WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 795

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 795

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.

Please note: Most WEPAL-QUASIMEME reference materials are found to be stable over the long term (>10 years) for most determinand/matrix combinations. There are a few exceptions known to us as being less stable over the long term. These are organotins in sediment (MS6), ASP in shellfish (BT7), some PAHs and PCBs in sediment (SETOC) and N-NH_4 (as N) in clay soils (ISE).

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 795 of Sediment, from the dam of Iffezheim, in Germany, is prepared for the WEPAL proficiency programs. The sample has been used in 10 periods (or rounds). Only results from the last 5 periods are used. This way, the consensus values reflect the latest 'state of the art' analytical techniques used by the laboratories. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2025	4	2
2025	3	1
2025	2	3
2025	1	4
2024	3	3

Consensus Values SETOC 795

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
acenaphthylene	µg/kg	15.0	5.81	38.7	72	15.0	3.30	0.855	5.69
acenaphthene	µg/kg	7.91	2.67	33.8	62	8.00	1.75	0.425	5.37
fluorene	µg/kg	12.3	5.04	41.0	68	14.0	2.85	0.764	6.21
phenanthrene	µg/kg	166	32.6	19.6	134	164	22.5	3.52	2.12
anthracene	µg/kg	37.5	11.4	30.5	117	38.8	7.80	1.32	3.53
fluoranthene	µg/kg	390	60.9	15.6	135	383	37.0	6.55	1.68
pyrene	µg/kg	313	46.5	14.9	117	311	26.2	5.38	1.72
chrysene	µg/kg	216	39.1	18.1	134	216	23.9	4.23	1.96
benz(a)anthracene	µg/kg	186	35.4	19.1	135	186	21.2	3.81	2.05
benzo(b)fluoranthene	µg/kg	236	52.6	22.3	111	237	31.4	6.24	2.64
benzo(k)fluoranthene	µg/kg	114	21.2	18.5	131	116	13.2	2.32	2.02
benzo(a)pyrene	µg/kg	189	30.0	15.9	135	189	16.4	3.23	1.71
dibenz(ah)anthracene	µg/kg	38.3	8.29	21.6	100	38.3	4.75	1.04	2.70
indeno(1,2,3-cd)pyrene	µg/kg	147	29.8	20.3	131	146	20.1	3.25	2.21
benzo(ghi)perylene	µg/kg	152	24.5	16.1	134	153	14.2	2.65	1.74
EPA ∑PAH(16)	µg/kg	2320	389	16.8	83	2299	241	53.4	2.30

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 052	µg/kg	4.24	2.28	53.7	120	4.30	1.64	0.260	6.13
PCB 101	µg/kg	5.42	1.43	26.4	120	5.51	0.995	0.164	3.02
PCB 118	µg/kg	2.83	0.707	24.9	115	2.80	0.490	0.082	2.91
PCB 138	µg/kg	7.12	1.95	27.4	119	7.25	1.45	0.224	3.14
PCB 149	µg/kg	6.42	1.02	15.9	14	6.30	0.685	0.340	5.30
PCB 153	µg/kg	7.69	1.42	18.5	121	7.76	0.810	0.162	2.11
PCB 180	µg/kg	4.87	1.08	22.1	117	4.90	0.700	0.124	2.56
∑PCB(7)	µg/kg	36.3	8.31	22.9	59	36.5	5.40	1.35	3.72

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	89.6	13.1	14.6	35	88.5	8.86	2.76	3.08
pentachlorobenzene	µg/kg	1.37	0.298	21.8	21	1.36	0.180	0.081	5.95
o,p`-DDT	µg/kg	1.57	0.354	22.6	24	1.59	0.230	0.090	5.78
p,p`-DDE	µg/kg	4.28	0.903	21.1	32	4.31	0.578	0.200	4.66
p,p`-DDD	µg/kg	1.57	0.309	19.8	25	1.60	0.258	0.077	4.94

Consensus Values SETOC 795

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	168	40.5	24.1	105	165	27.0	4.94	2.94
Organic carbon	g/kg	23.6	2.01	8.5	63	23.7	1.34	0.317	1.35

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	10.3	0.682	6.6	61	10.4	0.460	0.109	1.06
Cd	mg/kg	0.381	0.049	12.8	51	0.390	0.030	0.009	2.24
Cr	mg/kg	40.6	7.87	19.4	63	40.4	3.90	1.24	3.05
Cu	mg/kg	35.3	3.25	9.2	63	35.0	2.00	0.512	1.45
Hg	mg/kg	0.244	0.026	10.8	57	0.246	0.015	0.004	1.78
Ni	mg/kg	29.9	2.90	9.7	64	30.0	1.70	0.454	1.52
Pb	mg/kg	29.9	3.47	11.6	62	30.0	2.00	0.550	1.84
Zn	mg/kg	120	9.78	8.1	62	121	5.75	1.55	1.29
Ba	mg/kg	140	15.7	11.2	42	140	10.4	3.03	2.16
Co	mg/kg	7.83	0.855	10.9	52	7.80	0.489	0.148	1.89
Mo	mg/kg	0.748	0.132	17.7	40	0.735	0.088	0.026	3.49
Sb	mg/kg	0.716	0.131	18.3	22	0.727	0.086	0.035	4.88
Sn	mg/kg	3.94	0.775	19.7	25	4.00	0.438	0.194	4.92

