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OFFICE OF ENVIRONMENT, HEALTH AND SAFETY
UNIVERSITY HALL, 3rd FLOOR

BERKELEY, CALIFORNIA 94720-1150

March 21, 2019

Lynn Nakashima
Project Manager
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, CA 94710

Subject: Sampling Results for Western Stege Marsh Near-Surface Sediment Samples
January 25, 2019, Sampling Event
Richmond Field Station Site
University of California, Berkeley

Dear Ms. Nakashima:

University of California, Berkeley Office of Environment, Health & Safety staff conducted the annual Public Health Assessment recommended marsh sediment sampling at the Richmond Field Station Site on January 25, 2019. The objective of the sampling effort was to characterize near-surface sediment in remediated portions of the Western Stege Marsh, as well as to evaluate incidental sediment contact by marsh restoration workers. This sampling event replicates the near-surface sediment sampling conducted in January 2008, February 2009, February 2010, February 2011, February 2012, February 2013, February 2014, January 2015, January 2016, January 2017, and January 2018. This letter provides the rationale for the selected sampling locations, a summary of field sampling protocols, including minor adjustments from previous years, and sample results. A figure showing the sampling locations is presented at the end of this letter. Complete analytical results are presented in Attachment 1.

Sample Locations

Incremental sampling methodology (ISM) sampling was selected for this project to provide a comprehensive and thorough evaluation of chemical concentrations in a specific area of potential exposure, or decision unit. The ISM sampling strategy for this project was based on selecting a decision unit to best represent potential exposure by workers involved in restoration activities within remediated marsh areas.

In January 2008, UC Berkeley established site-specific boundaries of the areas where marsh restoration activities may be performed. Based on this information, one decision unit, identified as Western Stege Marsh Decision Unit 1, was identified to evaluate possible exposure areas within remediated portions of the marsh under this sampling activity. This decision unit was first sampled in January 2008, and then once every subsequent year. The location and extent of the Western Stege Marsh Decision Unit 1 are presented on the figure at the end of this letter. The decision unit encompassed an area recommended for sampling in the Public Health Assessment, Evaluation of Exposure to Contaminants at the University of California, Berkeley, Richmond Field Station, as prepared by the

California Department of Public Health and Agency for Toxic Substances and Disease Registry, dated March 13, 2008. The health assessment report concluded that there was an unknown potential health risk to marsh restoration workers posed by recontamination of sediment in the remediated marsh. Surface samples at depths of 0 to 2 inches below ground surface (bgs) were collected because the decision unit is intended to characterize near-surface soils. The rationale for this sampling interval is that the sediment which workers may be exposed to during planting or weeding on the marsh plain. The near-surface sediment also represents any sediment that may be migrating within slough channels and being deposited on top of clean Bay Mud used as backfill in 2002 to 2004. Two previous sampling events were conducted in this decision unit in 2005 and 2006 using a discrete sampling methodology.

Field Sampling Protocols

The near-surface sediment sample was collected on January 25, 2019. The decision unit was identified in the field based on the description above and consistent with previous sampling events. One ISM surface soil sample was collected from the decision unit. The ISM soil sample consisted of 80 subsamples, or increment locations, collected from 0 to 2 inches bgs. The number of increments was increased from 50 in previous samples to 80 samples in January 2018 due to guidance from U.S Environmental Protection Agency (EPA) that recommends* a minimum of 75 increments be collected for assessment of polychlorinated biphenyls (PCB) concentrations using ISM methodology.

* This recommendation is based on the State of Hawai`i Department of Health Technical Guidance Manual for the Implementation of the Hawai`i State Contingency Plan Section 4.2.2 Minimum Number of Increments (http://www.hawaiidoh.org/tgm.aspx), which states: "A minimum of 75 increments per sample is recommended for contaminants suspected to be present as small nuggets in soil. This includes chips of lead-based paint, lead shot, oil-based chemicals that could form clumps in soil after release (e.g., PCB-infused transformer oil), and munitions and explosives of concern (MEC). A minimum of 50 increments per sample is recommended for other scenarios. This includes, for example, characterization of fill material that includes lead-contaminated incinerator ash and sites where the relative degree of contaminant heterogeneity is uncertain."

