WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 692

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 692

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 692 of Marine Sediment, from Netherland, is prepared for the WEPAL proficiency programs. The sample has been used in 4 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	1	2
2023	1	4
2020	1	3
2017	1	1

Consensus Values SETOC 692

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	99.6	41.5	41.7	113	101	31.0	4.88	4.90
acenaphthylene	µg/kg	29.4	11.4	38.6	83	29.7	6.70	1.56	5.30
acenaphthene	µg/kg	24.2	6.88	28.4	81	24.3	4.43	0.955	3.94
fluorene	µg/kg	49.3	15.5	31.5	94	49.5	10.5	2.00	4.06
phenanthrene	µg/kg	248	46.5	18.7	122	245	32.6	5.27	2.12
anthracene	µg/kg	85.3	21.1	24.7	114	85.7	14.9	2.47	2.90
fluoranthene	µg/kg	388	64.8	16.7	122	390	42.6	7.33	1.89
pyrene	µg/kg	333	51.7	15.5	111	330	30.7	6.13	1.84
chrysene	µg/kg	241	52.5	21.8	122	244	34.2	5.94	2.47
benz(a)anthracene	µg/kg	195	43.1	22.1	123	197	25.1	4.86	2.49
benzo(b)fluoranthene	µg/kg	333	86.6	26.0	104	330	52.7	10.6	3.19
benzo(k)fluoranthene	µg/kg	144	30.3	21.0	118	144	22.0	3.48	2.42
benzo(a)pyrene	µg/kg	179	39.3	22.0	123	182	25.0	4.43	2.48
dibenz(ah)anthracene	µg/kg	50.4	12.2	24.2	99	50.4	8.27	1.53	3.04
indeno(1,2,3-cd)pyrene	µg/kg	201	46.0	22.9	121	201	31.0	5.23	2.61
benzo(ghi)perylene	µg/kg	194	36.5	18.8	120	193	22.2	4.16	2.15
EPA ∑PAH(16)	µg/kg	2864	470	16.4	74	2811	287	68.3	2.39

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	5.36	1.76	32.8	82	5.52	1.11	0.243	4.53
PCB 052	µg/kg	5.43	1.52	28.0	95	5.42	0.975	0.195	3.60
PCB 101	µg/kg	8.79	2.24	25.5	97	8.93	1.46	0.284	3.23
PCB 118	µg/kg	4.89	0.884	18.1	88	4.90	0.587	0.118	2.41
PCB 138	µg/kg	11.3	3.41	30.3	99	11.2	2.10	0.428	3.80
PCB 153	µg/kg	13.5	2.83	20.9	99	13.8	1.89	0.356	2.63
PCB 180	µg/kg	6.95	1.56	22.4	96	7.00	1.00	0.199	2.86
∑PCB(7)	µg/kg	57.0	11.4	20.0	48	56.9	6.70	2.06	3.62

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobutadiene	µg/kg	1.77	0.288	16.3	12	1.80	0.179	0.104	5.88
dieldrin	µg/kg	87.1	14.9	17.2	16	86.2	9.13	4.67	5.36

Consensus Values SETOC 692

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	434	99.2	22.9	107	439	60.6	12.0	2.76
Organic carbon	g/kg	34.6	4.36	12.6	51	34.6	2.39	0.764	2.20
Particles < 63 µm	%	79.2	10.7	13.5	9	78.0	5.75	4.47	5.64

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	17.8	1.58	8.9	51	17.8	1.04	0.277	1.55
Cd	mg/kg	1.72	0.177	10.3	50	1.74	0.096	0.031	1.82
Cr	mg/kg	67.6	10.2	15.0	53	68.6	7.12	1.74	2.58
Cu	mg/kg	76.2	5.63	7.4	54	76.2	3.15	0.958	1.26
Hg	mg/kg	0.690	0.083	12.0	51	0.690	0.050	0.014	2.10
Ni	mg/kg	35.7	4.00	11.2	55	36.0	2.32	0.675	1.89
Pb	mg/kg	75.1	8.58	11.4	54	76.2	4.91	1.46	1.94
Zn	mg/kg	354	30.7	8.7	54	355	20.5	5.22	1.48
Ba	mg/kg	149	18.0	12.1	40	149	10.6	3.55	2.39
Co	mg/kg	12.0	1.23	10.2	44	12.0	0.995	0.231	1.93
Mo	mg/kg	1.06	0.252	23.7	34	1.04	0.155	0.054	5.09

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4,7,8 Cl6DD	ng/kg	2.67	0.363	13.6	9	2.63	0.233	0.151	5.67

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
1,2,3,4,7,8 Cl6DF	ng/kg	38.7	6.25	16.1	13	39.0	4.03	2.17	5.60

