



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 689



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 689 of Sediment, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 11 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. It also gives a better estimate of the concentrations of non-stable or volatile determinands. 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	4
2024	2	3
2022	4	4
2022	3	3
2022	2	2



Consensus Values SETOC 689

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	579	204	35.2	124	573	127	22.9	3.95
acenaphthylene	µg/kg	146	38.8	26.6	106	146	22.0	4.71	3.23
acenaphthene	µg/kg	201	43.5	21.7	111	200	29.3	5.16	2.57
fluorene	µg/kg	258	62.9	24.4	112	260	37.9	7.43	2.88
phenanthrene	µg/kg	2287	368	16.1	130	2297	246	40.3	1.76
anthracene	µg/kg	554	98.6	17.8	131	557	63.0	10.8	1.95
fluoranthene	µg/kg	3853	427	11.1	132	3844	258	46.4	1.21
pyrene	µg/kg	2926	339	11.6	110	2900	195	40.4	1.38
chrysene	µg/kg	1889	290	15.4	130	1895	185	31.8	1.68
benz(a)anthracene	µg/kg	1659	248	15.0	131	1660	141	27.1	1.63
benzo(b)fluoranthene	µg/kg	1871	354	18.9	107	1908	224	42.7	2.28
benzo(k)fluoranthene	µg/kg	913	124	13.6	131	922	74.2	13.6	1.49
benzo(a)pyrene	µg/kg	1282	171	13.3	131	1281	101	18.6	1.45
dibenz(ah)anthracene	µg/kg	304	59.6	19.6	111	303	36.6	7.07	2.32
indeno(1,2,3-cd)pyrene	µg/kg	1101	195	17.7	131	1103	124	21.2	1.93
benzo(ghi)perylene	µg/kg	1128	143	12.7	132	1145	84.6	15.6	1.38
EPA ΣPAH(16)	µg/kg	21181	2382	11.2	81	21191	1245	331	1.56

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	8.98	2.27	25.3	109	9.33	1.30	0.272	3.03
PCB 052	µg/kg	14.8	2.96	20.1	113	14.9	1.87	0.348	2.36
PCB 101	µg/kg	23.5	4.81	20.5	113	24.0	3.30	0.566	2.41
PCB 118	µg/kg	11.5	2.07	18.0	109	11.7	1.30	0.247	2.15
PCB 128	µg/kg	2.80	0.381	13.6	14	2.88	0.325	0.127	4.55
PCB 138	µg/kg	18.8	6.09	32.3	112	19.4	4.59	0.719	3.82
PCB 153	µg/kg	27.3	4.85	17.7	113	27.4	3.23	0.570	2.09
PCB 180	µg/kg	12.3	2.73	22.3	111	12.2	2.02	0.324	2.64
ΣPCB(7)	µg/kg	123	20.5	16.6	54	123	12.9	3.48	2.83

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	3.01	0.639	21.2	25	3.04	0.342	0.160	5.31
p,p'-DDE	µg/kg	3.61	0.550	15.2	28	3.82	0.377	0.130	3.60
o,p'-DDE	µg/kg	1.21	0.150	12.4	17	1.23	0.075	0.046	3.77
p,p'-DDD	µg/kg	2.88	0.637	22.1	25	2.88	0.345	0.159	5.52
o,p'-DDD	µg/kg	1.55	0.297	19.1	15	1.60	0.158	0.096	6.16



Consensus Values SETOC 689

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	326	80.9	24.8	95	325	50.5	10.4	3.18
Organic carbon	g/kg	22.4	2.45	10.9	62	22.2	1.55	0.389	1.74
CN - Total	mg/kg	9.95	1.48	14.9	44	9.96	0.920	0.279	2.81

