



WEPAL-QUASIMEME

Certificate of Analysis



International Soil-Analytical Exchange

REFERENCE MATERIAL

ISE sample 849

2026-Jul-30



General Information

In this report an overview is given of analytical data for this sample collected in our proficiency testing program. The consensus values are calculated using a robust statistical model. With this NDA model, the mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each measurand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

Please note: Most WEPAL-QUASIMEME reference materials are found to be stable over the long term (>10 years) for most measurand/matrix combinations. There are a few exceptions known to us as being less stable over the long term. These are organotins in sediment (MS6), ASP in shellfish (BT7), some PAHs and PCBs in sediment (SETOC) and N-NH₄ (as N) & N-NO₃ (as N) in clay soils (ISE).

All values, expressed on a weight basis (kg or %), are reported as oven-dried (105°C) material. Moisture is reported in the material as received.

Sample information

WEPAL reference materials are from natural sources only. There is no spiking, mixing or other alterations of the samples. For sample preparation, the ISE samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This ISE sample 849 of Sandy soil, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 7 rounds. Only results from the last 5 periods are used. This way, the consensus values reflect the latest 'state of the art' analytical techniques used by the laboratories. The results on which the values in this report are based were taken from the rounds given in the following table:

Year	Round	Number
2026	2	4
2024	4	3
2024	3	2
2024	2	4
2024	1	1



Consensus Values ISE 849



Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	17.3	1.31	7.5	68	17.4	0.663	0.198	1.14
As	mg/kg	4.67	1.20	25.7	41	4.52	0.630	0.235	5.02
Ba	mg/kg	190	20.0	10.6	56	191	13.5	3.35	1.76
Br	mg/kg	6.96	1.20	17.3	33	7.00	1.00	0.262	3.77
Ca	g/kg	2.19	0.313	14.3	66	2.20	0.181	0.048	2.20
Cd	mg/kg	0.291	0.056	19.2	32	0.289	0.040	0.012	4.25
Cr	mg/kg	31.5	7.29	23.2	62	32.1	4.95	1.16	3.68
Cu	mg/kg	5.77	1.97	34.1	56	6.10	1.10	0.329	5.70
Fe	g/kg	6.15	0.576	9.4	75	6.20	0.330	0.083	1.35
K	mg/kg	7862	709	9.0	86	7861	420	95.6	1.22
Mg	mg/kg	635	146	23.0	59	660	88.0	23.8	3.74
Mn	mg/kg	174	30.7	17.7	70	173	18.3	4.59	2.64
Na	mg/kg	3958	327	8.3	56	3956	199	54.6	1.38
P	mg/kg	790	70.8	9.0	67	790	40.0	10.8	1.37
Pb	mg/kg	20.3	3.55	17.5	67	20.3	2.20	0.543	2.67
Rb	mg/kg	30.4	2.04	6.7	39	30.5	1.50	0.408	1.34
S	mg/kg	314	71.6	22.8	67	308	37.0	10.9	3.48
Si	g/kg	416	8.27	2.0	61	414	5.32	1.32	0.319
Sr	mg/kg	41.4	6.09	14.7	49	41.8	3.70	1.09	2.63
Y	mg/kg	8.28	1.34	16.2	32	8.45	0.885	0.296	3.57
Zn	mg/kg	24.0	3.29	13.7	69	24.4	2.30	0.495	2.06
Zr	mg/kg	207	26.8	12.9	40	209	16.9	5.30	2.56
C-elementary	g/kg	19.2	1.26	6.6	157	19.2	0.800	0.126	0.655
V	mg/kg	26.7	4.67	17.5	61	27.0	3.00	0.748	2.80
Ti	mg/kg	912	122	13.4	62	908	72.0	19.4	2.13
N - elementary	g/kg	1.73	0.165	9.6	252	1.72	0.100	0.013	0.753
Ce	mg/kg	19.6	4.76	24.3	28	19.9	2.37	1.13	5.74
La	mg/kg	8.39	1.97	23.5	32	8.29	1.29	0.435	5.19
Hg	µg/kg	56.1	6.39	11.4	71	56.2	4.44	0.948	1.69

