

APPENDIX C. ANALYTICAL METHODS AND REPORTING LIMITS

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Table C-1. Method detection limits and reporting limits for PCB Aroclors, cPAHs, metals, TBT, organochlorine pesticides, SVOCs, and conventionals in tissue

Analyte	Method	Unit	MDL	RL
PCBs as Aroclors				
Aroclor 1016	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1221	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1232	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1242	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1248	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1254	EPA 8082A	µg/kg ww	2.37 ^a	4.00 ^b
Aroclor 1260	EPA 8082A	µg/kg ww	1.06 ^a	4.00 ^b
cPAHs				
Benzo(a)anthracene	EPA 8270D-SIM	µg/kg ww	0.537	5.00
Benzo(a)pyrene	EPA 8270D-SIM	µg/kg ww	0.915	5.00
Total benzofluoranthenes	EPA 8270D-SIM	µg/kg ww	1.00	10.0
Chrysene	EPA 8270D-SIM	µg/kg ww	0.488	5.00
Dibenzo(a,h)anthracene	EPA 8270D-SIM	µg/kg ww	1.53	5.00
Indeno(1,2,3-cd)pyrene	EPA 8270D-SIM	µg/kg ww	0.575	5.00
Metals				
Inorganic Arsenic	EPA 1632	mg/kg ww	0.004	0.010
Vanadium	EPA 6020A	mg/kg ww	na ^c	0.004
TBT	EPA 8270D-SIM	µg/kg ww	0.450	3.86
Organochlorine Pesticides				
Aldrin	EPA 8270D/1699 Mod	µg/kg ww	0.22	1.0
alpha-BHC	EPA 8270D/1699 Mod	µg/kg ww	0.26	1.0
beta-BHC	EPA 8270D/1699 Mod	µg/kg ww	0.4	1.0
Dieldrin	EPA 8270D/1699 Mod	µg/kg ww	0.22	1.0
gamma-BHC	EPA 8270D/1699 Mod	µg/kg ww	0.17	1.0
Heptachlor	EPA 8270D/1699 Mod	µg/kg ww	0.09	1.0

Table C-1. Method detection limits and reporting limits for PCB Aroclors, cPAHs, metals, TBT, organochlorine pesticides, SVOCs, and conventionals in tissue

Analyte	Method	Unit	MDL	RL
Heptachlor epoxide	EPA 8270D/1699 Mod	µg/kg ww	0.061	1.0
alpha-Chlordane ^d	EPA 8270D/1699 Mod	µg/kg ww	0.12	1.0
cis-Nonachlor ^d	EPA 8270D/1699 Mod	µg/kg ww	0.13	1.0
gamma-Chlordane ^d	EPA 8270D/1699 Mod	µg/kg ww	0.13	1.0
Oxychlordane ^d	EPA 8270D/1699 Mod	µg/kg ww	0.77	2.5
trans-Nonachlor ^d	EPA 8270D/1699 Mod	µg/kg ww	0.094	1.0
2,4'-DDD ^e	EPA 8270D/1699 Mod	µg/kg ww	0.31	2.5
2,4'-DDE ^e	EPA 8270D/1699 Mod	µg/kg ww	0.42	2.5
2,4'-DDT ^e	EPA 8270D/1699 Mod	µg/kg ww	0.46	1.0
4,4'-DDD ^e	EPA 8270D/1699 Mod	µg/kg ww	0.13	1.0
4,4'-DDE ^e	EPA 8270D/1699 Mod	µg/kg ww	0.7	2.5
4,4'-DDT ^e	EPA 8270D/1699 Mod	µg/kg ww	0.35	1.0
SVOCs				
BEHP	EPA 8270D	µg/kg ww	28.0 ^a	50.0 ^b
Carbazole	EPA 8270D/1699 Mod	µg/kg ww	7.37	20.0
PCP	EPA 8270D	µg/kg ww	31.3 ^a	100 ^b
Hexachlorobenzene	EPA 8270D	µg/kg ww	4.74 ^a	20.0 ^b
Conventionals				
Total solids	PSEP 1986	% dw	na	0.040
Lipids	Bligh and Dyer (mod)	% ww	na	0.010

^a SW 846 no longer requires MDL values. The laboratories have the option to use these values to assess sensitivity for EPA 8000 series methods. ARI has continued to maintain MDL studies for these analytes.