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	38.7	3.25	8.4	62	39.0	1.95	0.516	1.34
Cd	mg/kg	3.35	0.312	9.3	64	3.40	0.185	0.049	1.45
Cr	mg/kg	132	16.2	12.3	65	130	10.1	2.51	1.90
Cu	mg/kg	75.7	8.25	10.9	68	75.1	5.63	1.25	1.65
Hg	mg/kg	2.12	0.217	10.2	59	2.17	0.167	0.035	1.66
Ni	mg/kg	38.8	5.46	14.1	68	38.6	3.00	0.827	2.13
Pb	mg/kg	158	12.7	8.0	67	158	7.10	1.94	1.23
Zn	mg/kg	576	60.6	10.5	68	574	38.5	9.19	1.59
Ba	mg/kg	402	46.1	11.5	40	397	31.7	9.10	2.26
Co	mg/kg	10.1	1.16	11.5	52	10.1	0.849	0.202	2.00
Mo	mg/kg	5.00	0.611	12.2	41	4.99	0.378	0.119	2.39

Indicative Values SETOC 689

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	7.91	2.53	31.9	9	7.60	1.80	1.05	13.3
PCB 105	µg/kg	1.66	0.528	31.7	8	1.73	0.225	0.233	14.0
PCB 149	µg/kg	22.2	3.74	16.9	11	23.0	2.30	1.41	6.35
PCB 156	µg/kg	2.04	0.816	40.1	11	2.55	0.550	0.308	15.1
PCB 123	µg/kg	1.88	0.482	25.6	7	2.00	0.200	0.228	12.1
PCB 167	µg/kg	0.817	0.397	48.6	5	1.10	0.200	0.222	27.1

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	0.581	0.167	28.7	10	0.589	0.103	0.066	11.4
pentachlorobenzene	µg/kg	1.88	0.637	33.9	20	1.87	0.473	0.178	9.49
1,2,3 trichlorobenzene	µg/kg	1.36	0.442	32.5	13	1.48	0.366	0.153	11.3
1,2,3,4 tetrachlorobenzene	µg/kg	2.31	0.785	34.0	16	2.26	0.562	0.245	10.6
1,2,4 trichlorobenzene	µg/kg	54.3	18.1	33.3	16	54.6	13.4	5.66	10.4
1,3,5 trichlorobenzene	µg/kg	16.9	3.97	23.5	16	17.2	3.05	1.24	7.33
1,2,4,5 tetrachlorobenzene	µg/kg	6.75	1.07	15.8	4	6.73	0.638	0.666	9.87
alpha-HCH	µg/kg	0.244	0.015	6.1	5	0.250	0.010	0.008	3.42
beta-HCH	µg/kg	0.449	0.147	32.9	7	0.504	0.100	0.070	15.5
heptachlor epoxide	µg/kg	0.523	0.298	57.0	6	1.27	0.130	0.152	29.1
p,p'-DDT	µg/kg	0.667	0.412	61.8	19	1.27	0.495	0.118	17.7
o,p'-DDT	µg/kg	0.526	0.049	9.3	5	0.533	0.020	0.027	5.22
Sum trichlorobenzenes	µg/kg	82.6	13.9	16.8	5	80.0	10.0	7.76	9.39
Sum tetrachlorobenzenes	µg/kg	10.9	2.76	25.4	5	11.0	1.70	1.55	14.2

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	2.72	1.35	49.6	14	2.48	1.02	0.450	16.6
Inorganic carbon	g/kg	10.1	1.09	10.8	7	10.5	0.610	0.517	5.12
Particles < 63 µm	%	14.3	4.33	30.3	9	32.6	10.0	1.81	12.6
Particles > 63 µm	%	53.9	1.52	2.8	7	54.8	1.75	0.720	1.34
CN - Free	mg/kg	0.643	0.360	56.0	8	0.786	0.203	0.159	24.7

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sb	mg/kg	1.32	0.313	23.6	6	1.37	0.185	0.159	12.1
Sn	mg/kg	7.95	0.369	4.6	5	7.95	0.224	0.206	2.59
V	mg/kg	28.6	15.0	52.6	5	25.0	8.05	8.40	29.4



Indicative Values SETOC 689

Method: Brominated Flame Retardants

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
BDE 028	ng/kg	43.0	9.90	23.0	6	42.1	3.82	5.05	11.8
BDE 100	ng/kg	105	32.1	30.7	6	108	16.0	16.4	15.7

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	21.6	18.6	86.1	17	23.0	13.0	5.65	26.1