The ISM sampling technique was used to obtain sufficient near-surface soft sediments from the decision unit to account for both compositional and distributional heterogeneity of any possible contamination. The sampling protocol followed these steps:

1. The field sampler began at a corner of the decision unit and sampled in an orthogonal pattern, moving from east to west to collect subsamples from 80 locations with the decision unit. The specific locations of each subsample, shown in approximation on the attached figure, was not critical as long as they were distributed throughout the decision unit. The subsamples were collected using one clean metal spoon or disposable trowel for the decision unit.

2. The 80 subsamples were placed into clean, unused 32 ounce glass jars as they were collected. The final sample consisted of two nearly full 32 ounce jars. After the samples had been collected, the jars were placed in a cooler with ice.

3. The entire sample was immediately delivered to Enthalpy Analytical in Berkeley, California, after the sampling event, on January 25, 2019 for analysis by the Enthalpy Analytical Multi-Incremental Sub-Sampling (MIS) Procedure with subsampling to 30 gram sample for PCBs and a 10 gram subsample for metals analyses. A copy of the chain-of-custody form is presented in Attachment 1.

Sample Results

The sample was submitted for analysis of metals and PCB using the methods listed below.

- Preparation of Sample: U.S. Environmental Protection Agency Methods 3665A and 3050B
- Metals by EPA Method 6010; Mercury by EPA Method 7471A
- PCB analysis by EPA Method 8082 with Soxhlet Extraction Method 3540C

Pesticide analysis was excluded from this year's sampling event because review of pesticide analyses from previous sampling events dating from 2008 to 2017 determined that pesticides are not a chemical of concern. This is consistent with the March 17, 2010 Final CDPH and ATSDR Public Health Assessment's evaluation of marsh sediments and surface water at the RFS which identifies PCB and metals and potential exposure risks. Previous pesticide analyses are included for reference and will be included in future reports.

PCBs were reported at concentrations less than the commercial/industrial screening levels. All metals analyzed were detected at concentrations less than the applicable commercial/industrial screening level or not detected. Arsenic was reported at its background concentration of 16 milligrams per kilogram. The sampling results and screening criteria are presented in the tables following this letter.

The January 2019 sampling results were compared with the 2008 through 2018 sampling results from the same decision unit, as well as with averages from discrete samples collected from the same area during sampling events in 2005 and 2006. The analytical results from the 2019 sampling event are similar to the previously collected data; no trends have been identified.

If you have any questions or comments regarding this submittal, please call me at (510) 642-4848.

Sincerely,

Greg Haet
EH&S Associate Director
Environmental Protection

Enclosures: Analytical Summary Tables
Sample Location Figure

Attachment 1: Enthalpy Analytical Results Job Number 306718

POLYCHLORINATED BIPHENYLS (PCB) RESULTS
REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)

Screening Criteria	PCBs [a]			
	Aroclor-1248	**Aroclor-1254**	**Aroclor-1260**	**Total Aroclors**
Commercial worker	*0.528*	*0.528*	*0.528*	-
Construction worker	*3.50*	*2.02*	*3.50*	-
Maintenance worker	*3.50*	*3.50*	*3.50*	-
Off-Site Receptor	*5,620*	*5,620*	*5,620*	*5,620*
Other	*1*[(2)]	*1*[(2)]	*1*[(2)]	*1*
Category I Criteria	*1*	*1*	*1*	*1*
Category II Criteria	*1*	*1*	*1*	*1*
Sample Location				
WSM 16 discrete sample mean [(3)] March 1, 2005	0.19[(4)]	0.14[(5)]	0.054	0.384
WSM 30 discrete sample mean [(3)] June 13, 2006	0.22[(6)]	ND	0.016[(7)]	0.236
WSM DU1-001 January 17, 2008	0.081	0.053	0.021 J	0.155
WSM DU1-002 February 4, 2009	0.18	0.10	0.05	0.33
WSM DU1-003 February 18, 2010	0.31	0.16	0.036 J	0.506
WSM DU1-004 February 22, 2011	0.048 U	0.048 U	0.048 U	ND (<0.048)
WSM DU1-005 February 3, 2012	0.034 U	0.096	0.068	0.164
WSM DU1-006 February 4, 2013	0.010 U	0.010 U	0.010 U	ND (<0.010)
WSM DU1-007 February 27, 2014	0.19	0.042 U	0.03 J	0.268
WSM DU1-008 January 27, 2015	0.094	0.097	0.036	0.227
WSM DU1-009 January 21, 2016	0.100	ND (<0.0097)	ND (<0.0097)	0.100
WSMPHA17 January 18, 2017	ND (<0.012)	0.033	0.018	0.051
WSM2018PHA January 26, 2018	ND (<0.160)	ND	0.410	0.410
WSM2019PHA January 25, 2019	ND (<0.066)	ND (<0.066)	ND (<0.066)	ND (<0.066)

