



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 773



Certificate of Analysis SETOC 773

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 773 of Sediment, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 9 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
2022	1	4
2019	1	1
2016	3	2
2015	4	4
2012	3	4



Consensus Values SETOC 773

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	853	404	47.3	160	859	292	39.9	4.67
acenaphthylene	µg/kg	645	382	59.3	143	667	248	40.0	6.20
acenaphthene	µg/kg	170	45.3	26.7	145	170	30.0	4.70	2.77
fluorene	µg/kg	536	168	31.3	149	556	118	17.2	3.20
phenanthrene	µg/kg	7712	1325	17.2	166	7647	834	129	1.67
anthracene	µg/kg	1245	357	28.7	165	1260	257	34.8	2.79
fluoranthene	µg/kg	14711	2187	14.9	164	14518	1419	213	1.45
pyrene	µg/kg	9731	1393	14.3	149	9636	776	143	1.47
chrysene	µg/kg	7017	1342	19.1	166	6993	805	130	1.86
benz(a)anthracene	µg/kg	6532	1027	15.7	166	6510	603	99.6	1.52
benzo(b)fluoranthene	µg/kg	7802	1782	22.8	140	7694	1099	188	2.41
benzo(k)fluoranthene	µg/kg	3438	618	18.0	163	3492	368	60.5	1.76
benzo(a)pyrene	µg/kg	4605	828	18.0	166	4595	519	80.3	1.74
dibenz(ah)anthracene	µg/kg	1192	304	25.5	147	1215	175	31.4	2.63
indeno(1,2,3-cd)pyrene	µg/kg	4499	999	22.2	165	4497	598	97.2	2.16
benzo(ghi)perylene	µg/kg	4052	745	18.4	165	4036	414	72.5	1.79
EPA ΣPAH(16)	µg/kg	76136	10449	13.7	59	75861	5861	1700	2.23

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	21.3	6.68	31.3	132	21.7	4.11	0.727	3.40
PCB 052	µg/kg	49.5	10.0	20.2	138	50.0	6.42	1.07	2.15
PCB 101	µg/kg	24.3	6.12	25.2	136	24.0	4.00	0.656	2.70
PCB 105	µg/kg	9.61	1.35	14.0	28	9.75	0.718	0.319	3.32
PCB 118	µg/kg	17.5	3.03	17.4	126	17.9	2.09	0.338	1.93
PCB 138	µg/kg	13.7	4.06	29.7	131	13.8	2.54	0.444	3.24
PCB 153	µg/kg	14.2	2.89	20.4	136	14.2	1.72	0.310	2.18
PCB 156	µg/kg	1.33	0.232	17.4	15	1.31	0.113	0.075	5.62
PCB 180	µg/kg	10.0	2.24	22.3	133	10.3	1.47	0.243	2.42
ΣPCB(7)	µg/kg	158	28.5	18.0	39	157	15.0	5.70	3.61

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	301	113	37.4	133	300	87.0	12.2	4.05
Organic carbon	g/kg	32.4	3.81	11.8	68	32.4	2.52	0.578	1.78
Inorganic carbon	g/kg	6.19	1.01	16.3	16	6.05	0.525	0.315	5.09
Particles > 63 µm	%	75.0	6.39	8.5	12	74.0	4.10	2.31	3.07



Consensus Values SETOC 773

Method: Other parameters									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
CN - Total	mg/kg	6.67	0.901	13.5	42	6.71	0.521	0.174	2.61
Method: Metals									
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	11.8	1.29	10.9	67	11.9	0.744	0.197	1.67
Cd	mg/kg	1.49	0.173	11.6	68	1.50	0.105	0.026	1.77
Cr	mg/kg	123	36.0	29.2	71	125	23.0	5.34	4.34
Cu	mg/kg	75.2	11.9	15.8	72	75.8	7.74	1.75	2.33
Hg	mg/kg	0.621	0.096	15.5	70	0.621	0.063	0.014	2.31
Ni	mg/kg	43.7	6.73	15.4	72	43.0	4.28	0.992	2.27
Pb	mg/kg	158	17.6	11.1	73	160	11.0	2.57	1.62
Zn	mg/kg	318	28.2	8.9	73	320	18.0	4.12	1.30
Ba	mg/kg	141	18.2	13.0	52	141	11.0	3.16	2.25
Co	mg/kg	5.66	0.677	12.0	57	5.60	0.410	0.112	1.98
Mo	mg/kg	4.52	0.656	14.5	49	4.47	0.370	0.117	2.59