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	5.21	0.717	13.7	63	5.27	0.470	0.113	2.16
As	mg/kg	3.59	0.452	12.6	80	3.57	0.260	0.063	1.76
Ba	mg/kg	20.0	2.23	11.1	47	20.2	1.16	0.406	2.03
Ca	g/kg	1.37	0.157	11.5	78	1.36	0.097	0.022	1.62
Cd	mg/kg	0.251	0.038	15.0	88	0.252	0.023	0.005	1.99



Consensus Values ISE 849



Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Co	mg/kg	0.800	0.120	15.0	55	0.800	0.060	0.020	2.53
Cr	mg/kg	18.3	3.07	16.8	105	18.3	1.76	0.375	2.04
Cu	mg/kg	4.85	0.525	10.8	110	4.89	0.332	0.063	1.29
Fe	g/kg	5.18	0.501	9.7	78	5.21	0.320	0.071	1.37
K	mg/kg	392	109	27.8	75	408	81.9	15.7	4.01
Li	mg/kg	5.62	1.01	17.9	13	5.84	0.713	0.349	6.21
Mg	mg/kg	467	62.2	13.3	74	463	47.5	9.04	1.94
Mn	mg/kg	137	16.1	11.8	86	137	9.19	2.17	1.59
Mo	mg/kg	0.593	0.105	17.8	38	0.608	0.062	0.021	3.60
N	g/kg	1.65	0.172	10.4	111	1.65	0.110	0.020	1.24
Na	mg/kg	54.1	15.9	29.4	63	54.7	9.40	2.51	4.63
Ni	mg/kg	4.92	0.574	11.7	89	4.87	0.350	0.076	1.55
P	mg/kg	733	79.6	10.9	91	729	53.8	10.4	1.42
Pb	mg/kg	16.2	1.89	11.7	110	16.2	1.29	0.225	1.39
S	mg/kg	328	34.4	10.5	58	329	19.0	5.64	1.72
Sn	mg/kg	0.825	0.097	11.8	34	0.850	0.076	0.021	2.53
Sr	mg/kg	6.25	1.17	18.7	16	6.37	0.749	0.365	5.85
Zn	mg/kg	20.1	2.46	12.3	112	20.2	1.53	0.290	1.45
V	mg/kg	20.9	1.88	9.0	57	20.8	1.12	0.312	1.49
Be	mg/kg	0.192	0.030	15.5	24	0.191	0.021	0.008	3.96
U	mg/kg	0.440	0.049	11.1	8	0.444	0.025	0.022	4.91
Hg	µg/kg	53.2	8.48	15.9	54	53.9	4.92	1.44	2.71

Method: Aqua Regia (ISO 54321) (replacing former ISO 11466)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	4.95	0.611	12.3	102	4.96	0.403	0.076	1.53
As	mg/kg	3.61	0.372	10.3	116	3.63	0.246	0.043	1.20
Ba	mg/kg	20.4	2.54	12.5	46	20.6	1.37	0.469	2.30
Be	mg/kg	0.185	0.019	10.2	28	0.186	0.014	0.004	2.42
Ca	g/kg	1.37	0.119	8.6	87	1.37	0.070	0.016	1.16
Cd	mg/kg	0.255	0.036	14.1	132	0.257	0.024	0.004	1.54
Co	mg/kg	0.794	0.134	16.9	90	0.804	0.082	0.018	2.22
Cr	mg/kg	18.2	2.35	12.9	153	18.0	1.50	0.237	1.30
Cu	mg/kg	5.04	0.592	11.8	141	5.15	0.380	0.062	1.24
Fe	g/kg	5.21	0.473	9.1	111	5.20	0.270	0.056	1.08
Hg	µg/kg	57.4	8.64	15.0	70	58.1	5.02	1.29	2.25
K	mg/kg	398	66.3	16.7	94	393	36.5	8.55	2.15



