

# 1993 COMPILATION OF DATA ON FIVE BELGIAN SEDIMENTARY ROCK REFERENCE MATERIALS: AWI-1, SBO-1, PRI-1, CCH-1 AND DWA-1

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Five Belgian sedimentary rock reference materials have been prepared and distributed by the Geology, Petrology and Geochemistry Laboratory (Liège University, Belgium). Thirty-six laboratories participated in the international co-operative study. The individual data received from the participating laboratories are listed. Tables of compiled results are presented for major, minor and trace elements. These updated values are summarized into means, associated standard deviations, medians, and concentration ranges. "Recommended" (or proposed) values are presented.

In the beginning of 1980s, the "Contact Group of Instrumental Geochemistry" (FNRS-NFWO, Belgium) started a program of Belgian sedimentary rock reference materials. A set of five samples (AWI-1, SBO-1, PRI-1, CCH-1 and DWA-1) were prepared and distributed by the Geology, Petrology and Geochemistry Laboratory (University of Liège). The locations, descriptions, preparation and homogeneity testing of these samples have been described previously (1).

## PRESENTATION AND EVALUATION OF COMPILED DATA

The first compilation of analytical data on these samples was published in this Journal in April 1988 (1). It presented results from 18 collaborating laboratories (mainly from Belgium). During these past five years, some 60 laboratories throughout the world agreed to collaborate in the analysis. At the end of 1993, eighteen of them returned results using analytical methods of their choice. These new determinations have improved the situation for many trace elements.

The present compilation is a revised and updated version of the preliminary survey. It includes all the results published in the first compilation (1) and new data received or appeared in the literature up to December 1993.

## Presentation

The abbreviations for analytical methods are grouped in Table 1. Respectively for the five samples, AWI-1, SBO-1, PRI-1, CCH-1 and DWA-1, the compiled data are presented in Tables 2, 4, 6, 8 and 10 for major and minor elements and in Tables 3, 5, 7, 9 and 11 for trace elements.

We believe that the user of reference samples should have full access to all compiled data (Tables 2 to 11), so that he may recalculate them to reflect his own experience whenever desired. The presentation of individual data follows the style we have adopted previously. The data reported in Tables 2 to 11 are listed in ascending order of their concentration for every constituent. Trace elements are arranged in the alphabetical order of their chemical symbols. The "outliers" are identified by an asterisk and were

Table 1. Analytical method code

AAS	Atomic Absorption Spectrometry
COL	Colorimetry
DCP	Direct Coupled Plasma
EDXRF	Energy Dispersive X-Ray Fluorescence
FE	Flame Emission
GAMMA	Direct Gamma-Ray Counting
GRAV	Gravimetry
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectrometry
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
ISE	Ion Selective Electrodes
NAA	Neutron Activation Analysis
OES	Optical Emission Spectrometry
PIGE	Proton Induced Gamma Ray Emission
POT	Potentiometry
TXRF	Total Reflection X-Ray Fluorescence Spectrometry
VOL	Volumetry
XRF	Wavelength Dispersive X-Ray Fluorescence Spectrometry

*Text continues on page 183*

Table 2. Individual data for major and minor constituents (dry basis, %) in AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>SiO<sub>2</sub></b>								
*46.5	EDXRF	32	16.31	XRF	7	0.12	AAS	9
*59.15	XRF	7	16.38	XRF	45	0.12	OES	5
59.45	ICP-AES	43	16.4	ICP-AES	36	0.130	XRF	50
59.86	XRF	18	16.44	AAS	16	0.14	AAS	10
59.9	ICP-AES	48	16.46	XRF	30	0.14	AAS	49
59.98	AAS	10	16.48	XRF	18	0.14	DCP	8
60.12	ICP-AES	37	16.50	VOL	42	0.14	EDXRF	31
60.32	GRAV	3	16.55	XRF	49	0.14	ICP-AES	43
60.32	XRF	40	16.6	EDXRF	32	0.14	ICP-AES	48
60.41	GRAV	42	16.6	ICP-AES	48	0.142	XRF	45
60.45	XRF	45	16.60	XRF	40	0.145	ICP-AES	36
60.56	XRF	3	16.62	GRAV	3	0.15	AAS	16
60.64	GRAV	16	*17.30	XRF	2	0.15	ICP-AES	37
60.70	AAS	17	*17.68	AAS	10	0.15	ICP-MS	47
61	ICP-AES	36				0.15	OES	17
61.01	XRF	30	<b>Fe<sub>2</sub>O<sub>3</sub>T</b>			0.15	XRF	18
61.10	XRF	49	*6.54	VOL	8	0.15	XRF	30
61.60	XRF	2	6.89	NAA	22	0.15	XRF	40
*63.53	DCP	8	6.99	XRF	2	0.15	XRF	49
*64.5	EDXRF	31	7.00	XRF	18	0.16	EDXRF	32
			7.03	XRF	50	0.16	XRF	3
			7.04	COL	16	*0.18	AAS	42
<b>TiO<sub>2</sub></b>			7.07	OES	17	*0.181	TXRF	33
*0.73	COL	10	7.14	EDXRF	31			
*0.78	EDXRF	32	7.15	XRF	40	<b>MgO</b>		
0.84	COL	42	7.17	XRF	45	*1.39	AAS	8
0.86	ICP-AES	43	7.22	NAA	11	1.63	XRF	2
0.87	XRF	30	7.22	XRF	7	1.68	AAS	2
0.88	XRF	7	7.23	VOL	10	1.82	GRAV	42
0.88	XRF	18	7.23	XRF	45	1.97	XRF	18
0.89	ICP-AES	48	7.25	ICP-AES	43	2.00	AAS	10
0.9	ICP-AES	36	7.25	XRF	49	2.00	XRF	49
0.90	XRF	13	7.28	VOL	3	2.04	ICP-AES	43
0.90	XRF	40	7.28	VOL	42	2.06	ICP-AES	48
0.91	AAS	16	7.28	XRF	3	2.07	XRF	45
0.91	ICP-AES	37	7.3	ICP-AES	36	2.08	AAS	16
0.92	XRF	45	7.32	NAA	1	2.1	OES	17
0.92	XRF	49	7.34	ICP-AES	37	2.20	XRF	40
0.93	AAS	8	7.45	ICP-AES	48	2.25	ICP-AES	36
0.93	XRF	3	7.73	EDXRF	32	2.25	VOL	3
0.94	XRF	2	*7.99	XRF	30	2.27	XRF	30
0.96	ICP-MS	47	*8.44	TXRF	33	2.29	ICP-AES	37
1.01	XRF	50				2.38	XRF	3
1.02	OES	17	<b>FeO</b>			2.54	XRF	7
1.02	EDXRF	31	*4.25	POT	16			
*1.07	TXRF	33	5.30	VOL	2	<b>CaO</b>		
*1.09	XRF	45	5.31	VOL	3	*0.30	EDXRF	31
			5.56	VOL	42	*0.48	AAS	2
<b>Al<sub>2</sub>O<sub>3</sub></b>			5.58	VOL	10	*0.51	OES	17
*15.2	EDXRF	31	5.87	VOL	8	0.55	TXRF	28
15.87	DCP	8				0.55	XRF	50
16.06	OES	17	<b>MnO</b>			0.57	XRF	3
16.21	XRF	3	*0.09	TXRF	28	0.62	ICP-AES	36
16.28	ICP-AES	43	*0.11	AAS	2	0.62	NAA	1
16.29	ICP-AES	37	0.12	AAS	6	0.66	XRF	30

Table 2. Individual data for major and minor constituents (dry basis, %) in AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Re
0.69	TXRF	33	0.78	XRF	2	0.11	XRF	3
0.70	AAS	16	0.79	XRF	7	0.11	XRF	30
0.7	ICP-AES	48	0.80	FE	17	0.13	DCP	8
0.70	XRF	40	0.81	AAS	49	0.14	COL	6
0.71	XRF	2	0.84	AAS	8	0.14	ICP-AES	48
0.73	EDXRF	32	*0.96	NAA	22	0.14	ICP-MS	47
0.73	ICP-AES	37				0.14	XRF	2
0.73	ICP-AES	43	<b>K<sub>2</sub>O</b>			0.14	XRF	18
0.73	VOL	3	*2.29	TXRF	33	0.14	XRF	49
0.73	XRF	18	*2.62	XRF	7	0.143	XRF	45
0.73	XRF	49	2.89	ICP-AES	37	0.1438	COL	42
0.75	DCP	8	2.90	XRF	30	0.15	COL	16
0.76	XRF	7	2.98	AAS	8	0.17	ICP-AES	43
0.77	XRF	45	3.00	FE	3	0.188	ICP-AES	46
0.79	AAS	10	3.00	XRF	18	0.19	COL	49
*0.88	VOL	42	3.02	AAS	6	0.19	ICP-AES	37
*1.01	DCP	12	3.03	XRF	45	0.19	TXRF	28
			3.04	ICP-AES	43	0.19	XRF	3
			3.04	ICP-AES	48	0.21	COL	10
<b>Na<sub>2</sub>O</b>			3.05	AAS	16			
*0.6	ICP-AES	43	3.06	AAS	10	<b>CO<sub>2</sub></b>		
0.63	FE	42	3.07	AAS	49	1.46	VOL	8
0.64	XRF	30	3.07	XRF	2			
0.66	XRF	3	3.08	XRF	3	<b>LOI</b>		
0.7	ICP-AES	48	3.08	XRF	40	7.34	GRAV	17
0.71	ICP-AES	37	3.11	AAS	2	7.42	GRAV	42
0.73	AAS	16	3.14	TXRF	28	7.50	GRAV	45
0.73	NAA	1	3.15	XRF	49	7.56	GRAV	3
0.73	NAA	11	3.19	AAS	15	7.69	GRAV	10
0.74	AAS	10	3.2	FE	17	7.74	GRAV	16
0.76	AAS	6	3.22	FE	42	7.87	GRAV	49
0.76	FE	3				7.89	GRAV	37
0.77	NAA	25				7.92	GRAV	7
0.77	XRF	40	<b>P<sub>2</sub>O<sub>5</sub></b>			7.96	GRAV	2
0.77	XRF	45	*0.01	OES	17	8.04	GRAV	43
0.78	AAS	2	0.1	ICP-AES	36	8.11	GRAV	48

Table 3. Individual trace element data (ppm) for AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ag</b>			<b>Ba</b>			<b>Be</b>		
< 5	OES	5	350	ICP-AES	36	<10	OES	5
			353	NAA	22	*1.1	ICP-AES	43
<b>As</b>			358	ICP-MS	39	2.4	ICP-AES	36
13	ICP-MS	49	361	ICP-MS	47	2.6	ICP-AES	37
13	XRF	45	361	OES	17	2.6	ICP-MS	49
15	DCP	12	367	ICP-AES	43	2.84	ICP-MS	47
16.6	ICP-MS	48	375	ICP-MS	49	2.96	ICP-MS	48
16.7	NAA	22	375	XRF	4			
			378	ICP-MS	48	<b>Bi</b>		
<b>B</b>			384	ICP-AES	37	<5	OES	5
42	OES	5	415	ICP-AES	46	0.33	ICP-MS	48
83	ICP-AES	49	416	XRF	45			
280	OES	4	425	XRF	45	<b>Cd</b>		
			*448	XRF	18	0.03	ICP-MS	48

Table 3 (Cont'd.). Individual trace element data (ppm) for AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ce</b>			116	NAA	11	<b>Eu</b>		
75	ICP-MS	39	118	ICP-AES	46	*0.92	ICP-AES	36
76.7	NAA	1	120	NAA	25	1.35	ICP-MS	39
77	ICP-MS	47	124	ICP-AES	37	1.37	ICP-AES	46
77.4	ICP-MS	27	125	OES	17	1.38	ICP-MS	27
78	ICP-AES	36	126	XRF	4	1.39	ICP-MS	47
79.9	ICP-MS	27	127	TXRF	33	1.42	ICP-MS	27
79.9	NAA	25	128	ICP-MS	47	1.44	ICP-AES	20
80	ICP-MS	49	129	ICP-MS	49	1.47	ICP-AES	24
80	NAA	22	131	XRF	45	1.47	ICP-AES	26
81.7	ICP-AES	46	135	ICP-AES	43	1.5	ICP-MS	49
82	ICP-AES	24	<b>Cs</b>			1.51	NAA	11
82.3	ICP-AES	26	6.8	NAA	22	1.53	ICP-MS	48
82.73	ICP-MS	48	7	ICP-MS	49	1.54	NAA	25
82.8	NAA	11	7.02	ICP-MS	47	1.61	NAA	1
83.2	ICP-AES	46	7.17	ICP-MS	48	1.61	NAA	22
84	ICP-AES	20	7.2	NAA	25	<b>F</b>		
*89	XRF	4	<b>Cu</b>			577	PIGE	21
*95	TXRF	33	25	ICP-AES	36	602	ISE	40
<b>Cl</b>			26	OES	5	<b>Ga</b>		
<50	XRF	13	27	TXRF	28	*11.4	TXRF	33
<b>Co</b>			30	XRF	45	20.3	ICP-MS	39
*14	ICP-AES	43	32	ICP-MS	47	21	XRF	45
17	ICP-AES	49	32.9	ICP-AES	46	21	XRF	49
18	AAS	2	33	ICP-AES	49	21.8	ICP-MS	47
19	ICP-MS	39	33	TXRF	33	23.3	ICP-MS	48
19	OES	4	34	DCP	12	24	OES	5
19.5	NAA	22	35	ICP-AES	43	<b>Gd</b>		
20	ICP-AES	37	37	AAS	2	5.19	ICP-MS	39
20	ICP-AES	46	39	ICP-AES	37	5.27	ICP-MS	27
20	NAA	25	45	OES	17	5.3	ICP-AES	20
20	XRF	18	46	ICP-MS	39	5.84	ICP-MS	27
20	XRF	45	<b>Dy</b>			5.9	ICP-AES	24
20.8	NAA	1	4.05	ICP-MS	27	6.10	ICP-AES	46
20.9	NAA	11	4.1	ICP-AES	20	6.2	ICP-MS	47
21.3	ICP-MS	47	4.2	ICP-AES	24	6.3	ICP-MS	48
22	XRF	38	4.21	ICP-MS	39	6.37	ICP-AES	26
22.3	XRF	30	5.65	ICP-MS	47	7.1	ICP-MS	49
22.5	ICP-MS	49	5.70	ICP-AES	46	<b>Ge</b>		
24	ICP-AES	36	5.71	ICP-MS	27	<5	OES	5
*30	OES	5	5.71	ICP-MS	48	3.8	TXRF	33
*39	OES	17	5.87	ICP-AES	26	<b>Hf</b>		
<b>Cr</b>			5.9	ICP-MS	49	*4.13	ICP-MS	27
*100	ICP-MS	39	<b>Er</b>			5.29	ICP-MS	27
105	TXRF	28	2.04	ICP-MS	39	5.70	ICP-MS	49
111	XRF	18	2.25	ICP-MS	27	5.8	NAA	1
111	XRF	45	2.61	ICP-MS	27	5.82	ICP-MS	39
112	AAS	2	3.05	ICP-MS	48	6.2	NAA	25
113	ICP-AES	49	3.26	ICP-MS	47	6.26	NAA	11
113	NAA	1	3.27	ICP-AES	46	6.3	NAA	22
113.9	XRF	38	3.3	ICP-MS	49	6.6	ICP-AES	26
114	NAA	22	3.42	ICP-AES	26			
116	ICP-AES	36						

Table 3 (Cont'd.). Individual trace element data (ppm) for AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
7.37	ICP-MS	48	15.1	ICP-MS	47	23.5	ICP-MS	48
7.6	ICP-MS	47	16	ICP-AES	43	25	DCP	12
<b>Ho</b>			16.3	ICP-MS	48	25.7	ICP-MS	39
*0.79	ICP-MS	27	17.1	ICP-MS	49	27	XRF	18
0.9	NAA	1	17.4	XRF	45	31	ICP-AES	36
1.08	ICP-MS	27	17.5	XRF	30	32	TXRF	33
1.1	ICP-MS	49	17.7	XRF	38	33.6	ICP-MS	27
1.15	ICP-AES	26	18	ICP-AES	37	<b>Pr</b>		
1.19	ICP-MS	47	20.8	ICP-MS	27	*7.89	ICP-MS	39
1.24	ICP-MS	48	<b>Nd</b>			8.84	ICP-MS	27
<b>In</b>			33.9	ICP-MS	39	9.07	ICP-AES	46
<1	OES	5	34.3	ICP-MS	49	9.2	ICP-MS	49
<b>La</b>			34.4	ICP-MS	27	9.26	ICP-MS	27
34.7	ICP-MS	27	34.9	ICP-AES	46	9.43	ICP-MS	48
35.9	ICP-MS	39	35.6	ICP-AES	20	9.58	ICP-AES	26
37	ICP-AES	24	36.2	ICP-AES	26	9.8	ICP-MS	47
37.1	ICP-MS	49	36.5	NAA	25	<b>Rb</b>		
38	ICP-MS	47	36.6	ICP-MS	47	119	ICP-AES	43
38	NAA	22	36.8	NAA	1	122	XRF	13
38	TXRF	33	37.2	ICP-AES	24	123	ICP-MS	39
38.5	ICP-AES	20	37.4	ICP-MS	27	124	TXRF	33
38.7	ICP-MS	27	39	NAA	11	126	NAA	11
38.7	NAA	1	39	XRF	4	127	AAS	17
38.8	ICP-AES	46	39.48	ICP-MS	48	128	AAS	37
38.8	NAA	11	<b>Ni</b>			128	NAA	22
39.1	NAA	25	51	ICP-AES	49	128	TXRF	28
39.5	ICP-AES	26	52	AAS	2	132	ICP-MS	47
39.7	ICP-AES	46	53	XRF	45	132	ICP-MS	49
40.96	ICP-MS	48	54	TXRF	33	133.2	XRF	38
*44	ICP-AES	36	55	TXRF	28	134	XRF	4
*49	XRF	4	57	XRF	18	135	ICP-MS	48
<b>Lu</b>			61	ICP-AES	43	135	XRF	2
0.34	ICP-MS	39	61	NAA	22	135	XRF	18
0.36	ICP-AES	24	62	ICP-MS	39	136	XRF	30
0.36	ICP-MS	27	62	XRF	45	137	XRF	45
0.38	ICP-AES	20	63.4	ICP-AES	46	142	NAA	25
0.38	ICP-MS	27	64	ICP-AES	37	*155	XRF	49
0.47	ICP-AES	26	65	XRF	4	<b>S</b>		
0.48	ICP-AES	46	66	ICP-MS	47	830	XRF	13
0.50	ICP-MS	47	71	XRF	30	860	TXRF	28
0.5	ICP-MS	49	75	OES	5	908	XRF	4
0.50	NAA	25	*81	ICP-AES	36	1100	XRF	45
0.54	ICP-MS	48	*87	OES	17	*1201	ICP-AES	36
0.54	NAA	11	<b>Pb</b>			<b>Sb</b>		
0.56	NAA	1	*5.22	ICP-MS	27	<2	ICP-MS	49
<b>Mo</b>			15	TXRF	28	0.74	NAA	22
<3	OES	5	16	OES	5	0.76	ICP-MS	48
0.60	ICP-MS	47	17	XRF	45	*14	DCP	12
0.9	ICP-MS	49	20	AAS	2	<b>Sc</b>		
<b>Nb</b>			20	AAS	9	<20	TXRF	28
*11.4	ICP-MS	39	23	AAS	37	*10.8	ICP-AES	48
13.4	ICP-MS	27	23	ICP-MS	47			
			23	XRF	13			

