Appendix II

QUALITY CONTROL DATA

FOR ANALYTICAL CHEMISTRY

OF FISH TISSUE SAMPLES

Table A1-1. SWAMP Quality Control (QC) Requirements* for PCB Congeners in Tissue.

Type of QC Sample	Purpose	Required Frequency	Control Limit
Method Blank	Reagent contamination	1 per 20 samples or 1 per batch, whichever is more frequent	< MDL for analyte of interest
Calibration standards	Establish relationship between instrument response and target analyte concentration	As specified in method or laboratory SOP	Linear regression r>0.995
Calibration verification standard	Assess instrument drift	Every 10 samples	85-115% recovery
Certified reference material	Accuracy	1 per 20 samples or 1 per batch, whichever is more frequent	70-130% recovery of the 95% confidence level
Matrix spike (MS) and matrix spike duplicate (MSD)	Matrix effects and method performance	1 MS and 1 MSD 20 samples or 1 MS/MSD pair per batch, whichever is more frequent	50-150% recovery and RPD<25%
Surrogate spikes	Assess method performance and estimate recovery of target analytes	Added to every calibration standard, sample, and blank	As specified in method or by project manager
Field replicate	Method precision, homogeneity of sample	1 per 20 samples or 1 per batch, whichever is more frequent	RPD<25% if samples is 10 times MDL

Table A1-2. SWAMP Quality Control Requirements* for Total Mercury in Tissue.

Type of QC Sample	Purpose	Required Frequency	Control Limit
Method Blank	Reagent contamination	1 per 20 samples or 1 per batch, whichever is more frequent	< MDL for analyte of interest
Calibration standards	Establish relationship between instrument response and target analyte concentration	As specified in method or laboratory SOP	Linear regression r>0.995
Calibration verification standard	Assess instrument drift	Every 10 samples	80-120% recovery
Certified reference material	Accuracy	1 per 20 samples or 1 per batch, whichever is more frequent	75-125% recovery
Matrix spike (MS) and matrix spike duplicate (MSD)	Matrix effects and method performance	1 MS and 1 MSD 20 samples or 1 MS/MSD pair per batch, whichever is more frequent	75-125% recovery and RPD<25%
Field replicate	Method precision, homogeneity of sample	1 per 20 samples or 1 per batch, whichever is more frequent	RPD<25% if samples is 10 times MDL

*The two tables represent *some* of the QC requirements for tissue analysis under the SWAMP QA program
RPD = relative percent difference (sample difference divided by sample mean and multiplied by 100%)
SOP = standard operating procedure
MDL = method detection limit
RL = reporting limit

Table A1-3. Method blank results for PCB Congeners. Results reported in ppb (wet weight). MDL = 0.1 ppb and RL = 0.2 ppb.

QA-Designated Batch Identification	PCB Congener	Method Blank Sample Result	Method Blank Sample Result
TSM2000	18	ND	ND
TSM2000	28	0.096	0.088
TSM2000	31	0.099	0.091
TSM2000	99	0.044	0.060
TSM2000	118	0.212	0.237
TSM2000	128	ND	ND
TSM2000	138	0.112	0.129
TSM2000	149	ND	0.044
TSM2000	153	0.053	0.065
TSM2000	180	ND	ND
TSM2000	194	ND	ND
TSM2000	195	ND	ND
TSM2000	201	ND	ND
TSM2000	203	ND	ND
TSM2001	18	ND	NA
TSM2001	28	ND	NA
TSM2001	31	ND	NA
TSM2001	99	ND	NA
TSM2001	118	0.296	NA
TSM2001	128	ND	NA
TSM2001	138	0.198	NA
TSM2001	149	ND	NA
TSM2001	153	ND	NA
TSM2001	180	ND	NA
TSM2001	194	ND	NA
TSM2001	195	ND	NA
TSM2001	201	ND	NA
TSM2001	203	ND	NA

NA = not analyzed
ND = non-detect (below the MDL)

Table A1-4. Method blank results for Total Mercury. Results reported in ppm (dry weight). MDL = 0.011 and RL = 0.024 ppm.(dry weight).