Consensus Values ISE 849



Method: Aqua Regia (ISO 54321) (replacing former ISO 11466)									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
La	mg/kg	5.01	0.321	6.4	9	5.08	0.183	0.134	2.67
Li	mg/kg	5.76	1.10	19.1	27	5.94	0.610	0.265	4.60
Mg	mg/kg	461	53.3	11.6	100	456	33.2	6.66	1.44
Mn	mg/kg	134	11.4	8.5	126	135	7.30	1.27	0.949
Mo	mg/kg	0.613	0.070	11.4	67	0.620	0.042	0.011	1.74
Na	mg/kg	57.0	17.6	30.9	62	60.8	10.5	2.79	4.90
Ni	mg/kg	4.95	0.625	12.6	147	4.95	0.355	0.064	1.30
P	mg/kg	749	68.6	9.2	87	757	45.0	9.20	1.23
Pb	mg/kg	16.2	2.00	12.3	153	16.2	1.22	0.202	1.25
S	mg/kg	317	21.7	6.8	56	317	13.3	3.63	1.14
Sb	mg/kg	0.292	0.035	12.1	29	0.298	0.025	0.008	2.80
Se	mg/kg	0.294	0.082	27.8	33	0.304	0.062	0.018	6.05
Sn	mg/kg	0.815	0.105	12.9	23	0.854	0.097	0.027	3.37
Sr	mg/kg	6.61	1.43	21.7	28	6.68	0.955	0.338	5.11
Tl	mg/kg	0.063	0.010	15.9	23	0.064	0.008	0.003	4.14
U	mg/kg	0.426	0.042	9.9	23	0.424	0.024	0.011	2.58
V	mg/kg	21.1	1.74	8.2	66	21.1	1.05	0.268	1.27
Zn	mg/kg	20.6	2.24	10.9	152	20.9	1.30	0.227	1.10

Method: Extraction with boiling 2M HNO₃

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	mg/kg	0.264	0.028	10.8	68	0.265	0.018	0.004	1.64
Co	mg/kg	0.516	0.072	13.9	46	0.526	0.037	0.013	2.55
Cr	mg/kg	10.3	0.740	7.2	75	10.4	0.433	0.107	1.04
Cu	mg/kg	4.80	0.514	10.7	71	4.85	0.297	0.076	1.59
Hg	µg/kg	51.8	7.48	14.4	56	51.9	4.80	1.25	2.41
Mo	mg/kg	0.183	0.038	20.7	44	0.191	0.026	0.007	3.90
Ni	mg/kg	2.29	0.282	12.3	65	2.30	0.179	0.044	1.91
Pb	mg/kg	16.0	1.46	9.1	77	16.2	0.936	0.207	1.29
Zn	mg/kg	17.4	1.69	9.7	74	17.4	1.09	0.246	1.41

Method: Extraction with 0.1M NaNO₃

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	µg/kg	3.24	0.222	6.9	9	3.28	0.130	0.093	2.86
Cu	µg/kg	37.2	5.26	14.1	16	38.0	3.13	1.64	4.42
Zn	µg/kg	132	10.1	7.6	20	133	6.50	2.81	2.13



Consensus Values ISE 849



Method: Extraction with 0.01M CaCl₂ 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Co	µg/kg	13.0	1.51	11.6	8	13.3	1.00	0.666	5.13
K	mg/kg	79.8	5.46	6.8	33	79.2	3.79	1.19	1.49
Mg	mg/kg	96.9	7.05	7.3	28	96.2	4.43	1.67	1.72
Mn	mg/kg	17.1	1.82	10.7	17	17.0	1.00	0.552	3.23
N - NH ₄ (as N)	mg/kg	14.6	1.28	8.7	44	14.9	0.870	0.241	1.64
N - NO ₃ (as N)	mg/kg	64.7	4.18	6.5	41	64.5	2.71	0.817	1.26
Na	mg/kg	25.6	2.40	9.4	28	26.0	1.42	0.566	2.21
Zn	µg/kg	583	90.1	15.4	19	591	48.5	25.8	4.43

Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
pH - H ₂ O	...	5.86	0.171	2.9	456	5.87	0.110	0.010	0.171
pH - KCl	...	5.40	0.164	3.0	198	5.40	0.100	0.015	0.270
pH - CaCl ₂	...	5.46	0.131	2.4	141	5.48	0.080	0.014	0.253
Fraction < 2 µm	%	4.28	1.88	43.9	144	4.24	1.26	0.196	4.57
EC-SC (ISO 11265)	mS/m	20.2	2.69	13.3	188	20.0	1.48	0.245	1.21
Fraction < 63 µm	%	18.3	3.79	20.7	101	18.4	2.60	0.471	2.58
Fraction > 63 µm	%	81.3	3.23	4.0	89	81.2	2.30	0.428	0.526
Org.matter (L.O.I.)	%	3.86	0.272	7.1	204	3.86	0.166	0.024	0.617
TC=Total C (org.+inorg.)	g/kg	19.2	1.24	6.5	209	19.1	0.775	0.107	0.559
TOC=Total Org. C	g/kg	18.7	1.65	8.8	252	18.6	0.960	0.130	0.693
C - org others (W&B a.o.)	g/kg	18.4	2.45	13.3	211	18.4	1.63	0.211	1.14

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Moisture-content	%	1.00	0.170	17.0	233	1.01	0.100	0.014	1.39
delta 13C	‰ V-PDB	-28.6	0.119	0.4	21	-28.6	0.080	0.032	0.113
delta 15N	‰ Air	366	8.76	2.4	21	366	6.15	2.39	0.653

Method: Fluoride (Swiss standard procedure)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
F - Total	mg/kg	84.8	7.92	9.3	15	84.7	5.63	2.56	3.01

Method: Pot. CEC using 1M NH₄-acetate at pH=7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	6.33	1.44	22.7	149	6.45	0.910	0.148	2.33
Na	cmol+/kg	0.127	0.031	24.8	214	0.130	0.020	0.003	2.12



Consensus Values ISE 849



Method: Pot. CEC using 1M NH ₄ -acetate at pH=7									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
K	cmol+/kg	0.289	0.041	14.2	258	0.290	0.023	0.003	1.10
Mg	cmol+/kg	0.857	0.115	13.4	254	0.863	0.068	0.009	1.05
Ca	cmol+/kg	4.04	0.644	15.9	245	4.05	0.400	0.051	1.27

Method: Pot. CEC using 1M or 0.1M BaCl2-TEA at pH=8.1 (ISO 13536 OR BZE)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	10.6	1.88	17.7	18	10.8	1.25	0.553	5.21
Mg	cmol+/kg	0.880	0.114	13.0	8	0.880	0.073	0.051	5.74

Method: Pot. CEC using 1M NH4Cl (BZE)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Na	cmol+/kg	0.126	0.016	12.7	14	0.125	0.012	0.005	4.26
K	cmol+/kg	0.313	0.019	5.9	15	0.310	0.010	0.006	1.92
Mg	cmol+/kg	0.932	0.032	3.5	14	0.935	0.015	0.011	1.16
Ca	cmol+/kg	4.26	0.423	9.9	14	4.11	0.386	0.141	3.31
Mn	cmol+/kg	0.125	0.014	10.8	10	0.121	0.009	0.005	4.28

Method: Act. CEC using 0.01M BaCl2 (ISO 11260)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mg	cmol+/kg	0.879	0.083	9.4	11	0.885	0.045	0.031	3.55
Ca	cmol+/kg	4.60	0.340	7.4	11	4.63	0.180	0.128	2.79

Method: Act. CEC using cobaltihexamine (AFNOR NFX 31 130)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	4.46	1.01	22.6	44	4.42	0.495	0.190	4.26
Na	cmol+/kg	0.115	0.015	13.3	33	0.118	0.009	0.003	2.90
K	cmol+/kg	0.241	0.027	11.3	38	0.243	0.013	0.006	2.30
Ca	cmol+/kg	3.72	0.392	10.5	42	3.70	0.255	0.076	2.03
Mg	cmol+/kg	0.849	0.089	10.5	42	0.849	0.052	0.017	2.02
Mn	cmol+/kg	0.060	0.001	2.5	10	0.060	0.001	0.001	0.973

