



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 709



Certificate of Analysis SETOC 709

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 709 of Marine Sediment from Netherlands is prepared for the WEPAL proficiency programs. The sample is 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
1999	2	1
1997	2	2
1996	2	3
1993	3	2



Consensus Values SETOC 709

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
AOX	mg/kg	18.3	4.31	23.6	18	19.3	3.00	1.27	16.1	-	20.4

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	mg/kg	2.46	0.550	22.4	82	2.50	0.395	0.076	2.34	-	2.58
Cr	mg/kg	14.5	2.07	14.3	114	14.6	1.40	0.24	14.09	-	14.86
Ni	mg/kg	6.25	0.958	15.3	106	6.30	0.670	0.116	6.06	-	6.43
Pb	mg/kg	4.35	0.878	20.2	80	4.50	0.600	0.123	4.15	-	4.54
Zn	mg/kg	16.0	1.76	11.0	120	16.1	1.20	0.20	15.73	-	16.36



Indicative Values SETOC 709

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
benz(a)anthracene	µg/kg	4.77	1.546	32.4	49	5.16	1.160	0.276	4.33	-	5.22
benzo(b)fluoranthene	µg/kg	10.4	3.59	34.7	72	10.0	2.45	0.53	9.51	-	11.2
fluoranthene	µg/kg	14.1	6.53	46.3	104	14.7	4.65	0.80	12.8	-	15.4
pyrene	µg/kg	9.35	2.883	30.8	71	10.00	2.000	0.428	8.67	-	10.0

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Inorganic carbon	g/kg	3.57	0.702	19.7	9	3.70	0.500	0.293	3.04	-	4.10
Particles < 2 µm	%	2.41	1.024	42.5	36	2.50	0.725	0.213	2.06	-	2.75
Particles < 63 µm	%	4.31	1.710	39.7	15	4.50	1.300	0.552	3.36	-	5.25

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cd	mg/kg	0.0660	0.0272	41.2	42	0.0700	0.0200	0.0052	0.0575	-	0.0744
Cu	mg/kg	1.82	0.546	30.1	76	2.00	0.400	0.078	1.69	-	1.94



Informative Values SETOC 709

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
acenaphthene	µg/kg	1.62	0.620	21	20.00	152
acenaphthylene	µg/kg	5.15	5.065	12	50.00	148
anthracene	µg/kg	1.74	0.740	33	10.00	167
benzo(a)pyrene	µg/kg	6.00	2.300	51	10.00	150
benzo(ghi)perylene	µg/kg	7.00	3.000	48	18.50	153
benzo(k)fluoranthene	µg/kg	5.25	2.250	43	10.00	154
chrysene	µg/kg	7.00	2.600	59	10.00	141
dibenz(ah)anthracene	µg/kg	1.41	0.520	22	10.00	165
fluorene	µg/kg	2.78	1.590	34	10.00	146
indeno(1,2,3-cd)pyrene	µg/kg	9.10	3.100	48	20.00	151
naphthalene	µg/kg	8.90	5.800	48	38.50	141
phenanthrene	µg/kg	11.7	5.40	82	20.0	118

Method: Polychlorobiphenyls

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
PCB 028	µg/kg	0.790	0.7200	14	1.000	114
PCB 031	µg/kg	-	-	0	1.50	12
PCB 052	µg/kg	0.750	0.5500	18	1.000	115
PCB 101	µg/kg	0.550	0.4100	19	1.000	115
PCB 105	µg/kg	0.145	0.0800	4	1.500	14
PCB 118	µg/kg	0.205	0.0950	10	1.000	95
PCB 128	µg/kg	0.0600	0.0300	3	1.5000	16
PCB 138	µg/kg	0.630	0.3900	25	1.000	110
PCB 149	µg/kg	0.820	0.2400	5	3.500	12
PCB 153	µg/kg	0.600	0.4000	21	1.000	113
PCB 156	µg/kg	-	-	0	1.50	16
PCB 180	µg/kg	0.610	0.4500	21	1.000	112

Method: Organochlorine pesticides

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
1,2,3 trichlorobenzene	µg/kg	12.8	9.50	3	1.00	11
1,2,3,4 tetrachlorobenzene	µg/kg	-	-	0	3.00	15
alpha-endosulfan	µg/kg	-	-	0	1.00	78
alpha-HCH	µg/kg	-	-	0	1.00	89



Informative Values SETOC 709

beta-HCH	µg/kg	-	-	0	1.00	87
delta-HCH	µg/kg	-	-	0	1.00	48
dieldrin	µg/kg	-	-	0	1.00	85

Method: Organochlorine pesticides

Results smaller than (<)

(cont.)

Element	Unit	Median	MAD	N	Median of <	N
gamma-HCH	µg/kg	2.00	0.900	3	1.00	88
heptachlor	µg/kg	-	-	0	1.00	86
heptachlor epoxide	µg/kg	-	-	0	1.00	76
hexachlorobenzene	µg/kg	5.75	5.635	4	1.00	86
hexachlorobutadiene	µg/kg	-	-	0	1.00	39
o,p`-DDD	µg/kg	-	-	0	1.00	75
o,p`-DDE	µg/kg	-	-	0	1.00	72
p,p`-DDD	µg/kg	-	-	0	1.00	83
p,p`-DDE	µg/kg	-	-	0	1.00	85
p,p`-DDT	µg/kg	-	-	0	1.00	86
pentachlorobenzene	µg/kg	-	-	0	2.00	51

Method: Other parameters

Results smaller than (<)

Element	Unit	Median	MAD	N	Median of <	N
CN - Free	mg/kg	-	-	0	1.00	23
CN - Total	mg/kg	0.200	0.1000	9	1.000	38
EOX	mg/kg	0.200	0.1000	29	0.100	60
Organic carbon	g/kg	2.90	0.950	16		
Mineral oil, GC	mg/kg	15.0	8.00	11	50.0	22
Mineral oil, IR	mg/kg	24.0	14.30	15	10.0	19
Particles > 63 µm	%	89.4	1.73	6		

Method: Metals

Results smaller than (<)

Element	Unit	Median	MAD	N	Median of <	N
Hg	mg/kg	0.0300	0.0100	37	0.1000	72