Lab Batch Identification	Lab Sample ID	Result
TSM00THg1	MB-1	ND
TSM00THg1	MB-2	ND
TSM00THg1	MB-3	ND
TSM00THg2	MB-1	ND
TSM00THg2	MB-2	ND
TSM00THg2	MB-3	ND
TSM00THg3	MB-1	ND
TSM00THg3	MB-2	ND
TSM00THg3	MB-3	ND
TSM01THg1	MB-1	ND
TSM01THg1	MB-2	ND
TSM01THg1	MB-3	ND
TSM01THg2	MB-1	ND
TSM01THg2	MB-2	ND
TSM01THg2	MB-3	ND

ND = non-detect (below the MDL)

Table A1-5. Certified reference material results for PCB Congeners. NIST SRM-2978 mussel tissue. Results reported in ppb (dry weight).

QA-Designated Batch Identification	PCB Congener	Certified Value	95% CI Ranges +/-	Lower	Upper	70-130% of the 95% Confidence Interval		Result	Result	RPD
TSM2000	28	7.91	0.9	7.01	8.81	4.91	11.45	7.45	7.78	4.3
TSM2000	31	21.4	0.43	21.0	21.83	14.68	28.38	6.05	6.34	4.7
TSM2000	44	11.8	0.64	11.16	12.44	7.81	16.17	11.3	10.9	3.9
TSM2000	49	16.84	0.86	16.0	17.7	11.19	23.01	14.6	13.2	10.0
TSM2000	52	17.7	2.8	14.9	20.5	10.43	26.65	17.8	16.3	8.7
TSM2000	66	18.4	1.5	16.9	19.9	11.83	25.87	24.5	22.5	8.8
TSM2000	87	10.2	0.29	9.91	10.49	6.94	13.64	12.3	11.9	3.2
TSM2000	95	20.8	2.1	18.7	22.9	13.09	29.77	23.0	19.4	17.3
TSM2000	99	18.84	0.44	18.4	19.28	12.88	25.06	20.2	19.0	6.0
TSM2000	101	35.9	1.6	34.3	37.5	24.01	48.75	46.6	45.2	3.1
TSM2000	105	10.8	0.45	10.35	11.25	7.25	14.63	7.28	12.8	54.7
TSM2000	110	35.34	0.71	34.63	36.05	24.24	46.87	37.0	42.3	13.3
TSM2000	118	35.1	1.0	34.1	36.1	23.87	46.93	40.0	41.7	4.1
TSM2000	128	5.25	0.17	5.08	5.42	3.56	7.05	4.90	5.47	10.9
TSM2000	138	35.7	1.5	34.2	37.2	23.94	48.36	46.5	46.5	0.1
TSM2000	149	34.73	0.69	34.0	35.42	23.83	46.05	29.8	29.0	2.6
TSM2000	151	10.92	0.25	10.67	11.17	7.47	14.52	11.1	11.3	1.8
TSM2000	153	56.9	3.5	53.4	60.4	37.38	78.52	55.3	54.7	1.1
TSM2000	156	1.97	0.11	1.86	2.08	1.30	2.70	1.99	2.09	4.7
TSM2000	180	7.81	0.63	7.18	8.44	5.03	10.97	6.48	6.17	4.9
TSM2000	183	5.25	0.15	5.10	5.40	3.57	7.02	4.65	4.14	11.6
TSM2000	187	16.7	1.3	15.40	18.00	10.78	23.40	16.9	16.4	3.0

Table A1-5 (continued). Certified reference material results for PCB Congeners. NIST SRM-2978 mussel tissue. Results reported in ppb (dry weight).

