

Correction

Report of the International Association of Geoanalysts on the Certification of Penrhyn Slate, OU-6

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There were two errors in Table 7 in the IAG Report on the Certification of OU-6 (Kane 2004) that require correction. First, the values listed for trace elements in the column headed s_{bias} were variances (s_{bias}^2) rather than standard deviations. Second, total uncertainty in weighing form of 0.037% was incorrectly listed as the value for $s_{\text{stability}}$ for all major oxides. This total uncertainty should have been apportioned to all constituents in the sample in the ratio of their concentrations to arrive at a unique value of $s_{\text{stability}}$ for each constituent. The first of these errors had no impact on the total uncertainties of reference values given in Table 6, but the

second did affect the calculation of U. Thus, the corrected Tables 6 and 7 are republished here, and the original tables should not be used.

It should be noted that the corrected $s_{\text{stability}}$ is smaller than originally reported for all of the major and minor oxides except SiO_2 , and that this has a highly significant impact on the final uncertainties (U) in Table 6. These uncertainty values now meet the targets, while using the incorrect values many had not. With this correction in $s_{\text{stability}}$ for the major oxides, it becomes clear why this uncertainty component could properly be ignored in calculating U for the trace elements. Any time that one component of uncertainty is relatively small in comparison to others (< 10%), it affects only the third or higher significant figure of the combined uncertainties. Since we are reporting only two significant figures, this allows that component to be omitted from the summation in quadrature that leads to the final combined U.

Table 6.
Certified values and their uncertainties (95% confidence intervals) for IAG CRM OU-6

	Certified value	U = t.u *		Certified value	U = t.u *
SiO_2	57.35	0.30	Gd	5.30	0.38
TiO_2	0.99	0.013	Hf	4.70	0.32
Al_2O_3	20.45	0.31	Ho	1.04	0.05
$\text{Fe}_2\text{O}_3(\text{T})$	8.94	0.20	La	33.2	1.8
MnO	0.28	0.003	Lu	0.45	0.02
MgO	2.41	0.025	Nb	14.49	0.58
CaO	0.74	0.011	Nd	30.2	1.5
Na_2O	1.76	0.048	Ni	40.2	1.3
K_2O	3.03	0.033	Pb	28.80	0.79
P_2O_5	0.12	0.004	Pr	7.91	0.26
LOI	3.62	0.061	Rb	121.3	3.9
TOTAL	99.52		Sc	23.1	3.2
			Sm	6.01	0.42
As	13.23	0.66	Sn	2.67	0.19
Ba	480	13	Sr	131.7	2.6
Ce	77.1	2.7	Ta	1.02	0.12
Co	29.2	1.1	Tb	0.86	0.04
Cr	70.7	2.1	Th	11.3	1.0
Cs	8.10	0.28	U	1.92	0.09
Cu	40.4	4.9	V	129.8	5.1
Dy	5.06	0.14	Y	27.75	0.74
Er	2.93	0.22	Yb	2.98	0.10
Eu	1.36	0.05	Zn	111.4	3.4
Ga	24.17	0.73	Zr	174.2	5.7

Table 6 (continued).
Certified values and their uncertainties
(95% confidence intervals) for IAG CRM OU-6

	Information value	U = t.u *
Fe(II)O	1.65	0.081
Fe ₂ O ₃ (calc)	7.12	0.21
H ₂ O ⁻	0.14	0.13
CO ₂	0.23	0.08
Be	2.53	0.31
Li	95.3	4.5
Sb	0.56	0.13
Tl	0.54	0.06
Tm	0.45	0.02

Major oxide values are expressed in % m/m, whereas trace element values are expressed in mg kg⁻¹. * See text (Kane 2004) and Table 7.

Table 7.
Standard deviations summed in quadrature to produce u, expansion
factor t, and other statistics related to expanded uncertainty U = t.u

