

APPENDIX C. QA/QC Data

Table 1. Methyl Mercury in Sediments QA Summary

3.93 ng/g was used as value for 1944 (not a certified value)

Batch ID	CRM 1944 ng/g	% Rec 1944	Avg Method Balnk	Dup RPD	MS % Rec	MSD % Rec	MS/MSD RPD	Qualifier
Analytical Set 1	2.73	69.4	0.0011	16.3	72.9	78.7	7.7	a, c
Analytical Set 2	3.03	77.0	0.0011	5.1	93.9	93.7	0.2	
Analytical Set 3	3.01	76.6	0.003	12.0	101.0	86.1	15.9	
Analytical Set 5	3.56	90.6	0.012	2.0	98.7	70.3	33.6	c, d
Analytical Set 8	3.07	78.2	0.005	10.0	89.0	113.8	24.5	
Analytical Set 10	3.01	76.5	ND	200.0	100.5	91.5	9.4	b
Analytical Set 12	3.70	94.2	ND	5.0	97.6	145.3	39.3	c, d
Analytical Set 13	2.84	72.3	0.004	11.1	118.5	114.5	3.4	a
Analytical Set 14	3.79	96.5	0.0045	5.3	100.2	101.9	1.7	
Analytical Set 15	3.38	85.9	0.0008	51.1	111.8	91.3	20.2	b
Analytical Set 16	3.51	89.4	0.004	121.1	99.5	115.0	14.5	b
Analytical Set 17	2.94	74.8	0.001	100.0	91.6	85.1	7.4	a, e
Analytical Set 18	3.28	83.4	ND	8.3	124.4	108.3	13.8	
Analytical Set 19	3.78	96.2	ND	18.5	64.8	59.5	8.5	c
Analytical Set 20	3.16	80.5	0.001	2.8	123.7	111.0	10.8	
Analytical Set 21	3.41	86.8	0.003	13.8	77.7	74.1	4.7	c
Analytical Set 27	3.69	93.9	ND	54.8	128.2	124.2	3.1	b, c
Analytical Set 28	2.72	69.2	0.001	13.4	115.8	116.0	0.2	a
Analytical Set 29	3.73	94.9	0.004	1.6	119.3	125.7	5.2	
Analytical Set 32	3.97	100.0	ND	9.1	98.8	127.7	25.5	c
Analytical Set 35	2.73	69.6	ND	52.6	121.9	123.2	1.1	a, b
Analytical Set 36	3.72	94.6	0.003	21.4	104.5	94.1	10.5	
Analytical Set 37	3.57	90.9	ND	4.1	103.5	113.9	9.6	
Analytical Set 38	5.12	130.3	0.005	8.2	78.4	94.1	18.2	a
Analytical Set 39	4.16	105.9	0.001	112.1	76.0	130.1	52.5	b, c, d
s 01 MMHg Ext. #4	3.65	92.9	0.002	11.9	103.0	109.5	6.1	
s 01 MMHg Ext. #5	3.57	90.9	0.003	8.3	105.0	96.4	8.5	
s 01 MMHg Ext. #7	2.92	74.3	ND	0.2	86.0	92.8	7.6	a
sd 01 MMHg Ext. #8	3.91	99.6	ND	2.2	105.6	99.5	5.9	
sd 01 MMHg Ext. #9	3.25	82.6	0.002	6.8	125.0	116.9	6.7	
d 01 MMHg Ext #1	4.94	125.7	0.002	5.5	87.9	88.0	0.1	
d 01 MMHg Ext #2	3.02	76.8	0.004	9.7	124.3	121.9	2.0	
d 01 MMHg Ext #3	3.46	88.0	0.003	1.0	114.9	107.3	6.8	
d 01 MMHg Ext #4	3.82	97.3	0.002	2.4	98.1	117.9	18.3	
d 01 MMHg Ext #5	4.04	102.8	0.003	3.0	104.0	102.0	1.9	
d 01 MMHg Ext #6	3.77	95.9	0.003	0.5	111.0	102.0	8.5	
d 01 MMHg Ext #8	3.43	87.2	0.004	4.5	103.2	105.4	2.1	
d 01 MMHg Ext #9	3.16	80.5	0.002	4.3	120.5	103.6	15.1	
d 01 MMHg Ext #12	3.59	91.4	ND	6.2	100.4	79.1	23.7	
d 01 MMHg Ext #13	4.29	109.0	0.004	7.2	121.7	122.3	0.5	
d 01 MMHg Ext #15	3.21	81.8	0.002	16.6	112.2	99.0	12.5	
d 01 MMHg Ext #16	4.12	104.9	0.007	1.9	111.0	103.4	7.1	
d 01 MMHg Ext #17	2.06	52.4	ND	10.7	109.8	110.5	0.6	a
d 01 MMHg Ext #18	3.89	99.0	0.003	22.6	73.0	74.0	1.4	c
s 02 MMHg Ext. #2	3.02	76.8	0.007	14.0	96.4	101.0	4.6	
s 02 MMHg Ext. #4	4.50	115.0	0.001	20.4	106.0	108.0	2.2	
s 02 MMHg Ext. #6	3.76	95.7	ND	11.0	102.0	112.0	9.5	
s 02 MMHg Ext. #8	4.62	118.0	ND	10.4	104.0	99.5	4.2	
s 02 MMHg Ext. #9	4.85	123.0	ND	5.0	99.1	93.4	5.9	
s 02 MMHg Ext. #10	3.38	86.0	ND	2.5	101.0	96.7	4.4	
s 02 MMHg Ext. #11	2.91	74.0	ND	11.6	85.7	99.9	15.3	a
s 02 MMHg Ext. #12	2.97	75.6	ND	4.1	114.0	93.8	19.6	
s 02 MMHg Ext. #13	3.66	93.1	ND	7.2	77.3	92.0	17.3	
s 02 MMHg Ext. #14	3.74	95.2	0.001	22.6	98.6	99.1	0.5	
<b>% success</b>		<b>83.3</b>		<b>88.9</b>	<b>92.6</b>	<b>87.0</b>	<b>94.4</b>	

