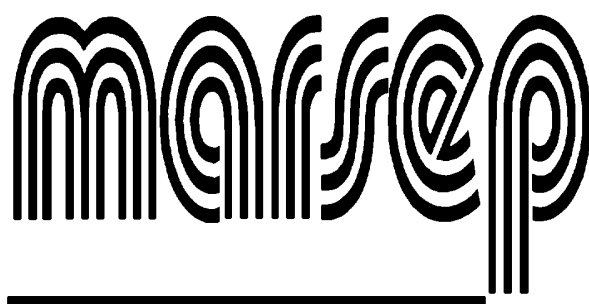




WEPAL-QUASIMEME

Certificate of Analysis



International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 238

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

This MARSEP sample 238 of Organic Fertilizer, from Belgium, is prepared for the WEPAL proficiency programs. The sample has been used in 15 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 measurands. 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
2025	3	1
2024	4	4
2023	3	4
2021	1	2

Consensus Values MARSEP 238

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	0.769	0.240	31.1	57	0.770	0.165	0.040	5.16
As	mg/kg	0.358	0.037	10.2	27	0.360	0.026	0.009	2.46
B	mg/kg	17.6	3.30	18.7	46	17.6	2.32	0.608	3.45
Ba	mg/kg	25.1	2.22	8.8	22	25.1	1.15	0.591	2.36
Be	µg/kg	30.0	4.06	13.5	8	30.4	2.57	1.80	5.99
Ca	g/kg	41.1	2.44	5.9	117	40.9	1.50	0.282	0.687
Cd	mg/kg	0.055	0.016	29.4	72	0.057	0.010	0.002	4.34
Co	mg/kg	0.409	0.060	14.7	63	0.402	0.042	0.009	2.31
Cr	mg/kg	4.43	0.750	16.9	104	4.58	0.506	0.092	2.07
Cu	mg/kg	15.3	1.45	9.5	120	15.3	0.918	0.166	1.08
Fe	g/kg	1.11	0.123	11.1	90	1.11	0.071	0.016	1.47
Hg	µg/kg	19.8	6.69	33.9	71	20.6	4.57	0.992	5.02
K	g/kg	31.5	2.19	7.0	131	31.5	1.47	0.239	0.761
Mg	g/kg	1.84	0.146	7.9	123	1.84	0.080	0.016	0.895
Mn	mg/kg	30.5	2.53	8.3	89	30.5	1.64	0.335	1.10
Mo	mg/kg	0.525	0.066	12.6	73	0.536	0.041	0.010	1.85
Na	g/kg	10.1	0.575	5.7	75	10.1	0.300	0.083	0.819
Ni	mg/kg	2.66	0.346	13.0	99	2.70	0.226	0.043	1.64
N	g/kg	97.8	3.47	3.6	122	98.0	2.08	0.393	0.402
P	g/kg	24.2	1.48	6.1	131	24.2	0.902	0.162	0.669
Pb	mg/kg	1.82	0.333	18.3	91	1.82	0.210	0.044	2.40
Sb	µg/kg	76.3	12.0	15.7	11	76.0	7.15	4.50	5.90
Se	µg/kg	479	56.7	11.8	27	486	40.0	13.6	2.85
Sr	mg/kg	51.9	4.93	9.5	14	51.5	2.73	1.65	3.17
Zn	mg/kg	93.9	6.87	7.3	124	93.7	4.70	0.771	0.821
S	mg/kg	24154	2331	9.7	58	24032	1470	383	1.58
TC =totalC (org+inorg)	g/kg	396	16.2	4.1	43	397	10.0	3.09	0.779
U	mg/kg	0.129	0.020	15.6	13	0.129	0.012	0.007	5.40
TOC =total org.C	g/kg	393	24.3	6.2	11	398	13.0	9.17	2.33
OC = org.C	g/kg	384	38.4	10.0	12	385	13.3	13.8	3.60

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	33.4	6.36	19.0	17	34.0	4.50	1.93	5.77
loss-on-ignition	%	77.0	0.351	0.5	98	77.0	0.205	0.044	0.058
residue-on-ignition	%	23.0	0.211	0.9	13	23.0	0.100	0.073	0.318
dry weight	%	93.3	0.634	0.7	57	93.3	0.300	0.105	0.112

Indicative Values MARSEP 238

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	15.3	12.6	82.1	8	16.1	6.05	5.55	36.3
Ga	µg/kg	240	30.1	12.5	4	247	15.9	18.8	7.83
Li	mg/kg	0.954	0.180	18.9	10	0.982	0.105	0.071	7.47
N - NH4 (as N)	mg/kg	2243	93.0	4.1	5	2214	62.4	52.0	2.32
S - SO4 (as S)	mg/kg	23579	2809	11.9	7	23470	1658	1327	5.63
Sn	mg/kg	0.206	0.065	31.5	19	0.202	0.042	0.019	9.04
Ti	mg/kg	42.1	41.9	99.5	11	50.9	32.8	15.8	37.5
V	mg/kg	1.64	0.479	29.2	32	1.69	0.319	0.106	6.44
Tl	µg/kg	20.4	10.1	49.4	9	21.6	7.44	4.21	20.6