



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 766



Certificate of Analysis SETOC 766

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 766 of Sediment from Czech. Rep. is prepared for the WEPAL proficiency programs. The sample is 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
2011	4	3
2009	4	1
2008	1	4
2006	3	1
2004	1	4



Consensus Values SETOC 766



Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
acenaphthene	µg/kg	18.6	4.03	21.7	127	19.5	2.70	0.45	17.9	-	19.3
benz(a)anthracene	µg/kg	132	20.5	15.5	231	134	14.0	1.7	129.3	-	134.6
benzo(a)pyrene	µg/kg	117	22.0	18.7	231	118	15.3	1.8	114.6	-	120.3
benzo(b)fluoranthene	µg/kg	136	29.7	21.8	192	140	20.5	2.7	132	-	140
benzo(ghi)perylene	µg/kg	88.0	19.82	22.5	221	87.7	13.66	1.67	85.4	-	90.6
benzo(k)fluoranthene	µg/kg	67.6	13.96	20.6	212	70.0	10.00	1.20	65.7	-	69.5
chrysene	µg/kg	136	27.8	20.5	227	137	19.0	2.3	132.1	-	139.4
fluoranthene	µg/kg	288	43.2	15.0	231	290	30.0	3.6	282	-	293
indeno(1,2,3-cd)pyrene	µg/kg	86.5	19.27	22.3	221	87.0	13.00	1.62	83.9	-	89.0
phenanthrene	µg/kg	171	38.7	22.7	232	174	27.0	3.2	166	-	176
pyrene	µg/kg	228	32.1	14.1	208	230	22.0	2.8	224	-	232

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 180	µg/kg	6.78	1.559	23.0	173	6.98	1.042	0.148	6.55	-	7.01

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
o,p'-DDE	µg/kg	1.16	0.289	24.8	34	1.19	0.193	0.062	1.06	-	1.26
o,p'-DDT	µg/kg	11.8	2.87	24.4	64	12.0	2.00	0.45	11.0	-	12.5

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
AOX	mg/kg	598	85.9	14.4	21	582	56.0	23.4	559	-	637
Organic carbon	g/kg	10.4	1.36	13.0	66	10.5	0.94	0.21	10.08	-	10.75
Mineral oil, IR	mg/kg	71.9	14.52	20.2	37	70.0	10.00	2.98	67.1	-	76.8
Particles < 2 µm	%	6.62	0.742	11.2	41	6.66	0.515	0.145	6.39	-	6.85
Particles < 63 µm	%	24.6	3.37	13.7	24	24.9	2.18	0.86	23.2	-	26.0
Particles > 63 µm	%	74.2	1.91	2.6	20	74.3	1.35	0.54	73.3	-	75.1

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	mg/kg	8.13	1.076	13.2	112	8.01	0.752	0.127	7.93	-	8.34
Ba	mg/kg	56.4	4.69	8.3	16	57.1	3.28	1.46	54.0	-	58.9
Cd	mg/kg	0.235	0.0528	22.5	80	0.240	0.0390	0.0074	0.223	-	0.247
Co	mg/kg	5.22	0.412	7.9	16	5.16	0.280	0.129	5.00	-	5.44
Cr	mg/kg	79.0	11.50	14.6	115	79.1	7.60	1.34	76.9	-	81.1



Consensus Values SETOC 766



(cont.)

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cu	mg/kg	18.1	1.58	8.7	115	18.2	1.08	0.18	17.80	-	18.39
Hg	mg/kg	0.318	0.0291	9.1	108	0.320	0.0200	0.0035	0.313	-	0.324
Ni	mg/kg	30.2	2.67	8.8	116	30.2	1.85	0.31	29.7	-	30.7
Pb	mg/kg	14.6	2.49	17.0	112	14.9	1.74	0.29	14.2	-	15.1
Zn	mg/kg	70.4	6.60	9.4	117	70.4	4.54	0.76	69.2	-	71.6