QA-Designated Batch Identification	PCB Congener	Certified Value	+/-	95% CI Ranges Lower	Upper	70-130% of the 95% Confidence Interval		Result
TSM2001	28	7.91	0.9	7.01	8.81	4.91	11.45	5.30
TSM2001	31	21.4	0.43	21.0	21.83	14.68	28.38	5.26
TSM2001	44	11.8	0.64	11.16	12.44	7.81	16.17	11.0
TSM2001	49	16.84	0.86	16.0	17.7	11.19	23.01	12.4
TSM2001	52	17.7	2.8	14.9	20.5	10.43	26.65	15.5
TSM2001	66	18.4	1.5	16.9	19.9	11.83	25.87	17.6
TSM2001	87	10.2	0.29	9.91	10.49	6.94	13.64	10.4
TSM2001	95	20.8	2.1	18.7	22.9	13.09	29.77	19.6
TSM2001	99	18.84	0.44	18.4	19.28	12.88	25.06	18.3
TSM2001	101	35.9	1.6	34.3	37.5	24.01	48.75	42.3
TSM2001	105	10.8	0.45	10.35	11.25	7.25	14.63	9.19
TSM2001	110	35.34	0.71	34.63	36.05	24.24	46.87	37.4
TSM2001	118	35.1	1.0	34.1	36.1	23.87	46.93	36
TSM2001	128	5.25	0.17	5.08	5.42	3.56	7.05	4.86
TSM2001	138	35.7	1.5	34.2	37.2	23.94	48.36	46.6
TSM2001	149	34.73	0.69	34.0	35.42	23.83	46.05	29.9
TSM2001	151	10.92	0.25	10.67	11.17	7.47	14.52	9.54
TSM2001	153	56.9	3.5	53.4	60.4	37.38	78.52	59.8
TSM2001	156	1.97	0.11	1.86	2.08	1.30	2.70	1.76
TSM2001	180	7.81	0.63	7.18	8.44	5.03	10.97	5.64
TSM2001	183	5.25	0.15	5.10	5.40	3.57	7.02	4.43
TSM2001	187	16.7	1.3	15.40	18.00	10.78	23.40	16.1

Table A1-6. Certified reference material results for Total Mercury. NIST DORM-2 dogfish muscle certified value = 4.64 ± 0.24 ppm. Results reported in ppm (dry weight).

Lab Batch Identification	Result	Percent Recovery
TSM00THg1	4.71	101.5
TSM00THg2	4.61	99.4
TSM00THg3	4.46	96.1
TSM01THg1	5.12	110.3
TSM01THg2	4.85	104.5

Figure A1-1. Control chart for percent recovery in DORM-2 for Total Mercury.

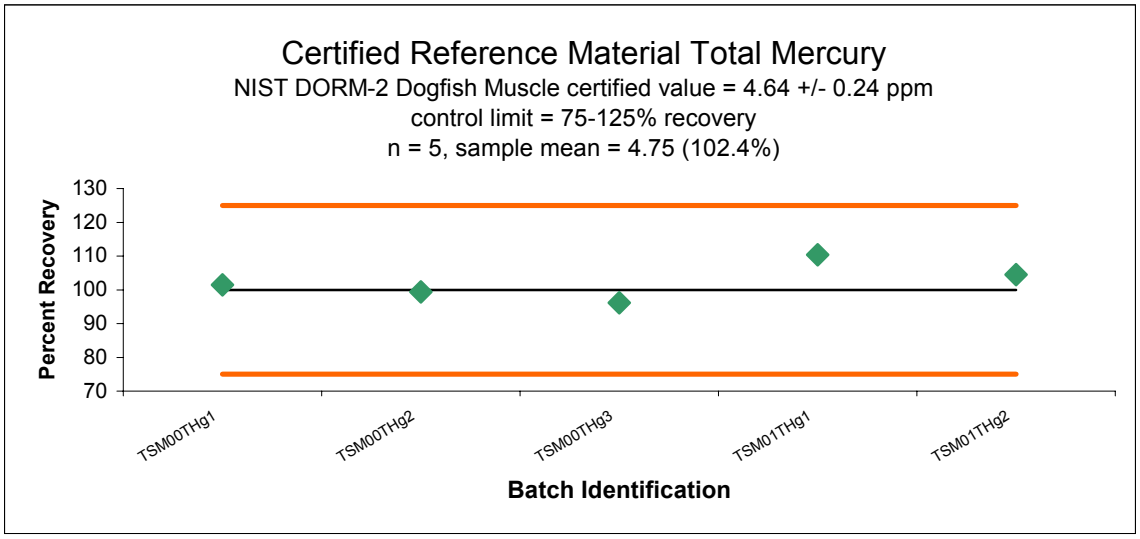

Table A1-7. Replicate analysis samples for PCB Congeners. RPD = relative percent difference (sample difference divided by sample mean and multiplied by 100%). Results reported in ppb (wet weight).