Table 3 (Cont'd.). Individual trace element data (ppm) for AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
*13.89	ICP-AES	43	1.19	ICP-MS	39	3.1	NAA	22
15	XRF	45	1.24	ICP-MS	47	3.15	NAA	11
15.3	XRF	38	1.28	NAA	25	3.32	NAA	25
15.8	NAA	22	1.31	ICP-MS	48			
16.4	NAA	11	1.36	NAA	22	<b>V</b>		
16.7	ICP-MS	39	1.37	NAA	1	112	XRF	13
16.7	NAA	1	1.37	NAA	11	114	ICP-AES	43
16.9	ICP-AES	46	*3.17	ICP-MS	27	120.3	XRF	38
17.1	ICP-AES	26				122	ICP-AES	46
17.1	NAA	25	<b>Tb</b>			124	XRF	18
17.4	ICP-AES	37	0.77	ICP-MS	27	128	ICP-AES	36
<b>Sm</b>			0.83	NAA	1	129	ICP-AES	37
*6.02	ICP-MS	39	0.85	ICP-MS	27	129	ICP-MS	49
6.65	ICP-MS	27	0.85	NAA	22	130	ICP-MS	47
6.73	ICP-MS	47	0.97	ICP-MS	48	132	XRF	45
6.76	ICP-MS	27	0.98	ICP-MS	47	143	ICP-MS	39
6.8	ICP-MS	49	1.0	ICP-MS	49	152	XRF	4
6.8	NAA	22	1.06	NAA	11	155	OES	17
6.89	ICP-AES	46	1.16	NAA	25	159	XRF	30
7	ICP-AES	24				160	OES	5
7.09	NAA	11	<b>Th</b>					
7.19	ICP-MS	48	*11	ICP-MS	39	<b>W</b>		
7.2	ICP-AES	20	11.2	ICP-MS	27	1.13	ICP-MS	47
7.29	ICP-AES	26	11.4	ICP-MS	27	6.43	ICP-MS	48
7.3	NAA	1	11.5	ICP-MS	48			
7.52	NAA	25	12	NAA	1	<b>Y</b>		
			12	NAA	22	20	TXRF	28
<b>Sn</b>			12	NAA	22	20.4	ICP-MS	39
<5	OES	5	12	TXRF	33	21	TXRF	33
2.77	ICP-MS	48	12.3	ICP-MS	49	21.2	ICP-MS	27
7	OES	4	12.4	ICP-MS	47	23.5	XRF	4
			12.5	NAA	25	27	ICP-AES	49
<b>Sr</b>			12.7	NAA	11	28	ICP-MS	27
94	NAA	1	13	XRF	45	29.3	ICP-MS	49
95	ICP-MS	47				30	XRF	30
100	ICP-AES	36	<b>Tl</b>			30.2	ICP-AES	46
104	ICP-AES	43	0.61	ICP-MS	48	31	ICP-AES	37
104	ICP-AES	46				31.1	ICP-AES	26
105	XRF	2	<b>Tm</b>			32.5	ICP-MS	48
106	ICP-MS	39	*0.18	NAA	1	33	ICP-AES	36
106	XRF	13	0.30	ICP-MS	39	33.5	XRF	45
106.2	XRF	38	0.34	ICP-MS	27	34	ICP-MS	47
107	XRF	4	0.38	ICP-MS	27	34.4	XRF	38
107	XRF	45	0.47	ICP-MS	47	35.1	ICP-AES	46
110	ICP-MS	49	0.5	ICP-MS	49	*41	XRF	2
110	XRF	30	0.53	ICP-MS	48			
112	XRF	18				<b>Yb</b>		
115	ICP-MS	48	<b>U</b>			2.36	ICP-MS	27
117	ICP-AES	37	2.75	XRF	39	2.38	ICP-AES	24
117	OES	17	2.76	ICP-MS	27	2.58	ICP-MS	39
118	TXRF	33	2.89	ICP-MS	27	2.65	ICP-AES	20
120	XRF	49	2.9	NAA	1	2.83	ICP-MS	27
*157	NAA	22	2.91	ICP-MS	48	2.94	ICP-MS	48
			3	XRF	45	3.08	NAA	25
<b>Ta</b>			3.10	ICP-MS	47	3.10	ICP-AES	46
1.02	ICP-MS	27	3.1	ICP-MS	49	3.2	ICP-MS	49
1.1	ICP-MS	49						

Table 3 (Cont'd.). Individual trace element data (ppm) for AWI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
3.2	NAA	22	100	TXRF	33	210	XRF	2
3.24	ICP-MS	47	101	AAS	9	213	ICP-AES	43
3.29	ICP-AES	26	102	XRF	45	218	ICP-MS	49
3.34	NAA	11	103	AAS	2	221	XRF	30
3.43	NAA	1	103	ICP-AES	37	223.5	XRF	38
*4	ICP-AES	36	103	ICP-MS	39	227	ICP-MS	47
			104	XRF	4	227	NAA	22
<b>Zn</b>			*115	ICP-AES	46	231	ICP-AES	37
91	XRF	18				232	ICP-MS	48
94	ICP-AES	43	<b>Zr</b>			233	XRF	4
94	ICP-AES	49	*142	ICP-MS	27	234	XRF	45
97.6	ICP-MS	48	200	ICP-MS	39	240	TXRF	28
98	ICP-MS	47	203	ICP-AES	49	244	ICP-AES	46
99	ICP-AES	36	209	ICP-MS	27			

Table 4. Individual data for major and minor constituents (dry basis, %) in SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>SiO<sub>2</sub></b>			0.97	XRF	2	6.87	NAA	22
*43.1	EDXRF	32	0.97	XRF	40	6.9	ICP-AES	36
*50.70	XRF	18	0.97	ICP-MS	47	6.97	COL	16
54.21	ICP-AES	43	0.98	OES	17	6.99	XRF	2
54.45	ICP-AES	48	0.99	AAS	16	7.00	XRF	40
54.53	GRAV	3	1.01	AAS	8	7.04	XRF	45
54.6	ICP-AES	36	1.07	TXRF	33	7.05	VOL	3
54.67	XRF	3	*1.12	XRF	45	7.08	NAA	1
54.91	GRAV	16	*1.14	XRF	50	7.10	XRF	49
54.93	XRF	45				7.13	XRF	45
54.94	ICP-AES	37	<b>Al<sub>2</sub>O<sub>3</sub></b>			7.15	NAA	11
55.20	XRF	30	17.4	EDXRF	32	7.16	ICP-AES	43
55.20	XRF	49	17.40	XRF	18	7.17	XRF	3
55.24	GRAV	42	17.6	ICP-AES	36	7.21	VOL	10
55.25	AAS	10	17.77	XRF	7	7.23	ICP-AES	37
55.25	XRF	40	18.08	GRAV	3	7.24	OES	17
55.62	AAS	17	18.18	ICP-AES	37	7.3	ICP-AES	48
56.00	XRF	2	18.21	XRF	3	7.76	XRF	50
57.60	XRF	7	18.22	XRF	40	7.82	EDXRF	32
*59.67	DCP	8	18.30	VOL	42	7.98	XRF	30
*67.3	EDXRF	31	18.31	ICP-AES	43	*8.19	EDXRF	31
			18.33	DCP	8	*8.29	TXRF	33
			18.38	AAS	10			
<b>TiO<sub>2</sub></b>			18.38	AAS	16	<b>FeO</b>		
*0.63	COL	10	18.44	XRF	30	*4.28	POT	16
*0.78	EDXRF	32	18.46	XRF	45	5.27	VOL	3
0.88	ICP-AES	43	18.60	XRF	49	5.49	VOL	2
0.88	XRF	18	18.71	ICP-AES	48	5.51	VOL	10
0.89	ICP-AES	36	18.89	OES	17	5.85	VOL	8
0.90	COL	42	18.90	XRF	2	5.92	VOL	42
0.90	XRF	7	*22.9	EDXRF	31			
0.90	XRF	30				<b>MnO</b>		
0.91	ICP-AES	48	<b>Fe<sub>2</sub>O<sub>3</sub>T</b>			*0.102	TXRF	28
0.92	ICP-AES	37	*6.53	VOL	8	*0.12	OES	5
0.93	XRF	49	6.77	VOL	42	0.146	AAS	9
0.94	EDXRF	31	6.81	XRF	7	0.15	AAS	2
0.94	XRF	3	6.81	XRF	18	0.16	AAS	6
0.942	XRF	45						

Table 4 (Cont'd). Individual data for major and minor constituents (dry basis, %) in SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
0.170	AAS	49	1.67	XRF	3	3.51	AAS	6
0.17	DCP	8	1.68	TXRF	33	3.52	AAS	10
0.17	ICP-AES	43	1.69	XRF	7	3.53	FE	3
0.17	ICP-AES	48	1.70	XRF	40	3.53	XRF	45
0.175	ICP-AES	36	1.73	AAS	16	3.57	ICP-AES	43
0.179	XRF	45	1.74	DCP	8	3.58	AAS	16
0.18	ICP-AES	37	1.74	OES	17	3.59	XRF	3
0.18	OES	17	1.75	XRF	18	3.60	AAS	49
0.18	XRF	18	1.81	EDXRF	31	3.6	FE	17
0.18	XRF	40	1.81	ICP-AES	37	3.6	ICP-AES	48
0.18	XRF	49	1.81	ICP-AES	48	3.60	XRF	2
0.19	AAS	10	1.82	VOL	42	3.60	XRF	30
0.19	AAS	16	1.83	ICP-AES	43	3.64	XRF	49
0.19	ICP-MS	47	1.84	XRF	45	3.66	AAS	15
0.19	EDXRF	32	1.85	AAS	10	3.70	FE	42
0.19	XRF	30	1.86	XRF	30			
0.20	AAS	42	1.91	XRF	2			
0.21	XRF	3	1.92	EDXRF	32	<b>P2O5</b>		
*0.220	TXRF	33	1.97	XRF	49	0.15	ICP-AES	36
*0.22	XRF	50				0.15	XRF	18
*0.24	EDXRF	31				0.16	ICP-MS	47
			<b>Na2O</b>			0.1619	COL	42
			0.51	ICP-AES	43	0.17	COL	6
<b>MgO</b>			0.59	ICP-AES	37	0.17	COL	16
1.45	AAS	8	0.59	NAA	1	0.17	ICP-AES	48
1.5	XRF	13	0.60	FE	42	0.17	XRF	3
1.54	AAS	2	0.6	ICP-AES	48	0.17	XRF	49
1.64	XRF	2	0.61	NAA	11	0.171	XRF	45
1.66	GRAV	42	0.62	AAS	2	0.18	COL	10
1.84	XRF	7	0.62	AAS	10	0.18	ICP-AES	37
1.90	XRF	40	0.62	AAS	16	0.18	XRF	2
1.91	XRF	18	0.63	AAS	6	0.19	DCP	8
2.03	OES	17	0.63	NAA	25	0.19	XRF	30
2.08	ICP-AES	43	0.64	FE	3	0.2	ICP-AES	43
2.11	AAS	10	0.65	AAS	8	*0.22	COL	49
2.11	ICP-AES	37	0.66	FE	17	*0.22	TXRF	28
2.12	AAS	16	0.68	AAS	49	*0.228	ICP-AES	46
2.12	ICP-AES	48	0.73	XRF	3			
2.15	XRF	45	0.75	XRF	40	<b>CO2</b>		
2.15	XRF	49	0.78	XRF	7	2.43	VOL	8
2.23	XRF	3	0.80	XRF	13			
2.27	XRF	30	0.80	XRF	45	<b>LOI</b>		
2.3	ICP-AES	36	*0.84	NAA	22	*8.88	GRAV	2
2.33	VOL	3	*0.93	XRF	30	9.37	GRAV	45
2.23	XRF	3				9.41	GRAV	16
			<b>K2O</b>			9.43	GRAV	7
<b>CaO</b>			*2.89	TXRF	33	9.52	GRAV	17
*1.28	AAS	2	*3.03	XRF	7	9.72	GRAV	42
*1.3	XRF	13	3.37	ICP-AES	37	9.72	GRAV	49
*1.32	TXRF	28	3.39	AAS	2	9.76	GRAV	3
1.42	NAA	1	3.40	XRF	18	9.80	GRAV	37
1.6	ICP-AES	36	3.47	TXRF	28	9.82	GRAV	43
1.61	XRF	50	3.50	AAS	8	9.87	GRAV	48
1.65	VOL	3	3.50	XRF	40	9.96	GRAV	10



Table 5. Individual trace element data (ppm) for SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ag</b>			101	NAA	22	<b>Cs</b>		
< 5	OES	5	102	ICP-AES	20	6.54	ICP-MS	47
<b>As</b>			102.2	ICP-AES	26	6.8	NAA	22
*19	DCP	12	104	ICP-AES	46	6.86	NAA	25
25	XRF	45	105	ICP-MS	49	6.97	ICP-MS	48
32	ICP-MS	49	108	XRF	4	7	ICP-MS	49
34.5	ICP-MS	48	<b>Cl</b>			<b>Cu</b>		
37	NAA	22	<50	XRF	13	26	TXRF	33
<b>B</b>			<b>Co</b>			27	OES	17
50	OES	5	*14	OES	4	27	XRF	45
91	ICP-AES	49	*14	TXRF	28	28	ICP-AES	36
297	OES	4	17	ICP-AES	43	30	OES	5
<b>Ba</b>			19	ICP-AES	49	31	ICP-AES	49
498	ICP-AES	36	19.8	NAA	22	35	DCP	12
502	XRF	4	20	ICP-AES	36	36	ICP-AES	37
510	ICP-AES	37	20	XRF	18	38	AAS	2
512	ICP-MS	47	21	XRF	45	39	ICP-AES	43
515	OES	17	21.7	NAA	25	41.4	ICP-AES	46
532	NAA	22	22	NAA	11	*44	TXRF	28
546	ICP-AES	43	22.6	ICP-AES	46	<b>Dy</b>		
549	ICP-MS	48	22.7	XRF	38	3.11	ICP-MS	27
550	XRF	13	23	XRF	30	3.3	ICP-AES	24
582	NAA	11	23.5	ICP-MS	47	3.4	ICP-AES	20
585	ICP-MS	49	24	AAS	2	5.70	ICP-MS	47
600	ICP-AES	46	24	OES	5	5.92	ICP-MS	48
605	XRF	45	24.5	NAA	1	6.16	ICP-AES	46
605	XRF	45	25	ICP-AES	37	6.32	ICP-AES	26
*639	XRF	18	26.4	ICP-MS	49	6.8	ICP-MS	49
<b>Be</b>			*40	OES	17	<b>Er</b>		
<10	OES	5	<b>Cr</b>			*1.72	ICP-MS	27
*1.39	ICP-AES	43	104	TXRF	28	3.17	ICP-MS	47
3	ICP-AES	37	106	XRF	18	3.26	ICP-MS	48
3.2	ICP-AES	36	107	ICP-AES	43	3.45	ICP-AES	46
3.2	ICP-MS	47	107	NAA	1	3.61	ICP-AES	26
3.4	ICP-MS	48	109.4	XRF	38	3.7	ICP-MS	49
3.4	ICP-MS	49	110	OES	5	<b>Eu</b>		
<b>Bi</b>			111	XRF	45	1.51	ICP-AES	46
<5	OES	5	112	ICP-AES	49	1.53	ICP-MS	47
0.45	ICP-MS	48	112	NAA	22	1.55	ICP-MS	27
<b>Ce</b>			113	NAA	11	1.59	ICP-AES	20
*87	TXRF	33	118	XRF	4	1.60	ICP-AES	24
*89	ICP-AES	36	119	AAS	2	1.62	ICP-AES	26
92	ICP-MS	47	119	XRF	45	1.64	NAA	11
96.4	NAA	25	123	ICP-AES	37	1.65	NAA	1
98.9	ICP-MS	27	123	ICP-MS	47	1.70	NAA	25
98.9	NAA	1	124	OES	17	1.71	ICP-MS	48
99	ICP-AES	24	124	NAA	25	1.73	NAA	22
100.2	ICP-MS	48	127	ICP-AES	46	1.8	ICP-AES	36
101	ICP-AES	46	128	ICP-AES	36	*1.9	ICP-MS	49
101	NAA	11	*137	ICP-MS	49			
			*176	TXRF	33			

Table 5 (Cont'd.). Individual trace element data (ppm) for SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>F</b>			47.5	NAA	22	56	XRF	45
782	PIGE	21	47.8	NAA	11	59	AAS	2
812	ISE	40	48.2	ICP-AES	46	59	XRF	18
			48.4	ICP-MS	49	59	XRF	45
<b>Ga</b>			48.7	ICP-AES	26	60	ICP-AES	49
17.5	TXRF	33	48.8	ICP-AES	46	61	NAA	22
24	XRF	45	49.68	ICP-MS	48	62	XRF	4
24	XRF	49	51	ICP-AES	36	63	ICP-MS	47
24.2	ICP-MS	47	*56	XRF	4	64	ICP-AES	37
25.3	ICP-MS	48				64	ICP-AES	43
*36	OES	5	<b>Lu</b>			65	XRF	30
			0.32	ICP-AES	24	65.3	ICP-AES	46
<b>Gd</b>			0.34	ICP-MS	27	68	OES	5
5.3	ICP-AES	20	0.36	ICP-AES	20	46	ICP-AES	46
5.88	ICP-MS	27	0.50	ICP-AES	26	*75	ICP-AES	36
5.9	ICP-AES	24	0.50	ICP-MS	47	*82	OES	17
6	ICP-MS	47	0.51	ICP-AES	46			
6.64	ICP-AES	46	0.51	ICP-MS	48	<b>Pb</b>		
6.72	ICP-MS	48	0.52	NAA	25	21	AAS	2
7	ICP-AES	26	0.54	NAA	11	21	XRF	45
*8.2	ICP-MS	49	0.6	ICP-MS	49	23.7	ICP-MS	27
			0.69	NAA	1	25	XRF	13
<b>Ge</b>						25.5	ICP-MS	47
<5	OES	5	<b>Mo</b>			26	AAS	9
3.7	TXRF	33	<3	OES	5	27	OES	5
			0.77	ICP-MS	47	27.4	ICP-MS	48
<b>Hf</b>			1.5	ICP-MS	49	30	DCP	12
4.70	ICP-MS	49				31	AAS	37
4.76	ICP-MS	47	<b>Nb</b>			32	TXRF	33
4.9	ICP-AES	26	14.5	ICP-MS	47	32	XRF	18
4.9	NAA	1	15	ICP-AES	37	*40	ICP-AES	36
4.94	ICP-MS	27	16	ICP-AES	43			
5	NAA	25	17	ICP-MS	48	<b>Pr</b>		
5.22	NAA	11	18.1	XRF	38	10.6	ICP-AES	46
5.5	NAA	22	18.1	XRF	45	10.83	ICP-MS	48
*6.33	ICP-MS	48	18.8	ICP-MS	27	11	ICP-MS	27
			19	XRF	30	11.2	ICP-MS	47
<b>Ho</b>			19.1	ICP-MS	49	11.4	ICP-AES	26
*0.54	ICP-MS	27				11.6	ICP-MS	49
1.15	ICP-MS	47	<b>Nd</b>					
1.23	ICP-AES	26	*39	ICP-MS	47	<b>Rb</b>		
1.3	ICP-MS	48	40.2	ICP-AES	46	150	AAS	37
1.4	ICP-MS	49	41	ICP-AES	20	151	NAA	11
1.4	NAA	1	41.5	NAA	1	153	TXRF	28
			41.9	ICP-MS	49	157	ICP-AES	43
<b>In</b>			42	XRF	4	160	AAS	17
<1	OES	5	42.2	ICP-AES	26	160	XRF	30
			42.3	NAA	25	161	XRF	2
<b>La</b>			42.6	ICP-MS	27	161	XRF	4
*33	TXRF	33	42.61	ICP-MS	48	161.7	XRF	38
45	ICP-MS	47	43.2	ICP-AES	24	162	NAA	22
45.6	ICP-AES	24	*44.5	NAA	11	163	ICP-MS	47
46.2	NAA	1				164	NAA	25
46.7	ICP-AES	20	<b>Ni</b>			165	ICP-MS	48
46.8	ICP-MS	27	50	TXRF	33	165	XRF	45
47.2	NAA	25	52	TXRF	28	166	XRF	18

