



WEPAL-QUASIMEME

Certificate of Analysis



International Soil-Analytical Exchange

REFERENCE MATERIAL

ISE sample 993

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 993 of Sandy Soil, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 10 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	1
2024	1	4
2023	2	2
2021	1	3
2018	4	4



Consensus Values ISE 993



Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	16.7	1.14	6.9	77	16.7	0.600	0.163	0.976
As	mg/kg	3.60	0.786	21.8	53	3.64	0.416	0.135	3.74
Ba	mg/kg	284	23.5	8.3	66	285	13.7	3.61	1.27
Br	mg/kg	8.10	1.61	19.9	31	8.30	0.900	0.362	4.47
Ca	g/kg	4.17	0.397	9.5	78	4.20	0.225	0.056	1.35
Cd	mg/kg	11.5	1.20	10.4	57	11.6	0.820	0.199	1.72
Co	mg/kg	3.09	0.770	24.9	55	3.28	0.480	0.130	4.21
Cr	mg/kg	126	19.2	15.2	86	126	12.7	2.59	2.05
Cu	mg/kg	59.0	8.63	14.6	84	59.4	5.80	1.18	1.99
Fe	g/kg	6.46	0.550	8.5	87	6.52	0.342	0.074	1.14
K	mg/kg	7890	418	5.3	93	7857	262	54.1	0.686
Mg	mg/kg	678	133	19.7	69	694	60.9	20.1	2.96
Mn	mg/kg	274	34.0	12.4	87	279	21.6	4.55	1.66
Mo	mg/kg	2.26	0.311	13.7	41	2.30	0.160	0.061	2.68
Na	mg/kg	4154	271	6.5	68	4150	168	41.1	0.989
Ni	mg/kg	35.0	5.20	14.9	85	35.3	3.50	0.705	2.01
P	mg/kg	1023	126	12.3	77	1026	71.6	17.9	1.75
Pb	mg/kg	80.0	8.50	10.6	84	79.7	4.90	1.16	1.45
Rb	mg/kg	29.3	2.08	7.1	45	29.4	1.30	0.388	1.33
S	mg/kg	1325	348	26.3	73	1310	180	50.9	3.84
Si	g/kg	406	5.98	1.5	65	406	3.00	0.927	0.228
Sn	mg/kg	14.5	1.71	11.8	39	14.5	1.00	0.343	2.37
Sr	mg/kg	46.1	5.05	11.0	55	46.0	3.30	0.852	1.85
Y	mg/kg	10.5	1.51	14.4	34	10.7	0.950	0.324	3.09
Zn	mg/kg	169	18.9	11.2	87	168	11.8	2.54	1.51
Zr	mg/kg	216	26.8	12.4	42	220	17.0	5.17	2.40
C-elementary	g/kg	26.1	1.81	6.9	146	26.2	1.14	0.187	0.718
Sb	mg/kg	4.13	0.715	17.3	41	4.10	0.470	0.140	3.38
Tl	mg/kg	0.277	0.064	22.9	21	0.281	0.039	0.017	6.25
V	mg/kg	43.3	5.90	13.6	74	44.0	3.60	0.858	1.98
Ti	mg/kg	938	109	11.6	66	936	70.5	16.7	1.79
N - elementary	g/kg	2.35	0.207	8.8	247	2.36	0.130	0.016	0.700
Ce	mg/kg	19.7	4.04	20.5	33	20.0	2.41	0.878	4.45
La	mg/kg	8.32	2.32	27.9	32	8.48	1.57	0.513	6.16
Hg	µg/kg	264	34.5	13.1	73	265	20.6	5.04	1.91