QA-Designated Batch Identification	Parent Sample Identification	PCB Congener	Parent Sample Result	Replicate Sample Result	RPD	Sample <10xMDL
TSM2000	384.010.F.00	18	0.314	0.334	6.2	x
TSM2000	384.010.F.00	28	1.17	1.18	0.2	
TSM2000	384.010.F.00	31	1.01	1.01	0.2	
TSM2000	384.010.F.00	99	6.26	6.16	1.6	
TSM2000	384.010.F.00	118	15.3	15.9	3.6	
TSM2000	384.010.F.00	128	3.89	4.95	24.0	
TSM2000	384.010.F.00	138	37.8	39.4	4.0	
TSM2000	384.010.F.00	149	11.2	11.3	1.4	
TSM2000	384.010.F.00	153	44.0	46.5	5.6	
TSM2000	384.010.F.00	180	21.6	22.5	4.1	
TSM2000	384.010.F.00	194	3.09	3.09	0.1	
TSM2000	384.010.F.00	195	0.596	0.497	18.1	x
TSM2000	384.010.F.00	201	4.85	4.97	2.5	
TSM2000	384.010.F.00	203	3.51	3.57	1.6	
TSM2000	384.001.F.00	18	0.135	0.126	7.2	x
TSM2000	384.001.F.00	28	0.288	0.302	5.0	x
TSM2000	384.001.F.00	31	0.230	0.277	18.9	x
TSM2000	384.001.F.00	99	0.479	0.509	6.0	x
TSM2000	384.001.F.00	118	1.04	1.14	9.2	
TSM2000	384.001.F.00	128	0.240	0.264	9.7	x
TSM2000	384.001.F.00	138	1.66	1.81	8.4	

Table A1-7 (continued). Replicate analysis samples for PCB Congeners. RPD = relative percent difference (sample difference divided by sample mean and multiplied by 100%). Results reported in ppb (wet weight).

QA-Designated Batch Identification	Parent Sample Identification	PCB Congener	Parent Sample Result	Replicate Sample Result	RPD	Sample <10xMDL
TSM2000	384.001.F.00	149	0.752	0.818	8.4	x
TSM2000	384.001.F.00	153	1.51	1.63	7.5	
TSM2000	384.001.F.00	180	0.662	0.696	4.9	x
TSM2000	384.001.F.00	194	0.107	0.105	2.3	x
TSM2000	384.001.F.00	195	ND	ND	ND	
TSM2000	384.001.F.00	201	0.174	0.173	0.8	x
TSM2000	384.001.F.00	203	0.122	0.169	32.6	x
TSM2001	013.002.F.01	18	ND	ND	ND	x
TSM2001	013.002.F.01	28	0.102	0.276	92.1	x
TSM2001	013.002.F.01	31	0.093	0.224	82.6	x
TSM2001	013.002.F.01	99	0.235	0.273	15.0	x
TSM2001	013.002.F.01	118	0.655	0.834	24.0	x
TSM2001	013.002.F.01	128	0.113	0.112	0.9	x
TSM2001	013.002.F.01	138	0.950	0.846	11.6	x
TSM2001	013.002.F.01	149	0.298	0.287	3.8	x
TSM2001	013.002.F.01	153	0.750	0.680	9.8	x
TSM2001	013.002.F.01	180	0.251	0.238	5.3	x
TSM2001	013.002.F.01	194	0.038	0.024	<MDL	x
TSM2001	013.002.F.01	195	ND	ND	ND	x
TSM2001	013.002.F.01	201	0.031	0.027	<MDL	x
TSM2001	013.002.F.01	203	0.043	0.039	<MDL	x

Figure A1-2. Control chart for replicate sample analysis RPD for PCB Congeners. Only results >10 times the MDL are shown on control chart.

