WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 796

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 796

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 796 of Soil from polluted area, 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
2022	3	1
2019	3	4
2017	1	2
2014	1	2
2013	4	1

Consensus Values SETOC 796

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	19.4	9.32	48.1	112	20.6	6.82	1.10	5.68
acenaphthene	µg/kg	9.50	2.96	31.2	84	10.0	1.94	0.404	4.25
fluorene	µg/kg	13.0	4.25	32.7	95	13.3	2.70	0.545	4.19
phenanthrene	µg/kg	158	29.5	18.7	169	158	19.0	2.83	1.80
anthracene	µg/kg	27.5	10.0	36.4	138	29.0	7.10	1.07	3.87
fluoranthene	µg/kg	342	53.2	15.6	173	345	34.7	5.06	1.48
pyrene	µg/kg	265	42.4	16.0	151	268	28.1	4.32	1.63
chrysene	µg/kg	188	37.8	20.2	168	188	25.5	3.65	1.94
benz(a)anthracene	µg/kg	163	27.1	16.6	170	162	17.5	2.59	1.59
benzo(b)fluoranthene	µg/kg	209	44.5	21.3	140	211	29.1	4.71	2.25
benzo(k)fluoranthene	µg/kg	93.1	17.1	18.3	163	94.7	10.3	1.67	1.80
benzo(a)pyrene	µg/kg	166	33.7	20.2	174	169	21.3	3.19	1.92
dibenz(ah)anthracene	µg/kg	30.2	8.49	28.1	127	31.0	5.00	0.942	3.12
indeno(1,2,3-cd)pyrene	µg/kg	128	29.1	22.8	169	127	18.7	2.80	2.19
benzo(ghi)perylene	µg/kg	123	22.1	17.9	167	125	14.8	2.13	1.73
EPA ∑PAH(16)	µg/kg	1959	246	12.6	57	1976	144	40.7	2.08

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 101	µg/kg	1.97	0.733	37.2	101	2.17	0.470	0.091	4.63
PCB 138	µg/kg	4.10	1.68	41.0	117	4.20	1.05	0.194	4.73
PCB 153	µg/kg	4.44	1.68	37.9	117	4.73	1.23	0.195	4.38
PCB 180	µg/kg	3.13	1.28	40.9	113	3.32	0.856	0.150	4.81
∑PCB(7)	µg/kg	16.6	3.56	21.5	29	16.8	1.60	0.826	4.98

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	66.4	36.5	54.9	133	73.0	25.0	3.95	5.95
Organic carbon	g/kg	72.2	7.52	10.4	71	72.4	4.80	1.12	1.55

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	8.61	0.996	11.6	71	8.64	0.640	0.148	1.72
Cr	mg/kg	45.9	10.7	23.4	73	45.9	8.00	1.57	3.42
Cu	mg/kg	24.3	2.84	11.7	75	24.2	1.91	0.409	1.68
Hg	mg/kg	0.166	0.027	16.2	65	0.170	0.020	0.004	2.51
Ni	mg/kg	22.3	2.98	13.3	75	22.5	1.70	0.429	1.93

Consensus Values SETOC 796

Method: Metals (cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Pb	mg/kg	48.9	6.44	13.2	74	49.2	3.46	0.936	1.92
Zn	mg/kg	118	12.4	10.5	74	119	8.50	1.80	1.53
Ba	mg/kg	62.3	14.2	22.7	59	63.4	8.57	2.30	3.70
Co	mg/kg	6.31	0.790	12.5	62	6.34	0.450	0.125	1.99
Mo	mg/kg	2.08	0.282	13.5	51	2.10	0.160	0.049	2.37

Indicative Values SETOC 796

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
acenaphthylene	µg/kg	8.86	6.09	68.7	74	10.0	4.00	0.885	9.99

