QUASIMEME

Quality assurance of information for marine environmental monitoring

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Certificate of Analysis

Sediment

REFERENCE MATERIAL

Sediment sample 31

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis Sediment 31

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.

The results of each determinand is expressed on dried sediment.

Sample information

QUASIMEME reference materials cover a range of natural Marine sediment species from contaminated waters from the North Sea and/or Mediterranean. There is no spiking, mixing or other alterations of the samples. For sample preparation the sediment samples are dried at 40 oC and milled to pass a 0.5 mm sieve.

This Sediment sample 31 of harbor sediment from Zeebrugge, Belgium is prepared for the QUASIMEME proficiency programs. The results on which the values in this report are based were taken from the periods given in the following table.

Year.Round	Program	Sample Round Id
2024.2	MS1	QTM148MS
2021.1	MS1	QTM135MS
2017.2	MS1	QTM121MS

Consensus Values MS1

Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Aluminium-RT	%	3.00	0.250	8.4	39	2.99	0.140	0.050	1.67
Arsenic-RT	mg/kg	11.9	1.28	10.8	36	11.9	0.770	0.268	2.25
Cadmium-RT	µg/kg	257	36.1	14.0	29	250	20.0	8.37	3.26
Chromium-RT	mg/kg	54.9	7.37	13.4	40	55.2	4.47	1.46	2.65
Copper-RT	mg/kg	10.1	0.844	8.3	41	10.2	0.500	0.165	1.63
Iron-RT	%	1.79	0.145	8.1	41	1.80	0.097	0.028	1.59
Lead-RT	mg/kg	24.1	2.89	12.0	39	23.3	2.05	0.578	2.40
Lithium-RT	mg/kg	29.0	3.99	13.8	29	29.0	2.50	0.927	3.20
Manganese-RT	mg/kg	406	33.1	8.2	39	406	23.2	6.63	1.63
Mercury-RT	µg/kg	104	16.0	15.3	36	104	10.4	3.34	3.20
Nickel-RT	mg/kg	14.3	1.95	13.6	41	14.2	1.18	0.380	2.66
Scandium-RT	mg/kg	6.20	0.806	13.0	8	6.21	0.580	0.356	5.74
Zinc-RT	mg/kg	72.5	6.05	8.3	42	72.8	3.72	1.17	1.61
Magnesium-RT	mg/kg	8107	571	7.0	13	8135	235	198	2.44
Phosphorus-RT	mg/kg	720	92.0	12.8	11	718	71.3	34.7	4.81
Potassium-RT	mg/kg	11522	957	8.3	9	11259	586	399	3.46
Barium-RT	mg/kg	175	15.7	9.0	21	178	10.8	4.29	2.45
Calcium-RT	g/kg	109	10.9	9.9	12	109	4.93	3.92	3.59
Vanadium-RT	mg/kg	60.5	4.63	7.6	28	60.1	2.68	1.09	1.81
Cobalt-RT	mg/kg	5.43	0.334	6.1	19	5.42	0.220	0.096	1.76
Strontium-RT	mg/kg	443	47.6	10.8	16	444	33.5	14.9	3.36

Method: Acid extractable (So-called totals) - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Aluminium-AE	%	1.87	0.419	22.4	45	1.90	0.260	0.078	4.18
Arsenic-AE	mg/kg	10.5	1.16	11.0	62	10.6	0.774	0.183	1.75
Cadmium-AE	µg/kg	238	23.0	9.7	55	239	14.0	3.87	1.63
Chromium-AE	mg/kg	36.7	7.60	20.7	64	37.1	4.65	1.19	3.23
Copper-AE	mg/kg	8.75	1.12	12.8	68	9.00	0.815	0.169	1.94
Iron-AE	%	1.65	0.126	7.7	55	1.66	0.090	0.021	1.29
Lead-AE	mg/kg	20.8	2.32	11.1	68	21.1	1.60	0.352	1.69
Lithium-AE	mg/kg	22.9	2.59	11.3	27	23.1	1.40	0.623	2.71
Manganese-AE	mg/kg	375	26.2	7.0	55	375	18.0	4.41	1.18
Mercury-AE	µg/kg	104	13.9	13.3	60	104	9.50	2.24	2.15
Nickel-AE	mg/kg	12.5	1.39	11.1	67	12.6	0.800	0.212	1.69
Zinc-AE	mg/kg	68.5	5.45	8.0	68	68.0	3.79	0.826	1.21

Consensus Values MS1

Magnesium-AE	mg/kg	7665	512	6.7	17	7632	432	155	2.03
Method: Acid extractable (So-called totals) - MS1									(cont.)
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
Phosphorus-AE	mg/kg	673	48.7	7.2	21	675	35.0	13.3	1.97
Calcium-AE	g/kg	106	5.15	4.9	13	106	3.34	1.79	1.69
Vanadium-AE	mg/kg	45.7	8.15	17.8	42	45.2	5.45	1.57	3.44
Cobalt-AE	mg/kg	4.84	0.516	10.7	32	4.88	0.345	0.114	2.36
Strontium-AE	mg/kg	417	46.3	11.1	18	415	25.9	13.7	3.28
Uranium-AE	mg/kg	0.699	0.105	15.0	14	0.721	0.049	0.035	5.00

Method: Carbon - MS1

Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
TOC	%	1.11	0.139	12.5	37	1.12	0.085	0.029	2.58
Inorganic-Carbonate	%	3.39	0.279	8.2	19	3.42	0.160	0.080	2.36

Indicative Values MS1

Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sodium-RT	mg/kg	13691	1041	7.6	7	13617	698	492	3.59
Titanium-RT	mg/kg	2726	245	9.0	5	2743	123	137	5.03
Cesium-RT	µg/kg	3819	377	9.9	4	3731	201	236	6.17
Rubidium-RT	mg/kg	52.5	5.45	10.4	7	52.9	2.96	2.58	4.91
Molybdenum-RT	mg/kg	0.615	0.342	55.6	8	0.715	0.166	0.151	24.6
Cerium-RT	mg/kg	38.0	7.91	20.8	4	39.0	3.70	4.94	13.0
Uranium-RT	mg/kg	1.65	0.175	10.6	7	1.60	0.095	0.083	5.02

Method: Acid extractable (So-called totals) - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Scandium-AE	mg/kg	4.53	1.22	26.8	7	4.80	0.600	0.574	12.7
Sodium-AE	mg/kg	9970	598	6.0	6	9935	420	305	3.06
Sulfur-AE	mg/kg	3229	197	6.1	5	3220	110	110	3.41
Potassium-AE	mg/kg	5984	1033	17.3	8	5949	698	457	7.63
Titanium-AE	mg/kg	474	217	45.7	7	524	234	102	21.6
Gallium-AE	µg/kg	5581	2101	37.6	5	5900	1130	1174	21.0
Selenium-AE	mg/kg	0.308	0.122	39.6	18	0.318	0.050	0.036	11.7
Barium-AE	mg/kg	46.7	20.4	43.6	28	46.3	14.9	4.81	10.3
Thallium-AE	µg/kg	188	79.4	42.2	14	201	55.5	26.5	14.1
Rubidium-AE	mg/kg	40.6	8.59	21.2	4	41.3	4.15	5.37	13.2
Molybdenum-AE	mg/kg	0.378	0.087	23.1	17	0.400	0.056	0.026	7.02