Consensus Values ISE 993

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	4.37	0.735	16.8	61	4.44	0.458	0.118	2.69
As	mg/kg	2.69	0.348	12.9	78	2.73	0.214	0.049	1.83
Ba	mg/kg	75.7	7.52	9.9	57	75.9	5.90	1.24	1.65
Ca	g/kg	3.30	0.325	9.9	68	3.33	0.200	0.049	1.49
Cd	mg/kg	11.4	0.933	8.2	111	11.4	0.599	0.111	0.969
Co	mg/kg	2.97	0.305	10.3	84	2.97	0.170	0.042	1.40
Cr	mg/kg	110	10.6	9.6	108	110	6.83	1.27	1.15
Cu	mg/kg	58.2	5.02	8.6	118	58.1	3.33	0.578	0.992
Fe	g/kg	5.66	0.597	10.5	72	5.70	0.382	0.088	1.55
K	mg/kg	303	115	38.0	72	306	92.9	16.9	5.60
Li	mg/kg	5.10	0.573	11.2	13	5.06	0.440	0.199	3.90
Mg	mg/kg	512	63.2	12.3	65	514	40.3	9.79	1.91
Mn	mg/kg	244	22.7	9.3	78	244	14.1	3.21	1.32
Mo	mg/kg	2.18	0.218	10.0	68	2.17	0.128	0.033	1.52
N	g/kg	2.27	0.246	10.8	130	2.27	0.162	0.027	1.19
Na	mg/kg	66.9	21.4	32.0	55	67.2	13.3	3.61	5.40
Ni	mg/kg	32.7	3.01	9.2	101	32.8	1.83	0.375	1.15
P	mg/kg	976	114	11.7	84	979	72.3	15.6	1.59
Pb	mg/kg	60.8	5.16	8.5	110	61.4	3.48	0.615	1.01
S	mg/kg	1354	175	12.9	60	1343	119	28.2	2.08
Sn	mg/kg	14.4	1.30	9.0	46	14.2	0.592	0.239	1.66
Sr	mg/kg	9.74	1.41	14.5	21	10.0	0.914	0.384	3.95
Zn	mg/kg	165	15.0	9.1	116	164	9.89	1.75	1.06
V	mg/kg	37.4	2.50	6.7	59	37.1	1.60	0.407	1.09
Sb	mg/kg	1.86	0.301	16.2	38	1.84	0.164	0.061	3.28
Be	mg/kg	0.163	0.028	16.9	29	0.158	0.018	0.006	3.93
Tl	mg/kg	0.084	0.015	17.8	15	0.087	0.009	0.005	5.74
Ag	mg/kg	2.77	0.241	8.7	26	2.75	0.183	0.059	2.13
Hg	µg/kg	248	41.5	16.7	65	249	26.5	6.44	2.60

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	2733	496	18.2	24	2688	241	127	4.63
Al	g/kg	4.22	0.563	13.3	107	4.20	0.350	0.068	1.61
As	mg/kg	2.74	0.286	10.5	117	2.75	0.150	0.033	1.21
Ba	mg/kg	77.5	8.68	11.2	50	77.3	3.95	1.54	1.98
Be	mg/kg	0.159	0.019	12.2	29	0.159	0.010	0.005	2.84