^b RL values are consistent with the LLOQ values required under EPA SW 846

^c SW 846 no longer requires MDL values.

^d Components chlordane sum.

^e Components of total DDx sum.

BEHP – bis(2-ethylhexyl) phthalate
BHC – benzene hexachloride
cPAH – carcinogenic polycyclic aromatic hydrocarbon
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane

EPA – US Environmental Protection Agency
MDL – method detection limit
na – not available
PCB – polychlorinated biphenyl
PCP – pentachlorophenol
PSEP - Puget Sound Estuary Program
RL – reporting limit

SIM – selective ion monitoring
SVOC – semivolatile organic compounds
TBT – tributyltin
total DDx – DDT isomers (2,4'-DDD, 4,4'-DDD,
2,4'-DDE, 4,4'-DDE, 2,4'-DDT and 4,4'-DDT)
ww – wet weight

Table C-2. EDL and LMCL values for dioxins/furan congeners

Analyte	EPA Method 1613B	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
2,3,7,8-TCDD	0.05	0.20
1,2,3,7,8-PeCDD	0.05	1.00
1,2,3,4,7,8-HxCDD	0.05	1.00
1,2,3,6,7,8-HxCDD	0.05	1.00
1,2,3,7,8,9-HxCDD	0.05	1.00
1,2,3,4,6,7,8-HpCDD	0.05	1.00
OCDD	0.05	2.00
2,3,7,8-TCDF	0.05	0.20
1,2,3,7,8-PeCDF	0.05	1.00
2,3,4,7,8-PeCDF	0.05	1.00
1,2,3,4,7,8-HxCDF	0.05	1.00
1,2,3,6,7,8-HxCDF	0.05	1.00
1,2,3,7,8,9-HxCDF	0.05	1.00
2,3,4,6,7,8-HxCDF	0.05	1.00
1,2,3,4,6,7,8-HpCDF	0.05	1.00
1,2,3,4,7,8,9-HpCDF	0.05	1.00
OCDF	0.05	2.00

^a EDL is a sample-specific DL. The value provided here is an estimate, and the sample-specific values will vary based on sample mass and the analytical conditions at the time of analysis

^b LMCL is Axys's lowest calibration limit. Detected values below the LMCL are J-qualified. The reported LMCL will be adjusted based on the sample mass of each sample.

Axys – Axys Analytical Services Ltd.

DL – detection limit

EPA – US Environmental Protection Agency

EDL – estimated detection limit

HpCDD – heptachlorodibenzo-*p*-dioxin

HpCDF – heptachlorodibenzofuran

HxCDD – hexachlorodibenzo-*p*-dioxin

HxCDF – hexachlorodibenzofuran

J – estimated concentration

LMCL – lower method calibration limit

OCDD – octachlorodibenzo-*p*-dioxin

OCDF – octachlorodibenzofuran

PeCDD – pentachlorodibenzo-*p*-dioxin

PeCDF – pentachlorodibenzofuran

RL – reporting limit

TCDD – tetrachlorodibenzo-*p*-dioxin

TCDF – tetrachlorodibenzofuran

ww – wet weight

Table C-3.EDL and LMCL values for PCB congeners

Analyte	EPA Method 1668C	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
PCB-1	0.1	2.0
PCB-2	0.1	2.0
PCB-3	0.1	2.0
PCB-4	0.2	2.0
PCB-5	0.2	2.0
PCB-6	0.2	2.0
PCB-7	0.2	2.0
PCB-8	0.2	2.0
PCB-9	0.2	2.0
PCB-10	0.2	2.0
PCB-11	0.2	2.0
PCB-12/13	0.2	2.0
PCB-14	0.2	2.0
PCB-15	0.2	2.0
PCB-16	0.1	2.0
PCB-17	0.1	2.0
PCB-19	0.1	2.0
PCB-21/33	0.1	2.0
PCB-22	0.1	2.0
PCB-23	0.1	2.0
PCB-24	0.1	2.0
PCB-25	0.1	2.0
PCB-26/29	0.1	2.0
PCB-27	0.1	2.0
PCB-28/20	0.1	2.0
PCB-30/18	0.1	2.0
PCB-31	0.1	2.0
PCB-32	0.1	2.0
PCB-34	0.1	2.0
PCB-35	0.1	2.0
PCB-36	0.1	2.0
PCB-37	0.1	2.0
PCB-38	0.1	2.0
PCB-39	0.1	2.0
PCB-41/40/71	0.1	2.0
PCB-42	0.1	2.0

