QUASIMEME

Quality assurance of information
for marine environmental monitoring

Certificate of Analysis

Sediment

REFERENCE MATERIAL

Sediment sample 61

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis   Sediment 61

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 61 of harbor sediment from Rotterdam harbor 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	MS6	QSP087MS
2023.2	MS8	QPF023MS
2022.1	MS6	QSP082MS
2022.1	MS8	QPF018MS
2021.2	MS2	QOR149MS
2021.2	MS3	QPH112MS

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB28	µg/kg	7.11	1.351	19.0	23	7.50	0.891	0.352	6.53	-	7.70
PCB52	µg/kg	7.51	1.366	18.2	25	7.42	0.880	0.342	6.95	-	8.07
PCB101	µg/kg	10.6	2.53	23.9	25	10.6	1.60	0.63	9.53	-	11.6
PCB118	µg/kg	6.73	1.380	20.5	25	6.73	0.970	0.345	6.16	-	7.30
PCB153	µg/kg	14.4	3.36	23.4	25	14.5	2.01	0.84	13.0	-	15.8
PCB180	µg/kg	7.24	1.421	19.6	25	7.03	0.925	0.355	6.65	-	7.82
PCB138	µg/kg	9.18	1.771	19.3	21	9.31	1.310	0.483	8.37	-	9.98

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.79	0.189	5.0	12	3.77	0.082	0.068	3.68	-	3.91

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
a-HCH	µg/kg	0.185	0.1158	62.5	12	0.211	0.0800	0.0418	0.112	-	0.258
g-HCH	µg/kg	0.122	0.0656	53.9	11	0.144	0.0470	0.0247	0.0783	-	0.165
Dieldrin	µg/kg	0.355	0.1451	40.9	6	0.399	0.1010	0.0740	0.210	-	0.500
pp'-DDE	µg/kg	2.18	0.537	24.6	19	2.10	0.360	0.154	1.93	-	2.44
pp'-DDT	µg/kg	0.874	0.5856	67.0	11	0.929	0.3600	0.2207	0.485	-	1.26
pp'-DDD	µg/kg	1.44	0.319	22.2	16	1.46	0.242	0.100	1.27	-	1.61
HCB	µg/kg	4.04	0.993	24.6	20	3.98	0.605	0.278	3.57	-	4.50
b-HCH	µg/kg	0.397	0.1725	43.4	12	0.433	0.1335	0.0622	0.288	-	0.505
HCBD	µg/kg	1.17	0.753	64.2	7	1.43	0.402	0.356	0.500	-	1.85
PCB31	µg/kg	5.75	1.238	21.6	14	5.88	0.858	0.414	5.04	-	6.45
PCB105	µg/kg	1.65	0.333	20.1	12	1.70	0.240	0.120	1.44	-	1.86
PCB138+PCB163	µg/kg	16.9	2.15	12.7	7	16.4	1.10	1.02	15.0	-	18.8
PCB156	µg/kg	1.12	0.267	23.8	12	1.14	0.135	0.096	0.955	-	1.29
d-HCH	µg/kg	-	-	-	4	0.200	0.1	-	-	-	-
PCB18	µg/kg	3.25	0.805	24.7	7	3.38	0.434	0.380	2.53	-	3.97
PCB44	µg/kg	4.13	1.104	26.7	6	4.10	0.605	0.564	3.03	-	5.23
PCB47	µg/kg	-	-	-	5	2.51	0.4	-	-	-	-
PCB49	µg/kg	5.74	0.770	13.4	6	5.81	0.461	0.393	4.97	-	6.51
PCB66	µg/kg	-	-	-	5	5.86	0.6	-	-	-	-
PCB110	µg/kg	-	-	-	5	9.25	0.2	-	-	-	-
PCB128	µg/kg	1.59	0.102	6.4	6	1.63	0.075	0.052	1.49	-	1.70
PCB149	µg/kg	11.7	2.49	21.3	9	11.8	1.88	1.04	9.81	-	13.6
PCB170	µg/kg	4.12	0.735	17.9	9	4.01	0.444	0.306	3.56	-	4.67
PCB183	µg/kg	1.43	0.129	9.0	6	1.47	0.057	0.066	1.30	-	1.56
PCB187	µg/kg	3.97	0.435	10.9	6	3.97	0.245	0.222	3.54	-	4.41
PCB158	µg/kg	-	-	-	4	1.09	0.1	-	-	-	-
PCB141	µg/kg	-	-	-	5	1.70	0.1	-	-	-	-
PCB151	µg/kg	-	-	-	5	3.58	0.4	-	-	-	-
PCB194	µg/kg	1.47	0.181	12.3	8	1.45	0.071	0.080	1.32	-	1.61