Notes:

Bold values indicate that the result exceeded the Category I criterion.

Screening criteria based on the Final Soil Management Plan, Revision 1, Table C-1, April 12, 2017.

(1) All other PCBs not detected

(2) Other criteria for PCBs are based on Toxic Substances Control Act (TSCA) criteria for high occupancy areas with no cap

(3) For detect-only data, the mean is the arithmetic mean. For chemicals with non-detect measurements, this value is the arithmetic mean with one-half the detection limit substituted for non-detect measurements.

(4) Thirteen detections

(5) Eleven detections

(6) Nineteen detections

(7) Twelve detections

J Estimated Value

NA Not available

ND, U Not detected

PESTICIDE RESULTS
REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)

	Pesticides [1]													
Screening Criteria	**Aldrin**	**Alpha-bhc**	**Heptachlor**	**Heptachlor expoxide**	**Endosulfan I**	**Dieldrin**	**Endrin**	**Endosulfan sulfate**	**4,4'-DDD**	**4,4'-DDE**	**4,4'-DDT**	**Alpha-Chlordane**	**Gamma-Chlordane**	**Methoxychlor**
Commercial worker	*0.107*	*0.289*	*0.405*	*0.200*	*3910*	*0.114*	*195*	*3,910*	*7.59*	*5.36*	*5.36*	*1.40*	*1.40*	--
Construction worker	*0.745*	*2.01*	*2.82*	*1.39*	*1100*	*0.792*	*54.9*	*1,100*	*52.8*	*37.3*	*37.3*	*9.76*	*9.76*	--
Maintenance worker	*0.745*	*2.01*	*2.82*	*1.39*	*27500*	*0.792*	*1,370*	*27,500*	*52.8*	*37.3*	*37.3*	*9.76*	*9.76*	--
Off-Site Receptors	*654*	*1,780*	*2,460*	*1,230*	--	*696*	--	--	*46,400*	*33,000*	*33,000*	*9,420*	*9,420*	--
Category I Criteria	*0.107*	*0.289*	*0.405*	*0.200*	*1,100*	*0.114*	*54.9*	*1,100*	*7.59*	*5.36*	*5.36*	*1.40*	*1.40*	--
Category II Criteria	*1.07*	*2.89*	*4.05*	*2.00*	*11,000*	*1.14*	*549*	*11,000*	*75.9*	*53.6*	*53.6*	*14.0*	*14.0*	--
Sample Location														
WSM 16 discrete sample mean[2] March 1, 2005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WSM 30 discrete sample mean [2] June 13, 2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WSM DU1-001 January 17, 2008	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.017 U	0.017 U	0.17 U
WSM DU1-002 February 4, 2009	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.060 U	0.060 U	0.60 U
WSM DU1-003 February 18, 2010	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.032 U	0.032 U	0.32 U
WSM DU1-004 February 22, 2011	0.017 CJ	0.034 U	0.034 U	0.033 CJ	0.0037 UJ	0.029 CJ	0.046 CJ	0.031 UJ	0.038 UJ	0.066 U	0.044 CJ	0.023 UJ	0.034 U	0.012 UJ
WSM DU1-005 February 3, 2012	0.0023 CJ	0.006 U	0.006 U	0.0031 J	0.006 U	0.012 U	0.012 U	0.012 U	0.0037 J	0.0036 CJ	0.0041 CJ	0.0015 CJ	0.0015 CJ	0.06 U
WSM DU1-006 February 4, 2013	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.017 U	0.017 U	0.17 U
WSM DU1-007 February 27, 2014	0.037 U	0.037 U	0.037 U	0.0095 CJ	0.037 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.037 U	0.037 U	0.37 U
WSM DU1-008 January 27, 2015	0.0042 U	0.00048 C J	0.00069 C J	0.0042 U	0.0042 U	0.0042 U	0.016 C J	0.0081 U	0.0077 C J	0.0081 U	0.18 C	0.00042 U	0.00042 U	0.00042 U

