



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 695



Certificate of Analysis SETOC 695

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-NH₄ (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 695 of Sediment, from Germany, 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
2025	4	3
2023	4	2
2021	4	4
2019	1	2
2016	4	1

Consensus Values SETOC 695

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	806	380	47.2	141	787	273	40.0	4.97
acenaphthylene	µg/kg	188	68.1	36.2	114	189	43.6	7.98	4.24
acenaphthene	µg/kg	237	73.9	31.2	122	242	49.2	8.37	3.53
fluorene	µg/kg	293	101	34.4	122	295	66.5	11.4	3.89
phenanthrene	µg/kg	2588	524	20.3	146	2617	327	54.2	2.10
anthracene	µg/kg	595	130	21.9	144	596	80.0	13.6	2.28
fluoranthene	µg/kg	3408	604	17.7	145	3390	383	62.7	1.84
pyrene	µg/kg	2445	440	18.0	121	2430	270	50.0	2.05
chrysene	µg/kg	1328	231	17.4	144	1347	150	24.1	1.81
benz(a)anthracene	µg/kg	1354	262	19.4	146	1358	158	27.1	2.00
benzo(b)fluoranthene	µg/kg	1324	351	26.5	113	1350	230	41.3	3.12
benzo(k)fluoranthene	µg/kg	675	114	16.8	143	680	67.6	11.9	1.76
benzo(a)pyrene	µg/kg	1058	199	18.8	146	1065	120	20.6	1.94
dibenz(ah)anthracene	µg/kg	207	50.7	24.5	120	208	30.9	5.79	2.80
indeno(1,2,3-cd)pyrene	µg/kg	819	165	20.2	142	813	94.5	17.4	2.12
benzo(ghi)perylene	µg/kg	791	146	18.4	146	796	82.5	15.1	1.90
EPA ΣPAH(16)	µg/kg	18310	3259	17.8	83	18417	2200	447	2.44

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	33.9	13.5	39.8	121	33.8	8.32	1.53	4.52
PCB 052	µg/kg	50.0	13.7	27.4	125	50.2	7.33	1.53	3.07
PCB 101	µg/kg	50.2	14.3	28.5	125	49.0	9.10	1.60	3.18
PCB 105	µg/kg	16.8	3.75	22.3	25	17.4	2.58	0.939	5.58
PCB 118	µg/kg	42.0	10.6	25.2	122	41.4	6.86	1.20	2.85
PCB 128	µg/kg	6.06	1.14	18.9	16	6.40	0.900	0.357	5.90
PCB 138	µg/kg	36.1	9.63	26.7	123	37.3	6.70	1.09	3.01
PCB 153	µg/kg	38.0	8.14	21.4	124	38.1	5.45	0.914	2.40
PCB 156	µg/kg	3.81	0.582	15.3	20	3.88	0.300	0.163	4.27
PCB 180	µg/kg	15.5	3.50	22.6	124	15.8	2.35	0.392	2.53
ΣPCB(7)	µg/kg	272	59.4	21.8	58	271	36.7	9.75	3.58

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4 tetrachlorobenzene	µg/kg	1.87	0.200	10.7	18	1.88	0.110	0.059	3.16



Consensus Values SETOC 695

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	701	167	23.8	113	700	94.6	19.6	2.80
Organic carbon	g/kg	47.3	5.97	12.6	72	47.6	3.49	0.880	1.86
CN - Total	mg/kg	8.50	1.40	16.5	41	8.49	0.946	0.273	3.21

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	13.4	1.82	13.6	64	13.4	0.925	0.284	2.12
Cd	mg/kg	1.28	0.181	14.1	64	1.31	0.117	0.028	2.20
Cr	mg/kg	62.8	13.4	21.3	62	63.4	8.05	2.13	3.38
Cu	mg/kg	58.0	5.48	9.4	64	58.7	3.32	0.856	1.47
Hg	mg/kg	0.290	0.045	15.5	57	0.298	0.028	0.007	2.57
Ni	mg/kg	40.7	5.20	12.8	66	40.3	3.20	0.800	1.96
Pb	mg/kg	96.6	12.8	13.2	66	96.9	7.07	1.96	2.03
Zn	mg/kg	470	58.2	12.4	65	470	35.5	9.02	1.92
Ba	mg/kg	313	38.1	12.2	53	313	22.4	6.53	2.09
Co	mg/kg	12.5	1.41	11.3	56	12.5	0.865	0.236	1.89
Mo	mg/kg	2.86	0.344	12.1	49	2.88	0.245	0.062	2.15