Consensus Values   MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Benzo[e]pyrene	µg/kg	281	50.9	18.1	19	282	25.3	14.6	256	-	305
Phenanthrene	µg/kg	377	89.9	23.8	28	391	59.0	21.2	342	-	412
Pyrene	µg/kg	406	71.9	17.7	28	409	52.4	17.0	378	-	434
Benzo[g,h,i]perylene	µg/kg	241	60.2	25.0	30	254	49.5	13.7	219	-	263
Fluoranthene	µg/kg	546	99.4	18.2	29	545	77.2	23.1	508	-	584
Benzo[a]anthracene	µg/kg	274	59.0	21.5	28	282	41.2	13.9	251	-	297
Fluorene	µg/kg	82.6	18.59	22.5	29	84.5	13.04	4.32	75.5	-	89.7
Acenaphthene	µg/kg	46.7	11.21	24.0	27	49.4	7.90	2.70	42.3	-	51.2
Chrysene	µg/kg	284	58.0	20.4	24	288	43.6	14.8	260	-	308

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.79	0.351	9.3	13	3.80	0.212	0.122	3.57	-	4.00

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Chrysene + Triphenylene	µg/kg	368	65.7	17.9	8	363	44.8	29.1	314	-	421
Indeno[1,2,3-cd]pyrene	µg/kg	255	82.5	32.4	30	254	53.2	18.8	224	-	286
Benzo[b]fluoranthene	µg/kg	381	146.1	38.3	25	379	83.1	36.5	321	-	442
Benzo[a]pyrene	µg/kg	227	69.0	30.4	29	225	37.6	16.0	200	-	253
Naphthalene	µg/kg	216	68.8	31.9	28	216	44.6	16.3	189	-	243
Dibenz[a,h]anthracene	µg/kg	59.6	19.88	33.4	29	58.5	12.00	4.62	52.0	-	67.1
Benzo[k]fluoranthene	µg/kg	163	49.3	30.3	26	178	27.6	12.1	143	-	183
Anthracene	µg/kg	147	43.2	29.4	30	154	28.6	9.8	131	-	163
Acenaphthylene	µg/kg	29.2	17.40	59.5	26	30.7	11.16	4.27	22.2	-	36.3
Dibenzothiophene	µg/kg	40.5	9.81	24.3	16	40.8	4.02	3.07	35.3	-	45.7
3-6-dimethylphenanthrene	µg/kg	-	-	-	5	24.5	3.9	-	-	-	-
2-methylphenanthrene	µg/kg	118	40.4	34.3	8	116	28.4	17.8	85.0	-	151
Perylene	µg/kg	175	45.4	26.0	18	176	33.8	13.4	152	-	197
Triphenylene	µg/kg	84.0	27.04	32.2	7	72.8	15.37	12.78	59.8	-	108
Benzofluoranthenes (b+j)	µg/kg	-	-	-	4	594	22.6	-	-	-	-
C1-phenanthr.+anthrac.	µg/kg	341	71.9	21.1	8	335	36.1	31.8	283	-	400
C2-phenanthr.+anthrac.	µg/kg	324	109.6	33.8	8	312	78.8	48.4	235	-	414
C3-phenanthr.+anthrac.	µg/kg	241	69.0	28.7	6	237	27.4	35.2	172	-	310
C1-pyrenes+fluoranthenes	µg/kg	413	187.4	45.4	6	418	117.7	95.7	225	-	600
C1-chrysenes	µg/kg	-	-	-	5	280	56.2	-	-	-	-
C2-chrysenes	µg/kg	-	-	-	4	222	79.2	-	-	-	-
C1-naphtalenes	µg/kg	-	-	-	5	359	14.4	-	-	-	-
C2-naphtalenes	µg/kg	318	128.1	40.3	7	319	78.4	60.5	204	-	433
C1-dibenzothiophenes	µg/kg	-	-	-	5	58.3	8.4	-	-	-	-
C2-dibenzothiophenes	µg/kg	-	-	-	5	104	17.0	-	-	-	-
C3-dibenzothiophenes	µg/kg	-	-	-	4	95.4	8.8	-	-	-	-
1-methylphenanthrene	µg/kg	-	-	-	5	78.1	6.9	-	-	-	-
1-methylnaphtalene	µg/kg	86.8	39.89	45.9	12	90.2	23.05	14.39	61.7	-	112
2-methylnaphtalene	µg/kg	157	46.4	29.6	13	169	24.0	16.1	129	-	185

