



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 697



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 697 of 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
2025	3	2
2021	3	2
2018	4	4
2016	3	1
2014	2	2



Consensus Values SETOC 697

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	318	136	43.0	156	319	89.7	13.7	4.30
acenaphthylene	µg/kg	86.1	35.8	41.6	117	87.6	21.6	4.14	4.80
acenaphthene	µg/kg	115	41.6	36.0	131	119	29.8	4.54	3.94
fluorene	µg/kg	149	57.5	38.7	135	151	41.0	6.19	4.16
phenanthrene	µg/kg	1017	183	18.0	162	1032	123	18.0	1.77
anthracene	µg/kg	429	106	24.8	163	429	68.0	10.4	2.43
fluoranthene	µg/kg	2006	290	14.5	162	1996	175	28.5	1.42
pyrene	µg/kg	1500	262	17.5	138	1505	176	27.9	1.86
chrysene	µg/kg	1033	198	19.2	161	1036	124	19.5	1.89
benz(a)anthracene	µg/kg	930	184	19.8	161	937	123	18.2	1.95
benzo(b)fluoranthene	µg/kg	1189	263	22.1	129	1187	160	29.0	2.44
benzo(k)fluoranthene	µg/kg	536	94.4	17.6	156	545	60.4	9.45	1.76
benzo(a)pyrene	µg/kg	785	146	18.6	161	790	86.5	14.4	1.83
dibenz(ah)anthracene	µg/kg	171	40.6	23.7	132	174	22.0	4.41	2.58
indeno(1,2,3-cd)pyrene	µg/kg	665	136	20.4	159	669	88.8	13.5	2.03
benzo(ghi)perylene	µg/kg	648	113	17.5	161	656	70.0	11.1	1.72
EPA ΣPAH(16)	µg/kg	11675	1934	16.6	69	11900	1319	291	2.49

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	44.3	13.4	30.1	127	45.3	8.12	1.48	3.34
PCB 052	µg/kg	44.2	9.38	21.2	130	44.3	5.75	1.03	2.33
PCB 101	µg/kg	53.5	9.90	18.5	131	53.8	6.30	1.08	2.02
PCB 105	µg/kg	5.52	1.19	21.5	27	5.70	0.600	0.286	5.18
PCB 118	µg/kg	33.2	5.13	15.4	123	33.1	3.30	0.578	1.74
PCB 128	µg/kg	4.61	0.910	19.7	22	4.50	0.583	0.242	5.26
PCB 138	µg/kg	28.0	7.65	27.4	131	29.0	5.05	0.836	2.99
PCB 153	µg/kg	44.9	8.18	18.2	131	44.5	5.50	0.893	1.99
PCB 156	µg/kg	2.63	0.539	20.5	22	2.69	0.330	0.144	5.46
PCB 180	µg/kg	16.1	2.73	17.0	129	16.0	1.60	0.300	1.87
ΣPCB(7)	µg/kg	280	45.4	16.2	48	282	29.5	8.19	2.93

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	10.2	2.33	22.8	37	10.4	1.50	0.479	4.69



Consensus Values SETOC 697

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	577	111	19.2	119	583	67.0	12.7	2.20
Organic carbon	g/kg	33.6	3.45	10.3	69	33.9	1.90	0.519	1.54
Inorganic carbon	g/kg	12.4	1.41	11.4	12	12.4	0.700	0.510	4.10
Particles < 63 µm	%	63.0	6.71	10.7	11	62.4	6.60	2.53	4.01
CN - Total	mg/kg	5.38	0.877	16.3	46	5.44	0.585	0.162	3.01

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	19.5	1.98	10.2	57	19.6	1.40	0.329	1.68
Cd	mg/kg	5.07	0.414	8.2	59	5.07	0.230	0.067	1.33
Cr	mg/kg	130	15.7	12.0	59	129	11.0	2.55	1.96
Cu	mg/kg	93.8	6.59	7.0	59	93.8	4.10	1.07	1.14
Hg	mg/kg	1.70	0.117	6.9	60	1.69	0.070	0.019	1.11
Ni	mg/kg	44.3	4.77	10.8	59	44.0	2.89	0.776	1.75
Pb	mg/kg	131	10.5	8.0	60	132	5.15	1.70	1.30
Zn	mg/kg	586	49.0	8.4	59	583	28.0	7.97	1.36
Ba	mg/kg	436	48.8	11.2	42	436	29.2	9.41	2.16
Co	mg/kg	13.2	1.48	11.2	47	13.4	1.00	0.270	2.04
Mo	mg/kg	2.04	0.306	15.0	39	2.05	0.200	0.061	3.01

Indicative Values SETOC 697

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	31.8	15.7	49.4	14	31.0	8.25	5.24	16.5
PCB 149	µg/kg	37.0	8.07	21.8	14	36.0	5.00	2.70	7.28
PCB 077	µg/kg	2.87	1.45	50.6	19	3.37	0.800	0.417	14.5
PCB 114	µg/kg	0.353	0.159	44.9	6	0.378	0.071	0.081	22.9
PCB 123	µg/kg	4.06	2.41	59.5	15	4.50	1.50	0.778	19.2
PCB 126	µg/kg	0.473	0.924	195.1	9	0.688	0.615	0.385	81.3
PCB 167	µg/kg	1.18	0.776	65.6	13	1.50	0.475	0.269	22.7
PCB 189	µg/kg	0.546	0.345	63.3	7	0.644	0.206	0.163	29.9