Method: Mehlich-3									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ca	mg/kg	911	80.2	8.8	100	920	52.3	10.0	1.10
Cu	mg/kg	0.755	0.300	39.7	93	0.751	0.211	0.039	5.15
Fe	mg/kg	573	78.6	13.7	114	571	51.0	9.21	1.61
K	mg/kg	119	12.7	10.6	102	119	8.38	1.57	1.31

Method: Mehlich-3									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mg	mg/kg	112	10.3	9.2	101	112	7.00	1.28	1.15
Mn	mg/kg	56.3	7.76	13.8	116	56.5	4.91	0.900	1.60
Na	mg/kg	28.5	5.34	18.7	72	29.2	3.41	0.786	2.76
P	mg/kg	250	29.5	11.8	138	249	20.0	3.14	1.26
Zn	mg/kg	5.26	0.718	13.6	112	5.21	0.500	0.085	1.61
Al	mg/kg	859	96.6	11.2	57	863	69.0	16.0	1.86

Method: Extraction with 0.01M CaCl ₂ - 0.005M DTPA 1:10 (w/v)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cu	mg/kg	0.865	0.216	25.0	84	0.887	0.120	0.030	3.41
Fe	mg/kg	157	49.3	31.4	96	158	28.8	6.29	4.01
Mn	mg/kg	23.5	3.81	16.2	99	23.5	2.00	0.479	2.04
Zn	mg/kg	3.18	0.492	15.4	92	3.19	0.318	0.064	2.01

Method: Extraction with 1M KCl 1:10 (w/v)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
N - NH ₄ (as N)	mg/kg	18.4	2.39	13.0	67	18.1	1.68	0.365	1.99
N - NO ₃ (as N)	mg/kg	64.0	7.84	12.3	82	62.3	5.21	1.08	1.69

Method: Phosphorus and related analysis									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P - Bray (as P)	mg/kg	185	76.5	41.3	132	179	45.5	8.33	4.49
P - Olsen (as P)	mg/kg	54.1	11.3	20.9	173	54.0	6.47	1.07	1.98
Al - Ox	mg/kg	1017	139	13.7	13	971	121	48.2	4.74
Fe - Ox	mg/kg	2498	301	12.0	13	2423	162	104	4.17
P - Ox	mg/kg	626	70.3	11.2	12	620	38.7	25.4	4.05
P - AL (as P)	mg/kg	203	30.4	15.0	46	203	14.7	5.60	2.76

Method: UK Soil Methods									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P - NaHCO ₃ (1/20)	mg/l	63.7	10.1	15.8	59	64.0	6.06	1.64	2.58
K - NH ₄ NO ₃ (1/5)	mg/l	162	14.7	9.0	66	160	9.39	2.25	1.39
Mg - NH ₄ NO ₃ (1/5)	mg/l	142	16.7	11.8	66	141	11.0	2.58	1.82
pH - H ₂ O (2/5)	...	5.78	0.134	2.3	60	5.80	0.100	0.022	0.374

Consensus Values ISE 849

Method: Extraction with dilute nitric acid (0.43 Mol/l) ISO 17586

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Zn	mg/kg	7.23	0.660	9.1	9	7.53	0.550	0.275	3.80
K	mg/kg	116	14.1	12.2	9	112	9.00	5.86	5.07
Mg	mg/kg	124	11.0	8.9	9	123	7.80	4.59	3.69
Ca	g/kg	1.12	0.089	8.0	9	1.11	0.040	0.037	3.33

Method: PEP-Ammoniumacetate-EDTA extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AAE10-Ca	mg/kg	914	109	11.9	9	920	64.3	45.4	4.97
AAE10-Mg	mg/kg	108	11.0	10.2	9	107	8.88	4.58	4.25
AAE10-K	mg/kg	117	8.13	6.9	9	116	4.28	3.39	2.89

Method: PEP-Test measurements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
pH-H ₂ O	...	5.94	0.156	2.6	9	5.97	0.140	0.065	1.10

Method: PEP-Physical parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C-org	%	1.61	0.187	11.6	8	1.61	0.124	0.083	5.14
Humus	%	2.72	0.347	12.7	8	2.77	0.210	0.153	5.63