WSM DU1-009 January 21, 2016	ND (< 0.034)	ND (< 0.034)	0.040	ND (< 0.034)	ND (< 0.034)	ND (< 0.034)	ND (< 0.067)	ND (< 0.067)	ND (< 0.067)	ND (< 0.067)	ND (< 0.067)	ND (< 0.034)	ND (< 0.034)	ND (< 0.34)
WSMPHA17 January 18, 2017	ND (<0.033)	ND (<0.033)	ND (<0.033)	ND (<0.033)	ND (<0.033)	ND (< 0.033)	ND (< 0.065)	ND (< 0.065)	ND (< 0.065)	ND (< 0.065)	ND (< 0.065)	ND (< 0.033)	ND (< 0.033)	ND (< 0.33)
WSM2018PHA January 26, 2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WSM2019PHA January 25, 2019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Only chemicals that were detected or have screening criteria are listed.
Bold values indicate that the result exceeded the Category I criterion.

Screening criteria based on the Final Soil Management Plan, Revision 1, Table C-1, April 12, 2017.

(1) All other pesticides were not detected.
(2) For detect-only data, the mean is the arithmetic mean. For chemicals with non-detect measurements, this value is the arithmetic mean with one-half the detection limit substituted for non-detect measurements.

C Relative percent difference between columns exceeds 40%
J Estimated Value
NA Not available – samples collected in 2005, 2006, 2018, and 2019 were not analyzed for pesticides.
U Not detected (method blank contamination)

METAL RESULTS
REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)