Table C-3.EDL and LMCL values for PCB congeners

Analyte	EPA Method 1668C	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
PCB-43	0.1	2.0
PCB-44/47/65	0.1	2.0
PCB-45/51	0.1	2.0
PCB-46	0.1	2.0
PCB-48	0.1	2.0
PCB-50/53	0.1	2.0
PCB-52	0.1	2.0
PCB-54	0.1	2.0
PCB-55	0.1	2.0
PCB-56	0.1	2.0
PCB-57	0.1	2.0
PCB-58	0.1	2.0
PCB-59/62/75	0.1	2.0
PCB-60	0.1	2.0
PCB-61/70/74/76	0.1	2.0
PCB-63	0.1	2.0
PCB-64	0.1	2.0
PCB-66	0.1	2.0
PCB-67	0.1	2.0
PCB-68	0.1	2.0
PCB-69/49	0.1	2.0
PCB-72	0.1	2.0
PCB-73	0.1	2.0
PCB-77	0.1	2.0
PCB-78	0.1	2.0
PCB-79	0.1	2.0
PCB-80	0.1	2.0
PCB-81	0.1	2.0
PCB-82	0.1	2.0
PCB-83/99	0.1	2.0
PCB-84	0.1	2.0
PCB-88/91	0.1	2.0
PCB-89	0.1	2.0
PCB-92	0.1	2.0
PCB-94	0.1	2.0
PCB-95/100/93/102/98	0.1	2.0
PCB-96	0.1	2.0

Table C-3.EDL and LMCL values for PCB congeners

Analyte	EPA Method 1668C	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
PCB-103	0.1	2.0
PCB-104	0.1	2.0
PCB-105	0.1	2.0
PCB-106	0.1	2.0
PCB-108/124	0.1	2.0
PCB-109/119/86/97/125/87	0.1	2.0
PCB-107	0.1	2.0
PCB-110/115	0.1	2.0
PCB-111	0.1	2.0
PCB-112	0.1	2.0
PCB-113/90/101	0.1	2.0
PCB-114	0.1	2.0
PCB-117/116/85	0.1	2.0
PCB-118	0.1	2.0
PCB-120	0.1	2.0
PCB-121	0.1	2.0
PCB-122	0.1	2.0
PCB-123	0.1	2.0
PCB-126	0.1	2.0
PCB-127	0.1	2.0
PCB-128/166	0.1	2.0
PCB-130	0.1	2.0
PCB-131	0.1	2.0
PCB-132	0.1	2.0
PCB-133	0.1	2.0
PCB-134/143	0.1	2.0
PCB-136	0.1	2.0
PCB-137	0.1	2.0
PCB-138/163/129/160	0.1	2.0
PCB-139/140	0.1	2.0
PCB-141	0.1	2.0
PCB-142	0.1	2.0
PCB-144	0.1	2.0
PCB-145	0.1	2.0
PCB-146	0.1	2.0
PCB-147/149	0.1	2.0
PCB-148	0.1	2.0

Table C-3.EDL and LMCL values for PCB congeners

Analyte	EPA Method 1668C	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
PCB-150	0.1	2.0
PCB-151/135/154	0.1	2.0
PCB-152	0.1	2.0
PCB-153/168	0.1	2.0
PCB-155	0.1	2.0
PCB-156/157	0.1	2.0
PCB-158	0.1	2.0
PCB-159	0.1	2.0
PCB-161	0.1	2.0
PCB-162	0.1	2.0
PCB-164	0.1	2.0
PCB-165	0.1	2.0
PCB-167	0.1	2.0
PCB-169	0.1	2.0
PCB-170	0.1	2.0
PCB-171/173	0.1	2.0
PCB-172	0.1	2.0
PCB-174	0.1	2.0
PCB-175	0.1	2.0
PCB-176	0.1	2.0
PCB-177	0.1	2.0
PCB-178	0.1	2.0
PCB-179	0.1	2.0
PCB-180/193	0.1	2.0
PCB-181	0.1	2.0
PCB-182	0.1	2.0
PCB-183/185	0.1	2.0
PCB-184	0.1	2.0
PCB-186	0.1	2.0
PCB-187	0.1	2.0
PCB-188	0.1	2.0
PCB-189	0.1	2.0
PCB-190	0.1	2.0
PCB-191	0.1	2.0
PCB-192	0.1	2.0
PCB-194	0.1	2.0
PCB-195	0.1	2.0

