



QUASIMEME

Quality assurance of information
for marine environmental monitoring

Certificate of Analysis



Sediment

REFERENCE MATERIAL

Sediment sample 27



Certificate of Analysis Sediment 27

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 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 10 results while the relative uncertainty is smaller than 6.25%. Indicative Values are based on a relative uncertainty of maximum 35% with at least 4 and less than 10 results or a relative uncertainty higher than 6.25%.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation) and the uncertainty in the assigned value. The confidence limits (at 95 % probability) are calculated for these determinands.

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 27 of River sediment from Elbe river, Germany 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
2020.2	MS1	QTM132MS
2017.2	MS1	QTM120MS
2015.1	MS1	QTM111MS



Consensus Values MS1

Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Aluminium-RT	%	4.50	0.511	11.4	47	4.50	0.356	0.093	4.35	-	4.65
Arsenic-RT	mg/kg	21.8	2.42	11.1	42	22.0	1.65	0.47	21.0	-	22.5
Barium-RT	mg/kg	516	52.6	10.2	22	515	35.4	14.0	492	-	539
Cadmium-RT	µg/kg	5000	454	9.1	43	4860	330	87	4860	-	5140
Calcium-RT	g/kg	44.3	2.23	5.0	10	44.7	1.50	0.88	42.8	-	45.9
Chromium-RT	mg/kg	81.8	9.43	11.5	45	80.8	6.46	1.76	79.0	-	84.7
Cobalt-RT	mg/kg	16.7	0.95	5.7	19	16.5	0.70	0.27	16.3	-	17.2
Copper-RT	mg/kg	92.1	7.47	8.1	46	92.6	5.22	1.38	89.9	-	94.3
Iron-RT	%	2.82	0.190	6.7	47	2.80	0.130	0.035	2.77	-	2.88
Lead-RT	mg/kg	116	9.1	7.8	43	116	6.0	1.7	112.8	-	118.4
Lithium-RT	mg/kg	36.4	3.39	9.3	40	35.7	2.30	0.67	35.3	-	37.5
Magnesium-RT	mg/kg	7160	432	6.0	12	7150	316	156	6889	-	7432
Manganese-RT	mg/kg	674	60.1	8.9	45	672	42.0	11.2	656	-	692
Mercury-RT	µg/kg	1920	163	8.5	38	1900	113	33	1862	-	1969
Nickel-RT	mg/kg	40.8	3.33	8.2	47	40.3	2.30	0.61	39.8	-	41.8
Phosphorus-RT	mg/kg	2260	160	7.1	13	2280	104	55	2162	-	2353
Potassium-RT	mg/kg	17000	1260	7.4	11	17000	900	470	16130	-	17800
Strontium-RT	mg/kg	214	19.4	9.1	18	214	13.2	5.7	204	-	223
Vanadium-RT	mg/kg	61.2	4.23	6.9	29	61.0	2.90	0.98	59.6	-	62.8
Zinc-RT	mg/kg	1170	84	7.2	48	1160	58	15	1147	-	1195

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Aluminium-AE	%	2.27	0.678	29.8	45	2.30	0.470	0.126	2.07	-	2.48
Arsenic-AE	mg/kg	20.7	1.98	9.6	64	20.7	1.33	0.31	20.2	-	21.2
Barium-AE	mg/kg	257	31.9	12.4	28	258	22.2	7.5	244	-	269
Cadmium-AE	µg/kg	5020	278	5.5	66	5010	195	43	4954	-	5091
Calcium-AE	g/kg	43.4	2.31	5.3	14	43.8	1.60	0.77	42.1	-	44.7
Chromium-AE	mg/kg	59.4	7.41	12.5	65	60.0	5.10	1.15	57.6	-	61.3
Cobalt-AE	mg/kg	15.0	0.82	5.5	31	15.1	0.57	0.18	14.71	-	15.31
Copper-AE	mg/kg	92.9	5.27	5.7	69	93.0	3.55	0.79	91.6	-	94.1
Iron-AE	%	2.59	0.196	7.5	58	2.58	0.134	0.032	2.54	-	2.64
Lead-AE	mg/kg	113	8.3	7.3	70	113	5.6	1.2	111.0	-	114.9
Lithium-AE	mg/kg	29.4	3.03	10.3	29	29.1	2.05	0.70	28.2	-	30.5
Magnesium-AE	mg/kg	6370	439	6.9	18	6320	315	129	6154	-	6589
Manganese-AE	mg/kg	621	32.8	5.3	58	620	22.1	5.4	612	-	629