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	0.254	0.230	90.5	26	0.371	0.180	0.056	22.2
PCB 052	µg/kg	0.469	0.275	58.5	43	0.500	0.180	0.052	11.2
PCB 105	µg/kg	0.159	0.011	6.9	6	0.161	0.005	0.006	3.52
PCB 118	µg/kg	0.609	0.300	49.3	49	0.612	0.158	0.054	8.80
PCB 128	µg/kg	0.458	0.356	77.6	8	0.533	0.188	0.157	34.3
PCB 149	µg/kg	4.40	2.09	47.4	15	4.79	1.11	0.673	15.3
PCB 156	µg/kg	0.348	0.209	60.1	7	0.390	0.140	0.099	28.4
PCB 167	µg/kg	0.142	0.040	27.9	4	0.151	0.021	0.025	17.4

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	0.826	0.241	29.1	17	0.820	0.177	0.073	8.84
1,2,4 trichlorobenzene	µg/kg	0.626	0.263	42.0	5	0.682	0.162	0.147	23.5
dieldrin	µg/kg	1.06	0.559	52.8	18	1.33	0.306	0.165	15.6
p,p`-DDT	µg/kg	2.36	0.695	29.4	28	2.51	0.380	0.164	6.95
o,p`-DDT	µg/kg	0.566	0.136	24.0	4	0.606	0.047	0.085	15.0
p,p`-DDE	µg/kg	3.65	1.20	32.9	36	3.69	0.690	0.250	6.85
p,p`-DDD	µg/kg	1.60	0.533	33.4	27	1.69	0.360	0.128	8.03
o,p`-DDD	µg/kg	0.559	0.130	23.3	9	0.577	0.047	0.054	9.71

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	0.360	0.143	39.6	20	0.348	0.090	0.040	11.1
Inorganic carbon	g/kg	3.15	1.63	51.8	17	3.30	1.00	0.494	15.7
Particles < 2 µm	%	15.7	11.1	70.8	17	16.0	6.60	3.36	21.5
Particles < 63 µm	%	40.0	10.5	26.2	17	39.7	5.30	3.17	7.93
Particles > 63 µm	%	50.7	11.4	22.4	14	49.5	8.60	3.80	7.48
CN - Total	mg/kg	1.45	0.674	46.5	36	1.64	0.366	0.141	9.68
CN - Free	mg/kg	0.889	0.346	39.0	17	0.907	0.223	0.105	11.8

Indicative Values SETOC 796

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	mg/kg	1.84	0.793	43.0	71	1.89	0.560	0.118	6.39

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,7,8 Cl5DD	ng/kg	1.07	0.246	23.1	5	1.13	0.120	0.138	12.9
1,2,3,4,7,8 Cl6DD	ng/kg	1.09	0.196	18.0	6	1.11	0.116	0.100	9.20
1,2,3,7,8,9 Cl6DD	ng/kg	1.47	0.516	35.0	6	1.64	0.326	0.263	17.9
1,2,3,6,7,8 Cl6DD	ng/kg	2.02	1.31	65.0	6	2.33	0.741	0.669	33.2
1,2,3,4,6,7,8 Cl7DD	ng/kg	30.9	12.9	41.6	7	31.5	6.00	6.09	19.7
Cl8DD	ng/kg	183	48.5	26.5	7	197	31.8	22.9	12.5

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	1.43	0.530	37.0	6	1.58	0.302	0.270	18.9
2,3,4,7,8 Cl5DF	ng/kg	2.50	0.504	20.2	6	2.60	0.220	0.257	10.3
1,2,3,7,8 Cl5DF	ng/kg	2.26	1.33	58.7	6	2.67	0.808	0.676	30.0
1,2,3,4,7,8 Cl6DF	ng/kg	4.31	2.09	48.6	6	4.28	0.816	1.07	24.8
1,2,3,7,8,9 Cl6DF	ng/kg	0.816	0.333	40.9	6	0.882	0.140	0.170	20.9
1,2,3,6,7,8 Cl6DF	ng/kg	2.71	1.71	63.0	6	2.87	0.735	0.872	32.2
2,3,4,6,7,8 Cl6DF	ng/kg	2.92	1.07	36.7	6	3.26	0.600	0.547	18.8
1,2,3,4,6,7,8 Cl7DF	ng/kg	25.9	7.36	28.5	7	25.5	3.20	3.48	13.5
Cl8DF	ng/kg	32.8	12.9	39.3	7	34.0	6.11	6.10	18.6