Indicative Values SETOC 773

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	18.2	5.62	30.9	13	18.0	3.50	1.95	10.7
PCB 128	µg/kg	2.46	0.624	25.4	19	2.65	0.435	0.179	7.28
PCB 149	µg/kg	12.0	2.62	21.8	14	11.9	1.78	0.875	7.28
PCB 077	µg/kg	4.30	1.15	26.8	20	4.36	0.595	0.322	7.49
PCB 114	µg/kg	0.513	0.178	34.6	7	0.582	0.075	0.084	16.4
PCB 123	µg/kg	1.07	0.901	84.3	12	1.29	0.676	0.325	30.4
PCB 126	µg/kg	0.087	0.049	56.9	6	0.116	0.026	0.025	29.0
PCB 157	µg/kg	0.255	0.055	21.5	7	0.272	0.032	0.026	10.1
PCB 167	µg/kg	0.548	0.102	18.5	6	0.590	0.073	0.052	9.46
PCB 169	µg/kg	0.009	0.003	35.6	5	0.010	0.002	0.002	19.9
PCB 189	µg/kg	0.212	0.016	7.4	6	0.206	0.013	0.008	3.76

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	0.840	0.304	36.2	21	1.05	0.149	0.083	9.88
pentachlorobenzene	µg/kg	0.701	0.188	26.9	6	0.708	0.097	0.096	13.7
1,2,4 trichlorobenzene	µg/kg	1.12	0.661	59.1	7	1.40	0.394	0.312	27.9
beta-HCH	µg/kg	0.494	0.410	83.0	9	0.700	0.390	0.171	34.6
p,p'-DDT	µg/kg	1.20	1.79	149.4	18	3.15	2.03	0.529	44.0
p,p'-DDE	µg/kg	1.40	0.777	55.6	23	2.10	0.371	0.203	14.5
p,p'-DDD	µg/kg	2.57	1.74	67.5	24	3.63	0.940	0.443	17.2
o,p'-DDD	µg/kg	1.25	0.773	61.7	16	1.90	0.367	0.241	19.3

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, IR	mg/kg	313	32.9	10.5	6	315	20.3	16.8	5.36
EOX	mg/kg	0.764	0.256	33.6	23	0.800	0.171	0.067	8.75
Particles < 2 µm	%	8.27	5.12	61.9	15	8.49	2.61	1.65	20.0
Particles < 63 µm	%	22.0	5.63	25.5	16	21.6	4.05	1.76	7.98

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DD	ng/kg	2.87	1.60	55.6	7	2.77	0.860	0.754	26.3
1,2,3,7,8 Cl5DD	ng/kg	31.3	29.8	95.1	8	35.6	18.3	13.2	42.0
1,2,3,4,7,8 Cl6DD	ng/kg	29.4	21.8	74.0	7	35.9	13.3	10.3	35.0
1,2,3,7,8,9 Cl6DD	ng/kg	49.0	25.7	52.4	8	50.8	12.9	11.4	23.2
1,2,3,6,7,8 Cl6DD	ng/kg	48.0	24.3	50.6	9	53.8	16.8	10.1	21.1

Indicative Values SETOC 773

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4,6,7,8 Cl7DD	ng/kg	278	143	51.4	9	274	104	59.5	21.4
Cl8DD	ng/kg	1013	380	37.5	8	1078	257	168	16.6

(cont.)