Table 5 (Cont'd.). Individual trace element data (ppm) for SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
169	XRF	13	144	ICP-AES	46	0.47	ICP-MS	47
170	ICP-MS	49	145	XRF	2	0.55	ICP-MS	48
174	TXRF	33	145.5	XRF	38	0.6	ICP-MS	49
175	XRF	49	146	ICP-AES	43			
			146	XRF	4			
			147	XRF	45	<b>U</b>		
<b>S</b>			147	XRF	13	*0.8	GAMMA	14
1500	XRF	13	147	XRF	13	2.75	ICP-MS	27
1628	XRF	4	149	ICP-AES	37	2.84	ICP-MS	47
1890	TXRF	28	149	XRF	18	3	NAA	22
2100	XRF	45	149	XRF	30	3	NAA	25
2403	ICP-AES	36	150	OES	17	3.1	ICP-MS	48
			151	ICP-MS	47	3.1	NAA	1
			158	TXRF	33	3.18	NAA	11
<b>Sb</b>			159	ICP-MS	48	3.7	ICP-MS	49
4.98	ICP-MS	48	163	ICP-MS	49	*4	XRF	45
6.3	NAA	22	165	XRF	49			
8	ICP-MS	49	*200	NAA	22			
*17	DCP	12						
			<b>Ta</b>			<b>V</b>		
<b>Sc</b>			1.18	ICP-MS	47	130	ICP-AES	36
<20	TXRF	28	1.3	ICP-MS	49	133	ICP-AES	43
*12.3	ICP-AES	48	1.31	NAA	1	138	XRF	18
15.19	ICP-AES	43	1.36	NAA	25	139.7	XRF	38
17.1	NAA	1	1.42	ICP-MS	48	145	ICP-AES	46
17.1	NAA	22	1.43	NAA	11	148	ICP-AES	47
17.1	XRF	38	1.53	NAA	22	150	ICP-AES	37
17.2	NAA	11	*2.68	ICP-MS	27	157	XRF	45
17.7	ICP-AES	46				159	OES	17
18	XRF	45	<b>Tb</b>			165	ICP-MS	49
18.1	ICP-AES	26	0.68	ICP-MS	27	170	OES	5
18.1	NAA	25	0.95	NAA	22	173	XRF	4
18.6	ICP-AES	37	1.02	ICP-MS	48	177	XRF	30
			1.04	NAA	1			
			1.05	ICP-MS	47			
			1.13	NAA	11			
<b>Sm</b>			1.2	ICP-MS	49	<b>W</b>		
7.21	ICP-MS	47	1.3	NAA	25	1.24	ICP-MS	47
7.33	ICP-MS	27				2.59	ICP-MS	48
7.6	ICP-AES	20	<b>Th</b>					
7.7	NAA	1	*7	TXRF	33	<b>Y</b>		
7.7	NAA	22	13.6	ICP-MS	27	*15.62	ICP-MS	27
7.77	ICP-MS	48	14.1	ICP-MS	48	*21	XRF	4
7.82	ICP-AES	46	14.2	ICP-MS	47	24	TXRF	28
7.87	NAA	11	14.8	NAA	22	26	ICP-AES	36
7.9	ICP-AES	24	14.9	NAA	25	29	ICP-AES	49
8.2	ICP-MS	49	15.1	NAA	11	31	TXRF	33
8.28	ICP-AES	26	15.5	ICP-MS	49	31.4	ICP-AES	46
8.3	NAA	25	16	GAMMA	14	31.7	ICP-MS	49
			17	XRF	45	32	ICP-AES	37
			17.2	NAA	1	32	XRF	30
<b>Sn</b>						32.3	ICP-AES	26
<5	OES	5	<b>Tl</b>			33.5	ICP-MS	48
3.52	ICP-MS	48	0.63	ICP-MS	48	34.3	XRF	38
7	OES	4				34.8	XRF	45
			<b>Tm</b>			35	ICP-MS	47
<b>Sr</b>			0.26	NAA	1	36.6	ICP-AES	46
*114	TXRF	28	0.29	ICP-MS	27	*42	XRF	2
138	ICP-AES	36						

Table 5 (Cont'd.). Individual trace element data (ppm) for SBO-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Yb</b>			<b>Zn</b>			<b>Zr</b>		
*2.09	ICP-MS	27	*67	TXRF	28	*129	ICP-MS	27
*2.11	ICP-AES	24	74	XRF	4	158	ICP-MS	47
2.43	ICP-AES	20	75	XRF	18	169	NAA	22
3	ICP-AES	36	75.2	ICP-MS	48	173	XRF	2
3.17	ICP-MS	48	77	XRF	45	174	ICP-AES	43
3.19	ICP-MS	47	80	ICP-AES	49	176	ICP-MS	49
3.2	NAA	25	80	TXRF	33	181	ICP-AES	37
3.26	NAA	1	81	ICP-AES	43	183	XRF	4
3.3	NAA	22	82	ICP-MS	47	186.4	XRF	38
3.38	ICP-AES	46	85	AAS	9	187	ICP-MS	48
3.45	NAA	11	88	ICP-AES	37	190	XRF	30
3.46	ICP-AES	26	93	ICP-AES	36	196	XRF	45
3.5	ICP-MS	49	95	AAS	2	200	ICP-AES	46
			*100	ICP-AES	46	200	TXRF	28

Table 6. Individual data for major and minor constituents (dry basis, %) in PRI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>SiO<sub>2</sub></b>			<b>Al<sub>2</sub>O<sub>3</sub></b>			<b>Fe<sub>2</sub>O<sub>3</sub>T</b>		
*52.1	EDXRF	32	0.70	XRF	40	*3.02	EDXRF	31
*67.51	XRF	7	0.71	XRF	49	3.13	NAA	22
67.87	ICP-AES	48	0.716	XRF	45	3.17	XRF	7
68.19	ICP-AES	43	0.72	OES	17	3.18	XRF	18
68.22	AAS	10	0.72	XRF	2	3.18	XRF	50
68.35	ICP-AES	37	0.72	XRF	3	3.19	COL	16
68.37	GRAV	3	0.75	ICP-AES	36	3.2	ICP-AES	36
68.45	XRF	45	0.75	ICP-MS	47	3.27	NAA	1
68.50	AAS	17	0.76	AAS	16	3.27	XRF	45
68.53	DCP	8	0.77	AAS	8	3.27	XRF	49
68.54	GRAV	42	0.78	XRF	45	3.28	XRF	45
68.65	XRF	30				3.30	NAA	11
68.70	XRF	2				3.30	XRF	40
68.76	XRF	40	10.48	DCP	8	3.31	XRF	2
68.84	XRF	3	10.53	ICP-AES	37	3.34	ICP-AES	37
68.92	GRAV	16	10.57	VOL	42	3.35	XRF	3
68.94	XRF	18	10.7	ICP-AES	36	3.36	OES	17
69	XRF	49	10.71	GRAV	3	3.37	VOL	3
69.3	ICP-AES	36	10.73	XRF	3	3.40	VOL	10
*73.7	EDXRF	31	10.80	XRF	45	3.42	XRF	30
			10.85	ICP-AES	43	3.45	ICP-AES	43
			10.85	XRF	40	3.55	VOL	8
			10.88	XRF	30	3.58	ICP-AES	48
			10.90	XRF	2	3.58	VOL	42
			10.91	AAS	16	*3.81	EDXRF	32
			10.95	XRF	49	*4.00	TXRF	33
			11	EDXRF	31			
			11.01	OES	17	<b>FeO</b>		
			11.07	ICP-AES	48	1.70	POT	16
			11.07	XRF	18	1.89	VOL	2
			11.1	EDXRF	32	2	VOL	3
			*11.31	AAS	10	2.11	VOL	10
			*12.45	XRF	7	2.20	VOL	42
						2.50	VOL	8

Table 6 (Cont'd.). Individual data for major and minor constituents (dry basis, %) in PRI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>MnO</b>			2.34	XRF	7	3.74	AAS	8
*0.01	EDXRF	31	2.38	EDXRF	31	3.76	FE	17
*0.024	OES	5	2.38	TXRF	33	3.78	XRF	20
0.028	TXRF	28	2.40	AAS	16	3.78	XRF	45
0.03	DCP	12	2.4	ICP-AES	36	3.81	AAS	49
0.03	ICP-AES	43	2.43	XRF	3	3.81	FE	3
0.03	ICP-AES	48	2.45	XRF	40	3.81	XRF	18
0.030	XRF	50	2.48	VOL	3	3.83	ICP-AES	48
0.033	AAS	9	2.48	XRF	50	3.84	XRF	3
0.04	AAS	6	2.51	AAS	10	3.85	AAS	10
0.04	AAS	10	2.51	ICP-AES	37	3.86	FE	42
0.04	AAS	49	2.52	XRF	49	3.88	AAS	16
0.04	ICP-AES	37	2.54	DCP	8	3.89	AAS	15
0.04	XRF	2	2.56	XRF	18	3.89	ICP-AES	43
0.04	XRF	18	2.58	ICP-AES	48	3.90	XRF	49
0.04	XRF	40	2.58	XRF	45	3.91	XRF	30
0.04	XRF	49	2.60	XRF	2	4.15	AAS	2
0.042	ICP-MS	47	2.61	ICP-AES	43	4.19	TXRF	28
0.042	XRF	45	2.63	DCP	12			
0.0461	AAS	42	2.63	EDXRF	32	<b>P2O5</b>		
0.05	AAS	16	2.68	XRF	30	*0.14	XRF	13
0.05	DCP	8	2.86	VOL	42	0.17	ICP-AES	43
0.05	EDXRF	32	*2.9	OES	17	0.17	ICP-AES	48
0.05	ICP-AES	36				0.1742	COL	42
0.05	OES	17	<b>Na2O</b>			0.178	XRF	45
0.05	XRF	3	*0.29	XRF	18	0.18	COL	6
0.05	XRF	30	*1.53	XRF	3	0.18	DCP	8
0.052	TXRF	33	1.60	XRF	30	0.18	ICP-AES	36
			1.63	ICP-AES	37	0.18	XRF	30
<b>MgO</b>			1.63	ICP-AES	43	0.18	XRF	49
*2.47	AAS	8	1.66	NAA	1	0.19	COL	10
2.85	XRF	2	1.67	XRF	7	0.19	COL	49
3.04	AAS	2	1.67	AAS	49	0.19	ICP-MS	47
3.10	XRF	49	1.68	ICP-AES	48	0.19	XRF	2
3.12	AAS	10	1.7	XRF	13	0.20	COL	16
3.13	OES	17	1.71	AAS	6	0.20	ICP-AES	37
3.16	ICP-AES	43	1.71	NAA	11	*0.216	ICP-AES	46
3.24	AAS	16	1.72	NAA	25	*0.25	XRF	3
3.24	XRF	18	1.72	XRF	40			
3.24	XRF	45	1.73	AAS	16	<b>CO2</b>		
3.25	ICP-AES	48	1.74	AAS	2	2.62	VOL	8
3.25	XRF	40	1.75	AAS	8			
3.31	ICP-AES	37	1.75	AAS	10	<b>LOI</b>		
3.35	VOL	3	1.77	XRF	45	4.93	GRAV	45
3.36	GRAV	42	1.8	FE	17	4.94	GRAV	3
3.37	XRF	30	1.80	NAA	22	4.97	GRAV	16
3.5	ICP-AES	36	1.84	FE	42	4.97	GRAV	17
3.61	XRF	3	*1.92	FE	3	4.97	GRAV	48
*4.3	XRF	13				4.98	GRAV	10
*4.64	XRF	7	<b>K2O</b>			4.99	GRAV	37
			*2.89	TXRF	33	5.00	GRAV	49
<b>CaO</b>			*3.18	XRF	7	5.01	GRAV	2
*2	XRF	13	3.3	GAMMA	14	5.04	GRAV	7
2.1	NAA	1	3.35	XRF	40	5.06	GRAV	43
2.20	AAS	2	3.47	AAS	6	*5.18	GRAV	42
2.34	TXRF	28	3.66	ICP-AES	37			

Table 7. Individual trace element data (ppm) for PRI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ag</b>			83.9	NAA	1	<b>Cu</b>		
<5	OES	5	84	ICP-AES	26	<1	OES	5
			86	ICP-AES	20	<5	ICP-AES	49
<b>As</b>						1	OES	4
<5	ICP-MS	49	<b>Co</b>			1.6	ICP-AES	46
4.67	ICP-MS	48	*2	DCP	12	2	TXRF	28
13	DCP	12	*2	OES	4	4	AAS	2
			*4	OES	5	4	XRF	45
<b>B</b>			5	ICP-AES	37	5	ICP-AES	36
17	OES	5	5	TXRF	28	5	ICP-AES	37
48	ICP-AES	49	6	AAS	2	5	ICP-AES	43
91	OES	4	6	ICP-AES	43	*10	OES	17
			7	NAA	22			
<b>Ba</b>			7.2	NAA	25	<b>Dy</b>		
450	XRF	13	7.6	NAA	1	3.4	ICP-AES	24
458	XRF	4	7.66	NAA	11	3.5	ICP-AES	20
498	OES	17	7.95	ICP-MS	47	4.37	ICP-MS	48
498	XRF	45	8	ICP-AES	36	4.47	ICP-AES	46
500	ICP-AES	36	8	XRF	45	4.65	ICP-AES	26
519	NAA	22	8.3	ICP-MS	49	4.85	ICP-MS	47
527	ICP-AES	37	8.6	ICP-AES	46	5	ICP-MS	49
528	ICP-MS	47	9	ICP-AES	49			
546	ICP-MS	48	9.5	XRF	38	<b>Er</b>		
555	XRF	18	*19	OES	17	2.6	ICP-MS	48
565	ICP-MS	49				2.62	ICP-AES	46
568	ICP-AES	43	<b>Cr</b>			2.7	ICP-MS	49
581	NAA	11	67.9	XRF	38	2.78	ICP-AES	26
581	XRF	45	68	XRF	45	2.80	ICP-MS	47
595	ICP-AES	46	72	NAA	1			
			72	XRF	18	<b>Eu</b>		
<b>Be</b>			73	OES	17	1.15	ICP-AES	46
<10	OES	5	73	XRF	45	1.23	ICP-AES	24
0.8	ICP-AES	43	74	AAS	2	1.23	ICP-AES	26
1.4	ICP-AES	37	75	NAA	11	1.24	NAA	1
1.5	ICP-AES	36	76	NAA	25	1.26	ICP-MS	47
1.5	ICP-MS	49	79	NAA	22	1.27	ICP-AES	20
1.6	ICP-MS	47	80	ICP-AES	43	1.27	NAA	11
1.6	ICP-MS	48	81	ICP-AES	49	1.30	NAA	25
			81	ICP-MS	47	1.37	NAA	22
<b>Bi</b>			82	UCP-AES	36	1.4	ICP-MS	49
<5	OES	5	83	TXRF	28	1.42	ICP-MS	48
0.12	ICP-MS	48	83.5	ICP-AES	46	*1.6	ICP-AES	36
			84	ICP-AES	37			
<b>Ce</b>			85	ICP-MS	49	<b>F</b>		
*62	XRF	4	90	XRF	4	372	ISE	40
*70	ICP-AES	36	*99	TXRF	33	394	PIGE	21
76	NAA	22	*110	OES	5			
77.1	NAA	25				<b>Ga</b>		
78	ICP-MS	47	<b>Cs</b>			11	TXRF	33
82	ICP-MS	49	2	ICP-MS	49	13	XRF	45
82.8	ICP-AES	46	2.2	ICP-MS	48	13	XRF	49
83	ICP-AES	24	2.2	NAA	22	13.5	ICP-MS	47
83.1	ICP-MS	48	2.31	NAA	25	14.1	ICP-MS	48
83.5	NAA	11	2.33	ICP-MS	47	*18	OES	5
83.8	ICP-AES	46						

Table 7 (Cont'd.). Individual trace element data (ppm) for PRI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Gd</b>			0.43	ICP-MS	47	12.8	ICP-MS	47
4.7	ICP-AES	20	0.43	ICP-MS	48	14	AAS	8
5.07	ICP-AES	46	0.45	NAA	11	17	DCP	12
5.1	ICP-AES	24	0.56	NAA	1	17	XRF	13
5.27	ICP-MS	48				18	TXRF	33
5.38	ICP-AES	26	<b>Mo</b>			20	ICP-AES	36
5.62	ICP-MS	47	<3	OES	5			
6.3	ICP-MS	49	0.51	ICP-MS	47	<b>Pr</b>		
			0.8	ICP-MS	49	9.02	ICP-AES	46
<b>Ge</b>						9.49	ICP-MS	48
<5	OES	5	<b>Nb</b>			9.5	ICP-MS	49
<5	TXRF	33	10.9	ICP-MS	47	9.73	ICP-AES	26
			11.8	ICP-MS	48	9.78	ICP-MS	47
<b>Hf</b>			12	ICP-AES	43			
9.4	ICP-AES	26	12.4	XRF	45	<b>Rb</b>		
9.9	ICP-MS	49	13	ICP-MS	49	83	XRF	13
10.4	NAA	25	13.1	XRF	30	84	AAS	37
10.5	NAA	1	13.5	XRF	38	84	NAA	11
10.7	NAA	22	14	ICP-AES	37	89	ICP-AES	43
10.8	NAA	11				88	NAA	22
11.6	ICP-MS	47	<b>Nd</b>			89	ICP-AES	43
12.5	ICP-MS	48	34.7	ICP-AES	46	89	XRF	4
			34.9	NAA	25	89	XRF	38
<b>Ho</b>			35	ICP-MS	49	89.8	ICP-MS	48
0.89	ICP-MS	48	35.3	ICP-AES	20	90	ICP-MS	47
0.92	ICP-AES	26	35.8	ICP-MS	47	90	XRF	2
1	ICP-MS	49	35.95	ICP-MS	48	91	AAS	17
1	NAA	1	36.2	ICP-AES	26	92	NAA	25
1.01	ICP-MS	47	36.4	ICP-AES	24	92	XRF	45
			*37.7	NAA	11	93	ICP-MS	49
<b>In</b>			*40.8	NAA	1	93	XRF	18
<1	OES	5				93	XRF	30
			<b>Ni</b>			95	TXRF	49
<b>La</b>			15	OES	5	*101	TXRF	28
35.6	ICP-AES	24	16	AAS	2	*106	TXRF	33
36	TXRF	33	18	ICP-AES	37			
36.5	NAA	22	18	TXRF	33	<b>S</b>		
36.7	ICP-MS	49	20	ICP-MS	47	<100	XRF	4
36.8	NAA	25	20.7	ICP-AES	46	170	XRF	13
37	ICP-MS	47	21	ICP-AES	49	400	ICP-AES	36
37.5	ICP-AES	46	21	NAA	22	500	XRF	45
37.8	ICP-AES	20	22	XRF	45			
37.8	NAA	11	23	XRF	45	<b>Sb</b>		
37.9	ICP-AES	46	24	TXRF	28	<2	ICP-MS	49
38.6	ICP-AES	26	25	ICP-AES	43	0.24	NAA	22
38.9	NAA	1	25	XRF	4	0.36	ICP-MS	48
39.5	ICP-MS	48	25	XRF	30	*15	DCP	12
40	ICP-AES	36	28	ICP-AES	36			
			*33	OES	17	<b>Sc</b>		
<b>Lu</b>						<20	TXRF	28
0.25	ICP-AES	24	<b>Pb</b>			9.1	ICP-AES	48
0.30	ICP-AES	20	7	AAS	2	9.44	NAA	1
0.4	ICP-MS	49	7	OES	5	9.5	NAA	22
0.41	NAA	25	10	XRF	45	9.52	NAA	11
0.42	ICP-AES	26	11.5	ICP-MS	48	9.6	ICP-AES	43
0.42	ICP-AES	46	12	AAS	37	9.8	NAA	25

Table 7 (Cont'd.). Individual trace element data (ppm) for PRI-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
9.86	ICP-AES	46	0.87	NAA	25	22	ICP-AES	49
9.9	ICP-AES	26	0.9	ICP-MS	49	23.2	ICP-MS	49
10	ICP-AES	37	1.03	ICP-MS	47	23.8	ICP-AES	46
10	XRF	45				24	ICP-AES	37
*15.3	XRF	38	<b>Th</b>			24	XRF	30
<b>Sm</b>			10	XRF	45	24.8	ICP-AES	26
6.2	NAA	22	10.3	ICP-MS		25	ICP-MS	48
6.37	ICP-AES	46	10.6	ICP-MS	47	25	XRF	2
6.4	ICP-AES	24	10.8	NAA	22	25.1	XRF	45
6.4	ICP-MS	49	11	NAA	25	26.2	XRF	38
6.47	NAA	11	11	TXRF	28	26.6	ICP-MS	47
6.51	ICP-MS	47	11.4	ICP-MS	49	28.5	ICP-AES	46
6.61	ICP-MS	48	11.4	NAA	11	*31	TXRF	33
6.74	NAA	25	13	GAMMA	14			
6.82	NAA	1	13.2	NAA	1	<b>Yb</b>		
6.86	ICP-AES	26	<b>Tl</b>			*1.71	ICP-AES	24
7	ICP-AES	20	0.19	ICP-MS	48	*1.98	ICP-AES	20
<b>Sn</b>			<b>Tm</b>			2.53	NAA	25
<5	OES	5	0.29	NAA	1	2.57	ICP-MS	48
1.99	ICP-MS	48	0.4	ICP-MS	49	2.70	ICP-AES	46
2	OES	4	0.43	ICP-MS	47	2.73	NAA	1
			0.43	ICP-MS	48	2.76	NAA	11
<b>Sr</b>						2.80	ICP-AES	26
*75	NAA	22	<b>U</b>			2.8	NAA	22
79	ICP-AES	36	2	XRF	45	2.9	ICP-MS	49
79	NAA	11	2.4	NAA	22	2.93	ICP-MS	47
83	TXRF	33	2.43	ICP-MS	47	3	ICP-AES	36
84	TXRF	28	2.47	NAA	1	<b>Zn</b>		
85	XRF	49	2.48	NAA	11	*31	AAS	2
86	OES	17	2.6	GAMMA	14	36	XRF	18
86.6	ICP-AES	46	2.6	ICP-MS	49	42	TXRF	28
87	XRF	2	2.6	NAA	25	42.5	ICP-MS	48
88	XRF	45	2.99	ICP-MS	48	45	AAS	9
89	ICP-MS	47				46	ICP-AES	37
89	XRF	13	<b>V</b>			46	ICP-AES	49
89.4	XRF	38	55.7	ICP-AES	46	47	XRF	45
91	ICP-AES	43	59	ICP-MS	47	49	ICP-AES	43
91	XRF	4	60	ICP-AES	43	50	XRF	4
94	ICP-AES	37	60	XRF	13	52	ICP-AES	36
94	XRF	30	61	OES	17	53	ICP-MS	47
95	ICP-MS	49	61	XRF	38	55.2	ICP-AES	46
96	ICP-MS	48	62	XRF	45	*62	TXRF	33
*100	XRF	18	64	ICP-MS	49	<b>Zr</b>		
<b>Ta</b>			66	ICP-AES	36	*290	TXRF	28
0.9	ICP-MS	49	68	ICP-AES	37	*355	XRF	2
0.91	ICP-MS	47	72	XRF	4	363.8	XRF	38
1	NAA	25	75	XRF	30	375	ICP-AES	49
1.02	ICP-MS	48	76	XRF	18	378	XRF	30
1.05	NAA	11	*90	OES	5	379	ICP-AES	43
1.06	NAA	1	<b>W</b>			384	ICP-MS	49
1.07	NAA	22	1.52	ICP-MS	47	386	ICP-MS	47
			2.84	ICP-MS	48	387	XRF	45
<b>Tb</b>			<b>Y</b>			395	XRF	4
0.69	NAA	22				397	NAA	22
0.79	NAA	1	*14	TXRF	28	401	ICP-AES	37
0.82	ICP-MS	48	*16.7	XRF	4	402	ICP-MS	48
0.84	NAA	11	21	ICP-AES	36	*440	ICP-AES	46



