WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 227

WAGENINGEN
UNIVERSITY & RESEARCH

marsep

Certificate of Analysis MARSEP 227

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 determinand 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.

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 MARSEP samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This MARSEP sample 227 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 11 periods (or 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.It also gives a better estimate of the concentrations of non-stable or volatile determinands. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2020	3	4
2017	4	1
2014	3	4
2011	4	1
2008	2	3

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Consensus Values MARSEP 227

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	14075	1129	8.0	14	14030	720	377	2.68
Al	g/kg	25.8	2.04	7.9	45	26.0	1.19	0.379	1.47
As	mg/kg	5.34	0.733	13.7	59	5.30	0.510	0.119	2.23
B	mg/kg	29.9	8.33	27.8	35	31.2	5.76	1.76	5.88
Ba	mg/kg	672	66.4	9.9	27	660	46.0	16.0	2.38
Be	µg/kg	572	61.7	10.8	23	573	27.0	16.1	2.81
Ca	g/kg	75.9	2.64	3.5	130	75.9	1.45	0.290	0.382
Cd	mg/kg	2.09	0.166	8.0	137	2.10	0.100	0.018	0.850
Co	mg/kg	9.12	0.735	8.1	111	9.11	0.530	0.087	0.956
Cr	mg/kg	113	11.5	10.2	134	112	6.45	1.24	1.10
Cu	mg/kg	636	42.4	6.7	143	634	24.0	4.43	0.696
Fe	g/kg	34.1	2.06	6.0	87	33.9	1.10	0.276	0.809
Hg	µg/kg	1392	150	10.8	115	1400	89.0	17.5	1.26
K	g/kg	3.16	0.750	23.7	137	3.15	0.484	0.080	2.53
Mg	g/kg	4.96	0.372	7.5	134	4.94	0.235	0.040	0.811
Mn	mg/kg	313	19.1	6.1	81	314	13.0	2.65	0.848
Mo	mg/kg	8.36	0.793	9.5	104	8.30	0.467	0.097	1.16
Na	g/kg	1.10	0.098	8.9	58	1.11	0.065	0.016	1.46
Ni	mg/kg	79.9	5.33	6.7	135	79.8	3.20	0.573	0.717
N	g/kg	23.0	0.653	2.8	126	23.0	0.400	0.073	0.316
P	g/kg	22.4	0.974	4.4	137	22.4	0.600	0.104	0.465
Pb	mg/kg	183	11.4	6.2	136	183	7.04	1.23	0.668
Sb	µg/kg	3900	673	17.2	19	3900	320	193	4.95
Se	µg/kg	3084	551	17.9	22	2945	385	147	4.76
Sn	mg/kg	80.9	14.0	17.3	20	79.1	8.98	3.91	4.84
Sr	mg/kg	270	26.0	9.6	14	271	20.5	8.68	3.21
V	mg/kg	23.8	4.73	19.9	38	23.9	3.29	0.959	4.04
Zn	mg/kg	1331	61.2	4.6	143	1332	38.0	6.39	0.480
S	mg/kg	6495	855	13.2	31	6593	490	192	2.95
TC =totalC (org+inorg)	g/kg	209	10.6	5.1	23	207	8.00	2.76	1.32

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	465	52.3	11.3	32	461	27.0	11.6	2.49
loss-on-ignition	%	37.7	0.793	2.1	110	37.7	0.455	0.094	0.250

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Indicative Values MARSEP 227

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Bi	µg/kg	3248	253	7.8	5	3200	122	141	4.35
Li	mg/kg	10.6	1.90	18.0	11	10.9	1.70	0.718	6.77
S - SO4 (as S)	mg/kg	5053	1636	32.4	7	6298	2486	773	15.3
Ti	mg/kg	178	137	77.0	10	166	96.9	54.1	30.4
Tl	µg/kg	126	38.5	30.5	12	130	26.1	13.9	11.0

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
dry weight	%	95.1	2.09	2.2	5	94.7	1.17	1.17	1.23