WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 791

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 791

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, the 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 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

All values, expressed on a weight basis (kg or %), are reported as oven-dried (105°C) material. Moisture is reported in the material as received.

Sample information

WEPAL reference materials are from natural sources only. There is no spiking, mixing or other alterations of the samples. For sample preparation, the SETOC samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This SETOC sample 791 of Marine Sediment, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 5 periods (or rounds). The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2023	3	3
2021	1	2
2018	1	1
2015	4	2
2012	1	1

Consensus Values SETOC 791

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	136	61.8	45.3	166	137	43.2	6.00	4.40
acenaphthylene	µg/kg	24.9	11.7	47.0	120	26.3	8.05	1.34	5.37
acenaphthene	µg/kg	35.1	12.8	36.5	127	36.4	9.40	1.42	4.05
fluorene	µg/kg	56.8	21.7	38.2	139	59.0	14.0	2.30	4.05
phenanthrene	µg/kg	283	66.4	23.4	174	285	43.3	6.30	2.22
anthracene	µg/kg	104	30.3	29.1	170	105	19.2	2.91	2.79
fluoranthene	µg/kg	539	103	19.1	174	543	65.0	9.75	1.81
pyrene	µg/kg	422	87.0	20.6	152	415	59.8	8.82	2.09
chrysene	µg/kg	308	71.2	23.1	172	317	50.1	6.79	2.21
benz(a)anthracene	µg/kg	249	56.1	22.5	174	253	37.2	5.31	2.13
benzo(b)fluoranthene	µg/kg	398	108	27.2	144	397	78.0	11.3	2.83
benzo(k)fluoranthene	µg/kg	171	39.8	23.2	170	174	24.0	3.82	2.23
benzo(a)pyrene	µg/kg	199	44.9	22.6	174	200	29.5	4.26	2.14
dibenz(ah)anthracene	µg/kg	58.9	16.1	27.3	136	60.8	10.2	1.72	2.93
indeno(1,2,3-cd)pyrene	µg/kg	237	48.6	20.5	174	236	30.5	4.60	1.94
benzo(ghi)perylene	µg/kg	230	40.1	17.4	170	230	23.0	3.84	1.67
EPA ∑PAH(16)	µg/kg	3484	638	18.3	61	3430	458	102	2.93

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	10.9	4.54	41.6	122	11.7	2.65	0.514	4.70
PCB 052	µg/kg	9.07	2.28	25.2	142	9.20	1.31	0.239	2.64
PCB 101	µg/kg	11.1	2.57	23.2	145	11.1	1.50	0.267	2.41
PCB 105	µg/kg	1.31	0.204	15.6	19	1.30	0.105	0.059	4.47
PCB 118	µg/kg	6.83	1.34	19.5	133	6.91	0.810	0.145	2.12
PCB 128	µg/kg	1.96	0.346	17.6	19	2.00	0.215	0.099	5.06
PCB 138	µg/kg	11.5	3.45	29.9	149	11.9	2.08	0.353	3.06
PCB 149	µg/kg	11.6	1.55	13.4	18	11.5	0.850	0.458	3.96
PCB 153	µg/kg	14.4	3.24	22.5	150	14.1	2.14	0.331	2.30
PCB 180	µg/kg	7.79	1.91	24.6	145	7.90	1.19	0.199	2.55
∑PCB(7)	µg/kg	75.1	14.6	19.4	40	76.4	7.90	2.88	3.83

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	422	93.7	22.2	134	424	57.9	10.1	2.39
Organic carbon	g/kg	32.7	4.37	13.4	69	33.0	3.00	0.658	2.01
Inorganic carbon	g/kg	18.9	2.86	15.1	18	19.3	1.75	0.843	4.45

Consensus Values SETOC 791

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	18.2	1.69	9.3	69	18.0	1.06	0.255	1.40
Cd	mg/kg	2.18	0.250	11.4	68	2.22	0.170	0.038	1.73
Cr	mg/kg	74.8	11.0	14.7	70	76.0	7.00	1.65	2.20
Cu	mg/kg	74.4	6.41	8.6	71	74.6	4.30	0.951	1.28
Hg	mg/kg	1.16	0.125	10.8	71	1.17	0.076	0.019	1.60
Ni	mg/kg	38.9	4.42	11.4	71	38.8	2.90	0.656	1.69
Pb	mg/kg	86.6	9.87	11.4	72	87.2	6.47	1.45	1.68
Zn	mg/kg	370	30.4	8.2	72	370	20.7	4.48	1.21
Ba	mg/kg	147	21.6	14.7	51	147	13.0	3.79	2.57
Co	mg/kg	10.8	1.24	11.5	56	11.0	1.00	0.207	1.92
Mo	mg/kg	1.37	0.299	21.8	40	1.37	0.233	0.059	4.31

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DD	ng/kg	8.26	1.36	16.5	11	8.60	0.740	0.513	6.21

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,4,7,8 Cl5DF	ng/kg	15.8	1.84	11.6	12	16.0	1.00	0.662	4.19
1,2,3,7,8 Cl5DF	ng/kg	22.2	3.65	16.5	11	22.4	1.65	1.38	6.20

