QUASIMEME

Quality assurance of information for marine environmental monitoring

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Certificate of Analysis

Sediment

REFERENCE MATERIAL

Sediment sample 36

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis Sediment 36

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 % probabilty) 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 36 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
2022.2	MS3	QPH115MS
2018.2	MS6	QSP067MS
2018.1	MS3	QPH098MS
2018.1	MS7	QBC055MS
2017.2	MS2	QOR133MS

Consensus Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB31	µg/kg	0.399	0.0668	16.8	19	0.420	0.0460	0.0191	0.366 - 0.431
PCB101	µg/kg	1.72	0.404	23.4	23	1.84	0.297	0.105	1.55 - 1.90
PCB153	µg/kg	3.77	0.612	16.2	24	3.91	0.421	0.156	3.51 - 4.03
pp'-DDE	µg/kg	0.253	0.0366	14.4	15	0.267	0.0265	0.0118	0.233 - 0.274

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	1.07	0.061	5.7	14	1.08	0.040	0.020	1.04 - 1.11

Indicative Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB52	µg/kg	0.908	0.3122	34.4	21	1.038	0.2380	0.0851	0.766 - 1.05
PCB105	µg/kg	0.321	0.1631	50.9	15	0.350	0.1140	0.0526	0.231 - 0.410
PCB118	µg/kg	1.02	0.317	31.2	21	1.12	0.240	0.087	0.873 - 1.16
PCB138+PCB163	µg/kg	4.65	0.722	15.5	6	4.64	0.510	0.368	3.93 - 5.37
PCB138	µg/kg	3.70	1.037	28.0	22	3.76	0.722	0.276	3.25 - 4.16
PCB156	µg/kg	0.306	0.0825	27.0	14	0.296	0.0565	0.0276	0.258 - 0.353
PCB180	µg/kg	2.69	0.679	25.3	21	2.74	0.460	0.185	2.38 - 3.00
g-HCH	µg/kg	0.0277	0.0097	35.2	6	0.0300	0.0064	0.0050	0.0180 - 0.0375
HCB	µg/kg	0.411	0.0931	22.6	16	0.408	0.0645	0.0291	0.362 - 0.461
Dieldrin	µg/kg	0.162	0.0817	50.3	5	0.187	0.0600	0.0457	0.0684 - 0.256
pp'-DDD	µg/kg	0.161	0.0522	32.4	13	0.149	0.0370	0.0181	0.130 - 0.192
pp'-DDT	µg/kg	0.113	0.0892	78.9	8	0.153	0.0629	0.0394	0.0403 - 0.186

Consensus Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Anthracene	µg/kg	12.1	4.15	34.2	49	12.0	2.96	0.74	10.9 - 13.3
Benzo[a]anthracene	µg/kg	41.5	11.02	26.5	46	43.2	7.83	2.03	38.2 - 44.8
Benzo[a]pyrene	µg/kg	39.2	10.93	27.9	47	41.2	7.70	1.99	36.0 - 42.4
Benzo[b]fluoranthene	µg/kg	64.7	12.32	19.0	43	64.7	8.43	2.35	60.9 - 68.5
Benzo[e]pyrene	µg/kg	46.6	10.56	22.7	30	47.6	7.21	2.41	42.6 - 50.5
Benzo[g,h,i]perylene	µg/kg	40.9	8.54	20.9	49	40.3	5.71	1.53	38.5 - 43.4
Benzo[k]fluoranthene	µg/kg	30.6	8.26	27.0	43	30.0	5.85	1.57	28.1 - 33.2
Chrysene	µg/kg	45.1	7.94	17.6	39	45.2	5.20	1.59	42.5 - 47.6
Dibenz[a,h]anthracene	µg/kg	9.90	3.117	31.5	44	10.45	2.150	0.587	8.96 - 10.9
Fluoranthene	µg/kg	106	18.8	17.7	49	107	12.9	3.4	101 - 111
Indeno[1,2,3-cd]pyrene	µg/kg	48.1	11.73	24.4	49	48.8	8.33	2.09	44.8 - 51.5
Perylene	µg/kg	32.1	7.37	22.9	25	32.5	4.90	1.84	29.1 - 35.2
Phenanthrene	µg/kg	63.1	16.43	26.1	47	62.8	11.16	3.00	58.2 - 67.9
Pyrene	µg/kg	74.0	11.87	16.0	46	74.9	7.79	2.19	70.5 - 77.5
C1-phenanthr.+anthrac.	µg/kg	39.5	7.08	17.9	13	41.5	5.20	2.45	35.2 - 43.7