	Metals																						
Screening Criteria	**Aluminum**	**Antimony**	**Arsenic (1)**	**Barium**	**Beryllium**	**Cadmium**	**Calcium**	**Chromium**	**Cobalt**	**Copper**	**Iron**	**Lead**	**Magnesium**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Potassium**	**Selenium**	**Silver**	**Sodium**	**Thallium**	**Vanadium**	**Zinc**
Commercial worker	*NA*	*367*	*0.224*	*100,000*	*1,760*	*1000*	*NA*	*100,000*	*273*	*36,700*	*100,000*	*320*	*NA*	*2,050*	*275*	*4,590*	*14,900*	*NA*	*4,590*	*4,590*	*NA*	*9.17*	*4,590*	*100,000*
Construction worker	*NA*	*109*	*1.58*	*2,110*	*29.0*	*68.1*	*NA*	*100,000*	*19.9*	*10,900*	*100,000*	*320*	*NA*	*212*	*77.0*	*1,360*	*60.6*	*NA*	*1,340*	*1,360*	*NA*	*2.72*	*1,360*	*81,600*
Maintenance worker	*NA*	*2,720*	*1.58*	*52,600*	*128*	*73.0*	*NA*	*100,000*	*34.1*	*100,000*	*100,000*	*320*	*NA*	*5,300*	*1,920*	*34,000*	*1,180*	*NA*	*33,500*	*34,000*	*NA*	*68.0*	*34,000*	*100,000*
Off-Site Receptors	*NA*	*--*	*745*	*686,000*	*1,330*	*762*	*NA*	*--*	*356*	*--*	*--*	*--*	*NA*	*68,600*	*41,200*	*--*	*12,300*	*NA*	*2,740,0000*	*--*	*NA*	*--*	*--*	*--*
Other	*NA(2)*		*16(1)*						*73(2)*					*5,900(2)*			*280(2)*							
Category I Criteria	*NA*	*109*	*16*	*2,110*	*29.0*	*68.1*	*NA*	*100,000*	*73*	*10,900*	*100,000*	*320*	*NA*	*5,900*	*77.0*	*1,360*	*280*	*NA*	*1,340*	*1,360*	*NA*	*2.72*	*1,360*	*81,600*
Category II Criteria	*NA*	*1,090*	*16*	*21,100*	*290*	*681*	*NA*	*100,000*	*199*	*100,000*	*100,000*	*800*	*NA*	*212*	*275*	*13,600*	*606*	*NA*	*13,400*	*13,600*	*NA*	*27.2*	*13,600*	*100,000*
Sample Location																								
WSM 16 discrete sample mean (3) March 1, 2005	NA	ND	**55.7**	ND	0.84	1.2(3)	NA	86.44	ND	118	NA	51.56	NA	NA	2.59	ND	85.75	NA	1.15(4)	ND	NA	ND	ND	276
WSM 30 discrete sample mean (3) June 13, 2006	NA	6.2c	**55.3**	78.1	0.61	1.24(5)	NA	89.4	14.8	136	NA	82.1	NA	NA	3.5	2.4(6)	81.4	NA	1.03(7)	0.29(8)	NA	0.51(9)	81.5	321
WSM DU1-001 January 17, 2008	28,000	2.4	15	53	0.53	0.38 J	2,700	74	13	67	46,000	32	15,000	470	1.6	0.50 U	69	3,300	1.0 U	0.50 U	8,200	1.0 U	67	140
WSM DU1-002 February 4, 2009	8,800	1.3	**22**	31	0.89 U	0.52 J	2,600	39	10	79	26,000	44	9,600	620	1.8	1.3	48	3,900	0.73 J	0.89 U	30,000	0.89 U	39	210
WSM DU1-003 February 18, 2010	24,000	3.9	**26**	61	0.60	0.68 J	3,900	81	12	100	38,000	52	13,000	330	2.6	0.89 J	73	4,900	1.2 J	0.96 U	21,000	1.9 U	71	260
WSM DU1-004 February 22, 2011	23,000	11	**35**	57	0.67	0.50 J	3,700	78	13	110	36,000	59	13,000	360	3.0	1.8	75	4,900	2.0 U	0.34 J	23,000	2.0 U	68	280
WSM DU1-005 February 3, 2012	20,000	0.45 J	**29**	51	0.76 J	0.49 J	3,500	72	12	90	38,000	52	12,000	590	2.3	1.6	68	4,700	1.1	0.47 J	22,000	0.11 J	54	230
WSM DU1-006 February 4, 2013	28,000	1.2 U	**28**	60	0.61	0.31 J	3,600	84	16	96	45,000	56	13,000	510	2.0	1.8	83	4,600	1.2 U	0.43 J	14,000	1.2 U	77	240
WSM DU1-007 February 27, 2014	24,000	1.2	**48**	64	0.77 J	0.93 J	3,900	100	19	140	60,000	83	16,000	790	1.9	4.5	94	5,200	1.4	0.64 J	22,000	0.31 J	86	400
WSM DU1-008 January 27, 2015	23,000	0.50 J	**25**	52	0.66	0.41 J	3,900	76	15	59	37,000	41	12,000	780	1.5	1.3	76	4,200	1.1	0.29 J	17,000	0.15 J	72	190
WSM DU1-009 January 21, 2016	NA	0.88	**19**	47	0.65	2.0	NA	80	14	77	NA	38	NA	NA	2.2	2.2	73	NA	ND (<0.5)	0.25	NA	0.81	70	180

