WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 793

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 793

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 793 of Marine Sediment, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 4 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
2022	2	3
2019	2	2
2016	2	4
2013	1	2

Consensus Values SETOC 793

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	86.8	38.9	44.8	115	91.9	25.9	4.53	5.22
acenaphthylene	µg/kg	24.2	10.7	44.2	89	24.0	7.30	1.42	5.86
acenaphthene	µg/kg	21.1	6.48	30.7	83	22.0	4.00	0.889	4.21
fluorene	µg/kg	39.4	12.1	30.6	94	40.0	8.79	1.55	3.95
phenanthrene	µg/kg	250	52.3	20.9	134	252	34.3	5.64	2.26
anthracene	µg/kg	72.9	20.1	27.6	124	72.4	12.4	2.26	3.10
fluoranthene	µg/kg	454	59.8	13.2	134	456	36.0	6.46	1.42
pyrene	µg/kg	384	64.2	16.7	112	384	36.7	7.58	1.97
chrysene	µg/kg	284	62.0	21.9	131	289	44.6	6.78	2.39
benz(a)anthracene	µg/kg	226	41.3	18.2	132	230	25.5	4.49	1.99
benzo(b)fluoranthene	µg/kg	344	85.3	24.8	103	342	57.0	10.5	3.05
benzo(k)fluoranthene	µg/kg	151	29.8	19.7	131	154	17.9	3.26	2.15
benzo(a)pyrene	µg/kg	213	40.6	19.1	135	212	27.0	4.37	2.05
dibenz(ah)anthracene	µg/kg	50.3	15.2	30.2	99	52.0	10.0	1.91	3.79
indeno(1,2,3-cd)pyrene	µg/kg	207	51.5	24.9	133	206	29.0	5.58	2.70
benzo(ghi)perylene	µg/kg	204	37.9	18.6	132	205	24.7	4.12	2.02
EPA ∑PAH(16)	µg/kg	3100	659	21.3	49	3115	426	118	3.80

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	4.30	1.53	35.5	98	4.20	0.830	0.193	4.49
PCB 052	µg/kg	3.83	1.40	36.6	109	3.94	0.940	0.168	4.38
PCB 101	µg/kg	6.44	1.63	25.3	112	6.33	0.997	0.192	2.99
PCB 118	µg/kg	3.97	0.968	24.3	102	4.00	0.545	0.120	3.01
PCB 138	µg/kg	8.95	2.70	30.1	112	9.00	1.61	0.319	3.56
PCB 153	µg/kg	10.4	2.51	24.1	113	10.5	1.60	0.295	2.83
PCB 180	µg/kg	6.59	1.79	27.1	113	6.73	1.16	0.210	3.19
∑PCB(7)	µg/kg	46.2	9.86	21.4	36	46.3	4.73	2.05	4.45

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	3.23	0.914	28.3	35	3.30	0.690	0.193	5.98
p,p`-DDE	µg/kg	1.69	0.404	23.8	27	1.73	0.206	0.097	5.73

Consensus Values SETOC 793

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	457	104	22.9	96	451	70.9	13.3	2.92
Organic carbon	g/kg	38.8	5.09	13.1	51	38.9	3.09	0.891	2.30

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	18.7	2.22	11.9	59	18.9	1.66	0.362	1.94
Cd	mg/kg	1.50	0.180	12.0	61	1.51	0.103	0.029	1.92
Cr	mg/kg	67.1	12.8	19.0	62	66.4	8.56	2.03	3.02
Cu	mg/kg	62.9	6.21	9.9	63	63.1	3.80	0.978	1.56
Hg	mg/kg	0.562	0.081	14.5	63	0.553	0.053	0.013	2.28
Ni	mg/kg	39.6	4.04	10.2	63	40.0	2.80	0.636	1.61
Pb	mg/kg	71.1	9.13	12.8	63	72.4	5.62	1.44	2.02
Zn	mg/kg	351	29.1	8.3	63	350	19.0	4.58	1.30
Ba	mg/kg	173	31.7	18.4	41	172	17.8	6.19	3.58
Co	mg/kg	13.3	1.10	8.3	47	13.4	0.720	0.201	1.51
Mo	mg/kg	1.02	0.216	21.2	29	1.04	0.139	0.050	4.93

Indicative Values SETOC 793

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	3.23	0.947	29.3	9	3.20	0.545	0.395	12.2
PCB 105	µg/kg	0.984	0.263	26.7	12	1.03	0.160	0.095	9.63
PCB 128	µg/kg	1.35	0.580	43.1	13	1.52	0.300	0.201	14.9
PCB 149	µg/kg	9.06	4.11	45.4	9	9.30	2.30	1.71	18.9
PCB 156	µg/kg	0.984	0.829	84.2	11	1.15	0.550	0.312	31.7
PCB 077	µg/kg	0.467	0.214	45.9	6	0.548	0.099	0.109	23.4