Table C-3.EDL and LMCL values for PCB congeners

Analyte	EPA Method 1668C	
	Tissue (ng/kg ww) based on 10-g sample	
	EDL ^a	LMCL ^b
PCB-196	0.1	2.0
PCB-197/200	0.1	2.0
PCB-198/199	0.1	2.0
PCB-201	0.1	2.0
PCB-202	0.1	2.0
PCB-203	0.1	2.0
PCB-204	0.1	2.0
PCB-205	0.1	2.0
PCB-206	0.1	2.0
PCB-207	0.1	2.0
PCB-208	0.1	2.0
PCB-209	0.1	2.0

^a EDL is a sample-specific DL. The value provided here is an estimate, and the sample-specific values will vary based on sample mass and the analytical conditions at the time of analysis.

^b LMCL is Axys's lowest calibration limit. Detected values below the LMCL are J-qualified. The reported LMCL will be adjusted based on the sample mass of each sample.

Axys – Axys Analytical Services Ltd.

DL – detection limit

EPA – US Environmental Protection Agency

EDL – estimated detection limit

J – estimated concentration

LMCL – lower method calibration limit

PCB – polychlorinated biphenyl

RL – reporting limit

ww – wet weight

Table C-4. Method detection limits and reporting limits for cPAHS and conventionals in sediment

Analyte	Method	Unit	MDL	RL
cPAHs (based on 10-g dw sample)				
Benzo(a)anthracene	EPA 8270D-SIM	µg/kg dw	0.537	5.00
Benzo(a)pyrene	EPA 8270D-SIM	µg/kg dw	0.915	5.00
Benzo(b)fluoranthene	EPA 8270D-SIM	µg/kg dw	1.37	5.00
Benzo(k)fluoranthene	EPA 8270D-SIM	µg/kg dw	0.760	5.00
Chrysene	EPA 8270D-SIM	µg/kg dw	0.488	5.00
Dibenzo(a,h)anthracene	EPA 8270D-SIM	µg/kg dw	1.53	5.00
Indeno(1,2,3-cd)pyrene	EPA 8270D-SIM	µg/kg dw	0.575	5.00
Conventionals				
Percent solids	SM 2540G	% dw	na	0.040
TOC (based on 1-g dw sample)	EPA 9060	% dw	0.018	0.02
Black carbon (based on 10-g dw sample)	Gustafsson, 2001 - CTO Pretreatment / Combustion (950°C) / IR detect	wt%	0.2	0.6

cPAH – carcinogenic polycyclic aromatic hydrocarbon

dw – dry weight

EPA – US Environmental Protection Agency

MDL – method detection limit

na – not available

PSEP - Puget Sound Estuary Program

RL – reporting limit

SIM – selective ion monitoring

ww – wet weight

Table C-5. EDLs and LMCLs for cPAHs in passive samplers and estimated detection limits in porewater

Analyte	EPA Method 8270 Modified		Estimated porewater DL (ng/L) ^c
	Passive Sampler (ng/g) Based on 1-g PE sample		
	EDL ^a	LMCL ^b	
Benzo(a)anthracene	5	25	0.138
Benzo(a)pyrene	5	25	0.035
Benzo(b)fluoranthene	5	25	0.035
Benzo(j/k)fluoranthene	5	25	0.035
Chrysene	5	25	0.138
Dibenzo(a,h)anthracene	10	25	0.005
Indeno(1,2,3-cd)pyrene	10	25	0.004

- ^a EDL is a sample-specific DL. The value provided here is an estimate, and the sample-specific values will vary based on sample mass and the analytical conditions at the time of analysis
- ^b LMCL is Axys's lowest calibration limit. Detected values below the LMCL are J-qualified. The reported LMCL will be adjusted based on the sample mass of each sample.
- ^c Assuming 0.1 g of PE and that full equilibrium is reached. Note that full equilibrium may not be achieved for all PAHs.

Axys – Axys Analytical Services Ltd.

DL – detection limit

EPA – US Environmental Protection Agency

EDL – estimated detection limit

J – estimated concentration

LMCL – lower method calibration limit

RL – reporting limit

ww – wet weight