WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 779

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 779

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 779 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
2021	1	3
2018	1	3
2014	1	4
2011	1	1
2008	1	1

Consensus Values SETOC 779

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	148	72.2	48.9	194	146	49.3	6.48	4.39
acenaphthylene	µg/kg	34.9	19.4	55.5	141	34.7	12.3	2.04	5.84
acenaphthene	µg/kg	49.1	22.3	45.5	155	51.0	15.0	2.24	4.57
fluorene	µg/kg	102	45.9	45.1	175	103	30.9	4.34	4.26
phenanthrene	µg/kg	1167	255	21.8	205	1157	158	22.2	1.90
anthracene	µg/kg	134	44.2	33.0	200	136	28.8	3.91	2.91
fluoranthene	µg/kg	636	140	22.0	207	636	87.0	12.2	1.91
pyrene	µg/kg	947	211	22.2	185	932	138	19.3	2.04
chrysene	µg/kg	980	226	23.0	205	975	141	19.7	2.01
benz(a)anthracene	µg/kg	488	139	28.4	202	493	83.0	12.2	2.49
benzo(b)fluoranthene	µg/kg	482	143	29.5	173	481	89.9	13.5	2.81
benzo(k)fluoranthene	µg/kg	191	46.2	24.1	196	190	29.0	4.12	2.16
benzo(a)pyrene	µg/kg	232	70.0	30.2	207	230	45.5	6.08	2.62
dibenz(ah)anthracene	µg/kg	89.1	28.5	32.0	170	90.2	18.7	2.73	3.07
indeno(1,2,3-cd)pyrene	µg/kg	262	72.1	27.5	204	264	44.0	6.31	2.41
benzo(ghi)perylene	µg/kg	274	65.5	23.9	205	276	39.0	5.72	2.09
EPA ∑PAH(16)	µg/kg	5874	1122	19.1	45	5981	623	209	3.56

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	8.09	3.18	39.2	133	8.47	1.73	0.344	4.25
PCB 052	µg/kg	8.00	2.96	37.0	150	8.30	1.94	0.302	3.77
PCB 101	µg/kg	9.85	2.50	25.4	158	10.2	1.77	0.249	2.52
PCB 118	µg/kg	6.45	1.56	24.2	144	6.59	0.885	0.163	2.52
PCB 138	µg/kg	11.6	3.24	27.8	162	11.9	1.85	0.318	2.73
PCB 153	µg/kg	14.0	3.18	22.7	163	14.1	1.90	0.311	2.22
PCB 180	µg/kg	7.17	1.56	21.7	152	7.14	0.985	0.158	2.20
∑PCB(7)	µg/kg	65.0	11.1	17.1	27	65.9	6.90	2.68	4.12

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, IR	mg/kg	958	155	16.1	17	965	110	46.9	4.89
Mineral oil, GC	mg/kg	1048	281	26.8	158	1043	191	27.9	2.67
Organic carbon	g/kg	37.1	4.62	12.5	75	37.9	3.00	0.667	1.80
Inorganic carbon	g/kg	21.4	2.52	11.8	23	21.0	1.40	0.657	3.07
Particles < 63 µm	%	87.2	12.2	13.9	20	85.9	9.75	3.40	3.90

Consensus Values SETOC 779

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	17.9	2.20	12.3	87	17.9	1.20	0.295	1.65
Cd	mg/kg	2.37	0.293	12.4	91	2.38	0.150	0.038	1.62
Cr	mg/kg	78.0	11.6	14.9	90	77.8	7.16	1.53	1.96
Cu	mg/kg	79.3	5.46	6.9	89	79.0	3.30	0.723	0.912
Hg	mg/kg	0.910	0.108	11.9	91	0.912	0.075	0.014	1.56
Ni	mg/kg	35.5	4.50	12.7	90	35.7	3.29	0.592	1.67
Pb	mg/kg	83.0	10.2	12.3	91	83.8	6.63	1.34	1.61
Zn	mg/kg	387	25.8	6.7	89	388	17.0	3.41	0.881
Ba	mg/kg	202	31.3	15.5	49	198	18.6	5.59	2.76
Co	mg/kg	11.7	1.61	13.7	52	11.8	1.07	0.279	2.38

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,7,8 Cl5DF	ng/kg	15.1	2.07	13.7	19	15.1	1.55	0.594	3.94

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	6.20	3.08	49.6	14	6.90	2.11	1.03	16.6
PCB 105	µg/kg	0.961	0.600	62.4	21	1.40	0.419	0.164	17.0
PCB 128	µg/kg	1.49	0.721	48.5	14	2.05	0.320	0.241	16.2
PCB 149	µg/kg	10.3	2.02	19.6	15	10.0	1.10	0.651	6.32
PCB 156	µg/kg	0.808	0.437	54.1	17	1.10	0.300	0.133	16.4
PCB 077	µg/kg	0.679	0.363	53.4	11	0.848	0.218	0.137	20.1
PCB 081	µg/kg	0.026	0.057	220.6	8	0.033	0.027	0.025	97.5
PCB 114	µg/kg	0.059	0.032	54.6	6	0.069	0.019	0.016	27.9
PCB 123	µg/kg	0.504	0.436	86.4	11	1.38	0.720	0.164	32.6
PCB 157	µg/kg	0.159	0.122	76.6	9	0.180	0.040	0.051	31.9
PCB 167	µg/kg	0.490	0.350	71.3	11	0.549	0.201	0.132	26.9
PCB 169	µg/kg	0.043	0.119	277.3	12	0.075	0.071	0.043	100
PCB 189	µg/kg	0.199	0.129	64.6	9	0.203	0.040	0.054	26.9