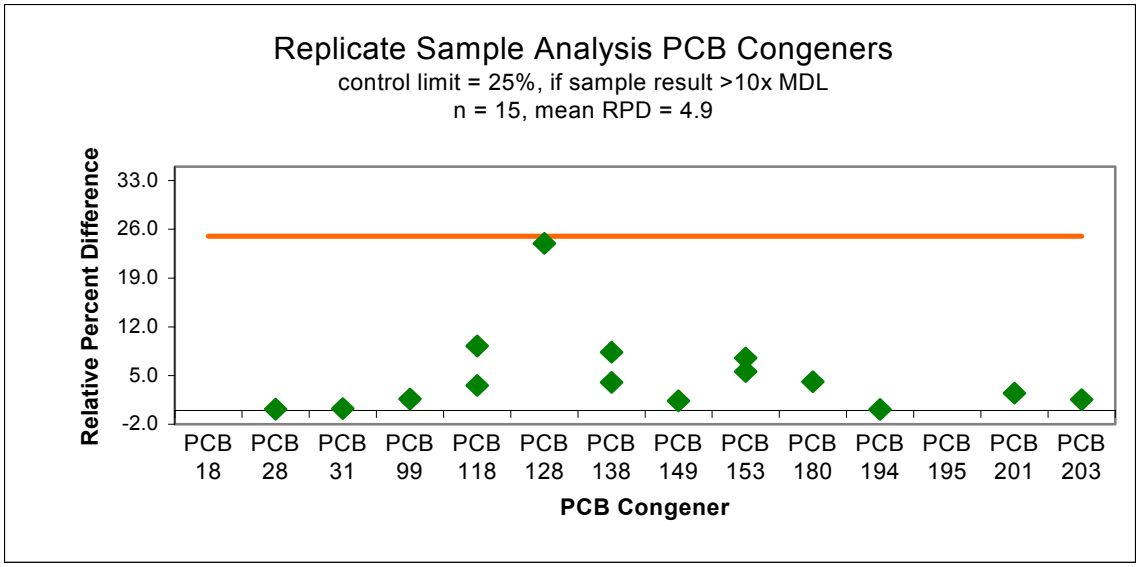

Table A1-8. Replicate analysis samples for Total Mercury. RPD = relative percent difference (sample difference divided by sample mean and multiplied by 100%). Results reported in ppm (dry weight).

Lab Batch Identification	Parent Sample Identification	Parent Sample Result	Replicate Sample Result	RPD
TSM00THg1	049.002.F.00	5.26	5.53	5
TSM00THg2	107.006.F.00	3.68	3.63	1.37
TSM00THg3	384.006.F.00	0.914	0.861	5.97
TSM01THg1	064.001.F.01	0.449	0.456	1.55
TSM01THg2	387.009.F.01	1.14	1.11	2.67

Figure A1-3. Control chart for replicate sample analysis RPD for Total Mercury.

