QUASIMEME

Quality assurance of information for marine environmental monitoring

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Certificate of Analysis

Sediment

REFERENCE MATERIAL

Sediment sample 29

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis Sediment 29

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 29 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
2022.2	MS8	QPF019MS
2021.1	MS6	QSP076MS
2019.2	MS6	QSP070MS
2019.2	MS7	QBC060MS
2018.2	MS8	QPF005MS
2018.1	MS3	QPH097MS
2018.1	MS6	QSP065MS
2018.1	MS7	QBC054MS
2017.1	MS2	QOR130MS
2017.1	MS8	QPF002MS
2016.2	MS7	QBC049MS
2016.1	MS2	QOR127MS
2015.2	MS3	QPH088MS
2015.2	MS7	QBC045MS
2015.1	MS7	QBC043MS

Consensus Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB31	µg/kg	1.68	0.502	29.9	38	1.65	0.317	0.102	1.51 - 1.84
PCB52	µg/kg	3.12	0.866	27.8	43	3.27	0.590	0.165	2.85 - 3.39
PCB101	µg/kg	5.27	1.094	20.7	43	5.26	0.744	0.209	4.94 - 5.61
PCB118	µg/kg	2.83	0.708	25.0	42	2.94	0.485	0.137	2.61 - 3.05
PCB138	µg/kg	7.78	1.980	25.5	38	7.68	1.275	0.401	7.13 - 8.43
PCB153	µg/kg	8.58	2.185	25.5	43	8.52	1.520	0.417	7.91 - 9.26
PCB180	µg/kg	5.72	1.311	22.9	42	5.75	0.880	0.253	5.31 - 6.13
HCB	µg/kg	18.0	3.75	20.8	33	17.7	2.47	0.82	16.7 - 19.4
pp'-DDD	µg/kg	21.8	5.84	26.8	33	21.2	3.95	1.27	19.7 - 23.9
pp'-DDE	µg/kg	13.4	2.05	15.4	36	13.5	1.44	0.43	12.7 - 14.0
op'-DDT	µg/kg	2.69	0.638	23.7	24	2.77	0.435	0.163	2.43 - 2.96
pp'-DDT	µg/kg	25.7	4.88	19.0	31	26.4	3.44	1.09	23.9 - 27.5

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	4.32	0.438	10.1	23	4.35	0.300	0.114	4.13 - 4.51

Indicative Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB105	µg/kg	0.785	0.3900	49.7	26	0.829	0.2790	0.0956	0.627 - 0.942
PCB138+PCB163	µg/kg	11.1	1.85	16.7	7	11.5	1.13	0.87	9.43 - 12.7
PCB156	µg/kg	0.776	0.3124	40.3	27	0.790	0.2100	0.0752	0.652 - 0.899
a-HCH	µg/kg	1.07	0.459	42.8	28	1.15	0.317	0.108	0.894 - 1.25
b-HCH	µg/kg	3.32	1.306	39.3	25	3.69	0.891	0.327	2.78 - 3.86
g-HCH	µg/kg	0.435	0.1460	33.5	27	0.452	0.1020	0.0351	0.378 - 0.493
d-HCH	µg/kg	0.322	0.1304	40.4	12	0.313	0.0880	0.0471	0.240 - 0.404
HCBD	µg/kg	1.20	0.483	40.4	12	1.20	0.324	0.174	0.892 - 1.50
Dieldrin	µg/kg	0.0887	0.0518	58.4	9	0.1238	0.0382	0.0216	0.0497 - 0.128