Indicative Values ISE 849



Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Co	mg/kg	1.10	0.417	37.9	37	1.10	0.184	0.086	7.78
Ga	mg/kg	4.12	1.39	33.7	37	4.80	1.30	0.285	6.92
I	mg/kg	1.67	0.267	16.0	8	1.65	0.150	0.118	7.08
Li	mg/kg	12.1	1.23	10.2	4	11.8	0.650	0.769	6.38
Mo	mg/kg	0.677	0.249	36.8	26	0.711	0.098	0.061	9.03
Ni	mg/kg	6.15	2.62	42.7	58	6.40	1.47	0.431	7.00
Se	mg/kg	0.815	0.583	71.5	8	1.15	0.300	0.257	31.6
Sn	mg/kg	1.04	0.647	62.4	16	1.64	0.397	0.202	19.5
Sb	mg/kg	0.680	0.294	43.2	16	0.643	0.193	0.092	13.5
Be	mg/kg	0.547	0.107	19.6	6	0.545	0.068	0.055	10.00
Tl	mg/kg	0.259	0.051	19.7	14	0.258	0.029	0.017	6.58
Ag	mg/kg	0.278	0.327	117.7	8	0.320	0.192	0.145	52.0
Bi	mg/kg	1.95	0.368	18.8	6	1.90	0.150	0.188	9.62
Nb	mg/kg	4.63	2.07	44.6	24	4.70	1.70	0.528	11.4
Nd	mg/kg	8.07	2.61	32.3	18	7.77	1.83	0.769	9.53
Sc	mg/kg	2.97	1.56	52.6	20	3.00	1.00	0.437	14.7
Th	mg/kg	2.99	1.49	49.9	18	3.06	1.06	0.439	14.7
U	mg/kg	0.936	0.259	27.7	18	0.980	0.130	0.076	8.16
Cs	mg/kg	0.909	0.672	73.9	9	1.43	0.380	0.280	30.8
W	mg/kg	1.56	0.516	33.2	9	1.80	0.400	0.215	13.8
Yb	mg/kg	0.751	0.178	23.7	7	0.708	0.122	0.084	11.2
Sm	mg/kg	2.04	0.936	46.0	10	2.00	0.640	0.370	18.2
Pr	mg/kg	1.99	1.17	58.9	7	2.04	0.420	0.555	27.8
Gd	mg/kg	1.21	0.414	34.2	6	1.25	0.240	0.211	17.5
Dy	mg/kg	1.41	0.200	14.2	7	1.45	0.082	0.095	6.69

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	1.97	1.14	58.0	27	2.30	0.682	0.275	14.0
Se	mg/kg	0.271	0.081	29.8	18	0.274	0.045	0.024	8.78
Sb	mg/kg	0.319	0.107	33.5	12	0.315	0.040	0.039	12.1
Tl	mg/kg	0.073	0.013	17.4	12	0.076	0.009	0.005	6.27
Ag	mg/kg	0.029	0.009	32.1	8	0.031	0.005	0.004	14.2
Ti	mg/kg	67.7	31.1	45.9	17	71.6	21.3	9.43	13.9



Indicative Values ISE 849

Method: Aqua Regia (ISO 54321) (replacing former ISO 11466)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	27.9	1.39	5.0	6	28.0	0.850	0.711	2.55
B	mg/kg	2.66	2.02	75.7	23	3.31	1.60	0.525	19.7
Bi	mg/kg	0.059	0.001	2.1	4	0.060	0.001	0.001	1.29
Ce	mg/kg	9.85	0.075	0.8	5	9.84	0.040	0.042	0.424
Rb	mg/kg	2.77	0.156	5.6	5	2.80	0.090	0.087	3.16
Sc	mg/kg	0.266	0.181	68.1	6	0.440	0.243	0.093	34.7
Th	mg/kg	0.684	0.346	50.7	6	0.744	0.147	0.177	25.9
Ti	mg/kg	84.5	28.0	33.2	34	90.7	18.0	6.01	7.11
Y	mg/kg	3.00	0.056	1.9	4	3.00	0.025	0.035	1.16

