



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Sediment Exchange for Tests on Organic Contaminants

REFERENCE MATERIAL

SETOC sample 690



Certificate of Analysis SETOC 690

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, the mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

All values, expressed on a weight basis (kg or %), are reported as oven-dried (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 690 of Sediment, from Germany, is prepared for the WEPAL proficiency programs. The sample has been used in 3 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
2024	4	1
2021	1	4
2018	2	4



Consensus Values SETOC 690

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
acenaphthylene	µg/kg	480	179	37.2	67	480	110	27.3	5.69
acenaphthene	µg/kg	95.8	39.1	40.8	69	93.6	26.4	5.88	6.14
fluorene	µg/kg	363	152	41.9	71	360	112	22.6	6.22
phenanthrene	µg/kg	4084	782	19.2	87	3995	536	105	2.57
anthracene	µg/kg	514	204	39.7	86	522	122	27.5	5.36
fluoranthene	µg/kg	7613	1308	17.2	87	7561	894	175	2.30
pyrene	µg/kg	4594	939	20.4	73	4518	577	137	2.99
chrysene	µg/kg	3324	680	20.5	85	3320	430	92.2	2.77
benz(a)anthracene	µg/kg	2121	554	26.1	87	2001	381	74.3	3.50
benzo(b)fluoranthene	µg/kg	3289	721	21.9	67	3254	476	110	3.35
benzo(k)fluoranthene	µg/kg	1580	263	16.6	84	1593	174	35.8	2.27
benzo(a)pyrene	µg/kg	1529	310	20.3	87	1510	220	41.6	2.72
dibenz(ah)anthracene	µg/kg	487	98.7	20.2	72	480	64.6	14.5	2.98
indeno(1,2,3-cd)pyrene	µg/kg	1855	316	17.1	86	1816	187	42.6	2.30
benzo(ghi)perylene	µg/kg	1697	273	16.1	86	1734	169	36.7	2.16
EPA ΣPAH(16)	µg/kg	35014	5801	16.6	49	35112	3098	1036	2.96

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 052	µg/kg	27.7	5.52	19.9	80	27.9	3.46	0.771	2.78
PCB 101	µg/kg	74.5	15.5	20.7	80	74.2	8.58	2.16	2.90
PCB 105	µg/kg	10.7	1.72	16.0	19	11.0	1.00	0.494	4.60
PCB 118	µg/kg	35.6	6.99	19.6	79	35.6	4.20	0.984	2.76
PCB 128	µg/kg	15.1	1.38	9.1	15	15.0	0.800	0.444	2.93
PCB 138	µg/kg	104	28.6	27.4	81	103	18.6	3.97	3.80
PCB 149	µg/kg	98.7	2.72	2.8	8	99.0	1.40	1.20	1.22
PCB 153	µg/kg	117	22.8	19.5	81	116	13.5	3.16	2.71
PCB 156	µg/kg	10.8	1.80	16.8	15	11.1	1.10	0.583	5.41
PCB 180	µg/kg	73.7	14.2	19.2	80	73.0	8.88	1.98	2.69
ΣPCB(7)	µg/kg	452	86.3	19.1	37	448	49.2	17.7	3.93

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
p,p'-DDE	µg/kg	17.1	4.07	23.9	30	16.1	3.10	0.930	5.45



Consensus Values SETOC 690

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Mineral oil, GC	mg/kg	1303	355	27.2	66	1317	246	54.6	4.19
Organic carbon	g/kg	35.1	4.55	13.0	44	35.2	2.46	0.857	2.44
Inorganic carbon	g/kg	25.8	3.09	12.0	10	26.1	1.82	1.22	4.74
Particles < 63 µm	%	60.0	8.50	14.2	9	59.8	5.40	3.54	5.90
CN - Total	mg/kg	5.57	1.13	20.3	29	5.64	0.763	0.263	4.72

