



QUASIMEME

Quality assurance of information
for marine environmental monitoring

Certificate of Analysis



Sediment

REFERENCE MATERIAL

Sediment sample 55



Certificate of Analysis Sediment 55

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 % probability) 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 55 of Harbor sediment from harbor of Rotterdam 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	MS2	QOR151MS
2022.1	MS3	QPH114MS
2021.2	MS6	QSP078MS
2021.2	MS8	QPF014MS
2021.1	MS7	QBC066MS
2020.2	MS8	QPF010MS
2020.1	MS2	QOR143MS
2020.1	MS3	QPH106MS
2020.1	MS6	QSP073MS
2020.1	MS7	QBC063MS



Consensus Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB28	µg/kg	32.4	4.56	14.1	34	32.3	3.01	0.98	30.8	-	34.0
PCB31	µg/kg	32.0	4.48	14.0	22	31.7	2.86	1.19	30.0	-	33.9
PCB44	µg/kg	68.8	6.45	9.4	12	68.8	4.28	2.33	64.7	-	72.8
PCB49	µg/kg	63.1	5.03	8.0	12	63.7	3.45	1.82	60.0	-	66.3
PCB52	µg/kg	151	14.3	9.5	34	150	9.8	3.1	146	-	156
PCB101	µg/kg	111	16.7	15.1	34	108	11.5	3.6	105	-	117
PCB105	µg/kg	13.5	2.75	20.3	24	13.4	1.89	0.70	12.4	-	14.7
PCB110	µg/kg	84.6	12.81	15.2	10	82.5	8.36	5.06	75.5	-	93.6
PCB118	µg/kg	47.3	5.17	10.9	35	47.9	3.68	1.09	45.5	-	49.0
PCB128	µg/kg	4.80	0.777	16.2	12	4.76	0.559	0.281	4.31	-	5.29
PCB138+PCB163	µg/kg	41.1	5.51	13.4	15	39.4	3.80	1.78	38.1	-	44.1
PCB138	µg/kg	29.6	6.56	22.2	29	29.5	4.35	1.52	27.1	-	32.1
PCB149	µg/kg	40.8	5.24	12.8	14	39.8	3.52	1.75	37.8	-	43.8
PCB153	µg/kg	39.4	8.36	21.2	35	40.6	5.85	1.77	36.5	-	42.3
PCB156	µg/kg	1.89	0.405	21.4	21	1.87	0.275	0.111	1.71	-	2.08
PCB180	µg/kg	9.59	1.571	16.4	37	9.64	1.054	0.323	9.07	-	10.1
PCB183	µg/kg	2.55	0.300	11.8	10	2.61	0.214	0.119	2.34	-	2.76

Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.16	0.189	6.0	22	3.15	0.121	0.050	3.08	-	3.24



Indicative Values MS2

Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB18	µg/kg	6.81	1.819	26.7	9	6.71	1.216	0.758	5.44	-	8.18
PCB47	µg/kg	20.4	6.71	33.0	9	22.0	4.70	2.80	15.3	-	25.4
PCB66	µg/kg	52.9	8.87	16.8	8	53.9	6.04	3.92	45.7	-	60.1
PCB141	µg/kg	5.76	1.366	23.7	9	5.83	0.984	0.569	4.73	-	6.79
PCB151	µg/kg	12.4	2.42	19.5	10	12.5	1.69	0.96	10.7	-	14.1
PCB158	µg/kg	3.07	0.873	28.4	9	3.13	0.613	0.364	2.41	-	3.73
PCB170	µg/kg	5.22	1.090	20.9	16	5.49	0.712	0.341	4.64	-	5.80
PCB187	µg/kg	6.43	1.361	21.2	11	6.37	0.936	0.513	5.53	-	7.34
PCB194	µg/kg	1.37	0.287	21.0	13	1.33	0.192	0.099	1.20	-	1.54
a-HCH	µg/kg	0.128	0.0918	71.7	17	0.157	0.0670	0.0278	0.0811	-	0.175
b-HCH	µg/kg	0.208	0.0850	40.9	17	0.233	0.0590	0.0258	0.165	-	0.252
g-HCH	µg/kg	0.134	0.0593	44.3	20	0.140	0.0420	0.0166	0.106	-	0.162
d-HCH	µg/kg	0.120	0.0368	30.6	5	0.134	0.0290	0.0205	0.0780	-	0.162
HCB	µg/kg	3.21	0.931	29.0	31	3.34	0.660	0.209	2.87	-	3.56
HCBD	µg/kg	1.00	0.488	48.7	8	1.21	0.313	0.216	0.604	-	1.40
Dieldrin	µg/kg	0.726	0.3382	46.6	15	0.758	0.2380	0.1091	0.540	-	0.912
pp'-DDD	µg/kg	1.71	0.535	31.3	28	1.82	0.368	0.126	1.50	-	1.91
pp'-DDE	µg/kg	2.64	0.714	27.0	27	2.78	0.527	0.172	2.36	-	2.92
pp'-DDT	µg/kg	0.536	0.1834	34.3	20	0.603	0.1294	0.0513	0.450	-	0.621