Consensus Values ISE 993



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

(cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ca	g/kg	3.26	0.291	8.9	97	3.27	0.167	0.037	1.13
Cd	mg/kg	11.5	1.05	9.2	161	11.5	0.630	0.104	0.906
Co	mg/kg	3.04	0.280	9.2	116	3.06	0.180	0.033	1.07
Cr	mg/kg	112	9.61	8.6	162	111	5.90	0.944	0.844
Cu	mg/kg	59.4	4.93	8.3	164	59.2	3.15	0.481	0.810
Fe	g/kg	5.51	0.539	9.8	119	5.55	0.300	0.062	1.12
Hg	µg/kg	262	34.3	13.1	84	260	20.0	4.68	1.79
K	mg/kg	287	65.8	22.9	95	287	36.0	8.44	2.94
Mg	mg/kg	498	51.4	10.3	105	498	29.7	6.27	1.26
Mn	mg/kg	239	17.4	7.3	129	239	10.0	1.91	0.802
Mo	mg/kg	2.26	0.226	10.0	90	2.27	0.135	0.030	1.31
Na	mg/kg	66.3	19.4	29.2	68	68.8	12.6	2.93	4.43
Ni	mg/kg	33.5	3.17	9.5	165	33.6	2.19	0.309	0.923
P	mg/kg	992	86.2	8.7	95	984	51.0	11.1	1.11
Pb	mg/kg	60.7	6.02	9.9	167	61.0	3.30	0.582	0.959
S	mg/kg	1352	128	9.4	77	1351	79.0	18.2	1.35
Sb	mg/kg	1.82	0.202	11.1	43	1.82	0.147	0.038	2.12
Sn	mg/kg	14.6	1.41	9.7	35	14.7	0.700	0.298	2.05
Sr	mg/kg	10.1	1.91	18.9	31	10.5	1.01	0.429	4.25
Tl	mg/kg	0.080	0.016	20.2	28	0.080	0.010	0.004	4.78
U	mg/kg	0.256	0.030	11.6	22	0.255	0.020	0.008	3.10
V	mg/kg	37.8	2.42	6.4	72	37.6	1.50	0.356	0.942
Zn	mg/kg	167	13.1	7.8	163	169	7.97	1.28	0.764

Method: Extraction with boiling 2M HNO₃

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	mg/kg	12.0	0.967	8.1	74	12.0	0.611	0.140	1.17
Co	mg/kg	2.74	0.179	6.5	63	2.76	0.080	0.028	1.03
Cr	mg/kg	99.9	7.31	7.3	78	100	4.39	1.03	1.03
Cu	mg/kg	61.0	4.11	6.7	78	61.0	2.15	0.582	0.955
Hg	µg/kg	250	20.9	8.4	58	249	13.1	3.44	1.37
Mo	mg/kg	1.88	0.251	13.4	66	1.87	0.165	0.039	2.06
Ni	mg/kg	26.6	2.04	7.7	78	27.0	1.26	0.288	1.08
Pb	mg/kg	58.5	5.02	8.6	78	58.9	3.20	0.711	1.21
Tl	mg/kg	0.058	0.005	9.0	20	0.059	0.003	0.001	2.51
Zn	mg/kg	157	10.5	6.6	78	158	6.99	1.48	0.941

Method: Extraction with 0.1M NaNO₃

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	µg/kg	359	32.6	9.1	25	356	20.6	8.16	2.28
Cu	µg/kg	835	80.4	9.6	26	835	52.6	19.7	2.36
Ni	µg/kg	1449	94.7	6.5	26	1455	64.5	23.2	1.60
Zn	µg/kg	5452	406	7.4	26	5449	279	99.4	1.82

Method: Extraction with 0.01M CaCl₂ 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	µg/kg	259	25.5	9.8	18	261	13.8	7.51	2.90
Co	µg/kg	120	14.2	11.8	10	119	9.00	5.60	4.67
Cu	µg/kg	877	68.4	7.8	19	877	38.0	19.6	2.24
K	mg/kg	34.9	2.81	8.1	38	35.2	1.82	0.570	1.63
Mg	mg/kg	123	8.52	6.9	29	122	5.42	1.98	1.61
Mn	mg/kg	22.7	2.18	9.6	19	22.5	1.21	0.626	2.76
N - NH ₄ (as N)	mg/kg	59.4	5.91	9.9	38	58.8	3.58	1.20	2.02
N - NO ₃ (as N)	mg/kg	63.6	5.02	7.9	39	63.4	3.24	1.00	1.58
Na	mg/kg	29.3	3.08	10.5	32	29.6	1.92	0.681	2.32
P	mg/kg	4.10	0.933	22.7	38	3.99	0.698	0.189	4.61
Zn	µg/kg	12344	1401	11.3	19	12454	933	402	3.25

Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
pH - H ₂ O	...	5.56	0.147	2.6	452	5.57	0.095	0.009	0.155
pH - KCl	...	5.46	0.127	2.3	198	5.46	0.070	0.011	0.206
pH - CaCl ₂	...	5.45	0.108	2.0	145	5.46	0.080	0.011	0.206
Fraction < 2 µm	%	4.21	1.87	44.5	122	4.20	1.20	0.212	5.04
EC-SC (ISO 11265)	mS/m	114	14.4	12.7	197	113	8.00	1.28	1.13
Fraction < 63 µm	%	19.5	4.05	20.7	83	19.2	2.20	0.556	2.85
Fraction > 63 µm	%	80.0	3.99	5.0	73	80.1	2.50	0.584	0.730
Org.matter (L.O.I.)	%	4.99	0.315	6.3	181	5.00	0.190	0.029	0.587
TC=Total C (org.+inorg.)	g/kg	25.4	1.78	7.0	198	25.4	1.19	0.158	0.621
TOC=Total Org. C	g/kg	25.2	2.30	9.1	219	25.1	1.56	0.194	0.771
C - org others (W&B a.o.)	g/kg	23.9	3.60	15.1	230	24.0	2.27	0.297	1.24

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Moisture-content	%	1.21	0.215	17.8	213	1.21	0.140	0.018	1.52
delta 13C	‰ V-PDB	-28.5	0.221	0.8	19	-28.5	0.137	0.063	0.222



Consensus Values ISE 993

Method: Other determinations									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 15N	‰ Air	4.78	0.260	5.4	19	4.85	0.170	0.075	1.56
Method: Fluoride (Swiss standard procedure)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
F - Total	mg/kg	73.6	5.70	7.7	14	72.9	3.70	1.90	2.59
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	8.18	1.97	24.0	157	8.31	1.11	0.196	2.40
Na	cmol+/kg	0.146	0.041	27.9	206	0.150	0.024	0.004	2.43
K	cmol+/kg	0.139	0.025	17.9	242	0.140	0.015	0.002	1.44
Mg	cmol+/kg	1.11	0.191	17.2	249	1.12	0.124	0.015	1.36
Ca	cmol+/kg	11.2	1.72	15.4	237	11.1	1.12	0.140	1.25
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	0.143	0.012	8.5	8	0.143	0.006	0.005	3.75
Method: Pot. CEC using 1M NH4Cl (BZE)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	14.4	0.866	6.0	8	14.2	0.500	0.383	2.67
Na	cmol+/kg	0.147	0.018	12.5	20	0.145	0.015	0.005	3.49
K	cmol+/kg	0.140	0.009	6.5	20	0.141	0.005	0.003	1.81
Mg	cmol+/kg	1.18	0.062	5.3	20	1.17	0.024	0.017	1.48
Ca	cmol+/kg	11.7	1.38	11.8	20	11.4	0.890	0.385	3.29
Al	cmol+/kg	0.053	0.007	12.6	8	0.052	0.005	0.003	5.57
Mn	cmol+/kg	0.152	0.023	15.2	15	0.153	0.013	0.007	4.92
Method: Act. CEC using 0.01M BaCl2 (ISO 11260)									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Na	cmol+/kg	0.146	0.017	11.9	9	0.140	0.010	0.007	4.97
Mg	cmol+/kg	1.15	0.072	6.3	10	1.15	0.031	0.028	2.48
Ca	cmol+/kg	9.19	1.15	12.5	10	9.20	0.695	0.454	4.94

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	6.85	1.14	16.7	47	6.88	0.670	0.208	3.04
Na	cmol+/kg	0.139	0.018	13.3	35	0.137	0.010	0.004	2.80
K	cmol+/kg	0.112	0.016	14.1	37	0.113	0.010	0.003	2.91
Ca	cmol+/kg	11.6	0.858	7.4	39	11.5	0.426	0.172	1.49
Mg	cmol+/kg	1.13	0.098	8.7	39	1.14	0.060	0.020	1.73
Mn	cmol+/kg	0.098	0.011	10.8	11	0.100	0.007	0.004	4.07