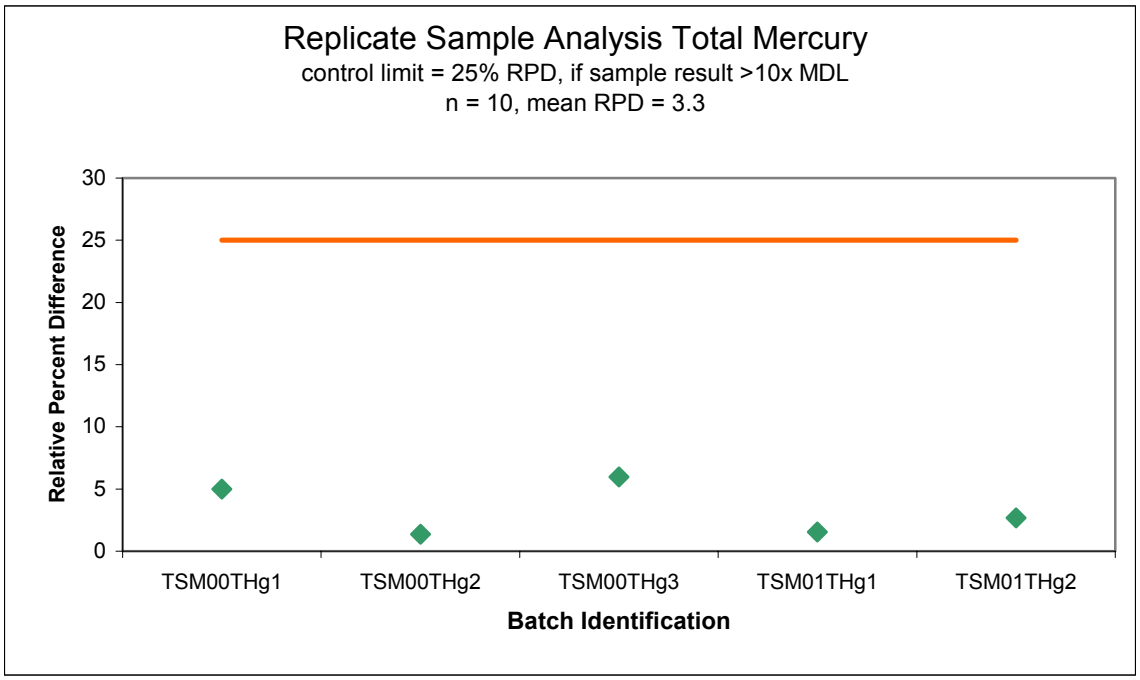

Table A1-10. Matrix spike (MS) and matrix spike duplicate (MSD) analysis samples for PCB Congeners. Results reported in ppb (wet weight). **Spike-level too low, result discarded.

QA-Designated Batch Identification	Parent Sample Identification	PCB Congener	MS Result	Percent Recovery	MSD Result	Percent Recovery
TSM2000	384.012.F.00	18	2.06	91.3	2.00	87.9
TSM2000	384.012.F.00	28	3.23	121	3.18	118
TSM2000	384.012.F.00	31	2.86	108	2.50	88.8
TSM2000	384.012.F.00	99	6.23	110	6.16	106
TSM2000	384.012.F.00	118	12.4	**	12.5	**
TSM2000	384.012.F.00	128	4.96	117	5.16	126
TSM2000	384.012.F.00	138	27.1	**	26.7	**
TSM2000	384.012.F.00	149	8.29	115	8.26	113
TSM2000	384.012.F.00	153	31.2	**	30.7	**
TSM2000	384.012.F.00	180	17.1	**	17.0	**
TSM2000	384.012.F.00	194	4.23	108	4.32	112
TSM2000	384.012.F.00	195	2.98	110	2.97	109
TSM2000	384.012.F.00	201	5.38	111	5.36	109
TSM2000	384.012.F.00	203	3.46	57.0	4.14	90.3
TSM2000	384.002.F.00	18	1.90	89.6	2.00	95.7
TSM2000	384.002.F.00	28	2.59	105	2.54	103
TSM2000	384.002.F.00	31	2.10	91.3	2.09	91.7
TSM2000	384.002.F.00	99	3.65	97.1	3.57	94.0
TSM2000	384.002.F.00	118	6.41	121	6.29	116
TSM2000	384.002.F.00	128	2.97	105	2.93	104
TSM2000	384.002.F.00	138	8.38	112	8.20	104
TSM2000	384.002.F.00	149	3.32	97.3	3.24	94.2
TSM2000	384.002.F.00	153	10.6	126	10.3	112
TSM2000	384.002.F.00	180	5.35	112	5.25	108
TSM2000	384.002.F.00	194	2.31	90.4	2.32	92.0
TSM2000	384.002.F.00	195	2.59	121	2.59	122
TSM2000	384.002.F.00	201	2.71	100	2.69	100
TSM2000	384.002.F.00	203	2.40	89.1	2.18	79.0
TSM2001	064.8.F.01	18	1.61	64.7	1.66	67.4
TSM2001	064.8.F.01	28	1.95	95.3	1.95	95.4
TSM2001	064.8.F.01	31	2.16	103	2.18	104
TSM2001	064.8.F.01	99	2.60	98.5	2.49	93.3
TSM2001	064.8.F.01	118	3.42	105	3.26	96.9
TSM2001	064.8.F.01	128	1.92	72.0	1.92	72.1
TSM2001	064.8.F.01	138	6.87	125	6.39	101
TSM2001	064.8.F.01	149	4.65	122	4.29	104
TSM2001	064.8.F.01	153	7.47	137	6.87	107
TSM2001	064.8.F.01	180	5.28	117	4.84	95.2
TSM2001	064.8.F.01	194	2.25	90.3	2.14	85.2
TSM2001	064.8.F.01	195	2.03	93.3	1.98	90.6
TSM2001	064.8.F.01	201	2.55	97.2	2.40	90.0
TSM2001	064.8.F.01	203	2.65	106	2.48	97.6

