WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 680

WAGENINGEN
UNIVERSITY & RESEARCH

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 mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into three sections: Consensus Values, Indicative Values and Values for Information. The division is made on the reliability of the data. Consensus Values are based on at least 16 results while the coefficient of variation is smaller than 25 %. Indicative Values are based on at least 8 and less than 16 results or a coefficient of variation between 25 % and 50 %. Other values, based on more than 2 and less than 8 results or a coefficient of variation higher than 50 %, are given for information only.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median and MAD (Median of Absolute Deviation) and the uncertainty in the consensus values. The confidence limits (at 95 % probability) are calculated for these determinands.
In the section with Information Values the following parameters are given: median, MAD and number of results. For determinands which have at least 5 results reported as smaller than (<) the median of these 'smaller than results' is calculated. In some cases this median of '<' values is much smaller than median and mean of the indicative values. This may be caused by a too optimistic (too low) value for the detection limit reported by a (small) majority of participating laboratories who report '<'-values.

All values, expressed on a weight basis (kg or %), are reported in oven dry (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 ºC and milled to pass a 0.5 mm sieve.

This SETOC sample 680 of Sediment from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 2 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	4	1
2020	2	1

Consensus Values   SETOC 680

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
anthracene	µg/kg	22.4	4.35	19.4	39	22.0	3.00	0.87	21.0	-	23.9
benz(a)anthracene	µg/kg	56.6	9.92	17.5	46	57.0	7.00	1.83	53.6	-	59.5
benzo(a)pyrene	µg/kg	54.2	10.16	18.7	46	55.5	6.91	1.87	51.2	-	57.2
benzo(b)fluoranthene	µg/kg	68.3	16.39	24.0	37	68.0	11.40	3.37	62.8	-	73.8
benzo(ghi)perylene	µg/kg	44.9	7.12	15.9	41	45.0	5.00	1.39	42.6	-	47.1
benzo(k)fluoranthene	µg/kg	33.5	7.04	21.0	42	34.2	4.89	1.36	31.3	-	35.7
chrysene	µg/kg	60.3	12.32	20.4	46	60.0	8.00	2.27	56.7	-	64.0
fluoranthene	µg/kg	99.2	18.81	19.0	49	98.0	13.00	3.36	93.8	-	105
indeno(1,2,3-cd)pyrene	µg/kg	45.5	9.87	21.7	41	45.5	6.80	1.93	42.4	-	48.6
phenanthrene	µg/kg	55.3	10.87	19.7	44	55.5	7.47	2.05	52.0	-	58.6
pyrene	µg/kg	77.3	15.49	20.0	37	78.0	11.00	3.18	72.1	-	82.4
EPA ∑PAH(16)	µg/kg	663	121.8	18.4	28	663	81.0	28.8	616	-	710

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 052	µg/kg	1.15	0.233	20.2	25	1.14	0.158	0.058	1.06	-	1.25
PCB 118	µg/kg	1.07	0.233	21.8	22	1.10	0.169	0.062	0.964	-	1.17

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Organic carbon	g/kg	9.90	1.876	18.9	22	9.92	1.270	0.500	9.07	-	10.7

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	mg/kg	7.37	0.689	9.3	24	7.56	0.497	0.176	7.08	-	7.66
Cd	mg/kg	0.460	0.0283	6.1	20	0.464	0.0203	0.0079	0.447	-	0.474
Co	mg/kg	4.04	0.448	11.1	18	4.02	0.320	0.132	3.82	-	4.26
Cr	mg/kg	23.4	4.73	20.2	25	23.7	3.37	1.18	21.4	-	25.3
Cu	mg/kg	11.3	1.53	13.5	26	11.7	1.05	0.37	10.7	-	11.9
Hg	mg/kg	0.162	0.0249	15.4	20	0.163	0.0175	0.0070	0.150	-	0.173
Ni	mg/kg	10.6	1.45	13.8	26	10.7	1.01	0.36	9.98	-	11.2
Pb	mg/kg	20.2	2.89	14.3	25	20.7	2.14	0.72	19.0	-	21.4
Zn	mg/kg	92.0	8.37	9.1	26	92.6	5.93	2.05	88.6	-	95.4

