



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 768



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 °C and milled to pass a 0.5 mm sieve.

This SETOC sample 768 of Sediment from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 8 periods (or rounds). Only results from the last 5 periods are used. In this way the consensus values will reflect the latest 'state of the art' in the analytical techniques used in 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
2017	3	1
2014	3	3
2011	4	4
2009	4	3
2008	2	3



Consensus Values SETOC 768



Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
benz(a)anthracene	µg/kg	2230	350	15.7	192	2240	239	32	2182	- 2281
benzo(a)pyrene	µg/kg	1750	295	16.9	193	1730	198	27	1704	- 1788
benzo(b)fluoranthene	µg/kg	2610	560	21.4	153	2590	374	57	2525	- 2704
benzo(ghi)perylene	µg/kg	1320	266	20.1	190	1320	182	24	1285	- 1361
benzo(k)fluoranthene	µg/kg	1170	197	16.9	186	1180	135	18	1137	- 1194
chrysene	µg/kg	2470	458	18.6	191	2450	315	41	2401	- 2532
fluoranthene	µg/kg	4820	769	15.9	190	4830	528	70	4714	- 4935
indeno(1,2,3-cd)pyrene	µg/kg	1440	284	19.7	190	1430	194	26	1404	- 1485
phenanthrene	µg/kg	1250	236	18.9	192	1240	160	21	1216	- 1283
pyrene	µg/kg	3600	578	16.0	165	3580	390	56	3515	- 3693
EPA ΣPAH(16)	µg/kg	23100	2140	9.2	23	22900	1480	560	22210	- 24060

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
PCB 105	µg/kg	0.539	0.1024	19.0	17	0.555	0.0750	0.0311	0.487	- 0.592

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Inorganic carbon	g/kg	7.68	1.395	18.2	19	7.50	1.000	0.400	7.01	- 8.35
Organic carbon	g/kg	43.2	4.81	11.1	67	43.3	3.40	0.74	42.0	- 44.4
Particles < 2 µm	%	8.51	1.763	20.7	30	8.56	1.215	0.402	7.85	- 9.16
Particles > 63 µm	%	69.8	6.21	8.9	19	69.6	4.40	1.78	66.9	- 72.8

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
As	mg/kg	11.4	0.83	7.2	84	11.5	0.58	0.11	11.27	- 11.63
Ba	mg/kg	183	16.5	9.0	36	182	11.9	3.4	177	- 188
Cd	mg/kg	0.677	0.1234	18.2	84	0.690	0.0900	0.0168	0.650	- 0.704
Co	mg/kg	7.39	0.505	6.8	38	7.43	0.360	0.102	7.23	- 7.56
Cr	mg/kg	45.0	7.37	16.4	86	45.5	5.05	0.99	43.4	- 46.5
Cu	mg/kg	74.0	5.90	8.0	87	74.7	3.89	0.79	72.8	- 75.3
Hg	mg/kg	0.688	0.1083	15.7	80	0.696	0.0755	0.0151	0.664	- 0.712
Ni	mg/kg	25.3	1.81	7.2	88	25.3	1.27	0.24	24.89	- 25.66
Pb	mg/kg	305	25.7	8.4	88	305	17.5	3.4	299	- 310
Zn	mg/kg	292	16.3	5.6	87	293	11.1	2.2	288.8	- 295.7



Indicative Values SETOC 768

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
acenaphthene	µg/kg	73.1	22.79	31.2	140	74.0	15.75	2.41	69.2	-	76.9
anthracene	µg/kg	245	64.9	26.5	190	251	44.5	5.9	235	-	254
dibenz(ah)anthracene	µg/kg	353	96.7	27.4	158	355	65.0	9.6	338	-	368
fluorene	µg/kg	88.9	27.00	30.4	151	88.5	18.50	2.75	84.5	-	93.2

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 028	µg/kg	1.32	0.469	35.6	62	1.37	0.330	0.074	1.20	-	1.44
PCB 031	µg/kg	0.942	0.3206	34.0	10	0.986	0.2355	0.1267	0.716	-	1.17
PCB 052	µg/kg	1.92	0.563	29.4	97	2.00	0.400	0.071	1.80	-	2.03
PCB 101	µg/kg	3.67	1.113	30.3	119	3.80	0.771	0.128	3.47	-	3.87
PCB 118	µg/kg	2.13	0.593	27.8	99	2.16	0.410	0.074	2.02	-	2.25
PCB 128	µg/kg	0.885	0.0667	7.5	10	0.880	0.0455	0.0264	0.838	-	0.932
PCB 138	µg/kg	5.43	2.031	37.4	127	5.50	1.400	0.225	5.08	-	5.79
PCB 149	µg/kg	4.93	1.970	40.0	16	5.25	1.410	0.616	3.89	-	5.97
PCB 153	µg/kg	5.94	1.911	32.2	129	6.10	1.310	0.210	5.61	-	6.27
PCB 156	µg/kg	0.589	0.1855	31.5	13	0.600	0.1300	0.0643	0.478	-	0.700
PCB 180	µg/kg	3.80	1.405	37.0	120	4.00	1.000	0.160	3.54	-	4.05
ΣPCB(7)	µg/kg	23.8	11.56	48.6	14	24.5	8.33	3.86	17.2	-	30.4

