QUASIMEME

Quality assurance of information for marine environmental monitoring

Certificate of Analysis

Sediment

REFERENCE MATERIAL

Sediment sample 28

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis   Sediment 28

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 28 of Estuarine sediment from Firth of Forth, Scotland 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	MS7	QBC064MS
2020.1	MS6	QSP072MS
2019.1	MS6	QSP068MS
2018.2	MS7	QBC056MS
2018.1	MS2	QOR135MS
2017.1	MS2	QOR131MS
2017.1	MS3	QPH093MS
2017.1	MS6	QSP061MS
2017.1	MS7	QBC050MS
2015.2	MS7	QBC044MS

Consensus Values   MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB31	µg/kg	0.974	0.2621	26.9	35	0.970	0.1810	0.0554	0.884	-	1.06
PCB52	µg/kg	1.15	0.309	26.8	37	1.20	0.220	0.064	1.05	-	1.26
PCB101	µg/kg	2.66	0.700	26.3	36	2.63	0.490	0.146	2.43	-	2.90
PCB118	µg/kg	1.49	0.251	16.9	37	1.49	0.178	0.052	1.41	-	1.57
PCB153	µg/kg	6.27	1.253	20.0	38	6.23	0.820	0.254	5.86	-	6.68
PCB180	µg/kg	4.14	0.877	21.2	38	4.30	0.610	0.178	3.85	-	4.43
HCB	µg/kg	18.3	5.10	28.0	33	18.8	3.46	1.11	16.5	-	20.1
pp'-DDD	µg/kg	1.45	0.346	23.9	29	1.49	0.226	0.080	1.31	-	1.58
pp'-DDE	µg/kg	0.813	0.1030	12.7	29	0.826	0.0690	0.0239	0.774	-	0.852

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.17	0.368	11.6	27	3.22	0.250	0.089	3.02	-	3.31

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
PCB105	µg/kg	0.547	0.1724	31.5	26	0.561	0.1180	0.0423	0.477 -	0.616
PCB138+PCB163	µg/kg	8.15	1.257	15.4	8	8.10	0.856	0.555	7.12 -	9.17
PCB138	µg/kg	6.03	1.834	30.4	35	6.40	1.260	0.387	5.40 -	6.65
PCB156	µg/kg	0.510	0.1427	28.0	25	0.542	0.1035	0.0357	0.451 -	0.569
a-HCH	µg/kg	0.0389	0.0299	76.8	17	0.0520	0.0233	0.0091	0.0236 -	0.0542
b-HCH	µg/kg	0.0589	0.0528	89.7	15	0.0600	0.0370	0.0171	0.0298 -	0.0880
g-HCH	µg/kg	0.0560	0.0496	88.6	15	0.0693	0.0353	0.0160	0.0287 -	0.0833
Dieldrin	µg/kg	0.882	0.2434	27.6	14	0.853	0.1635	0.0813	0.742 -	1.02
pp'-DDT	µg/kg	0.437	0.1656	37.9	23	0.424	0.1160	0.0432	0.366 -	0.508

Method: Nitrogen - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
PN	%	0.173	0.0026	1.5	5	0.173	0.0019	0.0014	0.170 -	0.176

Consensus Values   MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Benzo[a]anthracene	µg/kg	222	31.2	14.1	19	219	21.0	9.0	207	-	237
Benzo[a]pyrene	µg/kg	213	39.4	18.5	19	220	27.9	11.3	194	-	232
Benzo[k]fluoranthene	µg/kg	114	11.2	9.8	17	113	7.6	3.4	109	-	120
Chrysene	µg/kg	181	31.6	17.5	13	178	19.8	11.0	162	-	199
Fluoranthene	µg/kg	445	36.1	8.1	19	451	25.4	10.4	428	-	463
Indeno[1,2,3-cd]pyrene	µg/kg	168	30.5	18.2	19	167	20.7	8.8	153	-	182
Pyrene	µg/kg	468	70.3	15.0	18	458	48.3	20.7	433	-	502

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.09	0.434	14.1	12	3.12	0.316	0.157	2.82	-	3.36