Table 8. Individual data for major and minor constituents (dry basis, %) in CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>SiO<sub>2</sub></b>			0.35	XRF	40	0.012	OES	5
*0.73	EDXRF	32	0.454	XRF	7	*0.0132	AAS	42
*0.81	GRAV	3	*0.54	XRF	3	*0.02	DCP	8
0.89	ICP-AES	48	*0.58	VOL	17			
0.90	GRAV	16	*0.59	EDXRF	22	<b>MgO</b>		
0.909	XRF	29				*2.09	XRF	13
0.92	AAS	10	<b>Fe<sub>2</sub>O<sub>3</sub>T</b>			*2.28	XRF	3
0.93	ICP-AES	43	0.12	ICP-AES	43	*2.45	XRF	19
0.93	XRF	13	0.127	XRF	29	2.63	ICP-AES	35
0.93	XRF	49	0.15	ICP-AES	48	2.70	ICP-AES	35
0.98	GRAV	42	0.15	XRF	19	2.71	XRF	40
0.981	ICP-AES	35	0.151	ICP-AES	35	2.77	ICP-AES	37
1	ICP-AES	36	0.156	ICP-AES	35	2.77	ICP-AES	43
1	XRF	3	0.160	ICP-AES	35	2.85	POT	16
1	XRF	40	0.16	NAA	22	2.865	XRF	29
1.03	ICP-AES	37	0.17	NAA	1	2.87	AAS	10
1.04	XRF	19	0.17	NAA	11	2.88	ICP-AES	48
1.07	DCP	8	0.17	TXRF	28	2.91	XRF	18
			0.17	XRF	49	2.92	ICP-AES	35
<b>TiO<sub>2</sub></b>			0.19	COL	10	2.97	XRF	7
<0.05	XRF	49	0.19	COL	16	3.01	XRF	49
0.01	AAS	8	0.20	XRF	40	3.14	VOL	42
0.01	ICP-AES	36	0.201	XRF	7	3.25	ICP-AES	36
0.01	XRF	4	0.21	ICP-AES	37	3.27	OES	17
0.0106	ICP-AES	35	0.22	ICP-AES	36			
0.0110	ICP-AES	35	0.24	OES	17	<b>CaO</b>		
0.011	TXRF	28	*0.25	EDXRF	32	*47.9	DCP	8
0.0131	ICP-AES	35	*0.31	VOL	42	*49.5	ICP-AES	35
0.018	XRF	29	*0.34	VOL	8	*50.23	XRF	7
0.02	COL	10				51.11	OES	17
0.02	EDXRF	32	<b>FeO</b>			51.68	AAS	10
0.02	XRF	13	0.17	POT	16	51.87	VOL	10
0.02	XRF	40	0.17	VOL	8	51.89	VOL	42
0.021	ICP-MS	47				51.9	ICP-AES	35
0.022	XRF	7	<b>MnO</b>			51.9	ICP-AES	35
0.027	XRF	18	<0.005	AAS	49	52.001	XRF	29
0.03	ICP-AES	37	<0.02	XRF	49	52.10	XRF	49
*0.05	OES	17	0.003	XRF	29	52.19	POT	16
			0.0053	ICP-MS	47	52.22	ICP-AES	37
<b>Al<sub>2</sub>O<sub>3</sub></b>			0.0056	ICP-AES	35	52.24	ICP-AES	43
*0.1	XRF	19	0.0056	ICP-AES	35	52.27	ICP-AES	48
0.249	ICP-AES	35	0.0057	ICP-AES	35	52.3	XRF	19
0.25	AAS	10	0.0058	ICP-AES	34	52.31	XRF	40
0.257	ICP-AES	35	0.0059	ICP-AES	41	52.99	XRF	3
0.26	ICP-AES	48	0.006	EDXRF	32	53	ICP-AES	36
0.260	XRF	29	0.0062	TXRF	28	*54	XRF	13
0.263	ICP-AES	35	0.0064	ICP-MS	47	*55.94	TXRF	28
0.27	XRF	13	0.007	AAS	9	*63	EDXRF	32
0.27	XRF	49	0.0071	ICP-AES	36			
0.28	AAS	16	0.01	AAS	10	<b>Na<sub>2</sub>O</b>		
0.28	ICP-AES	43	0.01	AAS	16	*0.01	FE	17
0.31	ICP-AES	36	0.01	ICP-AES	37	0.03	AAS	49
0.31	OES	17	0.01	OES	17	0.034	ICP-AES	34
0.32	DCP	8	0.01	XRF	4	0.036	NAA	1
0.35	ICP-AES	37	0.01	XRF	40			

Table 8 (Cont'd.). Individual data for major and minor constituents (dry basis, %) in CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
0.036	ICP-AES	41	0.075	ICP-AES	41	0.05	XRF	49
0.04	AAS	6	0.08	AAS	10	0.056	ICP-AES	46
0.04	AAS	10	0.08	AAS	16	0.06	COL	6
0.04	AAS	16	0.0822	FE	42	0.06	COL	16
0.04	NAA	11	0.084	ICP-AES	34	0.06	ICP-AES	37
0.04	NAA	25	0.09	AAS	6	0.06	XRF	13
0.05	XRF	40	0.09	AAS	49	*0.11	DCP	8
0.0505	FE	42	0.09	ICP-AES	37	*0.16	XRF	3
0.06	ICP-AES	37	0.094	XRF	29			
0.062	XRF	29	0.11	NAA	1	<b>LOI</b>		
0.067	NAA	22	0.12	XRF	19	*41.94	GRAV	8
0.07	AAS	8	*0.14	AAS	8	43.08	GRAV	16
0.07	XRF	13				43.33	GRAV	17
			<b>P<sub>2</sub>O<sub>5</sub></b>			43.35	GRAV	37
<b>K<sub>2</sub>O</b>			0.04	COL	49	43.38	GRAV	48
*0.02	XRF	3	0.04	ICP-AES	48	43.43	GRAV	10
0.043	XRF	18	0.043	XRF	18	43.46	GRAV	7
0.05	XRF	49	0.0488	COL	42	43.50	GRAV	49
0.07	XRF	40	0.0488	ICP-MS	47	43.53	GRAV	43
0.071	XRF	7	0.05	COL	10	43.56	GRAV	42
						*43.93	GRAV	3

Table 9. Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ag</b>			*18	OES	17	3	ICP-AES	46
<1	OES	5	*23	ICP-AES	36	3.08	ICP-MS	35
			*36	NAA	11	3.1	ICP-AES	36
<b>As</b>			*40	NAA	1	3.3	NAA	22
<3	TXRF	28				3.4	ICP-AES	20
<5	ICP-MS	49	<b>Be</b>			3.42	ICP-AES	46
1.07	ICP-MS	47	<0.2	ICP-AES	37	3.453	ICP-MS	48
1.3	NAA	22	<1.6	ICP-MS	35	3.48	ICP-MS	27
12	DCP	12	<1.9	ICP-MS	35	3.53	ICP-MS	47
13.2	ICP-MS	48	<4	OES	5	3.57	ICP-AES	26
			<52	ICP-MS	35	3.6	NAA	1
<b>B</b>			0.2	ICP-AES	36	3.78	ICP-MS	39
<10	ICP-AES	49	0.2	ICP-MS	49	3.81	ICP-MS	35
10	OES	5	0.24	ICP-MS	47	4.1	ICP-MS	49
			0.32	ICP-MS	48	4.42	NAA	11
<b>Ba</b>			*0.8	ICP-AES	43			
<20	TXRF	28				<b>Cl</b>		
4.23	ICP-MS	35	<b>Bi</b>			370	XRF	13
4.51	ICP-MS	35	<5	OES	5			
4.56	ICP-MS	35	0.06	ICP-MS	48	<b>Co</b>		
4.78	ICP-AES	35				<0.23	ICP-MS	35
5	ICP-AES	46	<b>Cd</b>			<2	TXRF	28
5.14	ICP-AES	35	0.07	ICP-MS	48	<3	ICP-AES	37
5.63	ICP-MS	48	0.4	ICP-MS	47	<5	ICP-AES	49
8.8	ICP-MS	47				<5.7	ICP-MS	35
9	NAA	22	<b>Ce</b>			<10	OES	17
9.9	ICP-MS	39	2.31	ICP-MS	35	<10	XRF	4
11	ICP-MS	49	2.43	ICP-MS	27	<15	OES	5
*15	ICP-AES	37	2.8	NAA	25	0.22	NAA	1

Table 9 (Cont'd.). Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
0.22	NAA	22	4	XRF	45	0.4	ICP-MS	48
0.25	NAA	11	6	ICP-AES	37	0.43	ICP-MS	39
0.3	ICP-MS	35	6	ICP-AES	43	0.64	ICP-MS	47
0.3	NAA	25	*10	ICP-AES	36			
*1.2	ICP-MS	49				<b>Gd</b>		
*1.54	ICP-MS	39	<b>Dy</b>			<1.7	ICP-MS	35
*3	ICP-AES	46	< 1.6	ICP-MS	35	*0.38	ICP-AES	20
*3	XRF	45	*0.27	ICP-AES	20	0.61	ICP-MS	35
<b>Cr</b>			*0.39	ICP-MS	27	0.65	ICP-MS	27
<10	ICP-AES	49	0.575	ICP-AES	48	0.726	ICP-MS	48
<10	XRF	4	0.59	ICP-MS	35	0.73	ICP-MS	27
<20	OES	5	0.61	ICP-MS	35	0.74	ICP-MS	35
3.07	ICP-MS	35	0.62	ICP-MS	47	0.79	ICP-AES	26
3.3	ICP-MS	47	0.64	ICP-AES	46	0.8	ICP-MS	49
4	NAA	22	0.65	ICP-MS	27	0.81	ICP-AES	46
4.65	ICP-AES	35	0.66	ICP-AES	26	0.85	ICP-MS	47
5.7	ICP-AES	34	0.67	ICP-MS	39	0.92	ICP-MS	39
6	ICP-AES	41	0.8	ICP-MS	49			
6.8	NAA	1				<b>Ge</b>		
7	ICP-AES	37	<b>Er</b>			<10	OES	5
7	XRF	45	< 1.4	ICP-MS	35			
7.3	ICP-MS	39	*0.17	ICP-MS	27			
7.8	ICP-MS	49	0.29	ICP-MS	35	<b>Hf</b>		
9	NAA	25	0.30	ICP-MS	27	<0.33	ICP-MS	35
9.21	ICP-MS	35	0.315	ICP-MS	48	<0.33	ICP-MS	35
9.88	ICP-MS	35	0.32	ICP-AES	46	<3.5	ICP-MS	35
10.5	ICP-AES	35	0.34	ICP-MS	35	0.08	ICP-MS	39
11.5	ICP-MS	47	0.37	ICP-MS	47	0.09	NAA	22
13	ICP-AES	43	0.38	ICP-AES	26	0.11	ICP-MS	47
*20	XRF	18	0.4	ICP-MS	49	0.11	ICP-MS	49
*21	ICP-AES	46	0.45	ICP-MS	39	0.12	NAA	1
*64	OES	17				0.12	NAA	11
<b>Cs</b>			<b>Eu</b>			0.12	NAA	25
<0.14	ICP-MS	35	<0.10	ICP-MS	35	0.13	ICP-MS	48
<0.25	ICP-MS	35	<1	ICP-MS	35	0.15	ICP-AES	26
<1	ICP-MS	49	*0.11	ICP-AES	46			
<4.7	ICP-MS	35	0.12	ICP-MS	27	<b>Ho</b>		
0.05	ICP-MS	48	0.15	ICP-MS	27	<0.35	ICP-MS	35
0.12	NAA	25	0.15	ICP-MS	35	0.05	ICP-MS	35
0.13	NAA	22	0.15	ICP-MS	48	0.07	ICP-MS	47
0.17	ICP-MS	47	0.16	ICP-AES	20	0.08	ICP-MS	27
			0.16	ICP-AES	26	0.12	ICP-MS	35
			0.16	NAA	11	0.126	ICP-MS	48
			0.16	NAA	25	0.13	ICP-AES	26
			0.17	ICP-MS	39	0.13	ICP-MS	27
			0.17	NAA	1	0.15	ICP-MS	39
			0.18	ICP-MS	47	0.2	ICP-MS	49
			0.18	NAA	22	*0.4	NAA	1
			0.2	ICP-MS	49			
						<b>In</b>		
			<b>F</b>			<5	OES	5
			367	PIGE	21			
			382	ISE	40			
			<b>Ga</b>			<b>La</b>		
			<4	OES	5	*1.57	ICP-MS	27
						*3.45	ICP-MS	35
						4	ICP-AES	46

Table 9 (Cont'd.). Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
4.20	ICP-AES	46	<b>Nd</b>			8	XRF	19
4.26	ICP-MS	35	2.70	ICP-MS	35	10	AAS	9
4.3	NAA	22	2.87	ICP-MS	27	11	ICP-AES	36
4.45	ICP-MS	27	3.12	ICP-MS	35	<b>Pr</b>		
4.6	NAA	25	3.16	ICP-AES	46	0.56	ICP-MS	27
4.67	ICP-AES	26	3.4	ICP-AES	20	0.63	ICP-MS	35
4.71	ICP-MS	48	3.45	ICP-MS	35	0.74	ICP-AES	46
4.77	NAA	1	3.61	ICP-MS	39	0.80	ICP-MS	35
4.92	ICP-MS	35	3.70	ICP-MS	49	0.84	ICP-MS	35
4.92	ICP-MS	47	3.71	ICP-MS	27	0.88	ICP-MS	27
4.94	NAA	11	3.76	ICP-AES	26	0.9	ICP-MS	48
5	ICP-MS	49	3.78	ICP-MS	48	0.92	ICP-MS	47
5.46	ICP-MS	39	4	NAA	25	0.94	ICP-AES	26
*5.8	ICP-AES	20	4.57	NAA	11	0.98	ICP-MS	39
*7	ICP-AES	36	4.6	NAA	1	1	ICP-MS	49
			4.65	ICP-MS	47	<b>Rb</b>		
<b>Lu</b>			<b>Ni</b>			<5	NAA	1
<0.025	ICP-MS	35	<18	ICP-MS	35	<5	NAA	11
<0.1	ICP-MS	49	<20	ICP-AES	49	<5	XRF	2
<0.35	ICP-MS	35	*1.5	OES	5	<5	XRF	4
0.02	ICP-AES	20	4	DCP	12	<5	XRF	13
0.02	ICP-AES	46	5.39	ICP-MS	35	<6	XRF	30
0.035	ICP-MS	35	6	TXRF	28	<6.7	ICP-MS	35
0.04	ICP-AES	26	6.09	ICP-MS	35	*0.98	ICP-MS	48
0.04	ICP-MS	27	6.49	ICP-AES	35	2	AAS	37
0.04	NAA	1	6.61	ICP-AES	35	2.09	ICP-MS	35
0.04	NAA	11	6.9	ICP-MS	47	2.35	ICP-MS	35
0.042	ICP-MS	39	7.6	ICP-MS	47	2.6	NAA	22
0.045	ICP-MS	48	8	NAA	22	2.88	ICP-MS	39
0.05	NAA	25	9	ICP-AES	37	2.9	XRF	45
0.055	ICP-MS	47	10	ICP-AES	46	2.93	ICP-MS	47
<b>Mo</b>			10	XRF	4	3	TXRF	28
<0.32	ICP-MS	35	10	XRF	45	3.5	XRF	38
<0.60	ICP-MS	35	12	ICP-AES	43	*13	ICP-AES	43
<5	OES	5	*14.8	ICP-MS	39	*17	AAS	17
<11	ICP-MS	35	*22	ICP-AES	36	<b>S</b>		
0.63	ICP-MS	47	*22	OES	17	650	XRF	19
1.4	ICP-MS	49	<b>Pb</b>			1460	IODO	23
<b>Nb</b>			<4.8	ICP-MS	35	1740	XRF	13
<0.33	ICP-MS	35	<10	XRF	4	4005	ICP-AES	36
<6	XRF	30	<20	XRF	49	<b>Sb</b>		
<6.7	ICP-MS	35	1	DCP	12	<0.42	ICP-MS	35
0.06	ICP-MS	27	1	ICP-MS	49	<0.55	ICP-MS	35
0.33	ICP-MS	48	2.68	ICP-MS	48	<2	ICP-MS	49
0.35	ICP-MS	35	4.3	ICP-MS	47	<9.2	ICP-MS	35
0.37	ICP-MS	27	4.68	ICP-MS	35	0.25	NAA	22
0.39	ICP-MS	39	4.99	ICP-MS	35	0.29	ICP-MS	48
0.7	ICP-MS	49	5	XRF	13	*14	DCP	12
1.27	ICP-MS	47	6	OES	5	<b>Sc</b>		
1.5	XRF	45	6.43	ICP-MS	27	<0.45	ICP-MS	35
2.1	XRF	38	7	XRF	45	<0.53	ICP-MS	35
*6	ICP-AES	43	8	AAS	37			
*8	ICP-AES	37	8	ICP-MS	39			