Method: Total petroleum hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Total petroleum hydrocarbons	mg/kg	-	-	-	4	316	7.8	-	-	-	-

Indicative Values   MS3

Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PN	%	-	-	-	5	0.384	0.0	-	-	-	-

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Tributyltin (TBT)	µg Sn/kg	2.59	0.672	26.0	33	2.59	0.406	0.146	2.35 -	2.83

Indicative Values   MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Dibutyltin (DBT)	µg Sn/kg	3.81	1.172	30.7	30	3.76	0.655	0.267	3.37	-	4.25
Monobutyltin (MBT)	µg Sn/kg	10.7	7.05	65.8	24	12.1	4.87	1.80	7.75	-	13.7
Triphenyltin (TPhT)	µg Sn/kg	-	-	-	5	0.750	0.7	-	-	-	-

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
PFDA	µg/kg	0.248	0.0382	15.4	15	0.252	0.0279	0.0123	0.227	-	0.269
PFUnDA	µg/kg	0.179	0.0326	18.3	15	0.189	0.0209	0.0105	0.161	-	0.197
PFDoA	µg/kg	0.263	0.0473	18.0	15	0.263	0.0260	0.0153	0.237	-	0.289
total-PFOS	µg/kg	1.65	0.177	10.7	14	1.67	0.085	0.059	1.55	-	1.75

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
n-PFOS	µg/kg	1.51	0.301	19.9	15	1.57	0.163	0.097	1.34 -	1.67
PFOSA	µg/kg	0.0769	0.0335	43.5	8	0.0823	0.0151	0.0148	0.0496 -	0.104
PFHxA	µg/kg	0.0934	0.0225	24.1	13	0.0898	0.0141	0.0078	0.0799 -	0.107
PFOA	µg/kg	0.110	0.0358	32.4	14	0.111	0.0214	0.0119	0.0900 -	0.131
PFNA	µg/kg	0.0408	0.0125	30.6	12	0.0416	0.0085	0.0045	0.0329 -	0.0487
PFTrDA	µg/kg	0.0810	0.0226	28.0	12	0.0818	0.0181	0.0082	0.0668 -	0.0953
PFTeDA	µg/kg	0.0878	0.0327	37.2	9	0.113	0.0234	0.0136	0.0632 -	0.112
n-PFHxS	µg/kg	-	-	-	5	0.100	-	-	- -	-
GenX	µg/kg	-	-	-	4	0.0750	0.0	-	- -	-
NMeFOSAA	µg/kg	0.145	0.0571	39.4	12	0.154	0.0301	0.0206	0.109 -	0.181
NEtFOSAA	µg/kg	0.323	0.1389	43.0	12	0.333	0.0823	0.0501	0.236 -	0.411