Consensus Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Anthracene	µg/kg	117	37.9	32.3	51	115	26.2	6.6	107 - 128
Benzo[a]anthracene	µg/kg	349	74.5	21.3	47	353	51.0	13.6	328 - 371
Benzo[a]pyrene	µg/kg	332	58.6	17.6	48	330	39.4	10.6	315 - 349
Benzo[b]fluoranthene	µg/kg	395	87.0	22.0	42	400	61.7	16.8	368 - 422
Benzo[e]pyrene	µg/kg	310	67.0	21.6	31	315	47.3	15.0	286 - 335
Benzo[g,h,i]perylene	µg/kg	252	41.2	16.3	49	247	28.1	7.3	240 - 264
Benzo[k]fluoranthene	µg/kg	190	24.3	12.7	44	194	17.1	4.6	183 - 198
Chrysene + Triphenylene	µg/kg	441	43.3	9.8	19	447	28.4	12.4	421 - 462
Chrysene	µg/kg	387	71.3	18.4	35	391	49.5	15.1	362 - 411
Dibenz[a,h]anthracene	µg/kg	53.1	17.85	33.6	49	54.7	12.50	3.19	48.0 - 58.2
Fluoranthene	µg/kg	881	108.6	12.3	48	876	71.0	19.6	850 - 913
Indeno[1,2,3-cd]pyrene	µg/kg	251	65.9	26.3	49	257	44.8	11.8	232 - 270
Perylene	µg/kg	119	24.0	20.3	26	120	16.9	5.9	109 - 128
Phenanthrene	µg/kg	498	113.3	22.8	47	495	78.3	20.7	465 - 531
Pyrene	µg/kg	750	98.8	13.2	47	763	67.4	18.0	721 - 779

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	4.50	0.303	6.7	26	4.52	0.203	0.074	4.38 - 4.62

Indicative Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Acenaphthene	µg/kg	35.1	14.05	40.0	43	35.9	9.72	2.68	30.8 - 39.5
Acenaphthylene	µg/kg	35.9	16.72	46.6	37	39.2	11.30	3.44	30.3 - 41.5
Benzo[a]fluorene	µg/kg	84.2	17.73	21.1	5	85.6	12.20	9.91	63.8 - 105
Dibenzothiophene	µg/kg	45.7	15.00	32.8	23	45.9	10.36	3.91	39.2 - 52.2
Fluorene	µg/kg	78.0	30.07	38.5	44	79.2	20.68	5.67	68.9 - 87.1
Naphthalene	µg/kg	207	116.1	56.0	41	217	80.3	22.7	171 - 244
Triphenylene	µg/kg	91.5	7.23	7.9	8	95.0	5.97	3.19	85.6 - 97.4
1-methylpyrene	µg/kg	75.7	17.44	23.0	5	71.0	11.84	9.75	55.7 - 95.8
2-methylphenanthrene	µg/kg	106	24.8	23.5	14	105	17.0	8.3	91.5 - 120
3-6-dimethylphenanthrene	µg/kg	18.0	6.99	38.9	11	17.6	4.84	2.63	13.3 - 22.6
C1-phenanthr.+anthrac.	µg/kg	331	102.4	30.9	12	325	74.5	36.9	267 - 396
C2-phenanthr.+anthrac.	µg/kg	301	147.2	48.9	12	308	108.7	53.1	208 - 394
C3-phenanthr.+anthrac.	µg/kg	181	55.2	30.5	9	184	36.5	23.0	140 - 223
C1-pyrenes+fluoranthenes	µg/kg	414	158.7	38.3	9	426	106.6	66.1	294 - 534
C2-pyrenes+fluoranthenes	µg/kg	258	70.1	27.1	6	262	46.5	35.8	188 - 328
C1-chrysenes	µg/kg	257	46.3	18.0	9	262	32.6	19.3	222 - 292
C2-chrysenes	µg/kg	210	137.1	65.4	7	236	95.3	64.8	87.1 - 332
C1-naphtalenes	µg/kg	134	66.8	49.8	5	120	39.1	37.3	57.3 - 211
C2-naphtalenes	µg/kg	115	33.5	29.1	5	133	27.7	18.7	76.5 - 154
C3-napthalenes	µg/kg	140	32.3	23.0	5	156	27.0	18.0	103 - 178
C1-phenanthrenes	µg/kg	264	129.6	49.0	4	266	88.4	81.0	84.3 - 444

Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PN	%	0.385	0.0103	2.7	5	0.385	0.0073	0.0057	0.373 - 0.397

Consensus Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Dibutyltin (DBT)	µg Sn/kg	12.5	2.63	21.1	56	12.5	1.78	0.44	11.8	-	13.2
Tributyltin (TBT)	µg Sn/kg	5.53	1.484	26.8	58	5.53	1.035	0.244	5.14	-	5.92