Table 9 (Cont'd.). Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
0.22	NAA	22	4	XRF	45	0.4	ICP-MS	48
0.25	NAA	11	6	ICP-AES	37	0.43	ICP-MS	39
0.3	ICP-MS	35	6	ICP-AES	43	0.64	ICP-MS	47
0.3	NAA	25	*10	ICP-AES	36			
*1.2	ICP-MS	49				<b>Gd</b>		
*1.54	ICP-MS	39	<b>Dy</b>			<1.7	ICP-MS	35
*3	ICP-AES	46	< 1.6	ICP-MS	35	*0.38	ICP-AES	20
*3	XRF	45	*0.27	ICP-AES	20	0.61	ICP-MS	35
<b>Cr</b>			*0.39	ICP-MS	27	0.65	ICP-MS	27
<10	ICP-AES	49	0.575	ICP-AES	48	0.726	ICP-MS	48
<10	XRF	4	0.59	ICP-MS	35	0.73	ICP-MS	27
<20	OES	5	0.61	ICP-MS	35	0.74	ICP-MS	35
3.07	ICP-MS	35	0.62	ICP-MS	47	0.79	ICP-AES	26
3.3	ICP-MS	47	0.64	ICP-AES	46	0.8	ICP-MS	49
4	NAA	22	0.65	ICP-MS	27	0.81	ICP-AES	46
4.65	ICP-AES	35	0.66	ICP-AES	26	0.85	ICP-MS	47
5.7	ICP-AES	34	0.67	ICP-MS	39	0.92	ICP-MS	39
6	ICP-AES	41	0.8	ICP-MS	49			
6.8	NAA	1	<b>Er</b>			<b>Ge</b>		
7	ICP-AES	37	< 1.4	ICP-MS	35	<10	OES	5
7	XRF	45	*0.17	ICP-MS	27			
7.3	ICP-MS	39	0.29	ICP-MS	35	<b>Hf</b>		
7.8	ICP-MS	49	0.30	ICP-MS	27	<0.33	ICP-MS	35
9	NAA	25	0.315	ICP-MS	48	<0.33	ICP-MS	35
9.21	ICP-MS	35	0.32	ICP-AES	46	<3.5	ICP-MS	35
9.88	ICP-MS	35	0.34	ICP-MS	35	0.08	ICP-MS	39
10.5	ICP-AES	35	0.37	ICP-MS	47	0.09	NAA	22
11.5	ICP-MS	47	0.38	ICP-AES	26	0.11	ICP-MS	47
13	ICP-AES	43	0.4	ICP-MS	49	0.11	ICP-MS	49
*20	XRF	18	0.45	ICP-MS	39	0.12	NAA	1
*21	ICP-AES	46	<b>Eu</b>			0.12	NAA	11
*64	OES	17	<0.10	ICP-MS	35	0.12	NAA	25
<b>Cs</b>			<1	ICP-MS	35	0.13	ICP-MS	48
<0.14	ICP-MS	35	*0.11	ICP-AES	46	0.15	ICP-AES	26
<0.25	ICP-MS	35	0.12	ICP-MS	27	<b>Ho</b>		
<1	ICP-MS	49	0.15	ICP-MS	27	<0.35	ICP-MS	35
<4.7	ICP-MS	35	0.15	ICP-MS	35	0.05	ICP-MS	35
0.05	ICP-MS	48	0.15	ICP-MS	48	0.07	ICP-MS	47
0.12	NAA	25	0.16	ICP-AES	20	0.08	ICP-MS	27
0.13	NAA	22	0.16	ICP-AES	26	0.12	ICP-MS	35
0.17	ICP-MS	47	0.16	NAA	11	0.126	ICP-MS	48
			0.16	NAA	25	0.13	ICP-AES	26
			0.17	ICP-MS	39	0.13	ICP-MS	27
<b>Cu</b>			0.17	NAA	1	0.15	ICP-MS	39
<0.92	ICP-MS	35	0.18	ICP-MS	47	0.2	ICP-MS	49
<2	TXRF	28	0.18	NAA	22	*0.4	NAA	1
<5	ICP-AES	49	0.2	ICP-MS	49			
<10	OES	17	<b>F</b>			<b>In</b>		
<32	ICP-MS	35	367	PIGE	21	<5	OES	5
0.91	ICP-MS	35	382	ISE	40			
1.21	ICP-AES	35	<b>Ga</b>			<b>La</b>		
1.9	ICP-AES	34	<4	OES	5	*1.57	ICP-MS	27
2	ICP-AES	46				*3.45	ICP-MS	35
2.5	ICP-AES	41				4	ICP-AES	46
3.1	ICP-MS	39						

Table 9 (Cont'd.). Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<20	TXRF	28	291	ICP-AES	34	<b>Tm</b>		
<117	ICP-MS	35	292	ICP-AES	41	<0.023	ICP-MS	35
0.4	ICP-AES	37	294	ICP-MS	39	<0.027	ICP-MS	35
0.42	NAA	22	298	ICP-MS	47	<0.1	ICP-MS	49
0.45	NAA	11	310	ICP-MS	48	<0.35	ICP-MS	35
0.46	ICP-AES	46	318	ICP-MS	35	0.05	ICP-MS	27
0.47	NAA	1	319	ICP-MS	49	0.05	ICP-MS	47
0.5	ICP-AES	26	330	TXRF	28	0.061	ICP-MS	48
0.5	NAA	25	*356	NAA	22	*0.09	ICP-MS	39
*1.16	ICP-MS	39	*410	OES	17			
*13.1	ICP-AES	43				<b>U</b>		
<b>Sm</b>			<b>Ta</b>			3.47	ICP-MS	35
<3	ICP-MS	35	<0.1	ICP-MS	49	3.49	ICP-MS	48
*0.49	ICP-MS	35	<0.15	ICP-MS	35	3.50	ICP-MS	27
0.63	ICP-MS	27	<0.15	ICP-MS	35	3.53	ICP-MS	47
0.64	ICP-AES	46	<2.8	ICP-MS	35	3.6	GAMMA	14
0.64	ICP-MS	35	0.026	NAA	22	3.60	ICP-MS	27
0.641	ICP-MS	48	0.03	ICP-MS	48	3.72	ICP-MS	35
0.68	NAA	11	0.03	NAA	11	3.75	ICP-MS	35
0.7	ICP-MS	49	0.04	ICP-MS	39	3.8	ICP-MS	49
0.70	NAA	1	*0.17	ICP-MS	47	3.8	NAA	25
0.76	ICP-AES	26	<b>Tb</b>			3.9	NAA	11
0.77	ICP-MS	47	<0.47	ICP-MS	35	3.9	NAA	22
0.84	ICP-AES	20	*0.04	ICP-MS	35	4	NAA	1
0.84	NAA	22	0.06	ICP-MS	27	4	XRF	45
0.86	NAA	25	0.094	ICP-MS	35	4.13	ICP-MS	39
0.87	ICP-MS	39	0.094	NAA	22	<b>V</b>		
0.92	ICP-MS	27	0.10	ICP-MS	39	6	XRF	13
<b>Sn</b>			0.1	ICP-MS	49	6.30	ICP-AES	35
<0.55	ICP-MS	35	0.107	ICP-MS	48	6.94	ICP-AES	35
<0.60	ICP-MS	35	0.11	ICP-MS	27	8	XRF	4
<5	OES	5	0.12	NAA	1	7	ICP-AES	46
<9	ICP-MS	35	0.12	NAA	11	8	XRF	4
0.06	ICP-MS	48				9.2	ICP-MS	47
<b>Sr</b>			0.12	NAA	25	10	ICP-MS	49
*211	XRF	29	*0.20	ICP-MS	47	10	ICP-AES	37
*224	ICP-MS	35	<b>Th</b>			10	XRF	45
*225	ICP-MS	35	<2	TXRF	28	11	ICP-AES	43
248	XRF	4	<2.2	ICP-MS	35	11.2	ICP-MS	39
249	AAS	12	*0.01	ICP-MS	48	*21	ICP-AES	36
261	ICP-MS	47	*0.04	ICP-MS	27	*30	XRF	18
268	XRF	2	0.24	ICP-MS	27	*62	OES	17
268	XRF	13	0.26	ICP-MS	35	<b>W</b>		
269	XRF	30	0.28	ICP-MS	35	<0.52	ICP-MS	35
270	ICP-AES	46	0.30	NAA	11	<1.00	ICP-MS	35
273	XRF	45	0.30	NAA	25	<4.7	ICP-MS	35
273.1	XRF	38	0.30	NAA	25	0.8	ICP-MS	47
274	ICP-AES	35	0.31	NAA	1	22.4	ICP-MS	48
279	ICP-AES	37	0.32	ICP-MS	47	<b>Y</b>		
280	ICP-AES	36	0.33	ICP-MS	39	<7	XRF	4
280	NAA	11	*0.4	ICP-MS	49	<20	ICP-AES	49
283	ICP-AES	43	<b>Tl</b>			*3.56	ICP-MS	35
287	ICP-AES	35	<0.22	ICP-MS	35	4.29	ICP-MS	27
290	XRF	18	<0.28	ICP-MS	35	4.35	ICP-AES	35
			<3.2	ICP-MS	35			

Table 9 (Cont'd.). Individual trace element data (ppm) for CCH-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
4.46	ICP-AES	35	0.27	ICP-MS	47	29	ICP-AES	43
4.96	ICP-MS	35	0.27	NAA	11	29	ICP-AES	49
5.34	ICP-MS	27	0.28	ICP-AES	26	*36	XRF	4
5.37	ICP-AES	46	0.29	ICP-AES	46	*36	XRF	19
5.40	ICP-MS	35	0.30	ICP-MS	30	*45	TXRF	28
5.4	ICP-MS	49	0.3	ICP-MS	49			
5.43	ICP-AES	26	0.312	ICP-MS	48	<b>Zr</b>		
5.68	ICP-MS	48	0.32	NAA	22	<4.3	ICP-MS	35
5.77	ICP-AES	46				<6	XRF	4
6	ICP-AES	36				<20	ICP-AES	49
6	TXRF	28	<b>Zn</b>			2.15	ICP-MS	35
6.1	XRF	45	<34	ICP-MS	35	2.18	ICP-MS	35
6.44	ICP-MS	39	*14	DCP	12	2.41	ICP-MS	27
6.5	XRF	30	17.4	ICP-MS	35	2.60	ICP-MS	27
6.6	XRF	38	18	ICP-AES	37	3.94	ICP-MS	39
7	ICP-AES	37	18.2	ICP-MS	48	4.03	ICP-MS	48
7	ICP-MS	47	18.3	ICP-MS	35	4.6	ICP-AES	46
7	XRF	2	23	ICP-AES	35	5.15	ICP-AES	35
			23.8	ICP-AES	35	5.66	ICP-AES	35
<b>Yb</b>			24	ICP-AES	36	6	XRF	45
<1.1	ICP-MS	35	25	ICP-MS	47	7.6	ICP-MS	49
*0.10	ICP-AES	20	26	ICP-AES	34	10	NAA	22
*0.19	ICP-MS	27	27	ICP-AES	46	11	XRF	30
0.20	ICP-MS	35	27	ICP-MS	47	12	ICP-AES	37
0.25	ICP-MS	27	27	XRF	45	15	ICP-AES	43
0.25	NAA	1	27.2	ICP-MS	39	18.4	ICP-MS	47
0.26	NAA	25	27.3	ICP-AES	41	18.7	XRF	38
0.26	ICP-MS	35	28	AAS	9	19	TXRF	28
						*60	XRF	2

Table 10. Individual data for major and minor constituents (dry basis, %) in DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>SiO<sub>2</sub></b>			<b>TiO<sub>2</sub></b>			<b>Al<sub>2</sub>O<sub>3</sub></b>		
<0.20	XRF	49	<0.005	ICP-AES	44	<0.05	AAS	10
0.03	EDXRF	31	<0.01	COL	10	<0.10	AAS	16
0.042	ICP-AES	35	<0.05	XRF	49	<0.10	XRF	49
0.049	XRF	29	*0.001	XRF	7	0.015	XRF	19
0.05	AAS	10	*0.0012	ICP-AES	35	0.018	XRF	7
0.05	GRAV	16	*0.0013	ICP-AES	35	0.02	ICP-AES	43
0.05	ICP-AES	43	*0.0013	ICP-AES	35	0.02	ICP-AES	48
0.06	GRAV	3	*0.002	XRF	29	0.022	ICP-AES	35
0.064	XRF	7	0.0075	ICP-MS	47	0.024	ICP-AES	44
0.07	EDXRF	32	0.01	AAS	8	0.0273	ICP-AES	35
0.07	GRAV	42	0.01	ICP-AES	37	0.0275	ICP-AES	35
0.08	ICP-AES	44	0.01	XRF	3	0.03	XRF	13
0.08	ICP-AES	48	0.01	XRF	13	0.035	XRF	29
0.08	XRF	13	0.01	XRF	18	0.10	ICP-AES	37
0.09	ICP-AES	37	0.01	XRF	40	0.12	EDXRF	31
0.09	XRF	40	0.01	XRF	40	0.15	XRF	40
*0.11	XRF	19	*0.015	EDXRF	32	*0.18	DCP	8
*0.21	XRF	3	*0.03	XRF	50	*0.29	XRF	3
*0.36	DCP	8	*0.05	OES	17	*0.31	VOL	42
						*0.43	EDXRF	32

Table 10 (Cont'd.). Individual data for major and minor constituents (dry basis, %) in DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Fe<sub>2</sub>O<sub>3</sub>T</b>						<b>Na<sub>2</sub>O</b>		
*0.2	ICP-AES	36	0.08	XRF	40	0.03	AAS	16
0.213	XRF	29	*0.0824	AAS	42	0.035	NAA	1
0.22	ICP-AES	43	*0.10	OES	5	0.04	AAS	6
0.244	ICP-AES	44	*0.10	XRF	50	0.04	AAS	10
0.25	COL	16	*0.13	EDXRF	31	0.04	AAS	49
0.250	ICP-AES	35	*0.13	XRF	4	0.04	AAS	49
0.25	NAA	22	<b>MgO</b>			0.04	NAA	11
0.25	TXRF	28	*20.71	ICP-AES	44	0.042	XRF	29
0.25	XRF	19	20.79	XRF	44	0.0423	FE	42
0.25	XRF	44	21.02	XRF	18	0.05	AAS	8
0.253	ICP-AES	35	21.21	XRF	29	0.05	ICP-AES	37
0.26	ICP-AES	48	21.25	XRF	49	0.05	NAA	25
0.26	XRF	3	21.28	AAS	8	0.05	XRF	40
0.261	ICP-AES	35	21.3	XRF	13	*0.06	XRF	13
0.266	XRF	7	21.31	ICP-AES	43	*0.39	XRF	22
0.27	NAA	1	21.32	ICP-AES	37			
0.27	XRF	49	21.32	XRF	3	<b>K<sub>2</sub>O</b>		
0.29	NAA	11	21.36	XRF	7	<0.05	XRF	49
0.29	OES	17	21.36	XRF	19	<0.1	AAS	15
0.30	XRF	40	21.40	XRF	40	<0.1	XRF	13
0.31	COL	10	21.44	POT	16	*0.003	XRF	7
0.31	ICP-AES	37	21.45	AAS	10	0.01	AAS	6
0.32	EDXRF	31	21.5	ICP-AES	35	0.01	AAS	10
*0.38	EDXRF	32	21.53	ICP-AES	48	0.01	AAS	16
*0.40	XRF	50	21.6	ICP-AES	35	0.01	AAS	49
*0.46	VOL	8	21.63	VOL	10	0.01	AAS	49
*0.47	VOL	42	21.84	VOL	42	0.01	XRF	40
			22	ICP-AES	36	0.0110	FE	42
<b>FeO</b>			*22.3	ICP-AES	35	*0.018	XRF	29
<0.01	VOL	10	*23.22	OES	17	*0.06	AAS	8
0.17	VOL	8						
0.22	POT	16	<b>CaO</b>			<b>P<sub>2</sub>O<sub>5</sub></b>		
			*27.2	XRF	50	<0.05	XRF	49
<b>MnO</b>			*27.41	OES	17	0.01	COL	10
*0.037	XRF	29	*29.9	DCP	8	0.02	COL	6
0.05	EDXRF	32	30.07	TXRF	28	0.02	COL	16
0.05	ICP-AES	43	30.1	ICP-AES	36	0.02	COL	49
0.05	ICP-AES	48	30.27	XRF	44	0.02	XRF	13
0.05	XRF	49	30.4	ICP-AES	35	0.026	ICP-AES	46
0.057	ICP-AES	44	30.49	ICP-AES	44	0.0263	ICP-MS	47
0.0576	ICP-AES	35	30.5	ICP-AES	35	0.03	ICP-AES	37
0.058	AAS	9	30.61	POT	16	0.0358	COL	42
0.059	TXRF	28	30.69	XRF	19	*0.09	DCP	8
0.06	AAS	6	30.71	ICP-AES	37	*0.10	XRF	3
0.06	AAS	49	30.83	VOL	10			
0.06	ICP-AES	37	30.84	XRF	7	<b>LOI</b>		
0.06	XRF	18	30.85	XRF	49	*46.26	GRAV	8
0.06	XRF	44	30.87	AAS	10	*46.7	GRAV	48
0.0603	ICP-AES	35	30.94	XRF	29	46.98	GRAV	43
0.0618	ICP-MS	47	30.98	XRF	3	47.10	GRAV	49
0.0638	ICP-AES	35	31.05	XRF	18	47.21	GRAV	10
0.0639	ICP-AES	36	31.05	XRF	40	47.25	GRAV	16
0.07	AAS	10	31.26	ICP-AES	48	47.30	GRAV	37
0.07	AAS	16	31.27	ICP-AES	43	47.31	GRAV	7
0.07	DCP	8	31.33	VOL	42	47.38	GRAV	42
0.07	ICP-MS	47	31.4	EDXRF	32	47.51	GRAV	3
0.07	OES	17	31.4	XRF	13	47.6	GRAV	17
			31.5	ICP-AES	35			
			*33.3	EDXRF	31			



Table 11. Individual trace element data (ppm) for DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Ag</b>			<b>Ce</b>			4	ICP-AES	36
<1	OES	5	<3.2	ICP-MS	35	4	XRF	45
As			1.82	ICP-MS	27	4.37	ICP-AES	35
<2	TXRF	28	1.85	ICP-MS	35	5	ICP-AES	37
<5	ICP-MS	49	1.94	ICP-MS	27	5.78	ICP-MS	39
1.3	ICP-MS	48	2.1	NAA		6	ICP-AES	46
1.3	NAA	22	2.1	NAA	25	7	NAA	25
1.4	ICP-MS	47	2.18	ICP-MS	35	7.76	ICP-MS	47
*18	DCP	12	2.192	ICP-MS	48	*12	ICP-AES	43
			2.22	ICP-MS	39	*22	XRF	18
			2.24	ICP-AES	26	*40	OES	17
			2.3	ICP-AES	20			
<b>B</b>			2.36	ICP-MS	47	<b>Cs</b>		
<10	ICP-AES	49	2.4	ICP-MS	49	<0.14	ICP-MS	35
5	OES	5	2.43	ICP-AES	46	<0.25	ICP-MS	35
			2.62	NAA	11	<1	ICP-MS	49
<b>Ba</b>			2.7	ICP-AES	46	<4.7	ICP-MS	35
*9	ICP-AES	43	*3	NAA	22	0.01	NAA	22
18.9	ICP-MS	35	<b>Cl</b>			0.06	ICP-MS	47
19.3	ICP-MS	35	940	XRF	13	<b>Cu</b>		
20.2	ICP-MS	48	<b>Co</b>			<1	TXRF	28
20.5	ICP-AES	35	<0.23	ICP-MS	35	<5	ICP-AES	49
20.6	ICP-MS	35	<1	TXRF	28	<10	OES	17
21	ICP-AES	46	<3	ICP-AES	37	<32	ICP-MS	35
21.5	ICP-AES	35	<5	ICP-AES	49	1.53	ICP-MS	35
22	ICP-MS	39	<5.7	ICP-MS	35	1.55	ICP-MS	35
22	NAA	22	<10	XRF	4	1.60	ICP-AES	35
22	XRF	45	<15	OES	15	1.75	ICP-AES	35
25	ICP-MS	49	0.20	NAA	22	2	ICP-AES	46
26.2	ICP-MS	47	0.21	NAA	21	4.82	ICP-MS	39
29	ICP-AES	37	0.21	NAA	1	5	ICP-AES	37
30	OES	17	0.3	NAA	25	7	ICP-AES	36
35	ICP-AES	36	0.39	ICP-MS	35	8	ICP-AES	43
*38	NAA	11	0.8	ICP-MS	49	*29	DCP	12
*45	NAA	1	1.06	ICP-MS	39	<b>Dy</b>		
<b>Be</b>			*3	ICP-AES	46	<1.6	ICP-MS	35
<0.2	ICP-AES	37	*7	ICP-AES	43	*0.44	ICP-AES	20
<1.6	ICP-MS	35	*19	OES	17	*0.65	ICP-MS	35
<1.9	ICP-MS	35	<b>Cr</b>			0.73	ICP-MS	27
<4	OES	5	<1.63	ICP-AES	35	0.744	ICP-MS	48
<52	ICP-MS	35	<1.6	ICP-MS	35	0.80	ICP-MS	39
0.2	ICP-AES	36	<2.2	ICP-MS	35	0.82	ICP-AES	26
0.2	ICP-MS	49	<8.7	ICP-MS	35	0.83	ICP-MS	27
0.23	ICP-MS	48	<10	ICP-AES	49	0.83	ICP-MS	47
1.7	ICP-AES	43	<10	XRF	4	0.84	ICP-MS	35
2	ICP-MS	47	<20	OES	5	0.85	ICP-AES	46
<b>Bi</b>			2.7	ICP-MS	47	0.9	ICP-MS	49
<5	OES	5	2.9	ICP-MS	49	<b>Er</b>		
0.03	ICP-MS	48	3	NAA	1	<1.4	ICP-MS	35
<b>Cd</b>			3	NAA	11	0.41	ICP-MS	27
0.45	ICP-MS	48	3	NAA	22	0.46	ICP-MS	27
0.73	ICP-MS	47	4	DCP	12	0.474	ICP-MS	48