Figure A1-4. Control chart for MS/MSD sample analysis for PCB.

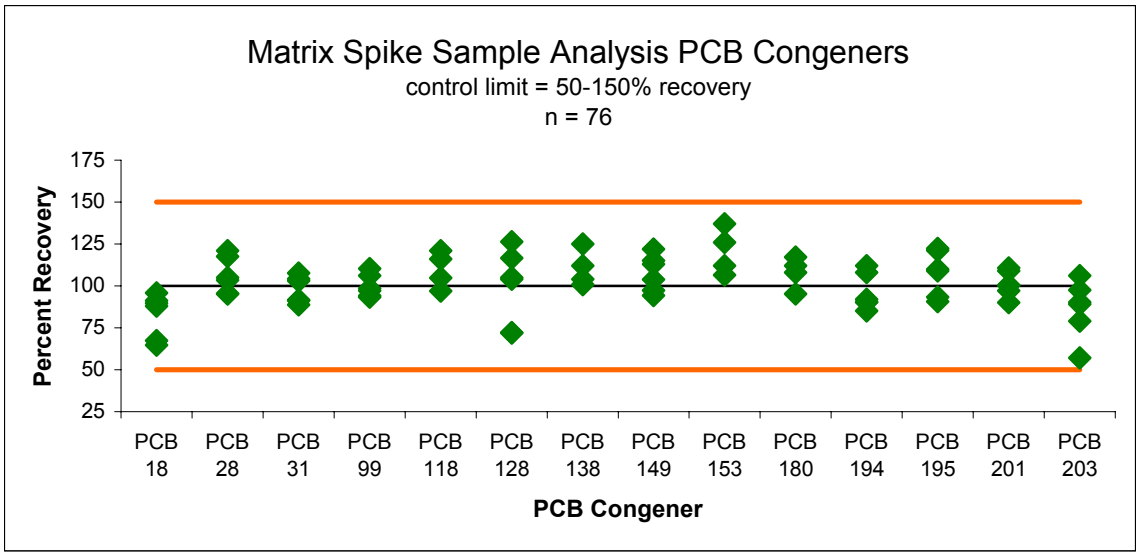

Table A1-11. Matrix spike (MS) and matrix spike duplicate (MSD) analysis samples for Total Mercury. Results reported in ppm (dry weight).

Lab Batch Identification	Parent Sample Identification	Parent Sample Result	MS Result	Percent Recovery	MSD Result	Percent Recovery
TSM00THg1	049.002.F.00	5.26	21.8	101.0	22.2	103.0
TSM00THg2	107.006.F.00	3.68	14.0	93.4	14.7	100.0
TSM00THg3	384.006.F.00	0.91	3.49	96.5	3.54	98.3
TSM01THg1	064.001.F.01	0.45	2.07	116.0	2.04	114.0
TSM01THg2	387.009.F.01	1.14	4.81	108.0	4.63	103.0

Figure A1-5. Control chart for MS/MSD sample analysis for Total Mercury.