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Acenaphthene	µg/kg	27.3	9.39	34.4	17	27.0	5.69	2.85	22.5	-	32.1
Acenaphthylene	µg/kg	25.6	14.44	56.4	13	26.1	10.50	5.01	17.0	-	34.3
Anthracene	µg/kg	114	28.4	25.0	20	111	19.4	8.0	100	-	127
Benzo[b]fluoranthene	µg/kg	249	62.3	25.0	18	255	44.2	18.4	218	-	280
Benzo[e]pyrene	µg/kg	194	77.9	40.2	15	194	57.0	25.2	151	-	237
Benzo[g,h,i]perylene	µg/kg	197	48.9	24.8	20	201	33.0	13.7	175	-	220
Chrysene + Triphenylene	µg/kg	234	55.3	23.6	9	229	40.6	23.0	193	-	276
Dibenz[a,h]anthracene	µg/kg	36.9	10.58	28.6	19	37.5	7.35	3.03	31.9	-	42.0
Dibenzothiophene	µg/kg	30.7	7.42	24.2	11	31.1	4.90	2.80	25.7	-	35.6
Fluorene	µg/kg	55.2	18.14	32.8	17	53.0	12.90	5.50	46.0	-	64.5
Naphthalene	µg/kg	203	67.3	33.1	17	199	45.4	20.4	169	-	238
Perylene	µg/kg	107	30.6	28.7	11	100	20.0	11.5	86.6	-	127
Phenanthrene	µg/kg	405	104.5	25.8	18	412	70.6	30.8	353	-	457
Triphenylene	µg/kg	59.0	13.55	23.0	5	55.5	8.30	7.57	43.4	-	74.6
2-methylphenanthrene	µg/kg	127	41.6	32.8	7	129	30.1	19.7	89.7	-	164
3-6-dimethylphenanthrene	µg/kg	26.2	7.13	27.2	5	26.9	4.91	3.98	18.0	-	34.4
C1-phenanthr.+anthrac.	µg/kg	427	77.0	18.0	6	455	58.5	39.3	350	-	504
C2-phenanthr.+anthrac.	µg/kg	418	59.9	14.3	6	418	46.5	30.5	358	-	477
C3-phenanthr.+anthrac.	µg/kg	314	62.8	20.0	4	298	44.0	39.3	227	-	402
C1-pyrenes+fluoranthenes	µg/kg	417	226.3	54.2	5	423	157.5	126.5	157	-	677
C1-chrysenes	µg/kg	252	113.7	45.1	4	261	73.4	71.1	94.4	-	410

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Tributyltin (TBT)	µg Sn/kg	2.93	1.609	54.9	48	2.90	1.194	0.290	2.47	-	3.40
Dibutyltin (DBT)	µg Sn/kg	2.21	1.060	48.1	42	2.31	0.737	0.205	1.88	-	2.54
Monobutyltin (MBT)	µg Sn/kg	5.87	2.111	36.0	40	5.98	1.404	0.417	5.19	-	6.54

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
BDE047	µg/kg	0.273	0.0447	16.4	49	0.281	0.0310	0.0080	0.260 -	0.286
BDE099	µg/kg	0.235	0.0360	15.3	48	0.244	0.0260	0.0065	0.225 -	0.246
BDE100	µg/kg	0.0532	0.0140	26.3	36	0.0557	0.0095	0.0029	0.0485 -	0.0580
BDE209	µg/kg	33.1	6.88	20.8	40	34.1	4.91	1.36	30.9 -	35.3

Indicative Values   MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
BDE028	µg/kg	0.0291	0.0121	41.6	36	0.0332	0.0088	0.0025	0.0250 -	0.0332
BDE153	µg/kg	0.0481	0.0184	38.2	36	0.0505	0.0125	0.0038	0.0419 -	0.0543
BDE154	µg/kg	0.0438	0.0159	36.4	38	0.0478	0.0116	0.0032	0.0386 -	0.0491
BDE183	µg/kg	0.0479	0.0244	50.9	34	0.0557	0.0178	0.0052	0.0394 -	0.0564
BDE66	µg/kg	0.0247	0.0094	38.2	26	0.0267	0.0064	0.0023	0.0209 -	0.0286
a-HBCD	µg/kg	0.142	0.0319	22.5	5	0.144	0.0235	0.0178	0.105 -	0.178
b-HBCD	µg/kg	0.0566	0.0158	27.9	5	0.0553	0.0107	0.0088	0.0385 -	0.0747
TBBP-A	µg/kg	0.221	0.1112	50.4	5	0.234	0.0775	0.0622	0.0929 -	0.349