Oxide	n labs	$s_{\bar{x}}$	u _{bias}	s _{matl median}	s _{stabil}	t	s _w	s _{LM}
SiO ₂	24	0.098	-	0.107	0.0212	2.064	0.217	0.479
TiO ₂	24	0.004	-	0.005	0.0004	2.064	0.010	0.019
Al ₂ O ₃	24	0.042	0.142	0.029	0.0076	2.064	0.081	0.205
Fe ₂ O ₃ (T)	28	0.027	0.078	0.048	0.0033	2.048	0.071	0.144
FeO	4	0.025	-	-	0.0006	3.182	0.015	0.051
MnO	27	0.001	-	0.001	0.0001	2.052	0.003	0.006
MgO	25	0.009	-	7.85E-03	0.0009	2.06	0.031	0.045
CaO	23	0.005	-	2.54E-03	0.0003	2.069	0.015	0.022
Na ₂ O	26	0.009	-	0.022	0.0007	2.056	0.022	0.044
K ₂ O	25	0.009	-	0.013	0.0011	2.06	0.026	0.047
P ₂ O ₅	25	0.002	-	1.17E-03	0.0000	2.06	0.003	0.008
H ₂ O ⁻	4	0.018	-	-	0.0369	3.182	0.021	0.037
H ₂ O ⁺	2	-	-	-	0.0001	-	0.009	-
CO ₂ *	6	0.031	-	-	0.0001	2.571	0.011	0.076
LOI	19	0.029	-	-	0.0013	2.101	0.081	0.127
Element								
As	12	0.215	-	0.207	0.005	2.201	0.916	0.744
Ba	24	2.845	4.818	2.983	0.177	2.069	10.942	13.938
Be	9	0.048	-	0.126	0.001	2.306	0.150	0.144
Ce	24	0.727	-	1.062	0.029	2.069	2.424	3.563
Co	20	0.318	-	0.394	0.011	2.093	1.147	1.423
Cr	21	0.901	-	0.486	0.026	2.086	2.448	4.127
Cs	17	0.090	-	0.094	-	2.120	0.215	0.370
Cu	14	0.772	-	2.136	-	2.160	2.618	2.888
Dy	17	0.055	-	0.035	-	2.120	0.130	0.227
Er	17	0.043	0.090	0.031	-	2.120	0.075	0.176
Eu	19	0.020	-	0.016	-	2.101	0.037	0.089
Ga	16	0.298	-	0.170	-	2.131	0.808	1.193
Gd	16	0.078	0.142	0.072	-	2.131	0.160	0.310
Hf	16	0.091	-	0.120	-	2.131	0.226	0.363
Ho	18	0.020	-	0.013	-	2.110	0.038	0.085
La	21	0.292	0.71902712	0.416	-	2.086	1.668	1.336
Li	7	1.439	-	1.174	-	2.447	1.502	3.808
Lu	16	0.008	-	6.93E-03	-	2.131	0.013	0.032
Nb	22	0.167	-	0.221	-	2.080	0.491	0.784
Nd	23	0.330	0.494	0.396	-	2.074	1.268	1.583
Ni	20	0.486	-	0.391	-	2.093	1.940	2.174

Table 7 (continued).

Standard deviations summed in quadrature to produce u , expansion factor t , and other statistics related to expanded uncertainty $U = t \cdot u$

Element	n labs	$s_{\bar{x}}$	u_{bias}	s_{matl} median	s_{stabil}	t	s_w	s_{LM}
Pb	22	0.247	-	0.290	-	2.080	1.013	1.159
Pr	17	0.094	-	0.078	-	2.110	0.301	0.386
Rb	26	0.746	-	1.718	-	2.060	2.098	3.804
Sb	6	0.024	-	0.045	-	2.571	0.037	0.058
Sc	16	0.396	1.383	0.354	-	2.131	0.643	1.586
Sm	18	0.068	0.146	0.120	-	2.110	0.286	0.287
Sn	10	0.084	-	-	-	2.262	0.240	0.265
Sr	27	0.957	-	0.825	-	2.056	1.885	4.972
Ta	15	0.018	0.052	0.010	-	2.131	0.046	0.070
Tb	18	0.015	-	0.012	-	2.101	0.027	0.064
Th	23	0.121	0.413	0.236	-	2.074	0.540	0.579
Tl	6	0.021	-	-	-	2.571	0.035	0.051
Tm	14	0.009	-	0.007	-	2.160	0.018	0.033
U	14	0.028	-	0.030	-	2.160	0.054	0.106
V	19	1.189	-	2.141	-	2.101	3.462	5.182
Y	23	0.247	-	0.257	-	2.074	0.716	1.184
Yb	19	0.037	-	0.032	-	2.101	0.075	0.159
Zn	23	0.955	-	1.322	-	2.074	2.362	4.582
Zr	23	1.266	-	2.418	-	2.074	4.707	6.073

s_w is pooled within-laboratory standard deviation. s_{LM} is between-laboratory standard deviation and should be similar in value to the Horwitz factor H_a (Table 1). $s_{\bar{x}} = s_{\text{LM}}/\sqrt{(n-1)}$.

* Unlike JSI-1, CO_2 (carbonate C only) and total C expressed as CO_2 give results in agreement, suggesting that organic carbon is insignificant in OU-6.

Major oxide values are expressed in % m/m, whereas trace element values are expressed in mg kg^{-1} . For definitions of u_{bias} and s_{stabil} refer to text (Kane 2004).