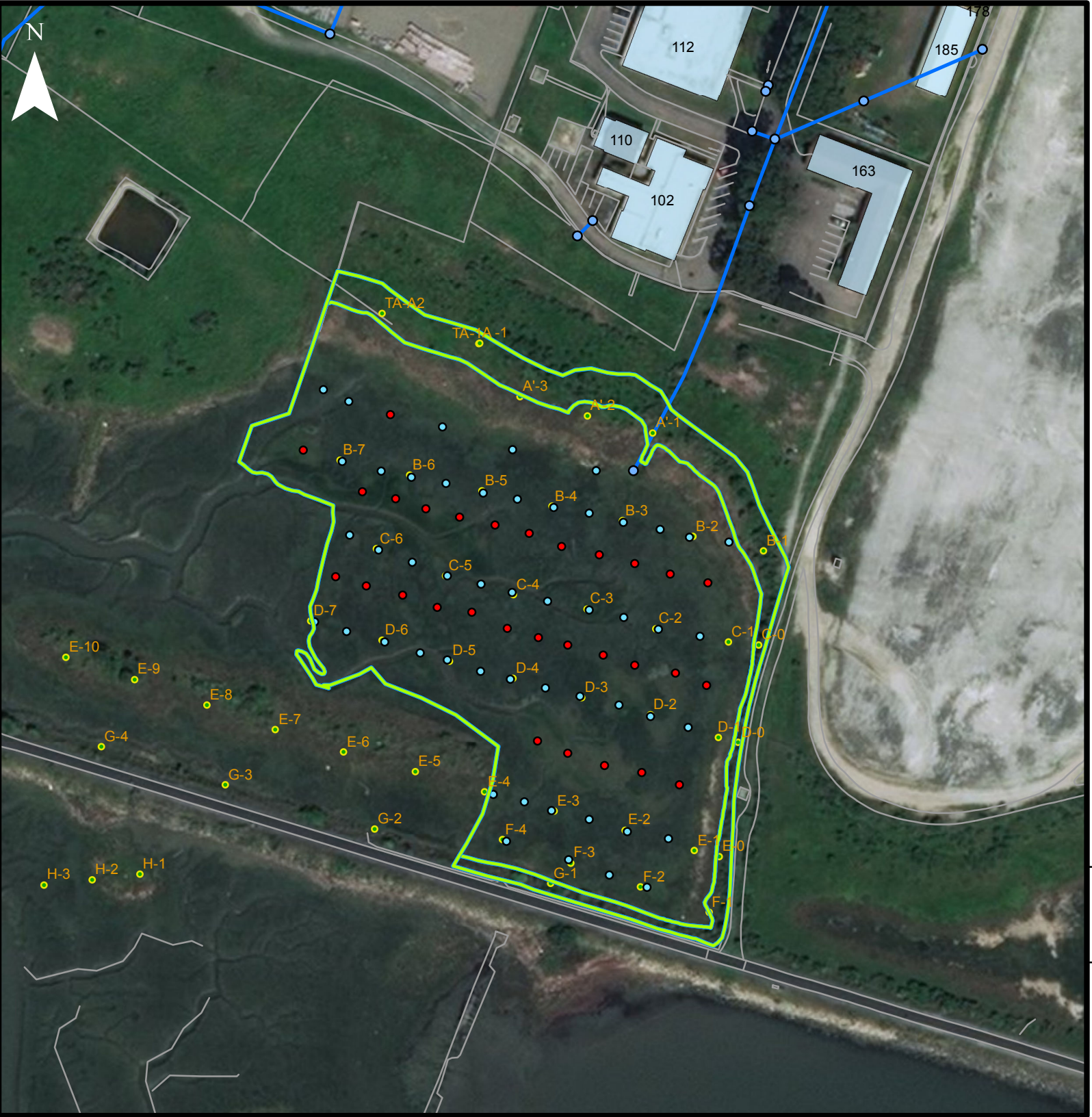
	Aluminum	Antimony	Arsenic (1)	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
WSMPHA17January 18, 2017	NA	ND (<2.0)	6.8	20	0.17	0.64	NA	30	4.6	29	NA	19	NA	NA	0.54	0.94	28	NA	ND (<2.0)	ND (<0.25)	NA	ND (<0.49)	29	110
WSM2018PHA January 26, 2018	NA	ND (<2.0)	13	21	0.21	0.27	NA	26	4.6	22	NA	17	NA	NA	0.46	0.63	24	NA	ND (<2.0)	ND (<0.25)	NA	ND (<0.51)	26	73
WSM2019PHA January 25, 2019	NA	ND (<2.0)	16	33	0.43	0.49	NA	53	9.3	52	NA	34	NA	NA	0.32	1.0	47	NA	ND (<2.0)	ND (<0.25)	NA	NA	49	140

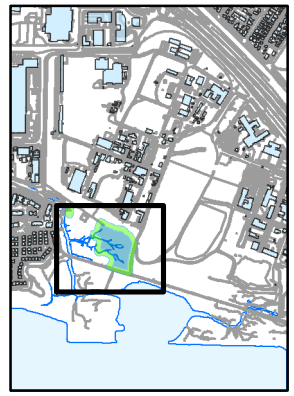
Notes:

Bold values indicate that the result exceeded the Category I criterion.
Screening criteria based on the Final Soil Management Plan, Revision 1, Table C-1, April 12, 2017.