Method: Mehlich-3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	0.653	0.195	29.9	58	0.656	0.126	0.032	4.91
Ca	mg/kg	2553	236	9.2	99	2550	154	29.6	1.16
Cu	mg/kg	18.9	3.57	18.9	102	19.0	2.38	0.442	2.34
Fe	mg/kg	545	76.4	14.0	101	543	48.3	9.51	1.74
K	mg/kg	55.0	6.92	12.6	101	55.0	4.36	0.861	1.57
Mg	mg/kg	145	14.4	9.9	100	145	9.30	1.80	1.24
Mn	mg/kg	53.1	8.12	15.3	105	53.8	5.60	0.991	1.86
Na	mg/kg	33.3	5.77	17.3	64	34.0	3.36	0.901	2.71
P	mg/kg	324	42.0	13.0	123	323	28.2	4.73	1.46
Zn	mg/kg	72.0	9.20	12.8	102	72.7	5.87	1.14	1.58
Al	mg/kg	552	85.4	15.5	56	556	54.7	14.3	2.58

Method: Extraction with 0.01M CaCl2 - 0.005M DTPA 1:10 (w/v)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cu	mg/kg	19.5	3.77	19.3	83	19.9	2.53	0.518	2.65
Fe	mg/kg	159	49.2	30.9	85	159	24.5	6.67	4.19
Mn	mg/kg	33.0	5.36	16.3	86	32.9	3.32	0.722	2.19
Zn	mg/kg	48.8	8.70	17.8	85	48.4	5.34	1.18	2.42

Method: Extraction with 1M KCl 1:10 (w/v)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
N - NH4 (as N)	mg/kg	71.2	10.2	14.3	58	70.7	6.14	1.67	2.35
N - NO3 (as N)	mg/kg	62.0	9.60	15.5	76	61.3	5.16	1.38	2.22

Method: Phosphorus and related analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P - Olsen (as P)	mg/kg	60.5	14.9	24.6	186	60.4	8.59	1.36	2.25
Al - Ox	mg/kg	644	77.4	12.0	14	636	46.8	25.8	4.01

Method: Phosphorus and related analysis									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Fe - Ox	mg/kg	2882	285	9.9	14	2887	212	95.3	3.31
P - Ox	mg/kg	796	61.3	7.7	13	792	36.0	21.2	2.67
P - AL (as P)	mg/kg	363	53.1	14.6	52	358	29.6	9.20	2.54
P - w (as P)	mg/l soil	15.1	2.79	18.5	18	15.4	1.88	0.822	5.44

Method: UK Soil Methods

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P – NaHCO ₃ (1/20)	mg/l	70.4	12.5	17.8	59	70.0	7.36	2.04	2.90
K - NH ₄ NO ₃ (1/5)	mg/l	71.7	8.46	11.8	65	72.1	5.65	1.31	1.83
Mg - NH ₄ NO ₃ (1/5)	mg/l	172	23.3	13.5	65	172	16.3	3.61	2.10
pH - H ₂ O (2/5)	...	5.52	0.099	1.8	62	5.52	0.060	0.016	0.285

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
K	mg/kg	58.3	6.60	11.3	10	57.7	5.40	2.61	4.47
Mg	mg/kg	146	18.3	12.5	10	149	14.0	7.22	4.94
S	mg/kg	976	123	12.6	9	984	68.4	51.4	5.27
Ca	g/kg	2.97	0.254	8.6	10	2.98	0.164	0.100	3.38

Method: PEP-Ammoniumacetate-EDTA extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AAE10-Ca	mg/kg	2733	213	7.8	9	2725	114	88.8	3.25
AAE10-Mg	mg/kg	142	11.4	8.0	9	141	9.25	4.73	3.33
AAE10-K	mg/kg	57.0	3.43	6.0	9	56.5	1.97	1.43	2.51