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
hexachlorobenzene	µg/kg	7.06	2.438	34.5	50	7.07	1.673	0.431	6.37	-	7.75
p,p'-DDD	µg/kg	2.71	1.250	46.2	26	2.90	0.915	0.306	2.20	-	3.21
p,p'-DDE	µg/kg	3.36	1.303	38.8	36	3.65	0.907	0.271	2.92	-	3.80

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
AOX	mg/kg	42.4	4.84	11.4	9	42.0	3.00	2.02	38.8	-	46.1
CN - Total	mg/kg	1.21	0.445	36.8	29	1.22	0.320	0.103	1.04	-	1.38
EOX	mg/kg	0.678	0.2116	31.2	42	0.700	0.1489	0.0408	0.612	-	0.744
Mineral oil, GC	mg/kg	204	69.1	33.8	148	208	47.7	7.1	193	-	215
Mineral oil, IR	mg/kg	294	91.5	31.1	11	282	60.0	34.5	233	-	355
Particles < 63 µm	%	27.6	7.54	27.4	21	28.9	5.20	2.06	24.1	-	31.0



Indicative Values SETOC 768

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Mo	mg/kg	1.16	0.296	25.5	25	1.20	0.200	0.074	1.04	-	1.28

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Tributyl Tin (TBT)	µg/kg	44.6	8.72	19.6	11	45.2	5.56	3.29	38.8	-	50.4



Informative Values SETOC 768



Method: Polycyclic aromatic hydrocarbons

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
acenaphthylene	µg/kg	61.0	22.17	118	100.0	41
naphthalene	µg/kg	72.0	27.20	149	100.0	42

Method: Polychlorobiphenyls

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
PCB 077	µg/kg	0.167	0.0570	7	1.000	23
PCB 081	µg/kg	0.0061	0.0020	4	0.9900	19
PCB 114	µg/kg	0.0476	0.0225	4	0.7450	18
PCB 123	µg/kg	0.310	0.0900	7	1.000	15
PCB 126	µg/kg	0.553	0.5346	7	1.000	23
PCB 157	µg/kg	0.0850	0.0120	5	0.9900	17
PCB 167	µg/kg	0.337	0.1190	8	1.000	13
PCB 169	µg/kg	0.0040	0.0010	5	1.0000	24
PCB 189	µg/kg	0.157	0.0850	8	0.995	14

Method: Organochlorine pesticides

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
1,2,3 trichlorobenzene	µg/kg	-	-	0	5.00	26
1,2,4 trichlorobenzene	µg/kg	1.43	0.604	7	10.00	9
1,3,5 trichlorobenzene	µg/kg	12.2	11.98	3	5.00	12
Sum trichlorobenzenes	µg/kg	28.6	26.34	3		
1,2,3,4 tetrachlorobenzene	µg/kg	-	-	0	3.00	22
Sum tetrachlorobenzenes	µg/kg	-	-	0	10.0	5
aldrin	µg/kg	0.547	0.2970	3	2.000	61
alpha-endosulfan	µg/kg	-	-	0	2.00	58
alpha-HCH	µg/kg	1.21	1.054	6	2.00	62
beta-endosulfan	µg/kg	-	-	0	4.00	34
beta-HCH	µg/kg	0.780	0.6000	5	2.000	58
chlordane	µg/kg	-	-	0	2.00	11
cis-chlordane	µg/kg	-	-	0	2.00	40
delta-HCH	µg/kg	-	-	0	3.00	49
dieldrin	µg/kg	0.557	0.1430	3	2.000	61
endosulfan	µg/kg	-	-	0	5.00	8
endrin	µg/kg	-	-	0	2.00	55



Informative Values SETOC 768

gamma-HCH	µg/kg	2.03	1.791	6	2.00	55
heptachlor	µg/kg	-	-	0	2.00	57
heptachlor epoxide	µg/kg	-	-	0	2.00	49

Method: Organochlorine pesticides Results smaller than (<) (cont.)

Element	Unit	Median	MAD	N	Median of <	N
hexachlorobutadiene	µg/kg	-	-	0	2.45	32
isodrin	µg/kg	-	-	0	2.00	47
o,p`-DDD	µg/kg	0.898	0.3840	9	2.000	45
o,p`-DDE	µg/kg	-	-	0	2.00	50
o,p`-DDT	µg/kg	0.545	0.0750	5	2.000	49
p,p`-DDT	µg/kg	3.70	1.450	24	3.00	46
pentachlorobenzene	µg/kg	0.270	0.0900	3	2.000	37
trans-chlordane	µg/kg	0.140	-	3	2.000	43

Method: Other parameters

Element	Unit	Median	MAD	N	Median of <	N
CN - Free	mg/kg	-	-	0	1.00	33

Method: Experimental

Element	Unit	Median	MAD	N
DEHP	µg/kg	749	430.5	4