Indicative Values SETOC 695

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	29.4	7.05	24.0	12	29.0	3.25	2.54	8.65
PCB 149	µg/kg	27.5	5.71	20.8	13	29.0	4.00	1.98	7.20
PCB 077	µg/kg	3.80	1.25	32.9	13	3.90	0.600	0.433	11.4
PCB 114	µg/kg	0.505	0.301	59.6	7	1.20	0.060	0.142	28.2
PCB 123	µg/kg	3.07	1.81	59.0	11	3.84	1.26	0.684	22.3
PCB 157	µg/kg	0.603	0.007	1.1	6	0.603	0.003	0.004	0.586
PCB 167	µg/kg	1.52	0.377	24.8	13	1.57	0.169	0.131	8.59

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	0.428	0.301	70.3	8	0.540	0.198	0.133	31.1
1,2,4 trichlorobenzene	µg/kg	6.19	1.35	21.8	16	6.19	0.892	0.422	6.82
1,3,5 trichlorobenzene	µg/kg	0.657	0.172	26.3	10	0.704	0.086	0.068	10.4
p,p'-DDT	µg/kg	0.547	0.574	105.0	10	0.786	0.334	0.227	41.5
p,p'-DDE	µg/kg	2.52	0.792	31.4	27	2.52	0.472	0.190	7.56
p,p'-DDD	µg/kg	0.784	0.393	50.1	16	0.911	0.230	0.123	15.7
o,p'-DDD	µg/kg	0.806	0.151	18.7	10	0.814	0.079	0.060	7.39
Sum tetrachlorobenzenes	µg/kg	2.03	0.374	18.4	5	2.10	0.223	0.209	10.3
pentachlorophenol	µg/kg	1.96	0.605	30.8	7	1.92	0.290	0.286	14.6

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	1.63	0.436	26.7	13	1.60	0.190	0.151	9.26
Inorganic carbon	g/kg	3.28	1.33	40.6	18	3.29	0.925	0.393	12.0
Particles < 2 µm	%	18.6	6.19	33.2	18	19.0	3.43	1.82	9.79
Particles < 63 µm	%	44.3	13.9	31.4	21	42.8	6.20	3.79	8.55
Particles > 63 µm	%	41.4	10.2	24.7	15	40.6	5.35	3.30	7.96
CN - Free	mg/kg	0.611	0.419	68.6	12	1.42	0.605	0.151	24.8

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sb	mg/kg	1.34	0.226	16.8	6	1.37	0.162	0.115	8.57
Sn	mg/kg	6.24	0.627	10.1	6	6.29	0.418	0.320	5.13
V	mg/kg	35.8	10.8	30.2	7	38.5	7.09	5.11	14.2



Indicative Values SETOC 695

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,6,7,8 Cl6DD	ng/kg	5.03	1.70	33.8	4	4.97	0.965	1.06	21.1
1,2,3,4,6,7,8 Cl7DD	ng/kg	87.5	12.1	13.8	4	88.0	5.53	7.57	8.65
Cl8DD	ng/kg	820	67.8	8.3	4	815	31.7	42.4	5.17

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	9.43	2.51	26.6	4	9.13	1.17	1.57	16.6
2,3,4,7,8 Cl5DF	ng/kg	5.07	0.601	11.8	4	5.13	0.285	0.375	7.41
1,2,3,7,8 Cl5DF	ng/kg	4.64	1.36	29.4	4	4.62	0.820	0.852	18.3
1,2,3,4,7,8 Cl6DF	ng/kg	7.09	1.84	26.0	4	7.03	0.895	1.15	16.2
1,2,3,4,6,7,8 Cl7DF	ng/kg	24.7	4.00	16.2	4	24.3	1.88	2.50	10.1
Cl8DF	ng/kg	36.7	13.0	35.3	4	35.9	6.26	8.10	22.1

Method: Brominated Flame Retardants

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
BDE 028	ng/kg	980	353	36.0	5	1033	203	197	20.1
BDE 047	ng/kg	7019	917	13.1	5	7047	521	512	7.30
BDE 099	ng/kg	10230	4517	44.2	5	10716	2838	2525	24.7
BDE 100	ng/kg	2173	904	41.6	5	2145	561	505	23.3
BDE 153	ng/kg	1241	236	19.0	5	1197	147	132	10.6
BDE 154	ng/kg	877	114	13.0	5	886	41.0	63.6	7.26
BDE 183	ng/kg	282	152	53.8	4	280	69.0	94.8	33.6
BDE 209	ng/kg	27952	4909	17.6	5	27546	3257	2744	9.82

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	10.5	7.20	68.6	19	9.52	4.48	2.06	19.7
DEHP	µg/kg	2002	745	37.2	8	2260	398	329	16.4