



# QUASIMEME

Quality assurance of information  
for marine environmental monitoring

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## Certificate of Analysis



**Sediment**

**REFERENCE MATERIAL**

**Sediment sample 32**

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## Certificate of Analysis Sediment 32

### 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 32 of Open sea sediment from Burbo bight, United Kingdom 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
2023.1	MS3	QPH117MS
2020.2	MS3	QPH107MS
2018.2	MS3	QPH099MS
2017.2	MS2	QOR132MS
2016.2	MS2	QOR129MS
2016.1	MS3	QPH090MS
2015.2	MS3	QPH087MS
2015.2	MS6	QSP055MS



### Consensus Values MS2

#### Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
pp'-DDE	µg/kg	0.185	0.0429	23.2	31	0.187	0.0230	0.0096	0.170	-	0.201
pp'-DDD	µg/kg	0.504	0.1243	24.6	30	0.530	0.0885	0.0284	0.458	-	0.551
PCB31	µg/kg	0.237	0.0586	24.7	38	0.249	0.0483	0.0119	0.218	-	0.256
PCB153	µg/kg	0.540	0.1460	27.1	43	0.540	0.1060	0.0278	0.495	-	0.584
PCB138	µg/kg	0.512	0.1601	31.3	40	0.532	0.1270	0.0316	0.461	-	0.563

#### Method: Carbon - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
TOC	%	0.364	0.0804	22.1	23	0.375	0.0555	0.0210	0.329	-	0.399



## Indicative Values MS2

### Method: Chlorinated organics - MS2

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
g-HCH	µg/kg	0.0133	0.0115	86.4	10	0.0210	0.0068	0.0046	0.0052	- 0.0215
Dieldrin	µg/kg	-	-	-	5	0.115	0.1	-	-	-
pp'-DDT	µg/kg	0.0932	0.0476	51.1	19	0.0900	0.0240	0.0136	0.0703	- 0.116
HCB	µg/kg	0.119	0.0435	36.5	28	0.128	0.0270	0.0103	0.102	- 0.136
op'-DDT	µg/kg	-	-	-	5	0.100	0.1	-	-	-
b-HCH	µg/kg	-	-	-	5	0.0560	0.0	-	-	-
HCBD	µg/kg	0.0614	0.0240	39.1	7	0.0570	0.0130	0.0114	0.0400	- 0.0829
PCB52	µg/kg	0.385	0.1405	36.5	42	0.381	0.0810	0.0271	0.341	- 0.428
PCB101	µg/kg	0.471	0.1693	36.0	42	0.490	0.1050	0.0327	0.418	- 0.524
PCB105	µg/kg	0.114	0.0483	42.3	24	0.117	0.0295	0.0123	0.0938	- 0.135
PCB118	µg/kg	0.366	0.1324	36.2	42	0.369	0.0760	0.0255	0.325	- 0.407
PCB138+PCB163	µg/kg	0.646	0.1128	17.5	9	0.655	0.0680	0.0470	0.561	- 0.731
PCB156	µg/kg	0.0577	0.0376	65.1	18	0.0700	0.0283	0.0111	0.0391	- 0.0763
PCB180	µg/kg	0.287	0.1032	35.9	42	0.284	0.0705	0.0199	0.255	- 0.319



## Consensus Values MS3

### Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Chrysene + Triphenylene	µg/kg	36.3	6.40	17.6	45	37.0	4.02	1.19	34.4	- 38.3
Benzo[e]pyrene	µg/kg	40.0	7.45	18.6	79	41.2	4.60	1.05	38.3	- 41.7
Indeno[1,2,3-cd]pyrene	µg/kg	38.9	10.19	26.2	124	39.5	6.39	1.14	37.1	- 40.7
Phenanthrene	µg/kg	44.0	8.83	20.0	122	44.6	5.55	1.00	42.5	- 45.6
Pyrene	µg/kg	49.8	8.94	17.9	121	49.7	5.70	1.02	48.2	- 51.4
Benzo[g,h,i]perylene	µg/kg	40.3	7.52	18.6	125	41.0	4.40	0.84	39.0	- 41.7
Fluoranthene	µg/kg	53.2	8.64	16.2	127	53.2	5.67	0.96	51.7	- 54.7
Benzo[a]anthracene	µg/kg	26.8	6.21	23.2	118	27.2	4.19	0.71	25.6	- 27.9
Benzo[b]fluoranthene	µg/kg	48.2	13.79	28.6	103	47.9	9.61	1.70	45.5	- 50.9
Benzo[a]pyrene	µg/kg	36.2	6.72	18.5	124	36.4	4.50	0.75	35.0	- 37.4
Naphthalene	µg/kg	16.3	5.60	34.3	105	16.4	3.90	0.68	15.3	- 17.4
Dibenz[a,h]anthracene	µg/kg	8.02	2.558	31.9	115	8.00	1.500	0.298	7.54	- 8.49
Benzo[k]fluoranthene	µg/kg	22.0	4.78	21.7	111	22.3	3.30	0.57	21.1	- 22.9
Anthracene	µg/kg	8.35	2.375	28.4	119	8.29	1.510	0.272	7.92	- 8.78
Fluorene	µg/kg	6.81	2.254	33.1	102	7.07	1.595	0.279	6.37	- 7.25
Acenaphthene	µg/kg	3.97	1.455	36.7	92	4.10	1.000	0.190	3.66	- 4.27
Dibenzothiophene	µg/kg	4.15	1.290	31.1	48	4.27	0.794	0.233	3.77	- 4.52
Perylene	µg/kg	11.5	2.52	21.8	67	11.6	1.56	0.38	10.9	- 12.1
Chrysene	µg/kg	28.6	6.63	23.2	92	28.6	4.50	0.86	27.3	- 30.0
Benzo[fluoranthenes (b+j)	µg/kg	70.8	13.52	19.1	15	71.9	8.50	4.36	63.4	- 78.3
C1-phenanthr.+anthrac.	µg/kg	55.0	15.76	28.6	34	56.1	12.56	3.38	49.5	- 60.5