Indicative Values SETOC 766

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
anthracene	µg/kg	29.5	9.88	33.5	192	30.0	7.00	0.89	28.1	-	30.9
dibenz(ah)anthracene	µg/kg	19.8	8.44	42.7	153	20.0	5.84	0.85	18.4	-	21.1
fluorene	µg/kg	20.0	7.38	36.9	152	20.6	5.25	0.75	18.8	-	21.2

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 077	µg/kg	0.0778	0.0127	16.4	13	0.0800	0.0100	0.0044	0.0702	-	0.0854
PCB 101	µg/kg	1.96	0.606	30.9	119	2.00	0.410	0.069	1.85	-	2.07
PCB 105	µg/kg	0.125	0.0323	25.9	14	0.135	0.0250	0.0108	0.106	-	0.143
PCB 118	µg/kg	0.716	0.3544	49.5	57	0.750	0.2500	0.0587	0.622	-	0.810
PCB 126	µg/kg	0.0107	0.0020	18.5	12	0.0115	0.0015	0.0007	0.0094	-	0.0119
PCB 128	µg/kg	0.713	0.1613	22.6	15	0.710	0.1100	0.0521	0.624	-	0.802
PCB 138	µg/kg	6.35	1.993	31.4	172	6.46	1.405	0.190	6.05	-	6.65
PCB 149	µg/kg	4.57	2.204	48.2	17	4.40	1.600	0.668	3.44	-	5.70
PCB 153	µg/kg	7.65	1.988	26.0	172	7.84	1.350	0.189	7.35	-	7.95
PCB 156	µg/kg	0.451	0.1189	26.4	17	0.460	0.0800	0.0361	0.390	-	0.511
PCB 157	µg/kg	0.0390	0.0055	14.2	9	0.0400	0.0040	0.0023	0.0348	-	0.0431
PCB 167	µg/kg	0.211	0.0130	6.2	10	0.210	0.0100	0.0052	0.202	-	0.221
PCB 189	µg/kg	0.107	0.0259	24.4	10	0.105	0.0180	0.0103	0.0883	-	0.125

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
beta-HCH	µg/kg	2.57	0.945	36.7	25	2.60	0.650	0.236	2.18	-	2.96
hexachlorobenzene	µg/kg	4.54	1.984	43.7	69	4.62	1.380	0.299	4.06	-	5.01
o,p'-DDD	µg/kg	18.5	4.65	25.1	73	18.0	3.15	0.68	17.4	-	19.6
p,p'-DDD	µg/kg	44.9	16.90	37.6	86	45.4	11.60	2.28	41.3	-	48.6
p,p'-DDE	µg/kg	42.4	11.45	27.0	92	42.4	7.70	1.49	40.1	-	44.8
p,p'-DDT	µg/kg	39.5	14.39	36.4	89	41.0	9.62	1.91	36.5	-	42.6

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
EOX	mg/kg	0.553	0.2123	38.4	78	0.549	0.1490	0.0301	0.505	-	0.601
Inorganic carbon	g/kg	1.24	0.416	33.7	23	1.30	0.300	0.108	1.06	-	1.41
Mineral oil, GC	mg/kg	67.8	20.24	29.8	148	67.4	14.15	2.08	64.5	-	71.1



Indicative Values SETOC 766

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Mo	mg/kg	0.945	0.1585	16.8	8	0.950	0.1100	0.0701	0.815	- 1.07

Method: Dibenzo-P Dioxin

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Cl8DD	ng/kg	30.0	9.38	31.3	13	33.0	7.00	3.25	24.4	- 35.6