Method: Nitrogen - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PN	%	0.304	0.0072	2.4	6	0.301	0.0050	0.0037	0.296	-	0.311



Consensus Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Acenaphthene	µg/kg	34.0	6.69	19.7	38	34.1	4.40	1.36	31.8	-	36.2
Anthracene	µg/kg	127	32.6	25.7	41	129	22.4	6.4	116	-	137
Benzo[a]anthracene	µg/kg	254	54.6	21.5	37	254	37.2	11.2	236	-	272
Benzo[a]pyrene	µg/kg	213	29.1	13.6	40	217	20.2	5.7	204	-	222
Benzo[b]fluoranthene	µg/kg	409	62.7	15.3	29	408	42.4	14.6	385	-	433
Benzo[e]pyrene	µg/kg	287	29.8	10.4	26	288	19.9	7.3	275	-	299
Benzo[g,h,i]perylene	µg/kg	240	37.3	15.6	41	242	25.7	7.3	228	-	252
Benzo[k]fluoranthene	µg/kg	177	29.3	16.6	33	177	21.0	6.4	166	-	187
Chrysene	µg/kg	290	70.9	24.4	28	276	47.9	16.7	262	-	317
Dibenz[a,h]anthracene	µg/kg	60.7	18.27	30.1	38	63.5	12.36	3.70	54.7	-	66.7
Dibenzothiophene	µg/kg	47.7	7.59	15.9	19	46.3	5.34	2.18	44.1	-	51.4
Fluoranthene	µg/kg	564	76.6	13.6	40	568	52.2	15.1	539	-	588
Fluorene	µg/kg	55.1	11.06	20.1	38	55.6	7.50	2.24	51.5	-	58.8
Indeno[1,2,3-cd]pyrene	µg/kg	261	39.0	14.9	40	260	26.2	7.7	249	-	274
Naphthalene	µg/kg	215	57.2	26.6	35	212	40.0	12.1	195	-	235
Perylene	µg/kg	186	31.3	16.8	20	189	21.5	8.8	172	-	201
Phenanthrene	µg/kg	362	86.6	23.9	38	359	62.2	17.6	334	-	391
Triphenylene	µg/kg	92.4	10.99	11.9	10	94.5	7.41	4.34	84.7	-	100
Pyrene	µg/kg	446	67.8	15.2	38	448	45.5	13.8	424	-	468
Benzo[fluoranthenes (b+j)	µg/kg	576	75.2	13.0	11	600	56.6	28.3	527	-	626
2-methylphenanthrene	µg/kg	156	18.8	12.0	11	161	12.0	7.1	144	-	169

Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	3.17	0.269	8.5	21	3.17	0.176	0.073	3.05	-	3.29