Indicative Values SETOC 791

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	8.03	2.00	24.9	14	8.60	1.59	0.667	8.31
PCB 156	µg/kg	0.934	0.252	26.9	16	1.05	0.139	0.079	8.42
PCB 077	µg/kg	0.872	0.155	17.8	10	0.880	0.115	0.061	7.05
PCB 081	µg/kg	0.014	0.007	54.0	5	0.016	0.005	0.004	30.2
PCB 114	µg/kg	0.068	0.032	46.8	7	0.069	0.020	0.015	22.1
PCB 123	µg/kg	0.508	0.444	87.4	11	1.20	0.387	0.167	33.0
PCB 157	µg/kg	0.193	0.115	59.7	8	0.215	0.052	0.051	26.4
PCB 167	µg/kg	0.514	0.222	43.2	7	0.600	0.125	0.105	20.4
PCB 169	µg/kg	0.503	1.06	211.6	10	0.460	0.455	0.421	83.6
PCB 189	µg/kg	0.222	0.038	17.2	8	0.238	0.027	0.017	7.61

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	1.55	0.740	47.7	19	1.75	0.483	0.212	13.7
hexachlorobenzene	µg/kg	12.4	4.50	36.3	49	12.9	2.78	0.804	6.48
pentachlorobenzene	µg/kg	1.92	0.781	40.6	19	2.03	0.427	0.224	11.6
1,2,3 trichlorobenzene	µg/kg	0.963	0.316	32.8	8	1.05	0.143	0.140	14.5
1,2,3,4 tetrachlorobenzene	µg/kg	1.44	1.02	70.5	11	1.73	0.703	0.384	26.6
1,2,4 trichlorobenzene	µg/kg	17.3	9.72	56.3	17	19.0	7.00	2.95	17.1
1,3,5 trichlorobenzene	µg/kg	16.4	7.18	43.9	15	17.0	4.75	2.32	14.2
isodrin	µg/kg	0.586	0.503	85.9	9	1.44	0.658	0.210	35.8
aldrin	µg/kg	0.575	0.794	137.9	8	3.32	2.53	0.351	60.9
dieldrin	µg/kg	0.661	0.684	103.6	12	1.93	0.928	0.247	37.4
p,p`-DDT	µg/kg	0.777	0.868	111.8	14	0.926	0.471	0.290	37.3
p,p`-DDE	µg/kg	2.04	0.865	42.3	31	2.35	0.359	0.194	9.51
p,p`-DDD	µg/kg	1.28	0.724	56.8	23	1.68	0.350	0.189	14.8
o,p`-DDD	µg/kg	0.648	0.402	62.1	13	0.771	0.244	0.139	21.5
Sum trichlorobenzenes	µg/kg	48.5	25.3	52.2	6	50.9	15.0	12.9	26.6

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, IR	mg/kg	425	119	28.0	8	422	69.0	52.7	12.4
EOX	mg/kg	2.27	0.863	37.9	24	2.30	0.550	0.220	9.68
Particles < 2 µm	%	26.6	7.12	26.8	13	28.2	3.19	2.47	9.29
Particles < 63 µm	%	65.6	15.2	23.2	16	60.8	13.0	4.75	7.24
Particles > 63 µm	%	18.0	7.72	42.9	11	17.8	4.04	2.91	16.2
CN - Total	mg/kg	1.04	0.402	38.8	32	1.18	0.218	0.089	8.58

Indicative Values SETOC 791

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,7,8 Cl5DD	ng/kg	1.69	1.33	79.0	9	1.90	0.790	0.556	32.9
1,2,3,4,7,8 Cl6DD	ng/kg	2.02	0.847	42.0	10	2.15	0.588	0.335	16.6
1,2,3,7,8,9 Cl6DD	ng/kg	4.26	2.83	66.4	10	4.92	1.82	1.12	26.3
1,2,3,6,7,8 Cl6DD	ng/kg	4.61	2.71	58.7	11	4.90	1.59	1.02	22.1
1,2,3,4,6,7,8 Cl7DD	ng/kg	66.3	14.0	21.2	12	65.0	9.73	5.07	7.64
Cl8DD	ng/kg	593	282	47.6	13	603	164	97.9	16.5

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	27.0	9.30	34.5	12	25.6	6.15	3.35	12.4
1,2,3,4,7,8 Cl6DF	ng/kg	53.8	16.1	30.0	11	55.0	11.4	6.08	11.3
1,2,3,7,8,9 Cl6DF	ng/kg	10.1	9.02	89.5	9	11.0	3.88	3.76	37.3
1,2,3,6,7,8 Cl6DF	ng/kg	20.2	9.48	46.9	12	21.0	3.99	3.42	16.9
2,3,4,6,7,8 Cl6DF	ng/kg	13.4	4.70	35.2	12	13.9	2.52	1.70	12.7
1,2,3,4,6,7,8 Cl7DF	ng/kg	158	49.1	31.1	12	164	21.3	17.7	11.2
1,2,3,4,7,8,9 Cl7DF	ng/kg	26.4	8.98	34.0	12	27.0	5.30	3.24	12.3
Cl8DF	ng/kg	1534	369	24.1	13	1545	226	128	8.35

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	23.9	7.18	30.1	11	23.2	4.19	2.71	11.3