a: SRM recovery is out of the 75-125% control limit

b: Duplicate RPD is greater than the 25% control limit

c: Matrix Spike and/or Matrix Spike Duplicate recovery is out of the 75-125% control limits

d: Matrix Spike/Matrix Spike Duplicate RPD is out of the 25% control limit

e: QA performed on a sample that had a <MDL concentration

Average RPD Spiked Lab Duplicates 10.4  
 Average RPD SRM Duplicates 20.3  
 Average RPD Field Duplicates 48.5

Excluding the certified reference material, since it does not have a certified value for methyl mercury, 76% of the batches passed all QA requirements.

Batches showing qualifiers were re-evaluated by the QA manager and analyst before data was used. One major difficulty in the beginning was getting a truly homogenous sample. Procedures improved as time went on.

APPENDIX C Continued. QA/QC Data

Table 2. Total Mercury in Sediments QA Summary

Batch ID	%Rec 1944	%Rec PACS-2	Avg Method Blank	Dup RPD	MS %Rec	MSD %Rec	MS/MSD RPD	Qualifier
Batch 1	NA	96.1	ND	11.7	100	102	1.98	
Batch 2	NA	102	ND	41.1	102	98.7	3.29	b
Batch 3	NA	95.6	ND	1.26	82.3	91.1	10.1	
Batch 4	NA	92.5	ND	3.74	94.4	97.2	2.92	
Batch 5	NA	106	ND	4.43	250	266	6.20	c
Batch 6	129	NA	ND	19.6	127	130	2.33	a,c
Batch 7	108	NA	ND	9.54	118	119	0.844	
Batch 8	103	NA	ND	2.83	119	108	9.69	
Batch 9	100	NA	ND	ND	109	104	4.69	
Batch 10	122	NA	ND	9.94	124	123	0.810	
Batch 11	113	NA	ND	22.5	140	133	5.13	e
Batch 12	106	NA	ND	21.7	64.1	83.3	26.1	c,d
Batch 13	111	NA	ND	3.30	124	123	0.810	
Batch 14	113	NA	ND	3.39	112	120	6.90	
Batch 15	112	NA	ND	18.1	115	113	1.75	
Batch 16	96.8	NA	ND	9.82	137	141	2.88	c
Batch 17	117	NA	ND	13.5	115	112	2.64	
Batch 18	116	NA	ND	6.91	107	100	6.76	
Batch 19	119	NA	ND	9.00	116	106	9.01	
Batch 20	132	NA	ND	13.3	124	121	2.45	a
Batch 21	126	NA	ND	12.2	122	115	5.22	a
Batch 23	122	NA	ND	2.48	135	131	3.01	c
Batch 24	104	NA	ND	11.4	119	112	6.06	
Batch 25	113	NA	ND	4.63	121	124	2.45	
Batch 26	110	NA	ND	3.69	118	118	0.00	
Batch 27	113	NA	ND	5.44	113	115	1.75	
Batch 29	108	NA	ND	1.76	110	112	1.80	
Batch 30	110	NA	ND	10.8	112	115	2.64	
Batch 31	117	NA	ND	1.37	104	120	14.3	
Batch 32	115	NA	ND	7.16	118	113	4.33	
Batch 34	107	NA	ND	0.00	122	124	1.63	
Batch 35	109	NA	ND	0.722	117	108	8.00	
Batch 36	110	NA	ND	0.00	118	120	1.68	
Batch 39	109	NA	ND	44.9	113	118	4.33	e
Batch 40	101	NA	ND	4.69	108	108	0.00	
Batch 41	118	NA	ND	0.597	120	124	3.28	
Batch 46	123	NA	ND	0.174	96.5	95.5	1.04	
Batch 47	128	NA	ND	13.7	126	119	5.71	a,c
Batch 48	117	NA	ND	84.5	111	107	3.67	b
Batch 49	124	NA	ND	8.52	121	110	9.52	
Batch 50	116	NA	ND	46.6	104	136	26.7	b,c,d
Batch 51	117	NA	ND	19.8	102	112	9.35	
Batch 52	110	NA	ND	7.24	111	115	3.54	
Batch 53	110	NA	ND	35.6	102	100	1.98	b
t022502	NA	NA	ND	7.07	101	96.7	4.35	
t031402	116	NA	0.0116	NA	115	110	4.44	
t031102	93.9	NA	ND	14.4	83.0	90.0	8.09	
t032602	130	NA	0.00525	16.0	103	109	5.66	
%Success	88.1	100	100	90.9	87.2	89.4	95.8	