Method: PEP-Test measurements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
pH-H ₂ O	...	5.63	0.116	2.1	9	5.67	0.070	0.048	0.859

Method: PEP-Physical parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C-org	%	2.25	0.161	7.2	8	2.23	0.120	0.071	3.16
Humus	%	3.81	0.394	10.3	8	3.86	0.215	0.174	4.56



Indicative Values ISE 993

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ga	mg/kg	4.25	1.63	38.3	37	4.20	0.900	0.334	7.87
I	mg/kg	1.14	0.452	39.6	5	1.29	0.320	0.253	22.1
Li	mg/kg	11.1	2.60	23.5	6	11.2	1.17	1.33	12.0
Se	mg/kg	0.712	0.517	72.6	10	0.692	0.334	0.204	28.7
Be	mg/kg	0.547	0.147	26.8	6	0.575	0.055	0.075	13.7
Ag	mg/kg	2.57	0.998	38.8	17	2.81	0.550	0.302	11.8
Bi	mg/kg	2.77	2.08	75.2	13	3.40	1.40	0.721	26.1
Nb	mg/kg	4.86	2.45	50.3	27	5.00	1.47	0.588	12.1
Nd	mg/kg	6.67	2.21	33.1	22	6.71	1.36	0.588	8.83
Sc	mg/kg	2.76	1.77	64.2	18	2.71	1.05	0.523	18.9
Th	mg/kg	2.71	1.33	49.1	19	2.80	0.800	0.382	14.1
U	mg/kg	0.846	0.307	36.3	21	0.858	0.166	0.084	9.90
Cs	mg/kg	1.38	1.46	105.6	11	1.89	1.47	0.549	39.8
W	mg/kg	2.23	1.31	58.6	11	2.02	0.820	0.492	22.1

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	2.52	1.29	51.3	25	2.85	0.704	0.323	12.8
Rb	mg/kg	3.05	0.150	4.9	6	3.05	0.076	0.077	2.51
Se	mg/kg	0.243	0.070	28.7	22	0.245	0.032	0.019	7.65
Y	mg/kg	5.87	0.686	11.7	5	5.83	0.243	0.383	6.53
Ti	mg/kg	79.0	40.1	50.8	17	75.1	25.4	12.2	15.4
Ce	mg/kg	10.1	0.803	8.0	4	10.2	0.415	0.502	4.98
La	mg/kg	4.62	0.446	9.7	5	4.69	0.260	0.249	5.40
U	mg/kg	0.266	0.059	22.2	11	0.280	0.043	0.022	8.37

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	3.59	2.80	78.0	31	4.20	1.86	0.628	17.5
Bi	mg/kg	1.08	0.180	16.7	9	1.12	0.110	0.075	6.97
Ce	mg/kg	9.00	0.808	9.0	6	8.89	0.492	0.412	4.58
La	mg/kg	4.39	0.757	17.3	8	4.31	0.445	0.335	7.63
Li	mg/kg	4.75	1.65	34.7	27	4.80	1.03	0.396	8.35
Nd	mg/kg	3.69	0.067	1.8	4	3.71	0.035	0.042	1.13
Rb	mg/kg	2.23	0.514	23.0	6	2.22	0.225	0.262	11.7
Sc	mg/kg	0.218	0.073	33.4	6	0.241	0.051	0.037	17.1
Se	mg/kg	0.236	0.076	32.3	34	0.235	0.044	0.016	6.93



Indicative Values ISE 993

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

(cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ti	mg/kg	86.4	31.3	36.2	38	88.3	17.1	6.35	7.35
Y	mg/kg	5.79	0.088	1.5	5	5.77	0.030	0.049	0.854