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	0.904	0.411	45.5	8	0.905	0.292	0.182	20.1
pentachlorobenzene	µg/kg	1.09	0.501	46.0	14	1.35	0.294	0.167	15.4
1,2,3 trichlorobenzene	µg/kg	1.47	0.812	55.3	9	1.71	0.396	0.338	23.1
1,2,3,4 tetrachlorobenzene	µg/kg	1.06	0.234	22.1	9	1.10	0.108	0.097	9.22
1,2,4 trichlorobenzene	µg/kg	10.7	4.30	40.1	16	11.0	2.77	1.35	12.5
1,3,5 trichlorobenzene	µg/kg	5.28	1.74	33.0	14	5.61	1.31	0.581	11.0
isodrin	µg/kg	1.69	1.88	111.5	14	3.37	1.29	0.629	37.2
aldrin	µg/kg	3.18	3.68	115.5	19	7.00	3.00	1.05	33.1
dieldrin	µg/kg	3.14	1.48	47.3	18	3.81	0.393	0.437	13.9
heptachlor epoxide	µg/kg	0.519	0.351	67.6	6	1.20	0.580	0.179	34.5
telodrin	µg/kg	1.61	0.707	43.8	15	2.00	0.411	0.228	14.1
p,p`-DDT	µg/kg	0.771	0.980	127.2	18	1.90	1.06	0.289	37.5
p,p`-DDD	µg/kg	0.914	0.377	41.2	22	1.20	0.209	0.101	11.0
o,p`-DDD	µg/kg	0.517	0.276	53.4	9	0.589	0.159	0.115	22.3
Sum trichlorobenzenes	µg/kg	19.7	2.15	10.9	4	20.0	1.05	1.34	6.81

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, IR	mg/kg	378	83.5	22.1	7	410	41.0	39.5	10.4
EOX	mg/kg	1.55	0.602	38.8	16	1.56	0.387	0.188	12.1
Inorganic carbon	g/kg	19.3	3.96	20.5	11	18.7	2.80	1.49	7.71
Particles < 2 µm	%	32.7	8.82	27.0	11	33.0	4.40	3.33	10.2
Particles < 63 µm	%	70.3	18.5	26.3	13	69.5	10.7	6.42	9.14
Particles > 63 µm	%	3.40	5.30	155.9	9	4.00	3.50	2.21	65.0
CN - Total	mg/kg	1.45	0.539	37.3	27	1.42	0.389	0.130	8.97
CN - Free	mg/kg	0.634	0.083	13.1	5	0.628	0.046	0.046	7.32

Indicative Values SETOC 793

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DD	ng/kg	4.30	0.569	13.2	5	4.10	0.348	0.318	7.40
1,2,3,7,8,9 Cl6DD	ng/kg	2.55	0.649	25.5	4	2.62	0.300	0.406	15.9
1,2,3,4,6,7,8 Cl7DD	ng/kg	51.7	19.6	37.9	5	49.6	6.30	11.0	21.2
Cl8DD	ng/kg	578	153	26.4	5	636	85.0	85.3	14.8

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	8.47	0.534	6.3	5	8.51	0.314	0.299	3.53
2,3,4,7,8 Cl5DF	ng/kg	7.61	1.16	15.2	5	7.41	0.350	0.648	8.51
1,2,3,7,8 Cl5DF	ng/kg	7.66	0.781	10.2	5	7.45	0.398	0.436	5.70
1,2,3,4,7,8 Cl6DF	ng/kg	25.4	3.32	13.1	5	24.8	2.03	1.86	7.31
1,2,3,6,7,8 Cl6DF	ng/kg	9.83	1.98	20.1	5	10.00	1.01	1.11	11.2
2,3,4,6,7,8 Cl6DF	ng/kg	6.32	3.26	51.6	5	6.09	1.94	1.82	28.9
1,2,3,4,6,7,8 Cl7DF	ng/kg	76.9	3.35	4.4	5	78.0	2.25	1.88	2.44
1,2,3,4,7,8,9 Cl7DF	ng/kg	10.3	2.98	28.9	5	10.2	1.07	1.66	16.2
Cl8DF	ng/kg	393	143	36.3	5	390	82.8	79.7	20.3

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	3.73	1.98	53.2	7	5.63	1.24	0.937	25.1
DEHP	µg/kg	881	131	14.9	5	853	73.0	73.4	8.33