ± 2z' (for applied geochemistry labs).

Contributing laboratories are listed in Table 4. Note that in order to preserve anonymity, there is no correspondence between entries in this table and the order in which laboratory results are listed in Tables 1 and 3.

Participation in future rounds

The benefit from proficiency testing arises from regular participation. All laboratories are invited to register for future rounds of this proficiency testing programme by contacting the Secretary of the Steering Committee.

Acknowledgements

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Appendix 1

Sample collection and preparation

Field notes on the collection of Belford dolerite OU2 as the Geo*PT4* proficiency testing sample.

- Locality. Craghill roadstone quarry, Belford, Northumberland, England (Grid reference NU 115 340).

- Collected by John Holbrook, John Watson and Phil Potts during December 1991.

- Sample type. Dolerite comprising plagioclase, feldspar, clinopyroxene, orthopyroxene and opaque oxides, the plagioclase grains being up to 0.5 mm long with clinopyroxene as polycrystalline aggregates up to 1.2 mm across.

- Field description. The sample was taken from surplus material remaining after preparation of the IWG-GIT reference material WS-E and a full field description can be found in Govindaraju *et al.* 1994.

Sample preparation

The sample was crushed, homogenised and hermetically sealed in packets at the Open University largely following procedures described in previous reports in this series.

Homogeneity testing

Homogeneity testing was based on an analysis of sixteen packets, selected at random. These samples were analysed by WD-XRF at the Open University for the major elements (SiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, TiO_2, LOI, Ba, Cr, Ni on glass disks and the trace elements (As, Ba, Co, Cr, Cu, Ga, Mo, Nb, Ni, Pb, Rb, S, Sc, Sr, Th, U, V, Y, Zn, Zr) on powder pellets, following the procedures described in the GeoPT1 report. Duplicate glass disks and duplicate powder pellets were prepared from separate test portions taken from each packet. Results for twelve major/minor oxides and nineteen trace elements were analysed using standard analysis of variance (ANOVA) procedures, as described in the Geo*PT2* report.

The power of the ANOVA test depends on the inherent measurement precision of the individual elements determined, and is poorest for those elements whose concentrations approach the method detection limit. For the Geo*PT4* homogeneity data, Pb, Th, U and Mo concentrations were in the detection limit range, Ga and S occurred at concentrations within two to ten times the detection limit, the other available elements were at concentrations greater than ten times the detection limit, where ANOVA results can be reliably assessed.

No significant differences between packets were detected at the 95% confidence level for most of the elements in the present study. However, for SiO_2, Fe_2O_3, MgO, CaO and S measured on fused disks, small between-packet differences were observed and quantified. In every case, the conclusion resulted from atypically small "within" RSDs of the homogeneity testing data, which, for some packets, were derived from notionally zero differences. Had the within-differences been larger, as has been the case for previous Geo*PT* runs, and for the original WS-E homogeneity data (Govindaraju *et al.* 1994), the results would have satisfied the 95% confidence level criteria.

Because OU-2 was prepared from stock remaining after preparation of the reference material WS-E, it is relevant to compare the results of the current homogeneity evaluation with corresponding data undertaken as part of the original reference material characteri-sation. These latter results showed that the "value for sigma (inhomo) is generally less than 0.2% relative where the elemental abundance exceeds 2.5% m/m, as it does for Si, Fe, Mg and Ca". Thus, despite the fact that some data in the present OU-2 (Geo*PT4*) round did not satisfy the 95% confidence criterion, the results do agree with the earlier assessment of homogeneity for all elements. We can conclude, therefore, that the present OU-2 Geo*PT4* sample is fit-for-purpose as far as its use in the current proficiency testing round is concerned.