NA	Not available
ND	Not detected
J	Estimated Value
U	Not detected
(1)	Arsenic screening value based on DTSC-approved ambient concentration developed for the adjacent Campus Bay site.
(2)	Screening levels for cobalt, manganese, and nickel were updated, and aluminum was eliminated as a chemical of concern in the Final SMP, Revision 1.
(3)	For detect-only data, the mean is the arithmetic mean. For chemicals with non-detect measurements, this value is the arithmetic mean with one-half the detection limit substituted for non-detect measurements
(4)	Fifteen detections
(5)	Eight detections
(6)	Eleven detections
(7)	Twenty-two detections
(8)	Twenty-six detections
(9)	Only thirteen detections
(10)	Two detections

.





2019 PHA Sampling Locations

- Decision Unit 1 boundary
- Increments added in 2018
- Increment location (approximate)
- Vegetation Quadrats
- Biologically Active Permeable Barrier

0 40 80 160 240 320

Feet

Berkeley EH&S

Richmond Field Station Site
University of California, Berkeley

WESTERN STEGE MARSH NEAR SURFACE SAMPLING JANUARY 25, 2019

EH&S ANB 2019.01

ENTHALPY

ANALYTICAL

Enthalpy Analytical

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 306718
ANALYTICAL REPORT

UC Berkeley Environ. Health & Safety	Project : STANDARD
317 University Hall #1150	Location : WSM-PHA
Berkeley, CA 94720-1150	Level : II

Sample ID	Lab ID
WSM-PHA-2019	306718-001

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____ Date: 02/01/2019

Haley Campbell
Project Manager
haley.campbell@enthalpy.com

CA ELAP# 2896, NELAP# 4044-001

ENTHALPY ANALYTICAL

CASE NARRATIVE

Laboratory number:	**306718**
Client:	**UC Berkeley Environ. Health & Safety**
Location:	**WSM-PHA**
Request Date:	**01/25/19**
Samples Received:	**01/25/19**

This data package contains sample and QC results for one soil sample, requested for the above referenced project on 01/25/19. The sample was received intact directly from field.

PCBs (EPA 8082):

All samples underwent sulfuric acid cleanup using EPA Method 3665A. All samples underwent sulfur cleanup using the copper option in EPA Method 3660B. Matrix spikes were not performed for this analysis in batch 267378 due to insufficient sample amount. WSM-PHA-2019 (lab # 306718-001) was diluted due to client history of high non-target or organic acid interference. No other analytical problems were encountered.

Metals (EPA 6010B and EPA 7471A):

No analytical problems were encountered.

CHAIN OF CUSTODY

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306718
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Chain of Custody # _____

Project No:
Project Name: WSM - PHA
Project P. O. No:
EDD Format: Report Level ☐ II ☐ III ☐ IV
Turnaround Time: ☐ RUSH _____ ☒ Standard

Sampler: Tim Pine
Report To: " + David Scrimger
Company: UC Berkeley EH&S
Telephone: 510-812-0242
Email: tpine@berkeley.edu

Lab No.	Sample ID.	SAMPLING		MATRIX				# of Containers	CHEMICAL PRESERVATIVE					ANALYTICAL REQUEST		
		Date Collected	Time Collected	Water	Solid				HCl	H2SO4	HNO3	NaOH	None	ISM Prep / 75 increments	PCB 8082 + Soxhlet 3540c	CAM 17 Metals
	WSM-PHA-2019	1/25/19	11:00		X			2					X	X	X	X

Notes:
Sample consists of all material in two 32oz jars.