Consensus Values MS1

Mercury-AE	µg/kg	1910	149	7.8	66	1920	101	23	1871	-	1944
Method: Acid extractable (So-called totals) - MS1											
(cont.)											
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Molybdenum-AE	mg/kg	0.787	0.0746	9.5	14	0.792	0.0505	0.0249	0.745	-	0.830
Nickel-AE	mg/kg	37.9	2.79	7.4	69	37.9	1.90	0.42	37.3	-	38.6
Phosphorus-AE	mg/kg	2230	82	3.7	15	2250	59	26	2189	-	2279
Strontium-AE	mg/kg	159	7.8	4.9	19	160	5.0	2.2	155.1	-	162.6
Thallium-AE	µg/kg	917	70.7	7.7	12	925	47.4	25.5	873	-	962
Uranium-AE	mg/kg	1.46	0.195	13.4	13	1.50	0.140	0.068	1.34	-	1.57
Vanadium-AE	mg/kg	41.1	11.72	28.5	42	39.6	8.45	2.26	37.4	-	44.7
Zinc-AE	mg/kg	1130	75	6.6	70	1130	51	11	1113	-	1148

Method: Carbon - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Inorganic-Carbonate	%	1.21	0.120	10.0	17	1.24	0.090	0.037	1.14	-	1.27
TOC	%	4.40	0.480	10.9	38	4.43	0.335	0.097	4.24	-	4.56



Indicative Values MS1

Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Molybdenum-RT	mg/kg	1.24	0.174	14.1	6	1.30	0.141	0.089	1.06	- 1.41
Rubidium-RT	mg/kg	80.2	16.45	20.5	8	82.5	11.95	7.27	66.8	- 93.6
Scandium-RT	mg/kg	7.48	1.433	19.2	9	7.79	1.090	0.597	6.40	- 8.56
Sodium-RT	mg/kg	6090	348	5.7	9	6010	228	145	5831	- 6356
Sulfur-RT	mg/kg	3090	133	4.3	5	3020	111	74	2938	- 3244
Thallium-RT	µg/kg	1200	52	4.3	4	1200	34	33	1133	- 1277
Titanium-RT	mg/kg	3560	291	8.2	7	3590	193	138	3303	- 3824
Uranium-RT	mg/kg	2.95	0.236	8.0	6	2.92	0.155	0.121	2.71	- 3.18

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Cerium-AE	mg/kg	50.9	2.97	5.8	4	49.9	2.22	1.86	46.8	- 55.0
Cesium-AE	µg/kg	7250	200	2.8	4	7180	150	125	6974	- 7530
Gallium-AE	µg/kg	7660	3227	42.1	9	7730	2163	1344	5230	- 10090
Potassium-AE	mg/kg	3820	1039	27.2	9	4010	685	433	3030	- 4600
Rubidium-AE	mg/kg	38.6	3.88	10.1	5	39.4	3.05	2.17	34.1	- 43.0
Scandium-AE	mg/kg	4.97	1.395	28.0	6	5.30	0.920	0.712	3.58	- 6.37
Selenium-AE	mg/kg	1.68	0.548	32.6	18	1.61	0.389	0.161	1.41	- 1.95
Sodium-AE	mg/kg	489	64.8	13.3	7	480	46.1	30.6	431	- 547
Sulfur-AE	mg/kg	3050	104	3.4	6	3030	70	53	2943	- 3151
Titanium-AE	mg/kg	502	129.8	25.9	9	543	99.8	54.1	404	- 599