### Method: Carbon - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
TOC	%	0.393	0.0740	18.8	56	0.391	0.0455	0.0124	0.373	- 0.412



## Indicative Values MS3

### Method: Polycyclic aromatic hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Acenaphthylene	µg/kg	3.21	1.690	52.6	87	3.38	1.000	0.226	2.85	-	3.57
Benzo[a]fluorene	µg/kg	8.52	4.625	54.3	12	8.94	2.350	1.669	5.61	-	11.4
3-6-dimethylphenanthrene	µg/kg	3.03	1.344	44.4	26	3.16	1.017	0.330	2.49	-	3.57
2-methylphenanthrene	µg/kg	16.3	5.02	30.7	36	16.4	3.75	1.05	14.6	-	18.0
1-methylpyrene	µg/kg	10.1	4.06	40.0	9	11.0	2.78	1.69	7.08	-	13.2
Triphenylene	µg/kg	9.59	3.000	31.3	23	9.70	1.580	0.782	8.29	-	10.9
Dibenzo[a,i]pyrene	µg/kg	-	-	-	4	2.82	0.9	-	-	-	-
Benzo[fluoranthenes (a+b+j+k)	µg/kg	82.4	11.52	14.0	9	86.3	7.40	4.80	73.7	-	91.0
C2-phenanthr.+anthrac.	µg/kg	45.9	16.04	34.9	33	45.0	11.60	3.49	40.2	-	51.6
C3-phenanthr.+anthrac.	µg/kg	26.2	8.91	34.0	23	24.7	7.35	2.32	22.3	-	30.0
C1-pyrenes+fluoranthenes	µg/kg	52.9	22.77	43.1	22	53.7	16.16	6.07	42.8	-	62.9
C2-pyrenes+fluoranthenes	µg/kg	42.4	11.56	27.3	14	40.7	6.74	3.86	35.7	-	49.0
C1-chrysenes	µg/kg	42.5	12.30	29.0	22	43.6	8.79	3.28	37.0	-	47.9
C2-chrysenes	µg/kg	35.6	19.26	54.1	17	38.0	12.95	5.84	25.8	-	45.5
C1-benzofluoranthenes	µg/kg	48.9	11.45	23.4	7	50.8	8.22	5.41	38.7	-	59.2
C1-naphthalenes	µg/kg	43.1	16.49	38.2	15	38.9	9.70	5.32	34.0	-	52.2
C2-naphthalenes	µg/kg	48.6	28.13	57.9	19	48.9	20.47	8.07	35.1	-	62.1
C3-naphthalenes	µg/kg	42.5	29.45	69.3	19	45.9	21.30	8.44	28.4	-	56.7
C1-phenanthrenes	µg/kg	53.8	19.27	35.8	8	53.6	12.89	8.51	38.1	-	69.5
C1-dibenzothiophenes	µg/kg	5.46	1.657	30.4	7	5.70	0.855	0.783	3.97	-	6.94
C2-dibenzothiophenes	µg/kg	7.74	2.104	27.2	7	8.27	1.239	0.994	5.86	-	9.62
C3-dibenzothiophenes	µg/kg	-	-	-	5	6.99	1.8	-	-	-	-
1-methylphenanthrene	µg/kg	14.1	3.66	25.9	8	14.3	2.05	1.62	11.2	-	17.1
2-methylanthracene	µg/kg	-	-	-	5	7.59	3.7	-	-	-	-
1-methylnaphthalene	µg/kg	15.3	6.89	45.0	15	15.5	3.53	2.22	11.5	-	19.1
2-methylnaphthalene	µg/kg	20.1	5.72	28.5	14	20.8	3.87	1.91	16.8	-	23.3

### Method: Total petroleum hydrocarbons - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Total petroleum hydrocarbons	mg/kg	48.8	14.08	28.8	8	49.7	10.00	6.22	37.4	-	60.3

### Method: Nitrogen - MS3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PN	%	0.0512	0.0123	24.0	11	0.0530	0.0090	0.0046	0.0430	-	0.0593



### Indicative Values MS6

#### Method: Organometals - MS6

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Dibutyltin (DBT)	µg Sn/kg	0.302	0.1847	61.1	6	0.355	0.0805	0.0942	0.118	-	0.487
Monobutyltin (MBT)	µg Sn/kg	1.04	0.771	74.5	9	1.58	0.731	0.321	0.454	-	1.62