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 031	µg/kg	3.62	0.823	22.8	7	3.50	0.500	0.389	10.8
PCB 105	µg/kg	1.08	0.282	26.0	13	1.10	0.176	0.098	9.03
PCB 128	µg/kg	1.78	0.608	34.2	10	1.95	0.400	0.240	13.5
PCB 149	µg/kg	10.7	2.55	23.7	12	11.3	1.70	0.920	8.56
PCB 156	µg/kg	0.992	0.269	27.1	8	1.03	0.195	0.119	12.0
PCB 077	µg/kg	0.631	0.559	88.6	10	0.800	0.327	0.221	35.0
PCB 126	µg/kg	0.021	0.007	31.9	4	0.023	0.004	0.004	19.9
PCB 157	µg/kg	0.175	0.109	62.2	5	0.220	0.073	0.061	34.8
PCB 167	µg/kg	0.460	0.111	24.1	6	0.470	0.067	0.056	12.3
PCB 189	µg/kg	0.201	0.031	15.5	5	0.210	0.010	0.017	8.67

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	15.3	4.02	26.3	24	16.2	3.27	1.02	6.70
pentachlorobenzene	µg/kg	5.17	1.41	27.3	13	5.22	0.618	0.489	9.47
1,2,3 trichlorobenzene	µg/kg	14.6	3.64	25.0	10	13.8	2.64	1.44	9.88
1,2,3,4 tetrachlorobenzene	µg/kg	9.47	1.59	16.8	11	9.38	0.824	0.600	6.33
1,2,4 trichlorobenzene	µg/kg	16.9	3.99	23.6	10	17.2	2.70	1.58	9.32
1,3,5 trichlorobenzene	µg/kg	11.2	2.16	19.3	10	11.4	1.62	0.855	7.61
isodrin	µg/kg	46.8	22.7	48.6	11	48.6	13.2	8.57	18.3
aldrin	µg/kg	30.6	37.4	122.5	12	36.8	26.5	13.5	44.2
telodrin	µg/kg	5.73	3.01	52.5	13	5.93	1.93	1.04	18.2
p,p`-DDE	µg/kg	1.76	0.404	23.0	14	1.75	0.186	0.135	7.67
p,p`-DDD	µg/kg	1.08	0.508	47.1	14	1.29	0.304	0.170	15.7
o,p`-DDD	µg/kg	0.648	0.198	30.5	8	0.671	0.100	0.087	13.5

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	2.88	1.09	38.0	18	2.93	0.812	0.322	11.2
Inorganic carbon	g/kg	22.1	4.23	19.1	8	21.5	2.38	1.87	8.46
Particles < 2 µm	%	30.0	20.4	68.0	7	26.0	8.12	9.64	32.1
CN - Total	mg/kg	0.779	0.434	55.7	21	1.10	0.330	0.118	15.2

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sb	mg/kg	1.01	0.496	49.1	7	1.01	0.162	0.235	23.2
Sn	mg/kg	7.53	0.772	10.3	6	7.50	0.460	0.394	5.24

Method: Metals (cont.)									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
V	mg/kg	50.1	10.4	20.8	6	52.4	6.55	5.33	10.6

Method: Dibenzo-P Dioxin									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
2,3,7,8 Cl4DD	ng/kg	5.75	1.36	23.7	12	5.95	0.700	0.492	8.55
1,2,3,7,8 Cl5DD	ng/kg	1.52	0.344	22.6	9	1.50	0.200	0.143	9.44
1,2,3,7,8,9 Cl6DD	ng/kg	3.22	0.768	23.9	10	3.37	0.406	0.304	9.44
1,2,3,6,7,8 Cl6DD	ng/kg	4.88	1.62	33.1	10	5.70	0.850	0.640	13.1
1,2,3,4,6,7,8 Cl7DD	ng/kg	73.9	28.0	37.8	12	76.6	23.4	10.1	13.6
Cl8DD	ng/kg	570	237	41.6	13	513	203	82.2	14.4

Method: Dibenzofuran									
Element	**Unit**	**Mean**	**Std.Dev.**	**CV %**	**N**	**Median**	**MAD**	**Uncertainty**	**Rel.Uncert. %**
2,3,7,8 Cl4DF	ng/kg	11.1	2.05	18.5	12	11.0	1.45	0.740	6.67
2,3,4,7,8 Cl5DF	ng/kg	9.80	3.34	34.1	12	10.4	2.57	1.20	12.3
1,2,3,7,8 Cl5DF	ng/kg	10.3	1.86	18.0	12	10.4	1.38	0.670	6.50
1,2,3,7,8,9 Cl6DF	ng/kg	8.31	2.39	28.7	9	8.90	1.11	0.994	12.0
1,2,3,6,7,8 Cl6DF	ng/kg	15.9	4.88	30.6	12	17.5	2.63	1.76	11.0
2,3,4,6,7,8 Cl6DF	ng/kg	11.1	5.18	46.6	11	11.5	3.50	1.95	17.6
1,2,3,4,6,7,8 Cl7DF	ng/kg	119	31.8	26.7	13	125	17.7	11.0	9.25
1,2,3,4,7,8,9 Cl7DF	ng/kg	17.0	4.98	29.3	12	18.0	3.20	1.80	10.6
Cl8DF	ng/kg	569	140	24.7	13	598	61.9	48.7	8.55