Indicative Values SETOC 795

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	17.2	9.22	53.7	74	21.0	6.64	1.34	7.80
VROM∑PAH10	µg/kg	1572	103	6.6	7	1588	53.0	48.7	3.10

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	1.98	1.02	51.4	101	2.25	0.670	0.127	6.40
PCB 031	µg/kg	1.98	0.625	31.5	9	2.10	0.300	0.260	13.1
PCB 105	µg/kg	0.871	0.188	21.5	8	0.901	0.127	0.083	9.52
PCB 128	µg/kg	0.784	0.406	51.7	9	1.20	0.183	0.169	21.6
PCB 156	µg/kg	0.846	0.329	38.9	13	0.956	0.264	0.114	13.5
PCB 167	µg/kg	0.353	0.125	35.5	6	0.341	0.076	0.064	18.1
PCB 169	µg/kg	0.221	0.004	1.7	4	0.220	0.002	0.002	1.06
PCB 189	µg/kg	0.128	0.023	18.0	5	0.129	0.011	0.013	10.0

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4 tetrachlorobenzene	µg/kg	0.505	0.068	13.5	4	0.507	0.032	0.043	8.45
1,2,4 trichlorobenzene	µg/kg	2.95	1.25	42.4	13	3.16	0.678	0.433	14.7
1,3,5 trichlorobenzene	µg/kg	2.84	1.29	45.6	14	2.92	0.869	0.433	15.2
p,p`-DDT	µg/kg	5.69	2.33	41.0	32	5.72	1.54	0.515	9.06
o,p`-DDE	µg/kg	0.433	0.164	38.0	7	0.423	0.086	0.078	17.9
o,p`-DDD	µg/kg	1.70	0.412	24.3	23	1.68	0.268	0.107	6.33

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	0.836	0.340	40.7	15	0.900	0.190	0.110	13.1
Inorganic carbon	g/kg	31.8	1.51	4.8	7	32.0	1.11	0.715	2.25
Particles < 2 µm	%	2.52	0.761	30.1	7	2.80	0.500	0.359	14.2
Particles < 63 µm	%	56.6	16.0	28.3	8	60.2	6.45	7.09	12.5
Particles > 63 µm	%	57.6	37.6	65.3	8	56.1	34.0	16.6	28.9
CN - Total	mg/kg	0.657	0.308	46.9	14	0.781	0.200	0.103	15.7
Particles < 16 µm	%	27.5	3.34	12.1	5	28.5	2.20	1.87	6.78
Particles < 50 µm	%	54.7	2.40	4.4	5	53.8	1.50	1.34	2.45
Particles < 2000 µm	%	100	0	-	4	100	0	0	0

Indicative Values SETOC 795

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
V	mg/kg	39.5	14.0	35.3	26	37.3	10.2	3.42	8.66

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DD	ng/kg	0.873	0.132	15.1	6	0.863	0.090	0.067	7.72
1,2,3,7,8 Cl5DD	ng/kg	1.89	0.374	19.8	7	1.98	0.223	0.176	9.36
1,2,3,4,7,8 Cl6DD	ng/kg	1.38	0.327	23.6	7	1.50	0.200	0.154	11.2
1,2,3,7,8,9 Cl6DD	ng/kg	2.62	0.801	30.6	7	2.60	0.500	0.379	14.4
1,2,3,6,7,8 Cl6DD	ng/kg	3.64	0.784	21.5	7	3.86	0.643	0.370	10.2
1,2,3,4,6,7,8 Cl7DD	ng/kg	65.8	21.1	32.0	9	65.0	17.0	8.78	13.3
Cl8DD	ng/kg	2630	664	25.2	9	2600	490	277	10.5

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	6.30	2.66	42.1	9	6.68	1.68	1.11	17.6
2,3,4,7,8 Cl5DF	ng/kg	3.36	1.25	37.2	7	3.40	0.600	0.590	17.6
1,2,3,7,8 Cl5DF	ng/kg	2.31	0.314	13.6	7	2.30	0.200	0.149	6.43
1,2,3,4,7,8 Cl6DF	ng/kg	5.59	0.991	17.7	8	5.67	0.348	0.438	7.83
1,2,3,6,7,8 Cl6DF	ng/kg	2.24	0.588	26.3	7	2.28	0.383	0.278	12.4
2,3,4,6,7,8 Cl6DF	ng/kg	2.38	0.704	29.5	7	2.50	0.300	0.333	14.0
1,2,3,4,6,7,8 Cl7DF	ng/kg	18.5	5.77	31.3	9	16.0	5.00	2.40	13.0
1,2,3,4,7,8,9 Cl7DF	ng/kg	3.06	0.691	22.6	6	3.15	0.450	0.353	11.5
Cl8DF	ng/kg	409	93.1	22.7	9	420	45.0	38.8	9.48

Method: Brominated Flame Retardants

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
BDE 099	ng/kg	469	135	28.9	4	475	73.5	84.6	18.0
BDE 209	ng/kg	31476	2707	8.6	4	32268	1443	1692	5.38

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
DEHP	µg/kg	664	153	23.0	4	670	69.0	95.5	14.4