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	1.12	0.073	6.6	28	1.13	0.052	0.017	1.09 - 1.14

Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PN	%	0.147	0.0083	5.6	10	0.147	0.0060	0.0033	0.141 - 0.153

Indicative Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Acenaphthene	µg/kg	4.38	1.952	44.5	37	4.56	1.340	0.401	3.73 - 5.03
Acenaphthylene	µg/kg	4.41	2.451	55.6	32	5.02	1.755	0.542	3.52 - 5.29
Chrysene + Triphenylene	µg/kg	51.8	11.08	21.4	15	52.7	7.80	3.58	45.7 - 57.9
Dibenzothiophene	µg/kg	4.83	1.316	27.2	17	4.99	0.890	0.399	4.16 - 5.51
Fluorene	µg/kg	8.07	2.963	36.7	42	8.43	2.066	0.571	7.15 - 8.99
Naphthalene	µg/kg	21.4	7.67	35.8	41	22.0	5.15	1.50	19.0 - 23.9
Triphenylene	µg/kg	13.4	3.80	28.5	10	13.0	2.63	1.50	10.7 - 16.0
Benzofluoranthenes (a+b+j+k)	µg/kg	114	12.2	10.7	5	114	8.8	6.8	100 - 128
Benzofluoranthenes (b+j)	µg/kg	80.3	10.92	13.6	7	81.0	7.73	5.16	70.5 - 90.0
1-methylphenanthrene	µg/kg	9.55	1.839	19.2	5	9.94	1.395	1.028	7.44 - 11.7
2-methylphenanthrene	µg/kg	18.6	5.65	30.4	12	18.9	3.84	2.04	15.0 - 22.1
3-6-dimethylphenanthrene	µg/kg	2.48	0.318	12.8	8	2.61	0.234	0.140	2.22 - 2.74
1-methylnaphtalene	µg/kg	8.82	5.182	58.8	7	10.03	3.860	2.448	4.18 - 13.4
2-methylnaphtalene	µg/kg	12.0	4.58	38.3	7	11.8	3.12	2.17	7.86 - 16.1
C2-phenanthr.+anthrac.	µg/kg	36.3	13.81	38.0	12	38.6	10.07	4.98	27.6 - 45.0
C3-phenanthr.+anthrac.	µg/kg	23.2	6.30	27.2	9	23.6	4.54	2.63	18.4 - 27.9
C1-pyrenes+fluoranthenes	µg/kg	54.4	26.49	48.7	9	61.3	18.70	11.04	34.5 - 74.4
C2-pyrenes+fluoranthenes	µg/kg	40.6	23.13	57.0	5	34.2	17.11	12.93	14.0 - 67.2
C1-chrysenes	µg/kg	33.1	12.89	38.9	9	32.0	8.95	5.37	23.4 - 42.8
C2-chrysenes	µg/kg	22.9	12.43	54.3	6	24.1	7.95	6.34	10.5 - 35.3
C1-naphtalenes	µg/kg	25.9	9.36	36.2	11	28.0	6.93	3.53	19.7 - 32.1
C2-naphtalenes	µg/kg	24.5	10.02	41.0	12	25.5	6.73	3.62	18.2 - 30.8
C3-napthalenes	µg/kg	23.5	7.72	32.9	12	24.9	5.97	2.78	18.6 - 28.3
C1-phenanthrenes	µg/kg	44.5	17.52	39.4	6	43.6	11.49	8.94	27.0 - 62.0
C1-dibenzothiophenes	µg/kg	6.17	1.392	22.6	4	6.46	0.940	0.870	4.23 - 8.10
C2-dibenzothiophenes	µg/kg	12.4	4.58	36.9	4	12.1	3.09	2.86	6.05 - 18.8

Indicative Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Monobutyltin (MBT)	µg Sn/kg	1.86	1.066	57.3	13	2.00	0.681	0.370	1.22 - 2.50
Dibutyltin (DBT)	µg Sn/kg	0.443	0.1182	26.7	10	0.476	0.0750	0.0467	0.360 - 0.526
Tributyltin (TBT)	µg Sn/kg	0.349	0.2111	60.4	10	0.398	0.1585	0.0834	0.200 - 0.498

Indicative Values MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
BDE209	µg/kg	38.7	13.78	35.6	5	38.5	9.32	7.70	22.9 - 54.5