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	1.03	0.761	73.8	13	1.50	0.500	0.264	25.6
hexachlorobenzene	µg/kg	3.96	2.23	56.4	44	4.33	1.55	0.420	10.6
pentachlorobenzene	µg/kg	1.14	0.823	72.2	17	1.35	0.647	0.250	21.9
1,2,3,4 tetrachlorobenzene	µg/kg	1.47	1.02	69.6	7	1.70	0.600	0.482	32.9
1,2,4 trichlorobenzene	µg/kg	18.1	13.8	76.1	10	17.7	7.71	5.45	30.1
1,3,5 trichlorobenzene	µg/kg	11.5	5.30	46.2	9	11.0	2.92	2.21	19.2
isodrin	µg/kg	2.77	3.20	115.6	16	7.32	2.42	1.00	36.1
aldrin	µg/kg	8.87	13.6	153.1	29	19.0	12.5	3.15	35.5
dieldrin	µg/kg	3.44	4.55	132.4	24	14.3	2.32	1.16	33.8
endrin	µg/kg	1.12	1.40	124.7	8	5.86	2.70	0.617	55.1
telodrin	µg/kg	10.1	7.03	69.9	20	13.5	5.49	1.97	19.5
p,p`-DDT	µg/kg	0.671	1.04	155.5	18	2.49	1.59	0.307	45.8
o,p`-DDT	µg/kg	0.582	0.725	124.6	10	7.60	1.40	0.287	49.3
p,p`-DDE	µg/kg	2.06	0.890	43.2	30	2.40	0.400	0.203	9.85
p,p`-DDD	µg/kg	1.03	1.35	130.8	24	2.92	1.62	0.343	33.4
o,p`-DDD	µg/kg	0.526	0.628	119.4	14	2.25	1.78	0.210	39.9

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	162	26.2	16.2	8	159	16.5	11.6	7.15
EOX	mg/kg	2.92	1.18	40.5	45	3.00	0.767	0.220	7.54

Method: Other parameters									(cont.)
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
Particles < 2 µm	%	28.5	7.00	24.5	22	30.0	3.75	1.87	6.54
Particles > 63 µm	%	3.98	1.76	44.1	16	4.60	1.22	0.549	13.8
CN - Total	mg/kg	1.63	0.650	39.9	45	1.66	0.380	0.121	7.44

Method: Metals									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
Mo	mg/kg	1.14	0.364	31.9	37	1.21	0.255	0.075	6.56

Method: Dibenzo-P Dioxin									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
2,3,7,8 Cl4DD	ng/kg	9.54	2.25	23.6	19	9.46	1.20	0.646	6.77
1,2,3,7,8 Cl5DD	ng/kg	3.06	1.66	54.3	15	3.42	1.22	0.536	17.5
1,2,3,4,7,8 Cl6DD	ng/kg	3.45	2.26	65.3	15	4.07	1.17	0.728	21.1
1,2,3,7,8,9 Cl6DD	ng/kg	4.20	2.93	69.8	19	4.75	1.45	0.840	20.0
1,2,3,6,7,8 Cl6DD	ng/kg	6.29	1.61	25.7	18	6.60	1.00	0.476	7.56
1,2,3,4,6,7,8 Cl7DD	ng/kg	75.8	26.5	34.9	20	80.2	13.2	7.40	9.76
Cl8DD	ng/kg	761	287	37.7	21	761	217	78.2	10.3

Method: Dibenzofuran									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
2,3,7,8 Cl4DF	ng/kg	12.7	3.91	30.9	20	13.3	2.30	1.09	8.65
2,3,4,7,8 Cl5DF	ng/kg	15.2	5.47	35.9	20	15.0	3.20	1.53	10.0
1,2,3,4,7,8 Cl6DF	ng/kg	46.4	13.7	29.6	20	48.3	7.79	3.84	8.28
1,2,3,7,8,9 Cl6DF	ng/kg	9.35	6.86	73.4	18	12.0	4.12	2.02	21.6
1,2,3,6,7,8 Cl6DF	ng/kg	22.9	6.77	29.5	18	23.3	3.41	1.99	8.69
2,3,4,6,7,8 Cl6DF	ng/kg	15.3	9.44	61.6	19	17.0	5.20	2.71	17.7
1,2,3,4,6,7,8 Cl7DF	ng/kg	167	48.2	28.9	20	166	20.5	13.5	8.08
1,2,3,4,7,8,9 Cl7DF	ng/kg	26.6	10.2	38.5	19	28.0	5.35	2.93	11.0
Cl8DF	ng/kg	622	339	54.5	21	637	234	92.5	14.9

Method: Experimental									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
Tributyl Tin (TBT)	µg/kg	17.3	7.51	43.5	14	20.3	4.02	2.51	14.5