a: SRM recovery is out of the 75-125% control limits

b: Duplicate RPD is greater than the 25% control limit

c: Matrix Spike and/or Matrix Spike Duplicate recovery is out of the 75-125% control limits

d: Matrix Spike/Matrix Spike Duplicate RPD is out of the 25% control limit

e: QA performed on a sample that had a <MDL concentration

Average RPD Spiked Lab Duplicates

5.2

Average RPD SRM Duplicates

12.9

Average RPD Field Duplicates

29.9

In general, 75% of all batches met QA requirements. Batches showing qualifiers were re-evaluated by the QA manager and analyst before data was used. One major difficulty was getting a truly homogenous sample.

APPENDIX C Continued. QA/QC Data

Table 3. Comparison of 5% Sediment splits for Calfed QA Methyl Hg (ng/g) dry weight

Sample Identification	Frontier Geo. Methyl Hg ng/g	Frontier Geo. Analytical Run ID	Frontier Geo. Date Analyzed	MLML Methyl Hg ng/g	MLML Analytical Digestion ID	MLML Date Analyzed	RPD FG vs MLML	Qualifier
#158 Petaluma Pt Marsh sed 1	0.214	MHG-7-001208-1.13	12/8/2000	0.101	Set 10	5/5/2000	71.7	
#130 Suisun Bay sed 1	0.166	MHG-7-001208-1.15	12/8/2000	0.261	Set 10	5/5/2000	44.4	
#361 Cache Cr. @ Conway Ranch sed A	10.843	MHG-7-001208-1.16	12/8/2000	0.810	Set 11	5/12/2000	172.2	a
#214 Liberty Island sed 1	0.952	MHG-7-001208-1.17	12/8/2000	0.643	Set 16	6/19/2000	38.7	
#152 SPB National Wildlife Refuge sed 1	0.236	MHG-7-001208-1.18	12/8/2000	0.171	Set 14	6/14/2000	31.9	
#256 San Pablo Bay sed 1	0.261	MHG-7-001208-1.21	12/8/2000	0.079	Set 16	6/19/2000	107.0	
#61 N. Mokelumne River sed 1	5.668	MHG-7-001208-1.35	12/8/2000	0.494	Set 19	6/25/2000	167.9	
#272 SFB near Brook Island sed 1	0.750	MHG-7-001208-1.23	12/8/2000	0.467	Set 20	6/26/2000	46.5	
#111 Mallard Island sed 1	0.743	MHG-7-001208-1.24	12/8/2000	0.290	Set 21	6/27/2000	87.8	
#64 Beaver Slough sed 1	0.895	MHG-7-001208-1.27	12/8/2000	0.650	s 01 Ext 7	4/17/2001	31.7	
#313 SFB sed 1	0.411	MHG-7-001208-1.28	12/8/2000	0.218	Set 27	7/17/2000	61.4	
#153 Napa Slough sed 1	0.470	MHG-7-001208-1.29	12/8/2000	0.259	Set 29	7/27/2000	57.9	
#131 Goodyear Slough sed 1	0.433	MHG-7-001208-1.30	12/8/2000	0.502	Set 32	8/23/2000	14.8	
#306 SFB near SFO sed 1	1.218	MHG-7-001208-1.33	12/8/2000	1.099	Set 32	8/23/2000	10.2	
Connection Slough seasonal sed 2 6/26/00	2.843	MHG-7-001208-1.34	12/8/2000	0.950	Set 35	9/10/2000	99.8	

a = Value for MLML did not pass QA and was never rerun

Average RPD 69.6

The success of having all the RPDs less than 25% was only 13.3%. Showing that MLML had a lower value 13 out of 15 samples, further research is needed in the freezing and thawing process of the samples during long-term storage.