Method: Extraction with boiling 2M HNO3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tl	mg/kg	0.039	0.007	17.3	12	0.040	0.004	0.002	6.25

Method: Extraction with 0.01M CaCl2 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	µg/kg	120	0	-	5	120	0	0	0
B	µg/kg	85.9	28.7	33.4	17	87.7	17.3	8.71	10.1
Cu	µg/kg	35.0	9.56	27.3	16	35.7	5.60	2.99	8.54
Fe	mg/kg	3.41	1.39	40.9	16	3.35	1.05	0.436	12.8
N total soluble	mg/kg	88.1	8.66	9.8	5	89.0	3.80	4.84	5.50
P	mg/kg	1.09	0.370	34.0	30	1.07	0.246	0.084	7.76
SO4	mg/kg	131	31.3	24.0	7	126	20.8	14.8	11.3
Ni	µg/kg	26.9	6.06	22.6	7	25.0	0	2.87	10.7

Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
TIC=Tot.Inorg C(as CaCO3)	%	0.128	0.172	135.1	78	0.170	0.132	0.024	19.1
Fraction < 16 µm	%	8.48	3.71	43.8	45	8.26	2.40	0.692	8.16
Active Lime (as CaCO3)	%	0.160	0.164	102.9	9	0.200	0.100	0.068	42.9

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B - Hot water	mg/kg	0.365	0.191	52.2	51	0.383	0.117	0.033	9.14

Indicative Values ISE 849

Method: Pot. CEC using 1M NH₄-acetate at pH=7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	cmol+/kg	0.034	0.030	88.9	8	0.040	0.025	0.013	39.3

Method: Pot. CEC using 1M or 0.1M BaCl₂-TEA at pH=8.1 (ISO 13536 OR BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Na	cmol+/kg	0.158	0.039	24.8	8	0.150	0.029	0.017	11.0
K	cmol+/kg	0.311	0.033	10.5	7	0.317	0.017	0.015	4.94
Ca	cmol+/kg	4.80	1.17	24.3	8	4.80	0.565	0.516	10.7

Method: Pot. CEC using 1M NH₄Cl (BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	6.26	0.418	6.7	4	6.27	0.190	0.261	4.17
Al	cmol+/kg	0.088	0.007	7.9	5	0.087	0.003	0.004	4.40
Fe	cmol+/kg	0.016	0.003	20.7	9	0.017	0.002	0.001	8.64

Method: Act. CEC using 0.01M BaCl₂ (ISO 11260)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	5.43	0.994	18.3	9	5.40	0.560	0.414	7.63
Na	cmol+/kg	0.118	0.031	26.4	9	0.116	0.015	0.013	11.0
K	cmol+/kg	0.283	0.070	24.6	11	0.294	0.038	0.026	9.25
Fe	cmol+/kg	0.094	0.017	18.2	5	0.090	0.010	0.010	10.2
Al	cmol+/kg	0.111	0.042	37.3	6	0.118	0.020	0.021	19.1

Method: Act. CEC using cobaltihexamine (AFNOR NFX 31 130)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	cmol+/kg	0.038	0.022	57.7	13	0.040	0.016	0.008	20.0

Method: Mehlich-3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	0.317	0.184	58.1	55	0.310	0.120	0.031	9.79
Cd	mg/kg	0.151	0.024	15.8	4	0.151	0.016	0.015	9.85
Co	mg/kg	0.082	0.032	39.3	5	0.090	0.020	0.018	21.9

Method: Extraction with Ca-lactate (VDLUFA, Germany)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
K	mg/kg	109	16.3	14.9	8	107	6.10	7.19	6.57
P	mg/kg	86.1	43.7	50.8	8	84.8	22.3	19.3	22.5



Indicative Values ISE 849

Method: Extraction with double lactate (VDLUFA, Germany)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P	mg/kg	66.8	3.04	4.6	4	67.7	1.63	1.90	2.85
K	mg/kg	100.0	11.2	11.2	4	102	5.93	7.02	7.03

