QUASIMEME

Quality assurance of information for marine environmental monitoring

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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
2022.1	MS6	QSP082MS
2022.1	MS8	QPF018MS
2021.2	MS2	QOR149MS
2021.2	MS3	QPH112MS

Consensus Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB28	µg/kg	7.09	1.236	17.4	23	7.50	0.891	0.322	6.56 - 7.62
PCB52	µg/kg	7.51	1.278	17.0	25	7.42	0.880	0.319	6.98 - 8.03
PCB101	µg/kg	10.5	2.41	22.9	25	10.6	1.60	0.60	9.55 - 11.5
PCB118	µg/kg	6.73	1.399	20.8	25	6.73	0.970	0.350	6.15 - 7.30
PCB138	µg/kg	9.32	1.970	21.1	21	9.31	1.310	0.537	8.42 - 10.2
PCB153	µg/kg	14.3	2.93	20.5	25	14.5	2.01	0.73	13.1 - 15.5
PCB180	µg/kg	7.23	1.390	19.2	25	7.03	0.925	0.347	6.66 - 7.80
HCB	µg/kg	4.03	0.865	21.5	20	3.98	0.605	0.242	3.63 - 4.43

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	3.79	0.122	3.2	12	3.77	0.082	0.044	3.72 - 3.87

Indicative Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PCB18	µg/kg	3.25	0.589	18.1	7	3.38	0.434	0.278	2.72 - 3.78
PCB31	µg/kg	5.74	1.195	20.8	14	5.88	0.858	0.399	5.05 - 6.42
PCB44	µg/kg	4.04	0.840	20.8	6	4.10	0.605	0.428	3.20 - 4.88
PCB47	µg/kg	2.46	0.498	20.2	5	2.51	0.376	0.278	1.89 - 3.04
PCB49	µg/kg	5.71	0.626	11.0	6	5.81	0.461	0.319	5.09 - 6.34
PCB66	µg/kg	5.98	0.786	13.1	5	5.86	0.568	0.439	5.08 - 6.88
PCB105	µg/kg	1.62	0.372	23.0	12	1.70	0.240	0.134	1.38 - 1.85
PCB110	µg/kg	9.18	0.213	2.3	5	9.25	0.178	0.119	8.94 - 9.43
PCB128	µg/kg	1.59	0.092	5.8	6	1.63	0.075	0.047	1.50 - 1.69
PCB138+PCB163	µg/kg	17.2	1.59	9.3	7	16.4	1.10	0.75	15.7 - 18.6
PCB141	µg/kg	1.65	0.113	6.9	5	1.70	0.091	0.063	1.52 - 1.78
PCB149	µg/kg	11.7	2.62	22.3	9	11.8	1.88	1.09	9.74 - 13.7
PCB151	µg/kg	3.57	0.561	15.7	5	3.58	0.410	0.314	2.93 - 4.22
PCB156	µg/kg	1.11	0.206	18.6	12	1.14	0.135	0.074	0.977 - 1.24
PCB158	µg/kg	1.08	0.138	12.7	4	1.09	0.090	0.086	0.893 - 1.28
PCB170	µg/kg	4.13	0.638	15.5	9	4.01	0.444	0.266	3.64 - 4.61
PCB183	µg/kg	1.44	0.082	5.7	6	1.47	0.057	0.042	1.36 - 1.52
PCB187	µg/kg	4.00	0.359	9.0	6	3.97	0.245	0.183	3.64 - 4.36
PCB194	µg/kg	1.45	0.101	7.0	8	1.45	0.071	0.045	1.37 - 1.53
a-HCH	µg/kg	0.185	0.1147	62.1	12	0.211	0.0800	0.0414	0.113 - 0.257
b-HCH	µg/kg	0.404	0.1919	47.5	12	0.433	0.1335	0.0692	0.283 - 0.525
g-HCH	µg/kg	0.121	0.0634	52.3	11	0.144	0.0470	0.0239	0.0790 - 0.163
d-HCH	µg/kg	0.132	0.0611	46.4	4	0.160	0.0375	0.0382	0.0469 - 0.217
HCBD	µg/kg	1.20	0.529	44.0	7	1.43	0.402	0.250	0.730 - 1.68
Dieldrin	µg/kg	0.356	0.1396	39.2	6	0.399	0.1010	0.0712	0.216 - 0.495
pp'-DDD	µg/kg	1.45	0.342	23.7	16	1.46	0.242	0.107	1.26 - 1.63
pp'-DDE	µg/kg	2.18	0.500	23.0	19	2.10	0.360	0.143	1.94 - 2.42
pp'-DDT	µg/kg	0.839	0.5097	60.8	11	0.929	0.3600	0.1921	0.501 - 1.18

Consensus Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Acenaphthene	µg/kg	46.7	11.17	23.9	27	49.4	7.90	2.69	42.3 - 51.1
Benzo[a]anthracene	µg/kg	274	56.3	20.6	28	282	41.2	13.3	252 - 296
Benzo[a]pyrene	µg/kg	226	56.2	24.8	29	225	37.6	13.0	205 - 248
Benzo[e]pyrene	µg/kg	282	38.7	13.8	19	282	25.3	11.1	263 - 300
Benzo[k]fluoranthene	µg/kg	161	38.1	23.6	26	178	27.6	9.3	146 - 177
Chrysene	µg/kg	284	59.0	20.8	24	288	43.6	15.1	259 - 309
Dibenzothiophene	µg/kg	40.6	5.79	14.3	16	40.8	4.02	1.81	37.5 - 43.6
Fluoranthene	µg/kg	548	107.4	19.6	29	545	77.2	24.9	507 - 588
Fluorene	µg/kg	82.5	18.23	22.1	29	84.5	13.04	4.23	75.6 - 89.5
Phenanthrene	µg/kg	375	83.3	22.2	28	391	59.0	19.7	343 - 408
Pyrene	µg/kg	407	74.3	18.3	28	409	52.4	17.6	378 - 435

