WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 728

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis SETOC 728

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 728 of Sandy Soil 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
2013	4	3
2007	3	2
1998	1	3
1996	1	2

Consensus Values SETOC 728

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
benzo(a)pyrene	µg/kg	61.8	13.58	22.0	176	62.0	9.15	1.28	59.7 - 63.8
benzo(b)fluoranthene	µg/kg	66.7	15.81	23.7	154	70.0	10.42	1.59	64.2 - 69.3
chrysene	µg/kg	60.4	14.96	24.8	173	60.0	10.00	1.42	58.1 - 62.6
fluoranthene	µg/kg	134	31.3	23.3	178	140	21.5	2.9	130 - 139

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	mg/kg	2.27	0.448	19.7	63	2.36	0.320	0.071	2.16 - 2.39
Ni	mg/kg	6.24	1.239	19.8	93	6.21	0.840	0.161	5.99 - 6.50
Pb	mg/kg	62.8	13.35	21.3	103	62.4	9.20	1.64	60.1 - 65.4
Zn	mg/kg	52.9	5.23	9.9	105	52.7	3.60	0.64	51.9 - 53.9

Indicative Values SETOC 728

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
anthracene	µg/kg	14.0	6.69	47.7	123	15.0	5.00	0.75	12.8 - 15.2
benz(a)anthracene	µg/kg	57.9	14.63	25.3	171	60.0	10.00	1.40	55.7 - 60.1
benzo(ghi)perylene	µg/kg	49.2	13.97	28.4	159	50.0	10.00	1.38	47.0 - 51.4
benzo(k)fluoranthene	µg/kg	33.0	8.59	26.0	146	33.0	6.00	0.89	31.6 - 34.4
dibenz(ah)anthracene	µg/kg	10.2	4.75	46.5	88	10.8	3.24	0.63	9.20 - 11.2
indeno(1,2,3-cd)pyrene	µg/kg	49.7	15.11	30.4	158	50.8	10.20	1.50	47.3 - 52.0
phenanthrene	µg/kg	69.8	20.12	28.8	176	70.0	13.80	1.90	66.8 - 72.8
pyrene	µg/kg	107	27.9	26.1	164	110	19.3	2.7	103 - 111

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
AOX	mg/kg	13.9	3.13	22.5	15	14.0	2.00	1.01	12.2 - 15.6
Inorganic carbon	g/kg	2.56	0.596	23.3	12	2.55	0.400	0.215	2.18 - 2.93
Organic carbon	g/kg	1.01	0.399	39.6	21	1.00	0.250	0.109	0.826 - 1.19
Particles > 63 µm	%	97.0	1.95	2.0	11	97.0	1.30	0.74	95.7 - 98.3

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Ba	mg/kg	26.6	7.73	29.1	13	27.9	5.50	2.68	21.9 - 31.2
Co	mg/kg	1.53	0.117	7.7	9	1.52	0.080	0.049	1.44 - 1.61
Cr	mg/kg	10.6	3.13	29.6	96	10.6	2.20	0.40	9.93 - 11.2
Cu	mg/kg	5.59	1.840	32.9	91	5.70	1.300	0.241	5.21 - 5.97
Hg	mg/kg	0.0825	0.0337	40.8	64	0.0950	0.0250	0.0053	0.0741 - 0.0909

Informative Values SETOC 728

Method: Polycyclic aromatic hydrocarbons					Results smaller than (<)	
Element	**Unit**	**Median**	**MAD**	**N**	**Median of <**	**N**
acenaphthene	µg/kg	5.05	2.080	50	20.00	118
acenaphthylene	µg/kg	5.86	3.855	50	50.00	105
fluorene	µg/kg	6.42	2.415	64	20.00	107
naphthalene	µg/kg	8.46	5.040	63	50.00	119

Method: Polychlorobiphenyls					Results smaller than (<)	
Element	**Unit**	**Median**	**MAD**	**N**	**Median of <**	**N**
PCB 028	µg/kg	0.370	0.3310	14	1.000	117
PCB 031	µg/kg	0.0380	0.0040	3	1.0000	13
PCB 052	µg/kg	0.500	0.4815	14	1.000	120
PCB 077	µg/kg	-	-	0	1.00	9
PCB 101	µg/kg	0.650	0.4133	14	1.000	122
PCB 105	µg/kg	0.0090	0.0030	3	1.0000	18
PCB 114	µg/kg	-	-	0	0.300	7
PCB 118	µg/kg	0.1470	0.1235	8	1.0000	109
PCB 123	µg/kg	-	-	0	0.300	7
PCB 128	µg/kg	-	-	0	1.00	17
PCB 138	µg/kg	0.800	0.7140	21	1.000	116
PCB 153	µg/kg	0.700	0.3000	19	1.000	116
PCB 156	µg/kg	0.0060	0.0020	3	1.0000	16
PCB 157	µg/kg	-	-	0	0.400	6
PCB 167	µg/kg	-	-	0	0.400	6
PCB 180	µg/kg	0.400	0.3475	18	1.000	118
PCB 189	µg/kg	-	-	0	0.300	7

Method: Organochlorine pesticides					Results smaller than (<)	
Element	**Unit**	**Median**	**MAD**	**N**	**Median of <**	**N**
aldrin	µg/kg	-	-	0	1.00	77
alpha-endosulfan	µg/kg	-	-	0	1.00	73
alpha-HCH	µg/kg	-	-	0	1.00	84
beta-HCH	µg/kg	-	-	0	1.00	79
cis-chlordane	µg/kg	-	-	0	1.00	32
dieldrin	µg/kg	-	-	0	1.00	81
endrin	µg/kg	-	-	0	1.00	78

gamma-HCH	µg/kg	0.510	0.4970	4	1.000	78
heptachlor epoxide	µg/kg	-	-	0	1.00	72
hexachlorobenzene	µg/kg	-	-	0	1.00	77

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

Element	Unit	Median	MAD	N	Median of <	N
o,p`-DDD	µg/kg	-	-	0	1.00	67
o,p`-DDE	µg/kg	-	-	0	1.00	68
o,p`-DDT	µg/kg	-	-	0	1.00	71
p,p`-DDD	µg/kg	1.02	0.990	4	1.00	79
p,p`-DDE	µg/kg	-	-	0	1.00	81
p,p`-DDT	µg/kg	0.0900	0.0160	3	1.0000	81
pentachlorobenzene	µg/kg	-	-	0	1.00	42
trans-chlordane	µg/kg	-	-	0	1.00	32

Method: Other parameters — **Results smaller than (<)**

Element	Unit	Median	MAD	N	Median of <	N
CN - Free	mg/kg	0.110	0.0700	5	1.000	25
CN - Total	mg/kg	0.200	0.1300	9	1.000	39
EOX	mg/kg	0.200	0.1400	15	0.100	55
Mineral oil, GC	mg/kg	20.9	12.02	23	20.0	50
Mineral oil, IR	mg/kg	22.5	9.75	6	22.5	18
Particles < 2 µm	%	1.53	0.900	16	1.00	8
Particles < 63 µm	%	2.79	1.390	15		

Method: Metals — **Results smaller than (<)**

Element	Unit	Median	MAD	N	Median of <	N
Cd	mg/kg	0.0800	0.0410	30	0.3000	75
Mo	mg/kg	0.482	0.1110	4	1.000	8

Method: Experimental — **Results smaller than (<)**

Element	Unit	Median	MAD	N	Median of <	N
Tributyl Tin (TBT)	µg/kg	-	-	0	7.40	6