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	11.1	1.50	13.5	38	11.0	0.900	0.304	2.74
Cd	mg/kg	3.95	0.474	12.0	40	3.92	0.290	0.094	2.37
Cr	mg/kg	153	18.7	12.2	39	152	12.0	3.74	2.44
Cu	mg/kg	139	18.0	13.0	39	140	10.0	3.61	2.60
Hg	mg/kg	0.525	0.074	14.1	39	0.537	0.039	0.015	2.82
Ni	mg/kg	34.5	4.62	13.4	39	34.8	3.20	0.925	2.68
Pb	mg/kg	71.0	8.41	11.9	41	71.0	5.50	1.64	2.31
Zn	mg/kg	481	49.3	10.2	40	483	29.5	9.74	2.02
Ba	mg/kg	402	45.8	11.4	28	400	29.5	10.8	2.69
Co	mg/kg	8.92	1.15	12.9	32	9.05	0.828	0.254	2.84
Mo	mg/kg	1.26	0.268	21.3	26	1.30	0.175	0.066	5.23



Indicative Values SETOC 690

Method: Polycyclic aromatic hydrocarbons

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
naphthalene	µg/kg	94.7	49.3	52.0	77	97.0	30.0	7.02	7.41

Method: Polychlorobiphenyls

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
PCB 028	µg/kg	4.05	1.81	44.6	65	4.29	1.09	0.280	6.92
PCB 031	µg/kg	3.27	1.32	40.4	4	3.45	0.550	0.825	25.2
PCB 114	µg/kg	0.724	0.320	44.2	4	0.806	0.171	0.200	27.6
PCB 123	µg/kg	3.34	0.934	28.0	8	3.40	0.600	0.413	12.4
PCB 157	µg/kg	1.31	0.302	23.0	8	1.45	0.150	0.133	10.2
PCB 167	µg/kg	4.79	1.09	22.7	11	4.59	0.410	0.410	8.57
PCB 169	µg/kg	1.52	1.46	96.2	8	3.51	0.630	0.646	42.5
PCB 189	µg/kg	1.93	0.580	30.1	8	2.05	0.245	0.256	13.3

Method: Organochlorine pesticides

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
hexachlorobenzene	µg/kg	1.22	0.412	33.7	17	1.27	0.220	0.125	10.2
1,2,4 trichlorobenzene	µg/kg	3.41	1.50	44.0	10	3.70	0.747	0.592	17.4
1,3,5 trichlorobenzene	µg/kg	0.975	0.477	48.9	7	0.966	0.264	0.225	23.1
p,p'-DDT	µg/kg	4.90	2.10	42.7	19	5.33	1.08	0.601	12.3
o,p'-DDE	µg/kg	0.959	0.348	36.3	15	1.02	0.216	0.112	11.7
p,p'-DDD	µg/kg	9.09	2.42	26.7	22	9.50	1.66	0.646	7.10
o,p'-DDD	µg/kg	3.14	1.51	48.2	15	3.31	0.696	0.488	15.6

Method: Other parameters

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
EOX	mg/kg	2.24	0.707	31.5	12	2.25	0.405	0.255	11.4
Particles < 2 µm	%	19.3	3.44	17.8	6	19.2	1.50	1.75	9.09
Particles > 63 µm	%	33.4	11.0	33.0	5	34.8	5.75	6.16	18.5

Method: Metals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Sb	mg/kg	1.06	0.320	30.2	5	1.10	0.204	0.179	16.9
Sn	mg/kg	12.7	1.66	13.1	7	12.3	0.770	0.786	6.18
V	mg/kg	35.4	5.66	16.0	7	37.1	2.78	2.68	7.55



Indicative Values SETOC 690

Method: Dibenzofuran

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
2,3,7,8 Cl4DF	ng/kg	9.38	2.97	31.6	4	9.68	1.60	1.85	19.8
1,2,3,4,7,8 Cl6DF	ng/kg	14.2	4.02	28.2	4	15.3	2.15	2.51	17.7
2,3,4,6,7,8 Cl6DF	ng/kg	4.26	1.87	43.8	4	4.67	0.989	1.17	27.4
1,2,3,4,6,7,8 Cl7DF	ng/kg	57.2	7.96	13.9	4	57.2	3.61	4.97	8.69
1,2,3,4,7,8,9 Cl7DF	ng/kg	6.75	3.17	46.9	4	6.73	2.06	1.98	29.3
Cl8DF	ng/kg	140	71.2	50.7	4	144	34.4	44.5	31.7

Method: Brominated Flame Retardants

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
BDE 047	ng/kg	358	81.1	22.6	5	383	54.4	45.3	12.7

Method: Experimental

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
DEHP	µg/kg	1464	325	22.2	5	1450	142	182	12.4