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
TOC	%	3.80	0.303	8.0	13	3.80	0.212	0.105	3.62 - 3.98

Indicative Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Acenaphthylene	µg/kg	29.2	16.05	55.0	26	30.7	11.16	3.94	22.7 - 35.7
Anthracene	µg/kg	146	40.7	27.8	30	154	28.6	9.3	131 - 161
Benzo[b]fluoranthene	µg/kg	379	124.8	32.9	25	379	83.1	31.2	328 - 431
Benzo[g,h,i]perylene	µg/kg	240	69.0	28.7	30	254	49.5	15.7	214 - 266
Chrysene + Triphenylene	µg/kg	368	64.1	17.4	8	363	44.8	28.3	316 - 420
Dibenz[a,h]anthracene	µg/kg	58.8	17.93	30.5	29	58.5	12.00	4.16	52.0 - 65.7
Indeno[1,2,3-cd]pyrene	µg/kg	254	76.7	30.1	30	254	53.2	17.5	226 - 283
Naphthalene	µg/kg	215	64.9	30.1	28	216	44.6	15.3	190 - 240
Perylene	µg/kg	175	47.9	27.4	18	176	33.8	14.1	151 - 198
Triphenylene	µg/kg	82.9	25.63	30.9	7	72.8	15.37	12.11	60.0 - 106
Benzofluoranthenes (b+j)	µg/kg	604	30.4	5.0	4	594	22.6	19.0	562 - 647
1-methylphenanthrene	µg/kg	76.0	10.12	13.3	5	78.1	6.86	5.66	64.4 - 87.7
2-methylphenanthrene	µg/kg	118	40.4	34.3	8	116	28.4	17.9	84.9 - 151
3-6-dimethylphenanthrene	µg/kg	25.3	5.71	22.5	5	24.5	3.89	3.19	18.8 - 31.9
1-methylnaphtalene	µg/kg	84.5	31.69	37.5	12	90.2	23.05	11.44	64.6 - 104
2-methylnaphtalene	µg/kg	157	34.2	21.8	13	169	24.0	11.9	136 - 177
C1-phenanthr.+anthrac.	µg/kg	331	52.9	16.0	8	335	36.1	23.4	288 - 374
C2-phenanthr.+anthrac.	µg/kg	325	111.3	34.3	8	312	78.8	49.2	234 - 415
C3-phenanthr.+anthrac.	µg/kg	235	40.6	17.3	6	237	27.4	20.7	194 - 275
C1-pyrenes+fluoranthenes	µg/kg	408	166.4	40.8	6	418	117.7	84.9	242 - 574
C1-chrysenes	µg/kg	275	74.5	27.1	5	280	56.2	41.7	189 - 360
C2-chrysenes	µg/kg	222	116.7	52.6	4	222	79.2	73.0	59.9 - 384
C1-naphtalenes	µg/kg	357	17.8	5.0	5	359	14.4	10.0	337 - 378
C2-naphtalenes	µg/kg	319	117.9	36.9	7	319	78.4	55.7	214 - 425
C3-napthalenes	µg/kg	304	215.9	71.0	7	281	149.2	102.0	111 - 497
C1-dibenzothiophenes	µg/kg	60.0	12.38	20.6	5	58.3	8.44	6.92	45.8 - 74.2
C2-dibenzothiophenes	µg/kg	108	23.5	21.9	5	104	17.0	13.2	80.6 - 135
C3-dibenzothiophenes	µg/kg	95.4	12.37	13.0	4	95.4	8.79	7.73	78.3 - 113

Method: Total petroleum hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total petroleum hydrocarbons	mg/kg	320	10.2	3.2	4	316	7.8	6.3	306 - 334

Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
PN	%	0.385	0.0512	13.3	5	0.384	0.0330	0.0286	0.326 - 0.444

Consensus Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Tributyltin (TBT)	µg Sn/kg	2.58	0.329	12.7	16	2.59	0.235	0.103	2.41 - 2.76

Indicative Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Dibutyltin (DBT)	µg Sn/kg	3.87	1.315	34.0	15	3.90	0.860	0.424	3.15 - 4.60
Monobutyltin (MBT)	µg Sn/kg	9.94	5.760	57.9	12	11.32	3.980	2.078	6.32 - 13.6

Indicative Values MS8

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
n-PFOS	µg/kg	1.61	0.247	15.3	6	1.62	0.175	0.126	1.36 - 1.86
PFHxA	µg/kg	0.0978	0.0228	23.3	5	0.0944	0.0156	0.0128	0.0715 - 0.124
PFOA	µg/kg	0.127	0.0308	24.4	5	0.132	0.0216	0.0172	0.0911 - 0.162
PFNA	µg/kg	0.0465	0.0162	34.8	5	0.0500	0.0106	0.0090	0.0279 - 0.0651
PFDA	µg/kg	0.214	0.0089	4.1	5	0.216	0.0062	0.0050	0.204 - 0.224
PFUnDA	µg/kg	0.202	0.0325	16.1	5	0.210	0.0221	0.0182	0.164 - 0.239
PFDoA	µg/kg	0.267	0.0893	33.5	5	0.255	0.0650	0.0499	0.164 - 0.369
PFTrDA	µg/kg	0.0853	0.0233	27.3	5	0.0920	0.0150	0.0130	0.0585 - 0.112