Table 4. Comparison of sediment splits with Battelle Methyl Hg (ng/g) dry weight

Sample Identification	Battelle Methyl Hg ng/g	Battelle Analytical Batch ID	Battelle Date Analyzed	MLML Methyl Hg ng/g	MLML Analytical Digestion ID	MLML Date Analyzed	RPD Battelle vs MLML
01-2365 North Tuolome @ Algerine <1.5	0.0129	121201MEB	12/12/2001	0.012	s 02 MMHg Ext 14	4/18/2002	7.2
01-2366 North Tuolome @ Algerine <60	0.180	121201MEB	12/12/2001	0.220	s 02 MMHg Ext 14	4/16/2002	20.0
01-2418 Cache Creek @ 505 <60	4.40	121201MEB	12/12/2001	7.83	s 02 MMHg Ext 14	4/16/2002	56.1
01-2417 Cache Creek @ 505 <1.5	0.484	121201MEB	12/12/2001	0.500	s 02 MMHg Ext 14	4/16/2002	3.3
01-2347 Tuolome @ Roberts Ferry <60	2.95	121201MEB	12/12/2001	2.20	s 02 MMHg Ext 14	4/16/2002	29.1
01-2424 Consumes @ Dillard <60	2.54	121201MEB	12/12/2001	2.52	s 02 MMHg Ext 14	4/16/2002	0.8

In general, the RPDs were less than 25%.

Average RPD 19.4

Table 5. Comparison of 5% Sediment splits for Calfed QA Total Hg (ng/g) dry weight

Sample Identification	Frontier Geo. Total Hg ng/g	Frontier Geo. Analytical Run ID	Frontier Geo. Date Analyzed	MLML Total Hg ng/g	MLML Analytical Digestion ID	MLML Date Analyzed	RPD FG vs MLML	Qualifier
#158 Petaluma Pt Marsh sed 1	318.874	THG6-001212-1.35	12/12/2000	322.040	Batch 5	5/24/2000	1.0	
#130 Suisun Bay sed 1	318.594	THG6-001212-1.33	12/12/2000	334.760	Batch 5	5/24/2000	4.9	
#361 Cache Cr. @ Conway Ranch sed A	537.012	THG6-001212-1.36	12/12/2000	575.110	Batch 5	5/24/2000	6.9	
#214 Liberty Island sed 1	216.812	THG6-001212-1.21	12/12/2000	266.440	Batch 6	8/24/2000	20.5	
#152 SPB National Wildlife Refuge sed 1	277.640	THG6-001212-1.20	12/12/2000	278.310	Batch 7	8/30/2000	0.2	
#256 San Pablo Bay sed 1	329.499	THG6-001212-1.17	12/12/2000	287.910	Batch 8	8/30/2000	13.5	
#61 N. Mokelumne River sed 1	212.428	THG6-001212-1.22	12/12/2000				NA	a
#272 SFB near Brook Island sed 1	501.325	THG6-001212-1.23	12/12/2000	533.720	Batch 12	9/5/2000	6.3	
#111 Mallard Island sed 1	327.434	THG6-001212-1.24	12/12/2000	286.580	Batch 13	9/7/2000	13.3	
#64 Beaver Slough sed 1	185.844	THG6-001212-1.25	12/12/2000	190.070	Batch 14	10/10/2000	2.2	
#313 SFB sed 1	249.437	THG6-001212-1.26	12/12/2000	239.540	Batch 15	9/14/2000	4.0	
#153 Napa Slough sed 1	339.128	THG6-001212-1.27	12/12/2000	347.060	Batch 16	9/19/2000	2.3	
#131 Goodyear Slough sed 1	368.972	THG6-001212-1.28	12/12/2000	340.230	Batch 20	10/9/2000	8.1	
#306 SFB near SFO sed 1	323.176	THG6-001212-1.29	12/12/2000	284.840	Batch 20	10/9/2000	12.6	
Connection Slough seasonal sed 2 6/26/00	167.020	THG6-001212-1.32	12/12/2000				NA	a

a = Sample was never run by MLML for THg

Average RPD 7.4

The sediment splits for total mercury compared well. All RPDs were less than 25%.