Indicative Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Monobutyltin (MBT)	µg Sn/kg	22.6	10.30	45.5	51	23.5	6.55	1.80	19.7 - 25.5
Monophenyltin (MPhT)	µg Sn/kg	0.0991	0.0399	40.3	4	0.1150	0.0303	0.0249	0.0437 - 0.155
Diphenyltin (DPhT)	µg Sn/kg	0.128	0.0346	27.0	4	0.142	0.0262	0.0216	0.0798 - 0.176

Consensus Values MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
BDE209	µg/kg	53.6	13.26	24.7	35	55.1	8.60	2.80	49.1 - 58.2

Indicative Values MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
BDE028	µg/kg	0.0240	0.0129	53.9	24	0.0309	0.0084	0.0033	0.0185 - 0.0294
BDE047	µg/kg	0.424	0.1954	46.1	48	0.440	0.1395	0.0353	0.368 - 0.481
BDE099	µg/kg	0.605	0.3091	51.1	48	0.644	0.2157	0.0558	0.516 - 0.695
BDE100	µg/kg	0.137	0.0842	61.7	45	0.151	0.0590	0.0157	0.111 - 0.162
BDE153	µg/kg	0.106	0.0682	64.3	45	0.119	0.0490	0.0127	0.0855 - 0.127
BDE154	µg/kg	0.0770	0.0391	50.7	43	0.0852	0.0277	0.0074	0.0650 - 0.0890
BDE183	µg/kg	0.0772	0.0354	45.9	40	0.0874	0.0245	0.0070	0.0659 - 0.0885
BDE66	µg/kg	0.0224	0.0158	70.6	24	0.0294	0.0114	0.0040	0.0157 - 0.0290
BDE85	µg/kg	0.0212	0.0170	80.2	21	0.0330	0.0145	0.0046	0.0135 - 0.0289
a-HBCD	µg/kg	20.5	7.81	38.0	5	20.8	5.16	4.36	11.6 - 29.5
b-HBCD	µg/kg	5.04	1.845	36.6	5	4.98	1.296	1.031	2.92 - 7.16
g-HBCD	µg/kg	20.3	4.10	20.2	5	21.4	3.20	2.29	15.6 - 25.0
TBBP-A	µg/kg	0.551	0.1597	29.0	4	0.521	0.1050	0.0998	0.329 - 0.773

Consensus Values MS8

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
n-PFOS	µg/kg	0.588	0.0894	15.2	20	0.589	0.0635	0.0250	0.546 - 0.630
PFDA	µg/kg	0.225	0.0339	15.1	16	0.228	0.0231	0.0106	0.207 - 0.243
PFDoA	µg/kg	0.179	0.0309	17.3	17	0.180	0.0210	0.0094	0.163 - 0.194

Indicative Values MS8

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
total-PFOS	µg/kg	0.687	0.1102	16.0	9	0.739	0.0760	0.0459	0.604 - 0.770
PFOSA	µg/kg	0.0464	0.0205	44.2	8	0.0527	0.0150	0.0091	0.0297 - 0.0631
PFHxA	µg/kg	0.0870	0.0355	40.8	11	0.0910	0.0242	0.0134	0.0634 - 0.111
PFHpA	µg/kg	0.0403	0.0193	47.9	9	0.0400	0.0141	0.0080	0.0258 - 0.0548
PFOA	µg/kg	0.100	0.0328	32.7	15	0.0967	0.0216	0.0106	0.0822 - 0.118
PFNA	µg/kg	0.0569	0.0210	37.0	11	0.0573	0.0143	0.0079	0.0430 - 0.0709
PFUnDA	µg/kg	0.182	0.0491	27.0	18	0.184	0.0339	0.0145	0.158 - 0.206
PFTrDA	µg/kg	0.0692	0.0368	53.2	9	0.0691	0.0261	0.0153	0.0414 - 0.0970
PFTeDA	µg/kg	0.0757	0.0322	42.5	8	0.0797	0.0235	0.0142	0.0495 - 0.102
NEtFOSAA	µg/kg	0.282	0.0524	18.5	4	0.301	0.0395	0.0327	0.210 - 0.355