Method: Water soluble 1:10 (w/v) (EN-12457-4)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
N - NO ₃ (as N)	mg/kg	56.7	9.63	17.0	7	56.0	4.00	4.55	8.02

Method: Phosphorus and related analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P - w (as P)	mg/l soil	11.0	3.50	31.6	11	10.7	1.88	1.32	11.9

Method: Water soluble 1:10 (w/v) (Neth standard VPR C85-06)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
SO ₄	mg/kg	106	37.3	35.2	10	108	19.1	14.7	13.9

Method: Extraction with dilute nitric acid (0.43 Mol/l) ISO 17586

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	1.69	0.030	1.7	4	1.69	0.014	0.019	1.09
Cd	mg/kg	0.250	0.009	3.4	4	0.249	0.005	0.005	2.14
Co	mg/kg	0.204	0.012	6.0	4	0.204	0.008	0.008	3.73
Cr	mg/kg	3.35	0.127	3.8	4	3.35	0.070	0.079	2.36
Cu	mg/kg	3.22	0.591	18.4	9	3.30	0.200	0.246	7.66
Ni	mg/kg	0.850	0.079	9.3	4	0.853	0.036	0.049	5.78
Pb	mg/kg	14.3	1.41	9.9	4	14.2	0.775	0.882	6.17
Al	g/kg	1.09	0.010	1.0	4	1.09	0.006	0.006	0.594
Fe	g/kg	1.49	0.232	15.6	8	1.55	0.100	0.103	6.90
Mn	mg/kg	101	15.2	15.1	9	103	11.2	6.32	6.27
P	mg/kg	395	72.9	18.5	9	399	47.5	30.4	7.69
Na	mg/kg	27.3	7.99	29.3	9	25.3	4.65	3.33	12.2
S	mg/kg	55.2	16.6	30.1	8	57.3	9.53	7.34	13.3

Method: PEP-Ammoniumacetate-EDTA extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AAE10-P	mg/kg	85.9	17.3	20.1	9	87.1	11.8	7.19	8.37



Indicative Values ISE 849



Method: PEP-Water extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
H2O10-Mg	mg/kg	25.2	2.02	8.0	7	25.7	1.22	0.953	3.78
H2O10-K	mg/kg	50.5	2.89	5.7	7	51.6	2.00	1.37	2.70
H2O10-P	mg/kg	5.35	0.417	7.8	7	5.38	0.180	0.197	3.69

Method: PEP-Test measurements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CO2-K	K-test	5.23	0.253	4.8	7	5.20	0.162	0.119	2.28
CO2-P	P-test	9.34	1.15	12.3	7	9.02	0.710	0.544	5.83
CC-Mg	Mg-test	9.65	0.376	3.9	7	9.52	0.200	0.178	1.84
pH-CC	...	5.52	0.146	2.6	4	5.52	0.070	0.091	1.66

Method: PEP-Physical parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ton (clay)	%	5.79	2.97	51.4	6	5.28	1.50	1.52	26.2
Schluff (silt)	%	9.19	2.00	21.7	6	9.45	0.943	1.02	11.1
Sand	%	80.8	1.90	2.4	5	80.5	1.09	1.06	1.32
TOC_400	%	1.73	0.350	20.3	6	1.71	0.245	0.179	10.3
ROC_600	%	0.191	0.052	27.1	4	0.183	0.025	0.032	16.9

Method: PEP-Cation Exchange Capacity

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ca	cmol+/kg	4.17	1.60	38.4	4	4.17	1.11	1.00	24.0
Mg	cmol+/kg	0.894	0.021	2.4	4	0.892	0.011	0.013	1.48
K	cmol+/kg	0.322	0.022	6.7	4	0.317	0.012	0.013	4.17
H	cmol+/kg	6.77	0.631	9.3	4	6.88	0.310	0.394	5.83
KAK	cmol+/kg	12.3	2.07	16.9	4	12.2	0.945	1.30	10.6
S-Wert	cmol+/kg	5.46	1.55	28.4	4	5.46	1.11	0.969	17.7
BAS	%	42.4	5.92	14.0	4	42.1	3.42	3.70	8.73