Method: Extraction with 0.01M CaCl₂ 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Fe	mg/kg	4.72	2.76	58.4	19	4.60	1.40	0.791	16.8
N total soluble	mg/kg	149	3.35	2.2	7	150	2.10	1.58	1.06
SO ₄	mg/kg	2424	556	22.9	11	2306	306	210	8.65
Ni	µg/kg	2519	250	9.9	6	2457	144	128	5.07

Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
TIC=Tot.Inorg C(as CaCO ₃)	%	0.221	0.334	150.8	61	0.310	0.260	0.053	24.1
Fraction < 16 µm	%	8.92	4.26	47.8	41	8.55	2.72	0.832	9.33
Active Lime (as CaCO ₃)	%	0.831	1.19	143.4	9	1.02	0.820	0.496	59.7

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CN - Total	mg/kg	3.05	0.286	9.4	4	3.05	0.130	0.179	5.87
B - Hot water	mg/kg	0.827	0.404	48.9	55	0.900	0.220	0.068	8.24

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	0.029	0.022	74.5	8	0.038	0.018	0.010	32.9

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	10.5	2.57	24.4	19	10.4	1.62	0.738	7.01
K	cmol+/kg	0.130	0.037	28.9	9	0.130	0.029	0.016	12.0
Mg	cmol+/kg	1.06	0.302	28.4	9	1.00	0.160	0.126	11.8
Ca	cmol+/kg	10.6	2.59	24.4	9	10.9	2.03	1.08	10.2

Method: Pot. CEC using 1M NH₄Cl (BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Fe	cmol+/kg	0.027	0.015	55.1	13	0.030	0.009	0.005	19.1



Indicative Values ISE 993

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	7.06	1.27	17.9	9	7.50	0.700	0.527	7.47
K	cmol+/kg	0.147	0.038	26.0	9	0.150	0.014	0.016	10.8
Fe	cmol+/kg	0.140	0.011	8.0	4	0.140	0.005	0.007	4.98
Al	cmol+/kg	0.045	0.022	48.6	4	0.045	0.015	0.014	30.4

Method: Act. CEC using 0.1M BaCl₂ (UNEP-UN/EC 91065A)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CEC	cmol+/kg	11.2	0.878	7.8	4	11.2	0.405	0.549	4.90
Na	cmol+/kg	0.134	0.012	8.8	4	0.134	0.007	0.007	5.53
K	cmol+/kg	0.118	0.010	8.0	4	0.118	0.005	0.006	5.03
Ca	cmol+/kg	9.46	0.615	6.5	4	9.60	0.307	0.384	4.06
Mg	cmol+/kg	1.25	0.088	7.0	4	1.27	0.042	0.055	4.36
Fe	cmol+/kg	0.079	0.034	42.7	4	0.078	0.021	0.021	26.7
Mn	cmol+/kg	0.139	0.012	8.8	4	0.139	0.006	0.008	5.49

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	cmol+/kg	0.041	0.054	132.5	9	0.052	0.032	0.022	55.2
Fe	cmol+/kg	0.007	0.008	123.7	9	0.010	0.007	0.003	51.5

Method: Mehlich-3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	mg/kg	6.97	0.834	12.0	4	7.03	0.404	0.521	7.48
Co	mg/kg	0.419	0.116	27.7	7	0.430	0.050	0.055	13.1

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
K	mg/kg	42.2	13.7	32.5	7	41.6	8.20	6.48	15.4
P	mg/kg	84.0	33.9	40.4	8	88.3	19.1	15.0	17.8

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cl	mg/kg	11.6	7.94	68.6	7	10.0	4.40	3.75	32.4
N - NO ₃ (as N)	mg/kg	58.9	11.8	20.1	8	57.0	7.57	5.23	8.88



Indicative Values ISE 993

Method: Phosphorus and related analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
P - Bray (as P)	mg/kg	207	122	59.1	128	208	74.4	13.5	6.53