Indicative Values MS3

Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Acenaphthylene	µg/kg	29.8	14.02	47.1	34	32.9	9.42	3.00	24.9	-	34.6
Benzo[a]fluorene	µg/kg	89.1	39.54	44.4	4	87.6	27.40	24.71	34.2	-	144
Chrysene + Triphenylene	µg/kg	357	87.4	24.5	14	338	59.5	29.2	307	-	407
Benzo[fluoranthenes (a+b+j+k)	µg/kg	683	154.7	22.7	5	687	107.5	86.5	505	-	861
1-methylpyrene	µg/kg	41.8	13.36	31.9	5	43.6	8.50	7.47	26.5	-	57.2
1-methylphenanthrene	µg/kg	98.1	25.23	25.7	7	94.1	16.18	11.92	75.5	-	121
3-6-dimethylphenanthrene	µg/kg	57.5	14.83	25.8	9	60.0	10.90	6.18	46.3	-	68.6
1-methylnaphthalene	µg/kg	97.7	28.81	29.5	12	103.3	20.85	10.40	79.6	-	116
2-methylnaphthalene	µg/kg	149	40.5	27.2	12	158	28.9	14.6	124	-	174
C1-phenanthr.+anthrac.	µg/kg	454	153.7	33.8	14	441	107.1	51.3	366	-	542
C2-phenanthr.+anthrac.	µg/kg	647	284.9	44.0	13	645	195.5	98.8	476	-	818
C3-phenanthr.+anthrac.	µg/kg	507	99.6	19.6	10	507	72.4	39.4	437	-	578
C1-pyrenes+fluoranthenes	µg/kg	412	226.3	54.9	10	405	151.8	89.5	253	-	571
C2-pyrenes+fluoranthenes	µg/kg	350	123.0	35.1	6	330	83.7	62.8	227	-	473
C1-chrysenes	µg/kg	361	108.7	30.2	9	373	76.6	45.3	279	-	443
C2-chrysenes	µg/kg	252	143.8	57.0	7	259	96.6	68.0	124	-	381
C1-benzofluoranthenes	µg/kg	365	94.3	25.8	4	350	62.3	58.9	234	-	496
C1-naphthalenes	µg/kg	314	97.6	31.1	10	306	65.6	38.6	245	-	383
C2-naphthalenes	µg/kg	439	235.9	53.7	13	365	174.4	81.8	298	-	580
C3-naphthalenes	µg/kg	377	137.8	36.5	13	410	99.7	47.8	295	-	460
C1-phenanthrenes	µg/kg	282	36.9	13.1	4	284	24.1	23.1	231	-	333
C1-dibenzothiophenes	µg/kg	124	23.7	19.1	9	123	17.2	9.9	106	-	142
C2-dibenzothiophenes	µg/kg	398	145.7	36.6	9	333	95.7	60.7	288	-	508
C3-dibenzothiophenes	µg/kg	398	176.6	44.4	7	398	118.8	83.4	240	-	556

Method: Total petroleum hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Total petroleum hydrocarbons	mg/kg	484	31.9	6.6	7	479	25.0	15.1	456	-	513

Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PN	%	0.303	0.0223	7.4	8	0.301	0.0150	0.0099	0.285	-	0.321



Consensus Values MS6

Method: Organometals - MS6

Element

Dibutyltin (DBT)

Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
µg Sn/kg	7.06	1.871	26.5	31	7.47	1.260	0.420	6.38	-	7.75



Indicative Values MS6

Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Tributyltin (TBT)	µg Sn/kg	11.9	3.95	33.3	35	13.0	2.82	0.83	10.5	-	13.2
Monobutyltin (MBT)	µg Sn/kg	33.8	21.98	65.0	27	37.0	15.91	5.29	25.1	-	42.5
Diphenyltin (DPHT)	µg Sn/kg	0.155	0.0539	34.7	4	0.174	0.0335	0.0337	0.0805	-	0.230