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	3.67	1.08	29.5	24	3.84	0.857	0.276	7.54
pentachlorobenzene	µg/kg	4.92	1.81	36.9	20	5.35	0.957	0.507	10.3
1,2,3 trichlorobenzene	µg/kg	2.37	0.860	36.2	13	2.48	0.519	0.298	12.6
1,2,3,4 tetrachlorobenzene	µg/kg	2.75	0.580	21.1	15	2.97	0.286	0.187	6.81
1,2,4 trichlorobenzene	µg/kg	45.2	18.5	40.9	16	49.1	11.7	5.78	12.8
1,3,5 trichlorobenzene	µg/kg	28.6	10.9	38.0	16	28.6	6.90	3.40	11.9
1,2,3,5 tetrachlorobenzene	µg/kg	2.13	0.476	22.4	4	2.00	0	0.298	14.0
1,2,4,5 tetrachlorobenzene	µg/kg	8.64	1.66	19.2	5	8.00	1.00	0.925	10.7
alpha-HCH	µg/kg	0.487	0.310	63.6	10	0.504	0.201	0.123	25.1
beta-HCH	µg/kg	0.551	0.138	25.0	11	0.610	0.107	0.052	9.42
dieldrin	µg/kg	3.26	1.77	54.4	21	4.00	0.984	0.483	14.8
alpha-endosulfan	µg/kg	0.489	0.355	72.7	7	1.22	0.710	0.168	34.4
p,p'-DDT	µg/kg	1.49	0.917	61.4	21	2.22	0.503	0.250	16.8
p,p'-DDE	µg/kg	5.20	1.51	29.1	30	5.87	0.805	0.345	6.64
o,p'-DDE	µg/kg	0.536	0.158	29.5	11	0.587	0.107	0.060	11.1
p,p'-DDD	µg/kg	2.02	0.813	40.3	24	2.23	0.478	0.208	10.3
o,p'-DDD	µg/kg	0.856	0.423	49.4	12	0.999	0.286	0.153	17.8

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, IR	mg/kg	705	216	30.7	4	682	107	135	19.2
EOX	mg/kg	2.80	1.25	44.5	20	2.77	0.885	0.349	12.4
Particles < 2 µm	%	19.1	6.11	31.9	9	20.6	3.40	2.55	13.3
Particles > 63 µm	%	29.9	7.06	23.6	7	31.0	4.20	3.34	11.2
CN - Free	mg/kg	0.845	0.546	64.6	14	0.900	0.321	0.182	21.6

Indicative Values SETOC 697

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sb	mg/kg	1.42	0.625	44.0	6	1.42	0.279	0.319	22.5
Sn	mg/kg	12.1	2.89	23.8	5	12.2	1.65	1.62	13.3
V	mg/kg	51.0	25.4	49.9	5	45.0	13.7	14.2	27.9

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,7,8,9 Cl6DD	ng/kg	7.04	1.52	21.7	5	7.30	0.800	0.852	12.1
Cl8DD	ng/kg	1763	1092	61.9	5	1922	322	610	34.6

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4,7,8 Cl6DF	ng/kg	71.5	35.2	49.2	4	72.4	16.0	22.0	30.7
2,3,4,6,7,8 Cl6DF	ng/kg	17.6	1.52	8.6	4	17.2	0.805	0.947	5.38
1,2,3,4,6,7,8 Cl7DF	ng/kg	258	31.3	12.2	4	250	16.8	19.6	7.59
1,2,3,4,7,8,9 Cl7DF	ng/kg	40.1	11.1	27.6	4	38.5	5.40	6.92	17.2

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	18.7	4.90	26.3	14	17.7	5.00	1.64	8.78

Method: Env. availability of non-polar organic compounds ISO 16751

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 52 avail	µg/kg	27.5	4.10	14.9	4	26.9	2.05	2.57	9.31
PCB 153 avail	µg/kg	13.6	3.80	27.9	4	14.1	1.75	2.38	17.4
PCB 180 avail	µg/kg	2.27	0.661	29.1	4	2.26	0.300	0.413	18.2
naphthalene avail	µg/kg	17.4	7.02	40.4	4	18.8	3.70	4.39	25.2
phenanthrene avail	µg/kg	238	96.8	40.6	5	270	52.7	54.1	22.7
fluoranthene avail	µg/kg	523	90.2	17.3	5	528	52.6	50.4	9.64
pyrene avail	µg/kg	411	208	50.6	5	415	81.7	116	28.3
benz(a)anthracene avail	µg/kg	184	35.3	19.1	5	183	21.7	19.7	10.7
benzo(b)fluoranthene avail	µg/kg	111	22.9	20.5	4	110	10.9	14.3	12.8
naphthalene res	µg/kg	308	121	39.2	4	320	64.3	75.4	24.5
acenaphthene res	µg/kg	87.1	10.3	11.9	4	84.3	5.44	6.45	7.41
fluorene res	µg/kg	131	21.7	16.5	4	131	9.86	13.6	10.3
phenanthrene res	µg/kg	755	178	23.6	4	762	81.7	111	14.8
fluoranthene res	µg/kg	1330	586	44.1	4	1350	297	366	27.5
pyrene res	µg/kg	1021	388	38.0	4	998	195	243	23.8



Indicative Values SETOC 697

Method: Env. availability of non-polar organic compounds ISO 16751

(cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
chrysene res	µg/kg	804	291	36.2	4	817	159	182	22.6
benz(a)anthracene res	µg/kg	667	234	35.0	4	644	118	146	21.9
benzo(b)fluoranthene res	µg/kg	833	233	28.0	4	852	109	146	17.5
benzo(k)fluoranthene res	µg/kg	437	116	26.6	4	423	52.2	72.6	16.6
benzo(a)pyrene res	µg/kg	673	85.4	12.7	4	677	39.2	53.4	7.93
indeno(1,2,3-cd)pyrene res	µg/kg	622	118	19.0	4	649	62.9	73.9	11.9
benzo(ghi)perylene res	µg/kg	600	105	17.5	4	582	49.6	65.7	11.0