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
1,2,3,4,6,7,8 Cl7DF	ng/kg	6.13	2.128	34.7	13	6.40	1.600	0.738	4.86	- 7.41
1,2,3,4,7,8 Cl6DF	ng/kg	3.08	1.122	36.5	10	3.20	0.800	0.444	2.29	- 3.87
1,2,3,4,7,8,9 Cl7DF	ng/kg	1.14	0.290	25.5	8	1.24	0.240	0.128	0.901	- 1.37
1,2,3,6,7,8 Cl6DF	ng/kg	1.04	0.178	17.1	8	1.09	0.130	0.078	0.896	- 1.19
1,2,3,7,8 Cl5DF	ng/kg	1.87	0.839	44.9	9	2.00	0.670	0.350	1.24	- 2.50
2,3,7,8 Cl4DF	ng/kg	2.75	1.030	37.4	12	3.00	0.765	0.372	2.10	- 3.40
Cl8DF	ng/kg	15.5	4.60	29.7	13	17.0	3.30	1.59	12.7	- 18.2



Indicative Values SETOC 766



Method: Polycyclic aromatic hydrocarbons

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
acenaphthylene	µg/kg	5.00	2.815	78	50.00	112
naphthalene	µg/kg	25.8	8.84	151	50.0	78

Method: Polychlorobiphenyls

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
PCB 028	µg/kg	0.569	0.2310	47	2.000	128
PCB 031	µg/kg	0.540	0.3605	8	2.000	11
PCB 052	µg/kg	0.594	0.3260	49	2.000	130
PCB 081	µg/kg	0.0055	0.0015	4	0.3500	14
PCB 114	µg/kg	0.0100	0.0020	6	0.5000	12
PCB 123	µg/kg	0.145	0.0580	7	0.500	12
PCB 169	µg/kg	0.0155	0.0115	4	0.7450	20

Method: Organochlorine pesticides

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
1,2,4 trichlorobenzene	µg/kg	-	-	0	5.00	5
1,3,5 trichlorobenzene	µg/kg	-	-	0	5.00	5
aldrin	µg/kg	1.20	1.000	3	2.00	80
alpha-endosulfan	µg/kg	2.30	1.290	3	2.00	76
alpha-HCH	µg/kg	1.06	0.440	9	2.00	87
beta-endosulfan	µg/kg	-	-	0	2.01	42
chlordane	µg/kg	-	-	0	2.00	18
cis-chlordane	µg/kg	-	-	0	2.00	44
delta-HCH	µg/kg	-	-	0	2.00	66
dieldrin	µg/kg	1.01	0.480	3	2.00	83
endosulfan	µg/kg	-	-	0	10.0	11
endrin	µg/kg	0.900	0.1000	5	2.000	76
gamma-HCH	µg/kg	1.28	0.720	9	2.00	80
heptachlor	µg/kg	1.01	0.110	3	2.00	79
heptachlor epoxide	µg/kg	-	-	0	2.00	74
pentachlorobenzene	µg/kg	-	-	0	2.00	54
telodrin	µg/kg	-	-	0	1.00	47
trans-chlordane	µg/kg	-	-	0	2.00	49



Indicative Values SETOC 766

Method: Other parameters

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
CN - Free	mg/kg	0.170	0.1000	7	1.000	34
CN - Total	mg/kg	0.250	0.1150	20	1.000	48

Method: Dibenzo-P Dioxin

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
1,2,3,4,6,7,8 Cl7DD	ng/kg	3.51	1.205	10		
1,2,3,4,7,8 Cl6DD	ng/kg	0.726	0.4260	3	1.000	10
1,2,3,6,7,8 Cl6DD	ng/kg	1.10	0.935	4	1.00	8
1,2,3,7,8 Cl5DD	ng/kg	0.605	0.4850	4	1.000	8
1,2,3,7,8,9 Cl6DD	ng/kg	0.400	0.3400	5	1.000	8
2,3,7,8 Cl4DD	ng/kg	1.000	0.3000	7	1.000	6

Method: Dibenzofuran

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
1,2,3,7,8,9 Cl6DF	ng/kg	0.905	0.3900	4	1.000	8
2,3,4,6,7,8 Cl6DF	ng/kg	1.04	0.520	7	3.00	6
2,3,4,7,8 Cl5DF	ng/kg	2.00	0.500	7	5.00	5

Method: Experimental

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
DEHP	µg/kg	2220	250	4		
Tributyl Tin (TBT)	µg/kg	1.40	0.400	5	9.80	9