Table 11 (Cont'd.). Individual trace element data (ppm) for DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
0.48	ICP-MS	35	<0.33	ICP-MS	35	0.06	NAA	11
0.5	ICP-MS	49	<3.5	ICP-MS	35	0.06	NAA	25
0.51	ICP-MS	35	0.02	NAA	22	0.078	ICP-MS	47
0.51	ICP-AES	46	0.025	ICP-MS	47			
0.53	ICP-AES	26	0.03	ICP-MS	48			
0.54	ICP-MS	39	0.05	ICP-MS	49			
0.58	ICP-MS	47	*0.33	ICP-MS	39			
<b>Eu</b>			<b>Ho</b>			<b>Mo</b>		
<1.0	ICP-MS	35	<0.35	ICP-MS	35	<0.32	ICP-MS	35
0.12	ICP-AES	46	0.14	ICP-MS	47	<0.60	ICP-MS	35
0.14	ICP-MS	27	0.15	ICP-MS	35	<5	OES	5
0.14	ICP-MS	27	0.16	ICP-MS	27	<11	ICP-MS	35
0.14	ICP-MS	35	0.17	ICP-MS	39	0.65	ICP-MS	47
0.15	ICP-AES	26	0.18	ICP-AES	26	2.3	ICP-MS	49
0.15	NAA	1	0.19	ICP-MS	35			
0.15	NAA	22	0.20	ICP-MS	27	<b>Nb</b>		
0.16	ICP-MS	35	0.2	ICP-MS	49	<0.28	ICP-MS	35
0.16	NAA	11	0.225	ICP-MS	48	<0.33	ICP-MS	35
0.16	NAA	25				<6	XRF	30
0.17	ICP-AES	20	<b>In</b>			<6.7	ICP-MS	35
0.17	ICP-MS	47	< 4	OES	5	0.01	ICP-MS	48
0.172	ICP-MS	48				0.02	ICP-MS	27
0.20	ICP-MS	39	<b>La</b>			0.10	ICP-MS	39
0.2	ICP-MS	49	*0.45	ICP-MS	27	0.1	ICP-MS	49
0.21	ICP-AES	36	2.92	ICP-AES	46	0.89	ICP-MS	47
			3.2	ICP-AES	36	*2.1	XRF	38
<b>F</b>			3.2	NAA	22	*7	ICP-AES	37
144	PIGE	21	3.24	ICP-MS	35	<b>Nd</b>		
154	ISE	40	3.37	ICP-AES	46	2.62	ICP-AES	46
			3.49	ICP-MS	27	2.68	ICP-MS	27
<b>Ga</b>			3.6	NAA	1	2.753	ICP-MS	48
<4	OES	5	3.62	ICP-MS	39	2.77	ICP-MS	35
0.07	ICP-MS	48	3.76	ICP-MS	48	2.8	ICP-AES	20
0.25	ICP-MS	39	3.79	ICP-MS	35	2.87	ICP-MS	35
0.38	ICP-MS	47	3.8	NAA	25	2.91	ICP-MS	27
			3.88	ICP-AES	26	3.01	ICP-MS	35
<b>Gd</b>			3.9	ICP-MS	49	3.10	ICP-AES	26
<1.7	ICP-MS	35	3.9	NAA	11	3.1	ICP-MS	49
*0.55	ICP-AES	20	3.97	ICP-MS	35	3.35	ICP-MS	39
0.68	ICP-MS	35	4.22	ICP-MS	47	3.38	NAA	11
0.71	ICP-MS	27	*4.6	ICP-AES	20	3.5	NAA	1
0.721	ICP-MS	48				3.5	NAA	25
0.78	ICP-MS	27	<b>Lu</b>			*4.21	ICP-MS	47
0.8	ICP-MS	49	<0.1	ICP-MS	49			
0.86	ICP-AES	26	<0.35	ICP-MS	35	<b>Ni</b>		
0.87	ICP-AES	46	0.03	ICP-AES	20	<1	OES	5
0.88	ICP-MS	35	0.03	ICP-MS	27	<1.4	ICP-MS	35
0.88	ICP-MS	39	0.04	ICP-MS	27	<2.8	ICP-AES	35
0.96	ICP-MS	47	0.04	ICP-AES	46	<3	ICP-AES	35
			0.05	ICP-AES	26	<3	ICP-AES	37
<b>Ge</b>			0.05	ICP-MS	35	<10	XRF	4
<10	OES	5	0.053	ICP-MS	48	<18	ICP-MS	35
			0.06	ICP-MS	35	<20	ICP-AES	49
<b>Hf</b>			0.060	ICP-MS	39	1.17	ICP-MS	35
<0.02	NAA	11	0.06	NAA	1	1.7	NAA	22
<0.33	ICP-MS	35				2	ICP-AES	46
						2.6	ICP-MS	47

Table 11 (Cont'd.). Individual trace element data (ppm) for DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
3	DCP	12	<b>S</b>			<b>Sr</b>		
5	TXRF	28	176	XRF	19	<50	NAA	11
6.22	ICP-MS	47	240	XRF	13	*40.1	ICP-MS	35
10.78	ICP-MS	39	295	IODO	23	43.9	ICP-AES	46
14	ICP-AES	43	639	ICP-AES	36	44.5	ICP-MS	35
*22	OES	17				45	XRF	2
<b>Pb</b>			<b>Sb</b>			45	XRF	13
<4.8	ICP-MS	35	<0.42	ICP-MS	35	45	XRF	45
*22	XRF	13	<0.55	ICP-MS	35	46	ICP-AES	43
27.5	ICP-MS	39	<2	ICP-MS	49	46	XRF	4
31	ICP-MS	35	<9.2	ICP-MS	35	47.7	XRF	38
31	ICP-MS	47	0.07	NAA	22	48	AAS	12
31	XRF	45	0.21	ICP-MS	48	48.3	ICP-AES	35
32	DCP	12	*21	DCP	12	49	ICP-MS	47
32	ICP-MS	35	<b>Sc</b>			49	ICP-MS	49
32.5	ICP-MS	48	<0.2	ICP-AES	37	49	XRF	30
32.6	ICP-MS	27	<0.45	ICP-MS	35	49.5	ICP-AES	35
34	TXRF	28	<0.53	ICP-MS	35	50	ICP-MS	48
37	AAS	9	<20	TXRF	28	51	ICP-AES	37
40	OES	5	<117	ICP-MS	35	51	TXRF	28
42	XRF	18	0.20	NAA	22	52.5	ICP-MS	35
43	AAS	37	0.2	NAA	25	53	ICP-AES	36
43	ICP-AES	36	0.24	NAA	1	53	ICP-MS	39
<b>Pr</b>			0.24	NAA	11	53	XRI	18
0.54	ICP-MS	27	0.25	ICP-AES	26	54.5	ICP-MS	47
0.56	ICP-MS	35	0.29	ICP-AES	46	*59	NAA	22
0.56	ICP-AES	46	*1.10	ICP-MS	39	*74	NAA	1
0.65	ICP-MS	35	*11.6	ICP-AES	43	*95	OES	17
0.654	ICP-MS	48				*118	XRF	29
0.67	ICP-MS	27	<b>Sm</b>			<b>Ta</b>		
0.7	ICP-MS	49	<3	ICP-MS	35	<0.1	ICP-MS	49
0.71	ICP-MS	39	0.55	ICP-MS	35	<0.15	ICP-MS	35
0.74	ICP-AES	26	0.56	ICP-MS	27	<0.15	ICP-MS	35
0.77	ICP-MS	35	0.56	NAA	22	<2.8	ICP-MS	35
0.77	ICP-MS	47	0.57	ICP-AES	20	0.003	NAA	11
<b>Rb</b>			0.57	ICP-MS	35	0.003	NAA	22
<0.40	ICP-MS	35	0.57	ICP-MS	39	0.03	ICP-MS	39
<0.40	ICP-MS	35	0.59	ICP-AES	46	0.04	ICP-MS	47
<1	ICP-MS	49	0.60	NAA	1	<b>Tb</b>		
<1	NAA	11	0.631	ICP-MS	48	<0.47	ICP-MS	35
<1	TXRF	28	0.66	ICP-AES	26	0.10	ICP-MS	27
<5	XRF	13	0.67	NAA	11	0.10	ICP-MS	35
<6	XRF	4	0.68	ICP-MS	27	0.11	ICP-MS	27
<6	XRF	30	0.7	ICP-MS	49	0.11	NAA	1
<6.7	ICP-MS	35	0.70	NAA	25	0.11	NAA	22
<20	XRF	49	0.72	ICP-MS	47	0.115	ICP-MS	48
0.11	ICP-MS	48	<b>Sn</b>			0.12	ICP-MS	35
0.2	NAA	22	<0.55	ICP-MS	35	0.12	ICP-MS	39
0.42	ICP-MS	39	<0.60	ICP-MS	35	0.14	NAA	11
0.56	ICP-MS	47	<5	OES	5	0.16	NAA	25
0.9	XRF	38	<9	ICP-MS	35	*0.2	ICP-MS	49
2	AAS	37	0.05	ICP-MS	48	*0.23	ICP-MS	47
*8	ICP-AES	43						
*13	AAS	17						

Table 11 (Cont'd.). Individual trace element data (ppm) for DWA-1 (\* - outliers)

Conc.	Meth.	Ref.	Conc.	Meth.	Ref.	Conc.	Meth.	Ref.
<b>Th</b>			6.97	ICP-MS	47	0.4	ICP-MS	49
<0.12	ICP-MS	35	7	XRF	13	0.40	NAA	11
<2.2	ICP-MS	35	8	ICP-MS	49	0.41	NAA	22
0.06	ICP-MS	35	8	TXRF	28	0.42	ICP-AES	46
0.07	NAA	1	8	XRF	45	0.42	ICP-MS	47
0.08	NAA	11	9	ICP-AES	43			
0.08	NAA	25	9.17	ICP-MS	39	<b>Zn</b>		
0.09	NAA	22	*12	ICP-AES	36	<34	ICP-MS	35
0.1	ICP-MS	49	*32	OES	17	*51	NAA	1
*0.21	ICP-MS	47				*66.8	ICP-MS	35
*0.30	ICP-MS	39				*68.2	ICP-MS	35
			<b>W</b>			76	DCP	12
<b>Tl</b>			<0.52	ICP-MS	35	76	ICP-AES	44
<3.2	ICP-MS	35	<1.00	ICP-MS	35	77	ICP-MS	47
0.01	ICP-MS	48	<4.7	ICP-MS	35	78.7	ICP-MS	48
0.34	ICP-MS	35	0.54	ICP-MS	48	79	XRF	45
0.38	ICP-MS	35	0.6	ICP-MS	47	79.2	ICP-MS	39
						80.1	ICP-AES	35
<b>Tm</b>			<b>Y</b>			82	ICP-AES	35
<0.1	ICP-MS	49	<20	ICP-AES	49	83	ICP-AES	46
<0.35	ICP-MS	35	7.22	ICP-MS	35	84	AAS	9
*0.02	ICP-MS	27	7.29	ICP-AES	35	84	ICP-AES	36
0.05	ICP-MS	27	7.67	ICP-AES	35	84	ICP-AES	49
0.05	NAA	1	7.79	ICP-MS	27	85	ICP-AES	43
0.06	ICP-MS	35	8	ICP-AES	36	86	XRF	18
0.07	ICP-MS	35	8.18	ICP-MS	35	89	ICP-AES	37
0.07	ICP-MS	39	8.42	ICP-MS	27	90	ICP-MS	47
0.07	ICP-MS	47	8.7	ICP-MS	49	91	TXRF	28
0.076	ICP-MS	48	8.77	ICP-AES	26	95	XRF	4
			9	ICP-AES	46			
<b>U</b>			9.18	ICP-MS	48	<b>Zr</b>		
<2	XRF	13	9.19	ICP-MS	35	<4.3	ICP-MS	35
1.3	NAA	1	9.39	ICP-AES	46	<6	XRF	4
1.32	ICP-MS	27	9.6	XRF	45	<20	ICP-AES	49
1.37	NAA	25	10	ICP-AES	37	0.26	ICP-MS	27
1.38	ICP-MS	27	10	TXRF	28	0.51	ICP-MS	35
1.38	ICP-MS	48	10	XRF	4	0.58	ICP-AES	35
1.39	ICP-MS	35	10.9	ICP-MS	39	0.80	ICP-AES	35
1.40	ICP-MS	35	11.1	XRF	38	0.86	ICP-MS	48
1.40	ICP-MS	35	11.5	XRF	30	1.10	ICP-MS	39
1.43	ICP-MS	39	12	XRF	2	1.3	ICP-AES	46
1.43	NAA	22	12.3	ICP-MS	47	1.7	ICP-MS	49
1.49	ICP-MS	47				2.18	ICP-MS	35
1.5	ICP-MS	49	<b>Yb</b>			4	XRF	45
1.52	NAA	11	<1.1	ICP-MS	35	5.15	ICP-MS	27
*2	GAMMA	14	*0.22	ICP-AES	20	5.6	XRF	30
			*0.30	ICP-MS	27	6	NAA	22
<b>V</b>			0.33	NAA	1	8	ICP-AES	43
<10	XRF	4	0.34	ICP-MS	35	8	TXRF	28
5	ICP-AES	46	0.36	NAA	25	*12.4	XRF	38
5.01	ICP-AES	35	0.38	ICP-MS	27	*17.6	ICP-MS	47
5.06	ICP-AES	35	0.39	ICP-MS	35	*21	ICP-AES	37
5.06	ICP-AES	47	0.39	ICP-MS	39	*23	XRF	2
6	ICP-AES	37	0.393	ICP-MS	48			
			0.40	ICP-AES	26			

Table 12. List of participating laboratories

- Ministère de l'Agriculture, Institut de Recherches Chimiques, Spectrographie, Tervuren, Belgium (G. Ledent)
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- Carmeuse, S.A., Engis, Belgium (G. Gillain)
- Carrières et Fours à chaux Dumont-Wautier, Engis, Belgium (Ch. Mignolet)
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  - (F. Saupé)
  - Spectrochimie - Service d'analyses des roches du CNRS (K. Govindaraju)
- Faculté Polytechnique de Mons, Département de Minéralogie, Pétrographie, Belgium (Y. Quinif)
- Geological Survey of Israël, Jerusalem, Israël (I.B. Brenner)
- Groupe des Sciences de la Terre, Laboratoire Pierre Süe, CNRS, C.E.N./Saclay - 91191 Gif/Yvette Cedex, France (J.L. Joron)
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- Imperial College at Silwood Park (TTC), NERC ICP-MS Facility, (CARE), Ascot, Berkshire SL5 7TE, England (K.E. Jarvis)
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- National Geophysical Research Institute, Geochemistry Group, Hyderabad 500 007, India (V. Balaram)
- The Open University, Department of Earth Sciences, Milton Keynes, MK7 6AA, England (P. Potts, J. Watson, P. Webb)
- Pittsburgh Corning Europa, Tessenderlo, Belgium (J. Bellens)
- Rheinisch-Westfälische Technische Hochschule Aachen, Abteilung für angewandte Lagerstättenlehre, Aachen, Germany (W.L. Plüger)
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- Université Claude Bernard, Lyon I, Centre des Sciences de la Terre, Laboratoire de Pétrographie, Villeurbanne, France (P. Capiez)
- Université Catholique de Louvain, Belgium
  - Laboratoire de Géochimie (A. Chabot, A. Navarre)
  - Laboratoire de Minéralogie et Géologie Appliquée (J. Naud)
- Université Libre de Bruxelles, Laboratoires Associés de Géologie, Pétrologie et Géochronologie, Belgium (A. Herbosch, A. Preat)
- Université de Liège, Sart Tilman, Liège 1, Belgium
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  - Laboratoire de Physique Nucléaire Expérimentale (J.M. Delbrouck, G. Robaye, I. Roelandts, G. Weber, )
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- Universiy of Innsbruck, Institute of Mineralogy and Petrography, 6020 Innsbruck, Austria (R. Tessadri)
- Vrije Universiteit Brussel, Laboratorium voor Geochronologie, Belgium (P. Pasteels)

Table 13. Compiled major and minor constituent data for AWI-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods Mean±SD(n)	Method
SiO <sub>2</sub>	60.46±0.55(16)	60.43	59.45-61.60	60.70±0.58(7)	60.12±0.65(4)	60.34(2)	60.46±0.17(3) 63.53	GRAV DCP-AES
TiO <sub>2</sub>	0.92±0.05(20)	0.91	0.84-1.02	0.92±0.05(11)	0.89±0.02(4)	0.92(2)	0.84 0.96 1.02	COL ICP-MS OES
Al <sub>2</sub> O <sub>3</sub>	16.44±0.29(17)	16.44	15.87-16.62	16.45±0.14(8)	16.39±0.15(4)	16.44(1)	15.87 16.06 16.50 16.62	DCP-AES OES VOL GRAV
Fe <sub>2</sub> O <sub>3</sub> T	7.21±0.17(23)	7.23	6.89-7.73	7.20±0.20(11)	7.34±0.09(4)		7.04 7.07 7.14±0.23(3) 7.26±0.03(3)	COL OES NAA VOL
FeO	5.52±0.23(5)	5.56	5.30-5.87				4.25 5.52±0.23(5)	POT VOL
Fe <sub>2</sub> O <sub>3</sub> c	1.08							
MnO	0.14±0.01(22)	0.14	0.12-0.16	0.15±0.01(9)	0.14±0.01(4)	0.13±0.01(5)	0.14(2) 0.14 0.15	OES DCP-AES ICP-MS
MgO	2.09±0.23(18)	2.08	1.63-2.54	2.13±0.28(8)	2.16±0.13(4)	1.92±0.21(3)	1.82 2.1 2.25	GRAV OES VOL
CaO	0.69±0.07(21)	0.71	0.55-0.79	0.68±0.08(12)	0.70±0.05(4)	0.75(2)	0.51 0.62 0.73 0.75	OES NAA VOL DCP-AES
Na <sub>2</sub> O	0.74±0.06(20)	0.76	0.63-0.84	0.74±0.07(6)	0.71(2)	0.78±0.04(6)	0.73±0.09(3) 0.74±0.02(3)	FE NAA
K <sub>2</sub> O	3.06±0.09(21)	3.06	2.89-3.22	3.06±0.08(8)	2.99±0.09(3)	3.07±0.07(7)	3.14±0.12(3)	FE
P <sub>2</sub> O <sub>5</sub>	0.15±0.03(20)	0.14	0.1-0.21	0.15±0.03(8)	0.16±0.04(5)		0.13 0.14 0.17±0.03(5)	DCP-AES ICP-MS COL
CO <sub>2</sub>	1.46						1.46	VOL
LOI	7.75±0.25(12)	7.81	7.34-8.11				7.75±0.25(12)	GRAV

Table 14. Compiled major and minor constituent data for SBO-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods Mean±SD(n)	Method
SiO <sub>2</sub>	55.16±0.79(16)	55.07	54.21-57.60	55.55±0.99(7)	54.55±0.31(4)	55.44(2)	54.89±0.36(3)	GRAV
TiO <sub>2</sub>	0.94±0.05(19)	0.94	0.88-1.07	0.94±0.05(10)	0.90±0.02(4)	1.00(2)	0.90 0.97 0.98	COL ICP-MS OES
Al <sub>2</sub> O <sub>3</sub>	18.24±0.44(19)	18.31	17.4-18.90	18.16±0.53(9)	18.20±0.46(4)	18.38(2)	18.08 18.30 18.33 18.89	GRAV VOL DCP-AES OES

Table 14 (Cont'd.). Compiled major and minor constituent data for SBO-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
Fe <sub>2</sub> O <sub>3</sub> T	7.15±0.31(23)	7.10	6.77-7.98	7.24±0.41(11)	7.15±0.17(4)		6.97	COL
							7.01±0.22(3)	VOL
							7.03±0.15(3)	NAA
							7.24	OES
FeO	5.61±0.27(5)	5.51	5.27-5.92				4.28	POT
							5.61±0.27(5)	VOL
Fe <sub>2</sub> O <sub>3</sub> c	0.92							
MnO	0.18±0.02(21)	0.18	0.146-0.21	0.19±0.01(7)	0.17±0.01(4)	0.17±0.02(7)	0.17	DCP-AES
							0.18	OES
							0.19	ICP-MS
MgO	1.97±0.28(20)	2.10	1.45-2.33	1.95±0.27(9)	2.15±0.10(4)	1.81±0.36(4)	1.66	GRAV
							2.03	OES
							2.33	VOL
CaO	1.76±0.12(23)	1.75	1.42-1.97	1.78±0.12(12)	1.76±0.11(4)	1.79(2)	1.42	NAA
							1.74	DCP-AES
							1.74	OES
							1.74	VOL
Na <sub>2</sub> O	0.66±0.08(20)	0.63	0.51-0.80	0.77±0.03(5)	0.57±0.05(3)	0.64±0.02(6)	0.61±0.02(3)	NAA
							0.63±0.03(3)	FE
K <sub>2</sub> O	3.55±0.09(21)	3.57	3.37-3.70	3.54±0.08(8)	3.51±0.13(3)	3.54±0.09(7)	3.61±0.09(3)	FE
P <sub>2</sub> O <sub>5</sub>	0.17±0.01(16)	0.17	0.15-0.2	0.17±0.01(6)	0.18±0.02(4)		0.16	ICP-MS
							0.17±0.01(4)	COL
							0.19	DCP-AES
CO <sub>2</sub>	2.43						2.43	VOL
LOI	9.67±0.20(11)	9.72	9.37-9.96				9.67±0.20(11)	GRAV

