WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 770

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 °C and milled to pass a 0.5 mm sieve.

This SETOC sample 770 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
2006	3	4
2005	3	2

Consensus Values   SETOC 770

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
benz(a)anthracene	µg/kg	740	117.7	15.9	107	731	79.0	14.2	718	-	763
benzo(a)pyrene	µg/kg	673	125.5	18.6	108	673	85.5	15.1	649	-	697
benzo(b)fluoranthene	µg/kg	1190	278	23.4	93	1190	190	36	1128	-	1243
benzo(ghi)perylene	µg/kg	706	159.3	22.6	105	697	107.0	19.4	675	-	736
benzo(k)fluoranthene	µg/kg	517	74.9	14.5	101	513	50.2	9.3	502	-	532
chrysene	µg/kg	955	223.9	23.4	107	935	152.7	27.1	912	-	998
fluoranthene	µg/kg	2060	375	18.2	108	2060	259	45	1990	-	2133
fluorene	µg/kg	70.5	13.67	19.4	97	71.0	9.00	1.74	67.7	-	73.2
indeno(1,2,3-cd)pyrene	µg/kg	725	170.9	23.6	106	726	115.5	20.8	692	-	758
phenanthrene	µg/kg	672	112.3	16.7	106	657	75.0	13.6	651	-	694
pyrene	µg/kg	1420	275	19.3	99	1420	189	35	1368	-	1478

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 180	µg/kg	3.51	0.824	23.5	60	3.55	0.545	0.133	3.30	-	3.72

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
p,p`-DDE	µg/kg	40.1	9.33	23.3	44	42.0	6.30	1.76	37.2	-	42.9

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Organic carbon	g/kg	61.1	6.78	11.1	31	61.2	4.79	1.52	58.6	-	63.6
Mineral oil, GC	mg/kg	231	56.0	24.3	71	231	39.0	8.3	218	-	244
Mineral oil, IR	mg/kg	186	40.0	21.6	24	191	26.5	10.2	169	-	202
Particles < 2 µm	%	29.9	2.85	9.5	19	30.0	2.00	0.82	28.5	-	31.2

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	mg/kg	13.2	3.01	22.7	55	13.3	2.10	0.51	12.4	-	14.0
Cd	mg/kg	1.08	0.173	16.0	55	1.10	0.120	0.029	1.03	-	1.13
Cr	mg/kg	63.3	10.02	15.8	55	64.0	6.90	1.69	60.6	-	66.0
Cu	mg/kg	53.2	3.45	6.5	56	53.1	2.35	0.58	52.3	-	54.2
Hg	mg/kg	0.441	0.0733	16.6	50	0.440	0.0505	0.0130	0.420	-	0.462
Ni	mg/kg	37.2	3.97	10.7	56	37.9	2.77	0.66	36.2	-	38.3
Pb	mg/kg	84.7	10.97	12.9	55	85.0	7.50	1.85	81.8	-	87.7
Zn	mg/kg	256	18.0	7.0	56	254	12.3	3.0	251	-	261

Indicative Values   SETOC 770

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
acenaphthene	µg/kg	44.4	15.11	34.1	70	46.0	10.25	2.26	40.8	-	48.0
anthracene	µg/kg	103	33.1	32.0	102	108	23.1	4.1	96.8	-	110
dibenz(ah)anthracene	µg/kg	160	42.1	26.4	98	163	29.5	5.3	151	-	168
naphthalene	µg/kg	49.6	23.87	48.1	77	53.0	17.04	3.40	44.2	-	55.0

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
PCB 028	µg/kg	1.29	0.557	43.2	33	1.40	0.400	0.121	1.09	-	1.49
PCB 052	µg/kg	1.90	0.598	31.4	41	2.00	0.400	0.117	1.71	-	2.09
PCB 101	µg/kg	3.42	0.870	25.4	61	3.43	0.580	0.139	3.20	-	3.64
PCB 118	µg/kg	1.66	0.462	27.9	39	1.70	0.300	0.092	1.51	-	1.81
PCB 138	µg/kg	4.93	1.678	34.0	72	5.00	1.125	0.247	4.54	-	5.33
PCB 149	µg/kg	4.80	1.385	28.8	8	5.24	0.955	0.612	3.67	-	5.93
PCB 153	µg/kg	5.70	1.531	26.9	69	5.96	1.040	0.230	5.33	-	6.07

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
o,p`-DDD	µg/kg	3.00	0.880	29.3	16	3.00	0.580	0.275	2.54	-	3.47
o,p`-DDE	µg/kg	1.54	0.696	45.1	12	1.50	0.500	0.251	1.11	-	1.98
p,p`-DDD	µg/kg	50.3	13.92	27.7	41	52.7	9.70	2.72	45.9	-	54.7

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
AOX	mg/kg	38.0	10.03	26.4	14	38.5	6.90	3.35	32.3	-	43.8
EOX	mg/kg	0.488	0.1259	25.8	39	0.500	0.0900	0.0252	0.447	-	0.528
Inorganic carbon	g/kg	11.0	1.19	10.9	15	11.2	0.90	0.38	10.3	-	11.6
Particles < 63 µm	%	58.9	26.02	44.2	11	58.0	19.80	9.81	41.7	-	76.2
Particles > 63 µm	%	21.7	3.55	16.4	8	22.3	2.60	1.57	18.8	-	24.6

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
acenaphthylene	µg/kg	54.6	24.26	56		50.0	32

Method: Polychlorobiphenyls

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
PCB 031	µg/kg	5.69	-	3			
PCB 077	µg/kg	-	-	0		2.50	8
PCB 105	µg/kg	0.560	0.0400	3		2.000	9
PCB 126	µg/kg	3.51	3.500	4		1.50	6
PCB 128	µg/kg	1.08	0.395	4		3.00	7
PCB 156	µg/kg	0.890	0.3250	4		1.000	5

Method: Organochlorine pesticides

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
beta-HCH	µg/kg	-	-	0		5.00	40
dieldrin	µg/kg	-	-	0		3.00	41
gamma-HCH	µg/kg	-	-	0		2.00	46
heptachlor	µg/kg	-	-	0		2.00	40
heptachlor epoxide	µg/kg	-	-	0		2.00	37
hexachlorobenzene	µg/kg	0.975	0.3750	8		2.500	38
o,p`-DDT	µg/kg	22.0	20.85	5		4.50	34
p,p`-DDT	µg/kg	4.16	1.945	22		5.00	26

Method: Other parameters

Element	Unit	Median	MAD	N		Results smaller than (<) Median of <	N
CN - Free	mg/kg	0.635	0.4000	10		1.000	8
CN - Total	mg/kg	1.49	0.750	30			