



# QUASIMEME

Quality assurance of information  
for marine environmental monitoring

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## Certificate of Analysis



**Sediment**

**REFERENCE MATERIAL**

**Sediment sample 33**

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## Certificate of Analysis Sediment 33

### 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 33 of Open sea sediment from Burbo bight, United Kingdom 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
2023.2	MS1	QTM145MS
2020.2	MS1	QTM133MS
2016.2	MS1	QTM117MS
2015.2	MS1	QTM113MS



## Consensus Values MS1

### Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Aluminium-RT	%	1.97	0.230	11.7	64	1.99	0.165	0.036	1.92	-	2.03
Arsenic-RT	mg/kg	8.51	1.115	13.1	56	8.49	0.648	0.186	8.21	-	8.81
Chromium-RT	mg/kg	60.5	7.93	13.1	61	61.0	5.40	1.27	58.5	-	62.6
Copper-RT	mg/kg	10.4	1.04	10.0	58	10.5	0.59	0.17	10.10	-	10.65
Iron-RT	%	1.35	0.113	8.4	63	1.35	0.070	0.018	1.32	-	1.38
Lead-RT	mg/kg	28.3	4.11	14.6	58	27.9	2.85	0.68	27.2	-	29.3
Lithium-RT	mg/kg	21.0	3.18	15.1	50	20.9	2.10	0.56	20.1	-	21.9
Manganese-RT	mg/kg	479	41.9	8.7	54	480	28.7	7.1	468	-	491
Mercury-RT	µg/kg	139	21.0	15.1	55	138	9.9	3.5	133	-	144
Nickel-RT	mg/kg	22.8	3.11	13.6	63	22.6	2.20	0.49	22.0	-	23.6
Zinc-RT	mg/kg	82.8	8.24	10.0	61	83.0	5.00	1.32	80.7	-	85.0
Sodium-RT	mg/kg	6480	339.1	5.2	10	6491	168.0	134.1	6241	-	6719
Magnesium-RT	mg/kg	5130	739.1	14.4	17	4960	415.0	224.1	4752	-	5509
Phosphorus-RT	mg/kg	318	22.8	7.2	16	320	16.0	7.1	306	-	330
Potassium-RT	mg/kg	8122	788.4	9.7	13	7970	580.0	273.3	7650	-	8590
Titanium-RT	mg/kg	1136	177.2	15.6	11	1117	93.0	66.8	1018	-	1254
Barium-RT	mg/kg	164	16.8	10.3	27	162	12.0	4.0	157	-	170
Calcium-RT	g/kg	28.0	2.89	10.3	15	27.8	2.08	0.93	26.5	-	29.6
Vanadium-RT	mg/kg	33.3	4.33	13.0	40	33.7	2.80	0.86	31.9	-	34.7
Cobalt-RT	mg/kg	5.85	0.804	13.8	31	5.90	0.510	0.181	5.55	-	6.14
Strontium-RT	mg/kg	130	17.7	13.7	23	131	11.3	4.6	122	-	137

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Aluminium-AE	%	0.975	0.3161	32.4	54	1.025	0.2400	0.0538	0.889	-	1.06
Arsenic-AE	mg/kg	7.45	0.923	12.4	83	7.39	0.620	0.127	7.25	-	7.65
Cadmium-AE	µg/kg	67.9	16.22	23.9	67	68.6	8.62	2.48	64.0	-	71.9
Chromium-AE	mg/kg	46.7	8.23	17.6	85	47.1	5.50	1.12	44.9	-	48.5
Copper-AE	mg/kg	9.24	1.170	12.7	92	9.39	0.695	0.152	9.00	-	9.48
Iron-AE	%	1.24	0.092	7.4	72	1.24	0.063	0.014	1.22	-	1.26
Lead-AE	mg/kg	24.6	3.38	13.7	89	24.5	2.10	0.45	23.9	-	25.3
Lithium-AE	mg/kg	13.9	2.69	19.4	38	13.9	1.37	0.55	13.0	-	14.8
Manganese-AE	mg/kg	455	33.6	7.4	77	454	20.4	4.8	448	-	463
Mercury-AE	µg/kg	135	22.1	16.4	80	138	15.2	3.1	130	-	140
Nickel-AE	mg/kg	20.6	2.92	14.2	86	20.5	2.00	0.39	19.9	-	21.2
Zinc-AE	mg/kg	77.7	5.33	6.9	90	77.6	3.30	0.70	76.5	-	78.8



### Consensus Values MS1

Magnesium-AE mg/kg 4604 530.1 11.5 19 4575 314.0 152.0 4350 - 4859  
**Method: Acid extractable (So-called totals) - MS1** (cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Phosphorus-AE	mg/kg	284	36.4	12.8	18	280	22.4	10.7	266	- 302
Calcium-AE	g/kg	26.0	1.86	7.2	15	26.2	1.10	0.60	25.0	- 27.0
Vanadium-AE	mg/kg	23.9	4.75	19.9	49	24.0	3.02	0.85	22.5	- 25.3
Cobalt-AE	mg/kg	5.26	0.739	14.0	42	5.39	0.540	0.143	5.03	- 5.50
Strontium-AE	mg/kg	102	8.9	8.8	19	102	5.5	2.6	97.4	- 106

### Method: Carbon - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
TOC	%	0.399	0.0991	24.8	54	0.409	0.0693	0.0169	0.372	- 0.426
Inorganic-Carbonate	%	0.822	0.1505	18.3	26	0.833	0.0948	0.0369	0.762	- 0.883



## Indicative Values MS1

### Method: Real totals - MS1

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cadmium-RT	µg/kg	80.3	27.35	34.1	45	86.2	15.30	5.10	72.1	-	88.5
Scandium-RT	mg/kg	3.78	0.805	21.3	11	3.83	0.460	0.304	3.24	-	4.31
Sulfur-RT	mg/kg	820	66.4	8.1	7	819	19.0	31.4	761	-	880
Thallium-RT	µg/kg	-	-	-	4	212	22.5	-	-	-	-
Rubidium-RT	mg/kg	33.8	4.19	12.4	9	35.0	2.85	1.74	30.7	-	37.0
Molybdenum-RT	mg/kg	2.95	0.552	18.7	11	2.89	0.298	0.208	2.59	-	3.32
Uranium-RT	mg/kg	0.924	0.1469	15.9	10	0.932	0.0890	0.0581	0.820	-	1.03

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Scandium-AE	mg/kg	-	-	-	5	2.77	0.5	-	-	-	-
Sodium-AE	mg/kg	-	-	-	5	3543	222.0	-	-	-	-
Potassium-AE	mg/kg	3537	1054.3	29.8	6	3660	540.5	538.0	2480	-	4590
Titanium-AE	mg/kg	143	55.2	38.6	6	138	35.1	28.2	88.1	-	198
Gallium-AE	µg/kg	3493	1844.1	52.8	6	3756	924.5	941.1	1650	-	5340
Barium-AE	mg/kg	43.2	21.59	50.0	34	44.5	15.25	4.63	35.6	-	50.7
Thallium-AE	µg/kg	72.9	40.56	55.6	12	68.9	30.01	14.64	47.4	-	98.4
Rubidium-AE	mg/kg	-	-	-	4	22.0	2.8	-	-	-	-
Molybdenum-AE	mg/kg	2.48	0.587	23.7	16	2.45	0.345	0.184	2.17	-	2.79