Consensus Values MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
BDE047	µg/kg	1.44	0.255	17.8	21	1.40	0.181	0.070	1.32	-	1.55
BDE099	µg/kg	1.24	0.221	17.8	21	1.20	0.149	0.060	1.14	-	1.34
BDE100	µg/kg	0.319	0.0589	18.5	21	0.318	0.0410	0.0161	0.292	-	0.346
BDE153	µg/kg	0.294	0.0681	23.2	22	0.318	0.0500	0.0181	0.264	-	0.324
BDE154	µg/kg	0.167	0.0363	21.7	20	0.172	0.0245	0.0101	0.150	-	0.184
BDE209	µg/kg	61.1	10.70	17.5	20	59.1	7.75	2.99	56.1	-	66.1



Indicative Values MS7

Method: Brominated Flame Retardants - MS7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
BDE028	µg/kg	0.246	0.0674	27.5	20	0.254	0.0485	0.0188	0.214	- 0.277
BDE183	µg/kg	0.227	0.0764	33.6	18	0.249	0.0560	0.0225	0.190	- 0.265
BDE66	µg/kg	0.0571	0.0214	37.5	14	0.0605	0.0126	0.0072	0.0449	- 0.0694
BDE85	µg/kg	0.0540	0.0291	53.8	15	0.0660	0.0203	0.0094	0.0380	- 0.0700
a-HBCD	µg/kg	11.6	0.84	7.2	5	11.8	0.50	0.47	10.6	- 12.5
b-HBCD	µg/kg	3.84	0.506	13.2	5	3.93	0.361	0.283	3.26	- 4.43
g-HBCD	µg/kg	48.6	2.48	5.1	4	48.2	1.64	1.55	45.2	- 52.0
total HBCD	µg/kg	62.8	6.18	9.8	5	61.2	4.71	3.45	55.7	- 69.9



Consensus Values MS8

Method: Perfluorinated alkyl substances - MS8

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
PFOA	µg/kg	0.439	0.0339	7.7	10	0.435	0.0240	0.0134	0.416	0.463



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	1.56	0.512	32.7	9	1.70	0.338	0.213	1.18	-	1.95
total PFOS	µg/kg	2.26	0.629	27.8	11	2.37	0.414	0.237	1.85	-	2.68
PFOSA	µg/kg	0.133	0.0520	39.0	7	0.142	0.0345	0.0246	0.0869	-	0.180
PFBA	µg/kg	0.0898	0.0242	26.9	5	0.0840	0.0158	0.0135	0.0621	-	0.118
PFHxA	µg/kg	0.119	0.0208	17.6	8	0.120	0.0135	0.0092	0.102	-	0.136
PFHpA	µg/kg	0.0413	0.0088	21.2	4	0.0415	0.0059	0.0055	0.0292	-	0.0535
PFNA	µg/kg	0.0596	0.0044	7.3	4	0.0579	0.0034	0.0027	0.0535	-	0.0657
PFDA	µg/kg	0.187	0.0135	7.2	8	0.183	0.0098	0.0059	0.176	-	0.198
PFUnDA	µg/kg	0.195	0.0098	5.0	7	0.194	0.0072	0.0046	0.186	-	0.203
PFDoA	µg/kg	0.189	0.0525	27.8	7	0.203	0.0330	0.0248	0.142	-	0.235
PFTTrDA	µg/kg	0.0939	0.0291	30.9	8	0.0927	0.0208	0.0128	0.0702	-	0.118
PFTeDA	µg/kg	0.0813	0.0082	10.1	5	0.0807	0.0053	0.0046	0.0719	-	0.0908
L-PFBS	µg/kg	0.0810	0.0418	51.6	8	0.0865	0.0306	0.0185	0.0469	-	0.115
L-PFHxS	µg/kg	0.0548	0.0118	21.5	4	0.0547	0.0078	0.0074	0.0384	-	0.0711
NMeFOSAA	µg/kg	0.405	0.1277	31.5	7	0.419	0.0937	0.0603	0.291	-	0.519
NEtFOSAA	µg/kg	1.08	0.471	43.5	7	1.12	0.310	0.222	0.662	-	1.50