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cl	mg/kg	4.35	2.68	61.7	5	5.10	2.06	1.50	34.5
SO4	mg/kg	2824	510	18.0	12	2754	247	184	6.51

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	1.59	0.102	6.4	5	1.58	0.059	0.057	3.60
B	mg/kg	1.61	0.876	54.4	4	1.52	0.445	0.547	34.0
Cd	mg/kg	11.0	1.65	15.0	4	11.2	0.800	1.03	9.37
Co	mg/kg	1.99	0.291	14.6	4	2.01	0.175	0.182	9.13
Cr	mg/kg	41.2	2.84	6.9	6	41.2	1.08	1.45	3.52
Cu	mg/kg	48.1	8.72	18.1	10	48.4	4.90	3.45	7.17
Ni	mg/kg	21.1	2.49	11.8	6	21.4	1.49	1.27	6.01
Pb	mg/kg	49.8	6.52	13.1	5	51.1	3.89	3.65	7.33
Zn	mg/kg	97.9	16.2	16.6	10	99.1	7.25	6.42	6.56
Al	g/kg	0.718	0.060	8.4	6	0.728	0.028	0.031	4.29
Fe	g/kg	1.75	0.335	19.2	10	1.77	0.265	0.132	7.58
Mn	mg/kg	153	27.9	18.3	9	147	16.7	11.6	7.62
P	mg/kg	677	118	17.4	9	670	63.8	49.0	7.24
Na	mg/kg	37.2	8.14	21.9	10	37.8	3.65	3.22	8.66

Method: PEP-Ammoniumacetate-EDTA extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AAE10-P	mg/kg	223	41.0	18.4	9	213	22.8	17.1	7.68

Method: PEP-Water extraction

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
H2O10-Mg	mg/kg	89.9	5.79	6.4	7	91.0	5.20	2.74	3.04
H2O10-K	mg/kg	30.6	2.10	6.9	7	30.6	1.40	0.993	3.25
H2O10-P	mg/kg	6.97	1.03	14.7	7	6.95	0.570	0.486	6.96



Indicative Values ISE 993

Method: PEP-Test measurements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CO2-K	K-test	3.03	0.175	5.8	7	3.06	0.092	0.083	2.72
CO2-P	P-test	19.6	2.06	10.5	7	19.1	1.29	0.972	4.96
CC-Mg	Mg-test	12.7	0.325	2.6	7	12.6	0.200	0.154	1.21
pH-CC	...	5.47	0.087	1.6	4	5.46	0.040	0.054	0.990

Method: PEP-Physical parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ton (clay)	%	6.82	2.61	38.3	6	6.95	1.50	1.33	19.5
Schluff (silt)	%	10.3	1.76	17.1	6	10.5	1.08	0.897	8.72
Sand	%	79.2	1.60	2.0	5	79.3	0.873	0.895	1.13
TOC_400	%	2.28	0.321	14.0	6	2.27	0.180	0.164	7.17
ROC_600	%	0.245	0.101	41.3	4	0.254	0.045	0.063	25.8

Method: PEP-Cation Exchange Capacity

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ca	cmol+/kg	10.6	3.85	36.5	4	10.6	2.53	2.41	22.8
Mg	cmol+/kg	1.22	0.105	8.7	4	1.22	0.050	0.066	5.41
Na	cmol+/kg	0.152	0.043	28.4	4	0.150	0.020	0.027	17.8
K	cmol+/kg	0.113	0.048	41.9	4	0.118	0.024	0.030	26.2
H	cmol+/kg	6.61	0.341	5.2	4	6.61	0.155	0.213	3.23
KAK	cmol+/kg	18.6	3.77	20.3	4	18.7	2.59	2.36	12.7
S-Wert	cmol+/kg	12.0	3.84	32.0	4	12.1	2.55	2.40	20.0
BAS	%	64.4	8.49	13.2	4	64.8	4.44	5.31	8.24