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
acenaphthene	µg/kg	5.87	2.011	34.2	17	6.00	1.360	0.610	4.85	-	6.90
acenaphthylene	µg/kg	6.55	2.782	42.4	17	6.31	1.889	0.843	5.13	-	7.98
dibenz(ah)anthracene	µg/kg	11.3	4.08	36.1	26	12.0	2.89	1.00	9.67	-	13.0
fluorene	µg/kg	10.7	3.18	29.9	21	10.8	2.20	0.87	9.21	-	12.1
naphthalene	µg/kg	20.9	6.73	32.3	30	21.9	4.63	1.54	18.4	-	23.4

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 028	µg/kg	1.17	0.369	31.4	26	1.16	0.264	0.091	1.03	-	1.32
PCB 101	µg/kg	1.53	0.610	39.8	30	1.55	0.437	0.139	1.31	-	1.76
PCB 138	µg/kg	1.92	0.736	38.4	33	2.03	0.520	0.160	1.66	-	2.18
PCB 153	µg/kg	2.34	0.735	31.4	34	2.33	0.517	0.158	2.08	-	2.59
PCB 180	µg/kg	1.49	0.587	39.4	27	1.58	0.422	0.141	1.26	-	1.72
∑PCB(7)	µg/kg	11.8	4.31	36.6	12	12.4	3.02	1.56	9.06	-	14.5

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
hexachlorobenzene	µg/kg	0.878	0.1302	14.8	10	0.876	0.0927	0.0514	0.786	-	0.970

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
CN - Total	mg/kg	0.610	0.2917	47.9	8	0.599	0.2041	0.1289	0.372	-	0.847
Mineral oil, GC	mg/kg	47.4	17.40	36.7	34	47.5	12.00	3.73	41.4	-	53.5

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ba	mg/kg	32.5	9.18	28.2	17	34.0	6.55	2.78	27.8	-	37.2
Mo	mg/kg	0.412	0.0251	6.1	11	0.420	0.0200	0.0095	0.395	-	0.428

Method: Polychlorobiphenyls

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
PCB 105	µg/kg	-	-	0		1.00	5
PCB 149	µg/kg	1.70	-	3			

Method: Organochlorine pesticides

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
1,2,3 trichlorobenzene	µg/kg	-	-	0		1.00	8
1,2,4 trichlorobenzene	µg/kg	2.60	0.704	6			
1,3,5 trichlorobenzene	µg/kg	1.68	0.393	6			
1,2,3,4 tetrachlorobenzene	µg/kg	-	-	0		1.00	8
alpha-HCH	µg/kg	-	-	0		1.00	18
dieldrin	µg/kg	-	-	0		1.00	14
gamma-HCH	µg/kg	-	-	0		1.00	18
heptachlor epoxide	µg/kg	1.000	0.4000	3		2.000	13
o,p`-DDD	µg/kg	-	-	0		1.00	16
o,p`-DDT	µg/kg	-	-	0		1.00	16
p,p`-DDD	µg/kg	-	-	0		1.00	20
p,p`-DDE	µg/kg	0.679	0.2110	4		1.000	17
p,p`-DDT	µg/kg	1.00	0.033	4		1.00	17
pentachlorobenzene	µg/kg	-	-	0		1.00	11

Method: Other parameters

Element	Unit	Median	MAD	N
EOX	mg/kg	0.400	0.1800	3
Inorganic carbon	g/kg	16.0	0.70	5
Particles < 2 µm	%	8.95	0.248	4
Particles < 63 µm	%	22.5	0.36	6
Particles > 63 µm	%	60.3	1.75	3

Method: Brominated Flame Retardants

Element	Unit	Median	MAD	N
BDE 047	ng/kg	117	14.4	4
BDE 099	ng/kg	186	38.0	3

Method: Experimental

Element	Unit	Median	MAD	N
Tributyl Tin (TBT)	µg/kg	34.9	11.87	4