Table 15. Compiled major and minor constituent data for PRI-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
SiO <sub>2</sub>	68.60±0.35(17)	68.54	67.87-69.3	68.76±0.19(7)	68.43±0.61(4)	68.36(2)	68.53	DCP-AES
							68.61±0.28(3)	GRAV
TiO <sub>2</sub>	0.71±0.03(20)	0.71	0.65-0.78	0.71±0.03(11)	0.71±0.03(11)	0.77(2)	0.65	COL
							0.72	OES
							0.75	ICP-MS
Al <sub>2</sub> O <sub>3</sub>	10.84±0.19(18)	10.87	10.48-11.1	10.92±0.12(9)	10.79±0.23(4)	10.91	10.48	NAA
							10.57	COL
							10.71	GRAV
							11.01	OES
Fe <sub>2</sub> O <sub>3</sub> T	3.32±0.13(23)	3.30	3.13-3.58	3.27±0.08(10)	3.39±0.16(4)		3.19	COL
							3.23±0.09(3)	NAA
							3.36	OES
							3.48±0.11(4)	VOL
FeO	2.07±0.27(6)	2.06	1.70-2.50				1.70	POT
							2.41±0.23(5)	VOL
Fe <sub>2</sub> O <sub>3</sub> c	1.02							
MnO	0.04±0.01(25)	0.04	0.028-0.052	0.04±0.01(11)	0.04±0.01(4)	0.04±0.01(6)	0.04(2)	DCP-AES
							0.04	ICP-MS
							0.05	OES

Table 15 (Cont'd.). Compiled major and minor constituent data for PRI-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
MgO	3.24±0.18(17)	3.24	2.85-3.61	3.24±0.23(7)	3.31±0.14(4)	3.13±0.10(3)	3.13 3.35 3.36	OES VOL GRAV
CaO	2.49±0.16(25)	2.51	2.1-2.86	2.49±0.11(13)	2.53±0.09(4)	2.37±0.16(3)	2.1 2.59(2) 2.67 2.9	NAA DCP-AES VOL OES
Na <sub>2</sub> O	1.71±0.06(20)	1.72	1.60-1.84	1.69±0.06(5)	1.65±0.03(3)	1.73±0.03(6)	1.72±0.06(4) 1.82(2)	NAA FE
K <sub>2</sub> O	3.79±0.21(22)	3.82	3.3-4.19	3.82±0.23(8)	3.79±0.12(3)	3.83±0.20(7)	3.3 3.81±0.05(3)	GAMMA FE
P <sub>2</sub> O <sub>5</sub>	0.18±0.01(15)	0.18	0.17-0.20	0.18±0.01(4)	0.18±0.01(4)		0.18 0.19±0.01(5) 0.19	DCP-AES COL ICP-MS
CO <sub>2</sub>	2.62						2.62	VOL
LOI	4.99±0.04(11)	4.98	4.93-5.06				4.99±0.04(11)	GRAV

Table 16. Compiled major and minor constituent data for CCH-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
SiO <sub>2</sub>	0.97±0.06(15)	0.98	0.89-1.07	0.97±0.05(6)	0.97±0.06(5)	0.92	0.94(2) 1.07	GRAV DCP-AES
TiO <sub>2</sub>	0.017±0.006(16)	0.019	0.01-0.03	0.019±0.006(8)	0.015±0.008(5)	0.01	0.02 0.021 0.05	COL ICP-MS OES
Al <sub>2</sub> O <sub>3</sub>	0.30±0.05(16)	0.28	0.249-0.454	0.32±0.08(5)	0.28±0.04(7)	0.27(2)	0.31 0.32 0.58	OES DCP-AES VOL
Fe <sub>2</sub> O <sub>3</sub> T	0.17±0.03(19)	0.17	0.12-0.24	0.17±0.03(6)	0.17±0.04(7)		0.17±0.01(3) 0.19(2) 0.24 0.33(2)	NAA COL OES VOL
FeO	0.17(2)						0.17 0.17	POT VOL
MnO	0.007±0.002(19)	0.006	0.003-0.012	0.007±0.003(5)	0.007±0.002(7)	0.009±0.002(3)	0.006(2) 0.011(2) 0.02	ICP-MS OES DCP-AES
MgO	2.91±0.19(16)	2.87	2.63-3.27	2.89±0.12(5)	2.85±0.20(7)	2.87	2.85 3.14 3.27	POT VOL OES
CaO	52.12±0.45(16)	52.15	51.11-53	52.34±0.39(5)	52.26±0.40(6)	51.68	47.9 51.11 51.88(2) 52.19	DCP-AES OES VOL POT
Na <sub>2</sub> O	0.048±0.014(16)	0.04	0.03-0.07	0.06±0.01(3)	0.04±0.01(3)	0.04±0.02(5)	0.05±0.01(4) 0.05	NAA FE
K <sub>2</sub> O	0.082±0.020(15)	0.084	0.043-0.12	0.07±0.03(6)	0.08±0.01(3)	0.09±0.01(4)	0.082 0.11	FE NAA
P <sub>2</sub> O <sub>5</sub>	0.051±0.008(12)	0.05	0.04-0.06	0.05±0.01(3)	0.05±0.01(3)		0.049 0.052±0.008(5) 0.11	ICP-MS COL DCP-AES
LOI	43.40±0.14(9)	43.43	43.08-43.56				43.40±0.14(9)	GRAV



Table 17. Compiled major and minor constituent data for DWA-1 (dry basis, %)

Constituent	Overall Mean±SD(n)	Median	Range	XRF Mean±SD(n)	ICP-AES Mean±SD(n)	AAS Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
SiO <sub>2</sub>	0.06±0.02(15)	0.06	0.03-0.09	0.06±0.02(6)	0.07±0.02(5)	0.05	0.06±0.1(3) 0.36	GRAV DCP-AES
TiO <sub>2</sub>	0.010±0.001(7)	0.01	0.0075-0.01	0.01(4)	0.01	0.01	0.0075 0.05	ICP-MS OES
Al <sub>2</sub> O <sub>3</sub>	0.05±0.05(13)	0.027	0.015-0.15	0.06±0.06(6)	0.03±0.03(7)	<0.05	0.18 0.31	DCP-AES VOL
Fe <sub>2</sub> O <sub>3</sub> T	0.27±0.03(22)	0.26	0.213-0.32	0.26±0.03(9)	0.26±0.03(7)		0.27±0.02(3) 0.28(2) 0.29 0.47(2)	NAA COL OES VOL
FeO	0.20(2)						0.17 0.22	VOL POT
Fe <sub>2</sub> O <sub>3</sub> c	0.05							
MnO	0.061±0.008(23)	0.06	0.05-0.08	0.06±0.01(6)	0.058±0.005(8)	0.064±0.006(5)	0.066(2) 0.07 0.07	ICP-MS DCP-AES OES
MgO	21.40±0.26(20)	21.36	20.79-22	21.22±0.20(9)	21.54±0.25(6)	21.37(2)	21.44 21.74(2) 23.22	POT VOL OES
CaO	30.84±0.41(23)	30.85	30.07-31.5	30.87±0.41(11)	30.78±0.50(8)	30.87	27.41 29.9 30.61 31.08(2)	OES DCP-AES POT VOL
Na <sub>2</sub> O	0.042±0.006(12)	0.041	0.03-0.05	0.046(2)	0.05	0.040±0.007(5)	0.042 0.042±0.008(3)	FE NAA
K <sub>2</sub> O	0.010±0.0004(6)	0.01	0.01-0.011	0.01		0.01(4)	0.011	FE
P <sub>2</sub> O <sub>5</sub>	0.023±0.007(9)	0.026	0.01-0.0358	0.02(1)	0.026(2)		0.021±0.009(5) 0.0263	COL ICP-MS
LOI	47.29±0.19(9)	47.30	46.98-47.6				47.29±0.19(9)	GRAV

Table 18. Compiled trace element data for AWI-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods	
							Mean±SD(n)	Method
Ag	<0.5						<0.5	OES
As	15±2(5)	15	13-16.7		14.8(2)	16.7	13 15	XRF DCP-AES
B	135±127(3)	83	42-280	83			161(2)	OES
Ba	378±25(13)	375	350-425	379±28(4)	368±10(4)	353	361 405±27(3)	OES XRF
Be	2.7±0.2(5)	2.6	2.4-2.96	2.5(2)	2.8±0.2(3)			
Bi	0.33				0.33		<5	OES
Cd	0.03				0.03			
Ce	80.2±2.7(16)	80	75-84	81.9±2.1(6)	79.7±2.7(6)	79.9±2.5(4)	92(2)	XRF
Cl	<50						<50	XRF
Co	20±2(17)	20	17-24	20±3(4)	20.9±1.8(3)	20.3±0.7(4)	18 19 21.1±1.2	AAS OES XRF

Table 18 (Cont'd.). Compiled trace element data for AWI-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Cr	119±8(20)	117	105-135	121±9(5)	129(2)	116±3(4)	112 118±10(7) 125	AAS XRF OES
Cs	7±0.2(5)	7	6.8-7.2		7.1±0.1(3)	7(2)		
Cu	34±6(14)	33	25-46	33±5(5)	39(2)		30±3(3) 34 36(2) 37	XRF DCP-AES OES AAS
Dy	5.1±0.8(10)	5.68	4.05-5.9	5±0.9(4)	5.21±0.84(6)			
Er	2.9±0.5(8)	3.16	2.04-3.42	3.35(2)	2.75±0.53(6)			
Eu	1.47±0.08(14)	1.47	1.35-1.61	1.44±0.05(4)	1.43±0.07(6)	1.57±0.05(4)		
F	590(2)						577 602	PIGE ISE
Ga	22±1(6)	21.4	20.3-24		21.8±1.5(3)		21(2) 24	XRF OES
Gd	6±0.6(10)	6	5.19-7.1	5.9±0.5(4)	6±0.7(6)			
Ge	3.8						< 5 3.8	OES TXRF
Hf	6.3±0.7(10)	6.23	5.29-7.6	6.6	6.4±1.1(5)	6.1±0.2(4)		
Ho	1.1±0.1(6)	1.13	0.9-1.24	1.15	1.15±0.08(4)	0.9		
In	< 1						< 1	OES
La	38.2±1.5(16)	38.6	34.7-40.96	38.7±1.1(5)	37.6±2.2(6)	38.7±0.5(4)	38	XRF
Lu	0.45±0.08(13)	0.48	0.34-0.56	0.42±0.06(4)	0.44±0.09(6)	0.53±0.03(3)		
Mo	0.8(2)				0.8(2)		< 3	OES
Nb	17±2(10)	17.3	13.4-20.8	17(2)	16.5±2.8(5)		17.5±0.2(3)	XRF
Nd	36.5±1.8(14)	36.6	33.9-39.48	36±1(4)	36±2.2(6)	37.4±1.4(3)	39	XRF
Ni	61±7(16)	61.5	51-75	60±6(4)	64(2)	61	52 60±7(7) 75	AAS XRF OES
Pb	24±6(15)	23	15-33.6	31	26±5(4)		16 21±2(3) 23±7(5) 25	OES AAS XRF DCP-AES
Pr	9.3±0.3(7)	9.26	8.84-9.8	9.33(2)	9.31±0.35(5)			
Rb	130±6(19)	132	119-142	119	131±5(4)	132±9(3)	128(2) 132±6(9)	AAS XRF
S	925±121(4)	884	830-1100	1201			925±121(4)	XRF
Sb	0.75(2)				0.76	0.74	14	DCP-AES
Sc	16.4±0.8(10)	16.7	15-17.4	17.1±0.3(3)	16.7	16.5±0.5(4)	15.2(2)	XRF
Sm	7±0.3(13)	7	6.65-7.52	7.1±0.2(4)	6.8±0.2(5)	7.2±0.3(4)		
Sn	< 5				2.77		7	OES
Sr	108±7(19)	107	94-120	106±7(4)	107±9(4)	94(1)	110±5(9) 117(1)	XRF OES
Ta	1.25±0.12(9)	1.28	1.02-1.37		1.17±0.11(5)	1.35±0.04(4)		
Tb	0.94±0.13(9)	0.97	0.77-1.16		0.91±0.10(5)	0.98±0.16(4)		
Th	12±0.6(12)	12	11-13		11.6±0.6(6)	12.3±0.4(4)	12.5(2)	XRF

Table 18 (Cont'd.). Compiled trace element data for AWI-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Tl	0.61				0.61			
Tm	0.42±0.09(6)	0.43	0.3-0.53		0.42±0.09(6)	0.18		
U	3±0.2(11)	3	2.75-3.32		2.92±0.16(6)	3.12±0.17(4)	3	XRF
V	134±16(15)	129	112-160	123±7(4)	134±8(3)		133±19(6) 158(2)	XRF OES
W	3.8(2)				3.8(2)			
Y	29±5(18)	30.1	20-35.1	31.2±2.7(6)	27.6±5.7(6)		27±6(6)	XRF
Yb	2.97±0.36(14)	3.09	2.36-3.43	2.86±0.42(4)	2.86±0.35(6)	3.26±0.15(4)		
Zn	99±4(13)	100	91-104	98±4(4)	100±3(3)		99±6(4) 102(2)	XRF AAS
Zr	223±13(16)	225	200-244	223±18(4)	217±13(5)	227	227±11(6)	XRF

Table 19. Compiled trace element data for SBO-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Ag	<0.5						<0.5	OES
As	32±5(4)	33.3	25-37		33.3(2)	37	19 25	ICP-AES XRF
B	146±132(3)	91	50-297	91			174(2)	OES
Ba	549±40(14)	548	498-605	539±46(4)	549±37(3)	557(2)	515 566±50(4)	OES XRF
Be	3.2±0.2(5)	3.2	3-3.4	3.1(2)	3.3±0.1(3)		<10	OES
Bi	0.45				0.45		<5	OES
Ce	101±4(14)	101	92-108	102±2(5)	99±5(4)	99±2(4)	108	XRF
Cl	<50						<50	XRF
Co	22±2(17)	22.6	17-26.4	21±3(5)	25(2)	22±2(4)	22±1(4) 24 24	XRF AAS OES
Cr	116±8(19)	113	104-128	119±9(5)	123	114±7(4)	111±6(6) 117(2) 119	XRF OES AAS
Cs	6.8±0.2(5)	6.86	6.54-7		6.8±0.3(3)	6.8(2)		
Cu	33±6(11)	31	26-41.4	35±6(5)			27(2) 29(2) 35 38	XRF OES DCP-AES AAS
Dy	5.1±1.5(8)	5.81	3.11-6.8	4.8±1.7(4)	5.4±1.6(4)			
Er	3.4±0.2(5)	3.45	3.17-3.7	3.53(2)	3.38±0.28(3)			
Eu	1.64±0.09(12)	1.63	1.51-1.8	1.62±0.11(5)	1.60±0.10(3)	1.68±0.04(4)		
F	797(2)						782 812	PIGE ISE
Ga	23±3(5)	24	17.5-25.3		25(2)		22±4(3)	XRF
Gd	6.2±0.6(7)	6	5.3-7	6.2±0.8(4)	6.2±0.5(3)			
Ge	3.7						<5 3.7	OES XRF

Table 19 (Cont'd.). Compiled trace element data for SBO-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Hf	5±0.3(8)	4.92	4.7-5.5	4.9	4.8±0.1(3)	5.2±0.3(4)		
Ho	1.3±0.1(5)	1.3	1.15-1.4	1.23	1.3±0.1(3)	1.4		
In	< 1						< 1	OES
La	47.7±1.6(14)	47.7	45-51	48.2±1.9(6)	47.5±2(4)	47.2±0.7(4)	44.5(2)	XRF
Lu	0.49±0.11(11)	0.51	0.32-0.69	0.42±0.10(4)	0.49±0.11(4)	0.58±0.09(3)		
Mo	1.1(2)				1.1(2)		< 3	OES
Nb	17±2(9)	18.1	14.5-19.1	15.5(2)	17.4±2.1(4)		18.4±0.5(3)	XRF
Nd	42±0.9(10)	42.1	40.2-43.2	41.7±1.3(4)	42.4±0.4(3)	41.9(2)	42	XRF
Ni	60±5(15)	61	50-68	63±2(4)	63	61	58±5(7) 59 68	XRF AAS OES
Pb	27±4(12)	26.5	21-32	40	26±2(3)		26±5(3) 27 28±5(4) 30	AAS OES XRF DCP-AES
Pr	11.1±0.4(6)	11.1	10.6-11.6	11(2)	11.2±0.3(4)			
Rb	163±7(19)	162	150-175	157	166±4(3)	159±7(3)	155(2) 165±7(10)	AAS XRF
S	1904±363(5)	1890	1500-2403	2403			1780±268(4)	XRF
Sb	6±2(3)	6.3	4.98-8		6.5(2)	6.3		
Sc	17.4±0.9(10)	17.5	15.19-18.6	17.4±1.5(4)		17.4±0.5(4)	17.6(2)	XRF
Sm	7.8±0.3(12)	7.8	7.21-8.3	7.9±0.3(4)	7.6±0.5(4)	7.9±0.3(4)		
Sn	5(2)				3.52		7	OES
Sr	150±7(17)	149	138-165	144±5(4)	158±6(3)	200	150 150±7(9)	OES XRF
Ta	1.36±0.11(7)	1.36	1.18±1.53		1.30±0.12(3)	1.41±0.10(4)		
Tb	1.05±0.18(8)	1.05	0.68-1.3		0.99±0.22(4)	1.11±0.15(4)		
Th	15.2±1.2(10)	15	13.6-17.2		14.4±0.8(4)	15.5±1.1(4)	16 17	GAMMA XRF
Tl	0.6				0.63			
Tm	0.43±0.15(5)	0.47	0.26-0.6		0.48±0.14(4)	0.26		
U	3.1±0.3(8)	3.1	2.75-3.7		3.1±0.4(4)	3.1±0.1(4)	0.8 4	GAMMA XRF
V	153±16(13)	150	130-177	140±10(4)	157(2)		157±18(5) 165(2)	XRF OES
W	1.9(2)				1.9(2)			
Y	32±3(14)	32	24-36.6	31±4(6)	33±2(3)		31±4(5)	XRF
Yb	3.21±0.30(11)	3.26	2.43-3.5	3.07±0.47(4)	3.29±0.19(3)	3.30±0.11(4)		
Zn	82±7(12)	81	74-95	86±6(4)	79(2)		77±3(4) 90(2)	XRF AAS
Zr	183±13(13)	183	158-200	185±13(3)	174±15(3)	169	188±10(6)	XRF

Table 20 (Cont'd.). Compiled trace element data for PRI-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
S	357±169(3)	400	170-500	400			335(2)	XRF
Sb	0.3(2)				0.36	0.24	15	DCP-AES
Sc	9.7±0.3(10)	9.7	9.1-10	9.7±0.4(5)		9.6±0.2(4)	10	XRF
Sm	6.6±0.2(11)	6.51	6.2-7	6.7±0.3(4)	6.5±0.1(3)	6.6±0.3(4)		
Sn	2(2)				1.99		2	OES
Sr	88±5(18)	88.5	79-96	88±7(4)	93±4(3)	79	86 88±4(9)	OES XRF
Ta	1±0.07(7)	1.02	0.9±1.07		0.94±0.07(3)	1.05±0.03(4)		
Tb	0.85±0.10(7)	0.84	0.69-1.03		0.92±0.11(3)	0.80±0.08(4)		
Th	11.3±1.1(10)	11	10-13.2		10.8±0.6(3)	11.6±1.1(4)	10.5(2) 13	XRF GAMMA
Tl	0.2				0.19			
Tm	0.39±0.07(4)	0.42	0.29-0.43		0.42±0.02(3)	0.29		
U	2.5±0.3(9)	2.48	2-2.99		2.7±0.3(3)	2.5±0.1(4)	2 2.6	XRF GAMMA
V	65±6(13)	62	55.7-76	62±6(4)	61.5(2)		61 68±7(6)	OES XRF
W	2.2(2)				2.2(2)			
Y	25±2(13)	24.8	21-28.5	24±3(6)	25±2(3)		25±1(4)	XRF
Yb	2.77±0.15(10)	2.78	2.53-3	2.83±0.15(3)	2.80±0.20(3)	2.71±0.12(4)		
Zn	47±5(12)	46.5	36-55.2	50±4(5)	48(2)		44±6(4) 45	XRF AAS
Zr	386±12(11)	386	363.8-402	385±14(3)	391±10(3)	397	381±13(4)	XRF