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	13.2	7.52	56.9	7	15.0	4.24	3.55	26.9
2,3,4,7,8 Cl5DF	ng/kg	31.5	15.9	50.6	7	29.0	8.55	7.52	23.9
1,2,3,7,8 Cl5DF	ng/kg	14.9	6.06	40.8	7	15.5	3.54	2.86	19.3
1,2,3,4,7,8 Cl6DF	ng/kg	41.0	17.5	42.6	8	39.4	14.4	7.73	18.8
1,2,3,7,8,9 Cl6DF	ng/kg	8.05	5.30	65.9	8	8.34	3.37	2.34	29.1
1,2,3,6,7,8 Cl6DF	ng/kg	31.2	15.9	51.1	7	30.0	11.0	7.53	24.1
2,3,4,6,7,8 Cl6DF	ng/kg	39.4	12.5	31.7	7	39.3	4.20	5.90	15.0
1,2,3,4,6,7,8 Cl7DF	ng/kg	170	42.0	24.8	7	168	22.0	19.8	11.7
1,2,3,4,7,8,9 Cl7DF	ng/kg	13.4	4.52	33.7	7	13.0	2.34	2.13	15.9
Cl8DF	ng/kg	107	48.1	44.7	8	105	20.2	21.2	19.8

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Tributyl Tin (TBT)	µg/kg	2.69	0.773	28.8	5	2.90	0.240	0.432	16.1

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	23.2	7.59	32.7	4	23.9	3.40	4.74	20.4
PCB 101 avail	µg/kg	5.58	2.59	46.3	4	5.37	1.21	1.62	29.0
PCB 118 avail	µg/kg	4.28	2.11	49.3	4	4.47	0.964	1.32	30.8
naphthalene avail	µg/kg	74.5	42.5	57.0	5	75.9	24.9	23.7	31.9
phenanthrene avail	µg/kg	3079	1367	44.4	5	2917	745	764	24.8
anthracene avail	µg/kg	90.9	41.5	45.6	5	107	27.8	23.2	25.5
fluoranthene avail	µg/kg	4483	2526	56.3	5	4715	1116	1412	31.5
pyrene avail	µg/kg	2700	254	9.4	5	2724	122	142	5.25
chrysene avail	µg/kg	1636	635	38.8	5	1609	226	355	21.7
benz(a)anthracene avail	µg/kg	1145	389	34.0	5	1096	165	217	19.0
benzo(b)fluoranthene avail	µg/kg	816	259	31.7	5	849	148	145	17.7
benzo(k)fluoranthene avail	µg/kg	375	102	27.2	5	368	58.7	56.9	15.2
benzo(a)pyrene avail	µg/kg	212	61.2	28.9	5	204	36.2	34.2	16.2
EPA ΣPAH(16) avail	µg/kg	16047	958	6.0	4	15842	507	599	3.73
naphthalene res	µg/kg	569	142	25.0	4	599	75.1	88.8	15.6

Indicative Values SETOC 773

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

(cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
phenanthrene res	µg/kg	4502	1296	28.8	4	4403	749	810	18.0
fluoranthene res	µg/kg	9069	919	10.1	4	9365	484	574	6.33
pyrene res	µg/kg	6556	828	12.6	4	6765	435	517	7.89
chrysene res	µg/kg	5110	2171	42.5	4	5003	1009	1357	26.6
benz(a)anthracene res	µg/kg	4793	2628	54.8	4	4896	1241	1642	34.3
benzo(b)fluoranthene res	µg/kg	5749	662	11.5	4	5910	353	414	7.20
benzo(k)fluoranthene res	µg/kg	2609	503	19.3	4	2718	257	315	12.1
benzo(a)pyrene res	µg/kg	4306	888	20.6	4	4308	403	555	12.9
indeno(1,2,3-cd)pyrene res	µg/kg	4278	2355	55.0	4	4659	1177	1472	34.4
benzo(ghi)perylene res	µg/kg	4398	1682	38.2	4	4234	839	1051	23.9