Table 21. Compiled trace element data for CCH-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Ag	<1						<1	OES
As	7±7(4)	7	1.07-13.2		7(2)	1.3	12	DCP-AES
B	<10			<10			10	OES
Ba	6.6±2.5(11)	5.1	4.23-11	5±0.2(3)	6.9±2.9(7)	9		
Be	0.2±0.1(4)	0.22	0.2-0.32	0.2	0.25±0.06(3)			
Bi	0.06				0.06		<5	OES
Cd	0.2(2)				0.2(2)			
Ce	3.4±0.5(18)	3.44	2.31-4.42	3.3±0.2(5)	3.3±0.6(9)	3.5±0.7(4)		

Table 21 (Cont'd.). Compiled trace element data for CCH-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Cl	370						370	XRF
Co	0.26±0.04(5)	0.25	0.22-0.3		0.3	0.25±0.04(4)		
Cr	7.4±2.9(17)	7	3.07-13	7.8±3.2(6)	7.4±3.2(7)	6.6±2.5(3)	7 64	XRF OES
Cs	0.12±0.05(4)	0.13	0.05-0.17		0.11(2)	0.13(2)		
Cu	3±2(9)	2.5	0.91-6	3±2(6)	2(2)		4	XRF
Dy	0.65±0.07(9)	0.64	0.575-0.8	0.65(2)	0.65±0.08(7)			
Er	0.35±0.05(9)	0.34	0.29-0.45	0.35(2)	0.35±0.06(7)			
Eu	0.16±0.02(13)	0.16	0.12-0.2	0.16(2)	0.16±0.03(7)	0.17±0.01(4)		
F	375(2)						367 382	PIGE ISE
Ga	0.5±0.1(3)	0.43	0.4-0.64		0.49±0.13(3)			
Gd	0.76±0.09(10)	0.77	0.61-0.92	0.80(2)	0.75±0.10(8)			
Ge	< 10						< 10	OES
Hf	0.11±0.02(9)	0.12	0.08-0.15	0.15	0.11±0.02(4)	0.11±0.02(4)		
Ho	0.12±0.05(9)	0.126	0.05-0.2	0.13	0.12±0.05(8)	0.4		
In	< 5						< 5	OES
La	4.7±0.4(14)	4.69	4-5.46	4.3±0.3(3)	4.8±0.4(7)	4.7±0.3(4)		
Lu	0.04±0.01(11)	0.04	0.02-0.055	0.03±0.01(3)	0.043±0.007(5)	0.043±0.006(3)		
Mo	1(2)				1(2)		< 5	OES
Nb	0.8±0.7(9)	0.4	0.06-2.1	7(2)	0.5±0.4(7)		1.8(2)	XRF
Nd	3.7±0.6(15)	3.7	2.7-4.65	3.4±0.3(3)	3.51±0.58(9)	4.4±0.3(3)		
Ni	8±2(14)	7.25	4-12	9±2(5)	6.5±1(4)	8	4 9±2(3) 12(2)	DCP-AES XRF OES
Pb	6±3(15)	6	1-11	11	4.6±2.3(7)		1 6 7±2(3) 9(2)	DCP-AES OES XRF AAS
Pr	0.84±0.14(11)	0.88	0.56-1	0.84(2)	0.83±0.15(9)			
Rb	2.7±0.5(9)	2.88	2-3.5		2.56±0.41(4)	2.6	2 3.1±0.3(3)	AAS XRF
S	1964±1437(4)	1600	650-4005	4005			1195(2) 1460	XRF IODO
Sb	0.27(2)				0.29	0.25		
Sc	0.46±0.04(7)	0.46	0.4-0.5	0.45±0.05(3)	1.16	0.46±0.03(4)		
Sm	0.75±0.10(14)	0.73	0.63-0.92	0.75±0.10(3)	0.74±0.12(7)	0.77±0.09(4)		
Sn	0.06				0.06			
Sr	284±21(24)	280	248-330	282±8(8)	300±22(6)	280	249 277±24(8) 410	AAS XRF OES
Ta	0.03±0.01(4)	0.03	0.026-0.04		0.04(2)	0.03(2)		
Tb	0.10±0.02(10)	0.10	0.06-0.12		0.10±0.02(6)	0.11±0.01(4)		
Th	0.29±0.03(9)	0.30	0.24-0.33		0.29±0.04(5)	0.30±0.01(4)		
Tl	< 0.3				< 0.3			

Table 21 (Cont'd.). Compiled trace element data for CCH-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Tm	0.05±0.01(3)	0.05	0.05-0.061		0.05±0.01(3)			
U	3.7±0.2(15)	3.75	3.47-4.13		3.67±0.21(9)	3.9±0.1(4)	4	GAMMA
V	8.7±1.9(11)	9.2	6-11.2	8.2±2.1(5)	10.1±1.0(3)		8±2(3) 62	XRF OES
W	12(2)				12(2)			
Y	5.8±0.9(20)	5.73	4.29-7	5.5±0.9(7)	5.56±0.84(8)		6.4±0.4(5)	XRF
Yb	0.27±0.03(13)	0.27	0.2-0.32	0.29(2)	0.27±0.04(7)	0.28±0.03(4)		
Zn	24±4(17)	26	17.4-29	25±3(9)	22.2±4.7(6)		14 27 28	DCP-AES XRF AAS
Zr	8±6(18)	5.83	2.15-19	8±5(5)	5.4±5.5(8)	10	14±6(4)	XRF

Table 22. Compiled trace element data for DWA-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Ag	<1						<1	OES
As	1.3±0.1(3)	1.3	1.3-1.4		1.35(2)	1.3(1)	18	DCP-AES
B	<10			<10			5	OES
Ba	24±5(15)	22	18.9-35	25±6(5)	22±3(7)	22	22 30	XRF OES
Be	<2	0.23	0.2-2	1(2)	0.8±1(3)		<4	OES
Bi	0.03				0.03		<5	OES
Cd	0.6(2)				0.6(2)			
Ce	2.2±0.3(15)	2.22	1.82-2.7	2.4±0.2(4)	2.1±0.2(8)	2.3±0.3(3)		
Cl	940						940	XRF
Co	0.23±0.05(4)	0.21	0.2-0.3	5(2)	0.8±0.3(3)	0.23±0.05(4)	19	OES
Cr	4.5±1.6(14)	4	2.7-7.76	4.8±0.9(4)	4.8±2.4(4)	4±2(4)	4 4 40	DCP-AES XRF OES
Cs	0.04(2)				0.06	0.01		
Cu	4±3(9)	2	1.53-8	4±3(6)	2.6±1.9(3)		29	DCP-AES
Dy	0.82±0.05(9)	0.83	0.73-0.9	0.84(2)	0.81±0.06(7)			
Er	0.50±0.05(10)	0.51	0.41-0.58	0.52(2)	0.49±0.05(8)			
Eu	0.16±0.02(16)	0.16	0.12-0.21	0.16±0.04(4)	0.17±0.03(8)	0.16±0.01(4)		
F	149(2)						144 154	PIGE ISE
Ga	0.23±0.16(3)	0.25	0.07-0.38		0.23±0.16(3)		<4	OES
Gd	0.81±0.09(10)	0.83	0.68-0.96	0.87(2)	0.80±0.10(8)			
Hf	0.03±0.01(4)	0.03	0.02-0.05		0.04±0.01(3)	0.02		
Ho	0.18±0.03(9)	0.18	0.14-0.225	0.18	0.18±0.03(8)			
In	<4						<4	OES
La	3.6±0.4(16)	3.69	2.92-4.22	3.4±0.4(4)	3.75±0.30(8)	3.6±0.3(4)		
Lu	0.05±0.01(13)	0.053	0.03-0.078	0.04±0.01(3)	0.05±0.02(7)	0.06(3)		

Table 22 (Cont'd.). Compiled trace element data for DWA-1 (ppm)

Element	Overall Mean±SD(n)	Median	Range	ICP-AES Mean±SD(n)	ICP-MS Mean±SD(n)	NAA Mean±SD(n)	Other Methods Mean±SD(n)	Method
Mo	1(2)				1(2)		< 5	OES
Nb	0.2±0.4(5)	0.1	0.01-0.89	7	0.2±0.4(5)		2.1	XRF
Nd	3±0.3(14)	2.96	2.62-3.5	2.8±0.2(3)	2.93±0.22(8)	3.46±0.07(3)		
Ni	5±4(9)	3	1.17-14	8(2)	5±4(4)	1.7	3 5 22	DCP-AES XRF OES
Pb	35±5(14)	32.6	27.5-43	43	31±2(6)		32 36±6(3) 40 40	DCP-AES XRF AAS OES
Pr	0.67±0.08(11)	0.67	0.54-0.77	0.65(2)	0.67±0.08(9)			
Rb	0.7±0.7(6)	0.49	0.11-2	8	0.4±0.2(3)	0.2	0.9 2	XRF AAS
S	338±207(4)	268	176-639	639			208(2) 295	XRF IODO
Sb	0.1(2)				0.21	0.07	21	DCP-AES
Sc	0.24±0.03(6)	0.24	0.20-0.29	0.27(2)	1.10	0.22±0.02(4)		
Sm	0.62±0.06(15)	0.60	0.55-0.72	0.61±0.05(3)	0.62±0.07(8)	0.63±0.06(4)		
Sn	0.05				0.05			
Sr	49±3(22)	49	43.9-54.5	49±3(6)	50±3(7)	67(2)	48 48±3(8) 95	AAS XRF OES
Ta	0.003(2)				0.035(2)	0.003(2)		
Tb	0.12±0.02(10)	0.11	0.10-0.16		0.11±0.01(6)	0.13±0.02(4)		
Th	0.08±0.01(6)	0.08	0.06-0.1		0.08(2)	0.08±0.01(4)		
Tl	0.2±0.2(7)	0.34	0.01-0.38		0.2±0.2(3)			
Tm	0.06±0.01(7)	0.07	0.05-0.076		0.07±0.01(6)	0.05		
U	1.4±0.1(13)	1.40	1.3-1.52		1.41±0.06(9)	1.41±0.09(4)	< 2 2	XRF GAMMA
V	6.9±1.6(12)	6.99	5-9.17	6±1.7(5)	7.3±1.7(4)		7.7±0.6(3) 32	XRF OES
W	0.6(2)				0.6(2)			
Y	9.4±1.5(22)	9.19	7.22-12.3	8.6±1(7)	9.1±1.6(9)		11±1(6)	XRF
Yb	0.39±0.03(13)	0.393	0.33-0.42	0.41(2)	0.39±0.02(7)	0.38±0.04(4)		
Zn	83±5(18)	84	76-95	83±4(8)	81±6(4)	51	76 84 88±7(4)	DCP-AES AAS XRF
Zr	3±3(15)	1.7	0.26-8	3±4(4)	1.7±1.7(7)	6	6±2(3)	XRF



Table 23. Recommended (or proposed) values for AWI-1, SBC-1, PRI-1, CCH-1 and DWA-1

Element	AWI-1	SBO-1	PRI-1	CCH-1	DWA
SiO <sub>2</sub>	<u>60.46*</u>	<u>55.16</u>	<u>68.60</u>	<u>0.97</u>	0.06
TiO <sub>2</sub>	<u>0.92</u>	<u>0.94</u>	<u>0.71</u>	0.017	0.010
Al <sub>2</sub> O <sub>3</sub>	<u>16.44</u>	<u>18.24</u>	<u>10.84</u>	0.30	0.05
FeO	5.52	5.61	2.07		
Fe <sub>2</sub> O <sub>3c</sub>	1.08	0.92	1.02		
MnO	<u>0.14</u>	<u>0.18</u>	<u>0.04</u>	0.007	0.06
MgO	2.09	1.97	<u>3.24</u>	<u>2.91</u>	<u>21.40</u>
CaO	<u>0.69</u>	<u>1.76</u>	<u>2.49</u>	<u>52.12</u>	<u>30.84</u>
Na <sub>2</sub> O	<u>0.74</u>	<u>0.66</u>	<u>1.71</u>	0.048	<u>0.042</u>
K <sub>2</sub> O	<u>3.06</u>	<u>3.55</u>	<u>3.79</u>	0.082	<u>0.010</u>
P <sub>2</sub> O <sub>5</sub>	0.15	<u>0.17</u>	<u>0.18</u>	<u>0.051</u>	0.023
Fe <sub>2</sub> O <sub>3T</sub>	<u>7.21</u>	<u>7.15</u>	<u>3.32</u>	0.17	<u>0.27</u>
LOI	<u>7.75</u>	<u>9.67</u>	<u>4.99</u>	<u>43.40</u>	<u>47.29</u>
As	15	32			1.3
Ba	<u>378</u>	<u>549</u>	<u>531</u>	6.6	<u>24</u>
Be	2.7	3.2	<u>1.4</u>	0.2	
Ce	<u>80</u>	<u>101</u>	<u>82</u>	<u>3.4</u>	<u>2.2</u>
Co	<u>20</u>	<u>22</u>	<u>7.4</u>	0.3	0.2
Cr	<u>119</u>	<u>116</u>	<u>78</u>	7.4	4
Cs	7	6.8	2.2	0.1	
Cu	<u>34</u>	<u>33</u>	3.5	3	4
Dy	<u>5.1</u>	5.1	<u>4.3</u>	<u>0.65</u>	<u>0.82</u>
Er	<u>2.9</u>	3.4	2.7	<u>0.35</u>	<u>0.50</u>
Eu	<u>1.47</u>	<u>1.64</u>	<u>1.29</u>	<u>0.16</u>	<u>0.16</u>
Ga	<u>22</u>	23	13	0.5	
Gd	<u>6</u>	<u>6.2</u>	<u>5.3</u>	<u>0.76</u>	<u>0.81</u>
Hf	<u>6.3</u>	5	<u>10.7</u>	<u>0.11</u>	0.03
Ho	<u>1.1</u>	1.3	1	0.1	<u>0.18</u>
La	<u>38</u>	<u>48</u>	<u>38</u>	<u>4.7</u>	<u>3.6</u>
Lu	<u>0.45</u>	<u>0.49</u>	<u>0.41</u>	<u>0.04</u>	<u>0.05</u>
Nb	<u>17</u>	<u>17</u>	<u>13</u>		
Nd	<u>37</u>	<u>42</u>	<u>36</u>	<u>3.7</u>	<u>3</u>
Ni	<u>61</u>	<u>60</u>	<u>21</u>	<u>8</u>	
Pb	24	<u>27</u>	13	6	35
Pr	<u>9.3</u>	<u>11.1</u>	9.5	<u>0.84</u>	<u>0.67</u>
Rb	<u>130</u>	<u>163</u>	<u>90</u>	<u>2.7</u>	
Sc	<u>16</u>	<u>17</u>	<u>9.7</u>	<u>0.46</u>	<u>0.24</u>
Sm	7	<u>7.8</u>	<u>6.6</u>	<u>0.75</u>	<u>0.62</u>
Sr	<u>108</u>	<u>150</u>	<u>88</u>	<u>284</u>	<u>49</u>
Ta	<u>1.2</u>	<u>1.4</u>	1	0.03	
Tb	<u>0.94</u>	1	<u>0.85</u>	<u>0.10</u>	<u>0.12</u>
Th	<u>12</u>	<u>15.2</u>	<u>11.3</u>	<u>0.29</u>	<u>0.08</u>
Tm	<u>0.42</u>	0.43	0.39	0.05	<u>0.06</u>
U	<u>3</u>	<u>3.1</u>	<u>2.5</u>	<u>3.7</u>	<u>1.4</u>
V	<u>134</u>	<u>153</u>	<u>65</u>	<u>8.7</u>	<u>6.9</u>
Y	<u>29</u>	<u>32</u>	<u>25</u>	<u>5.8</u>	<u>9.4</u>
Yb	3	<u>3.2</u>	<u>2.8</u>	<u>0.27</u>	<u>0.39</u>
Zn	<u>99</u>	<u>82</u>	<u>47</u>	<u>24</u>	<u>83</u>
Zr	<u>223</u>	<u>183</u>	<u>386</u>	8	

\* = "Recommended Values"; other values are "Proposed Values"; results on dry basis.

not used for computing the overall mean. Participating laboratories (Table 12) are given by a code number. No key is given to identify the source of specific data, each laboratory results being thus kept confidential.

### Evaluation

There is no agreement among compilers of reference materials about the best method for deriving the most probable values (2). As a preliminary step, in December 1981, the co-operating laboratories from Belgium took part in a round-table meeting. The relative merits of the submitted results were critically examined and discussed with the participants. Some "suspicious values" and "extreme outliers" clearly outside the limits of acceptability (as proposed by Abbey (3)) were eliminated. After this first cleaning, a statistical evaluation of the results received was carried out. Mean and standard deviation were determined for each element. All data lying outside two standard deviations from the mean were discarded and a new mean, the overall mean, and associated standard deviation were recalculated. Overall mean, standard deviation (SD), median, concentration range and number of values (n) used to calculate these parameters are listed in Tables 13 to 17 for major and minor elements and in Tables 18 to 22 for trace elements. As can be seen in most cases there is a very close agreement between the overall mean and the median. Mean and standard deviation were also calculated for each individual analytical technique where sufficient data were available. These means and associated deviations are also included in the statistical tables (Tables 13 to 22). The approach is similar to that reported by Gladney et al. (4).

The emergence of plasma spectrometry (ICP-AES and ICP-MS) since the earlier survey must be mentioned.

It was decided to present major and minor constituent data on the "dry" basis. So, when the data were not reported on a dry basis, they were readjusted by using the analyst's own values if available or the mean moisture content obtained from all the results.

The values were conventionally expressed as percentages of the oxide for major and minor constituents. Total iron was expressed as percentages Fe<sub>2</sub>O<sub>3T</sub>. Fe<sub>2</sub>O<sub>3c</sub> was obtained by difference between total iron and ferrous iron. For trace elements, the results are given in parts per million of the element. Analyses reported as "greater than (>)", "less than (<)" were excluded for the statistical evaluation.

### Recommended (or proposed) values

The availability of new determinations has enabled us to report "recommended" values based upon the terminology

proposed by Potts and Kane (5). Inspection of Table 23 shows that AWI-1, SBO-1 and PRI-1 have the most recommended values, and CCH-1 and DWA-1 the least. The two carbonates seem to be the most difficult to analyse for the trace elements presumably because of the low concentration levels involved.

It is perhaps instructive to mention that most recommended values for major and minor constituents in this paper do not differ very appreciably from the data compiled in the earlier report. It is also pointed out that our five sedimentary rock reference samples are now well characterised for their content of most of the rare-earth elements. This places them among the most interesting sedimentary reference materials for geochemical purposes.

The geoanalysts are encouraged to send the present authors their analytical data. This should make possible the establishment of additional "recommended" values.

#### ACKNOWLEDGEMENT

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#### RESUME

**Cinq échantillons de référence de roches sédimentaires belges ont été préparés et diffusés par le Laboratoire de Géologie, Pétrologie et Géochimie (Université de Liège, Belgique). Trente-six laboratoires ont participé à l'étude coopérative de ces échantillons. Les résultats individuels communiqués sont intégralement présentés. Les résultats analytiques traités statistiquement sont donnés dans des tableaux. Ils comprennent pour chaque élément, la**

**moyenne arithmétique, l'écart-type, la médiane, l'intervalle, le nombre de laboratoires ayant effectué l'analyse, les moyennes calculées pour les différentes méthodes d'analyse. Des valeurs recommandées (ou proposées) sont présentées.**

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#### RESUME

**Cinq échantillons de référence de roches sédimentaires belges ont été préparés et diffusés par le Laboratoire de Géologie, Pétrologie et Géochimie (Université de Liège, Belgique). Trente-six laboratoires ont participé à l'étude coopérative de ces échantillons. Les résultats individuels communiqués sont intégralement présentés. Les résultats analytiques traités statistiquement sont donnés dans des tableaux. Ils comprennent pour chaque élément, la**

**moyenne arithmétique, l'écart-type, la médiane, l'intervalle, le nombre de laboratoires ayant effectué l'analyse, les moyennes calculées pour les différentes méthodes d'analyse. Des valeurs recommandées (ou proposées) sont présentées.**

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