SAMPLE RECEIPT
☒ Intact
☐ Cold
☐ On Ice
☒ Ambient

RELINQUISHED BY:
Tim Pine DATE: 1/25/19 TIME: 13:00
DATE: TIME:
DATE: TIME:

RECEIVED BY:
Pat Mann DATE: 1/25/19 TIME: 13:00
DATE: TIME:
DATE: TIME:

SAMPLE RECEIPT CHECKLIST

Section 1: Login # 306718 Client: UC Berkeley EH&S

Date Received: 1-25-19 Project: _____

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Section 2: Samples received in a cooler? ☐ Yes, how many? _____ ☒ No (skip Section 3 below)

If no cooler Sample Temp (°C): 21.1 using IR Gun # ☐ A, or ☐ B

☐ Samples received on ice directly from the field. Cooling process had begun

If in cooler: Date Opened 1-25-19 By (print) SH (sign) _____

Shipping Info (if applicable) _____

Are custody seals present? ☒ No, or ☐ Yes. If yes, where? ☐ on cooler, ☐ on samples, ☐ on package

☐ Date: _____ How many _____ ☐ Signature, ☐ Initials, ☐ None

Were custody seals intact upon arrival? ☐ Yes ☐ No ☒ N/A

Section 3: *Important*: Notify PM if temperature exceeds 6°C or arrive frozen.

Packing in cooler: (if other, describe) _____

☐ Bubble Wrap, ☐ Foam blocks, ☐ Bags, ☐ None, ☐ Cloth material, ☐ Cardboard, ☐ Styrofoam, ☐ Paper towels

☐ Samples received on ice directly from the field. Cooling process had begun

Type of ice used: ☐ Wet, ☐ Blue/Gel, ☐ None Temperature blank(s) included? ☐ Yes, ☐ No

Temperature measured using ☐ Thermometer ID: _____, or IR Gun # ☐ A ☐ B

Cooler Temp (°C): #1: _____, #2: _____, #3: _____, #4: _____, #5: _____, #6: _____, #7: _____

Section 4:	YES	NO	N/A
Were custody papers dry, filled out properly, and the project identifiable	✓		
Were Method 5035 sampling containers present?		✓	
If YES, what time were they transferred to freezer?			
Did all bottles arrive unbroken/unopened?	✓		
Are there any missing / extra samples?		✓	
Are samples in the appropriate containers for indicated tests?	✓		
Are sample labels present, in good condition and complete?	✓		
Does the container count match the COC?	✓		
Do the sample labels agree with custody papers?	✓		
Was sufficient amount of sample sent for tests requested?	✓		
Did you change the hold time in LIMS for unpreserved VOAs?			✓
Did you change the hold time in LIMS for preserved terracores?			✓
Are bubbles > 6mm absent in VOA samples?			✓
Was the client contacted concerning this sample delivery?		✓	
If YES, who was called? By Date:			

Section 5:	YES	NO	N/A
Are the samples appropriately preserved? (If N/A, skip the rest of section 5)			✓
Did you check preservatives for all bottles for each sample?			
Did you document your preservative check?			

pH strip lot# _____, pH strip lot# _____, pH strip lot# _____

Preservative added:

☐ H2SO4 lot# _____ added to samples _____ on/at _____

☐ HCL lot# _____ added to samples _____ on/at _____

☐ HNO3 lot# _____ added to samples _____ on/at _____

☐ NaOH lot# _____ added to samples _____ on/at _____

Section 6:

Explanations/Comments: _____

Date Logged in 1-25-19 By (print) SH (sign) _____

Date Labeled 1-25-19 By (print) SH (sign) _____

ENTHALPY ANALYTICAL

Detections Summary for 306718

Results for any subcontracted analyses are not included in this summary.

Client : UC Berkeley Environ. Health & Safety
Project : STANDARD
Location : WSM-PHA

Client Sample ID : WSM-PHA-2019 Laboratory Sample ID : 306718-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Arsenic	16		1.5	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Barium	33		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Beryllium	0.43		0.099	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Cadmium	0.49		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Chromium	53		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Cobalt	9.3		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Copper	52		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Lead	34		0.99	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Mercury	0.32		0.017	mg/Kg	As Recd	1.000	EPA 7471A	METHOD
Molybdenum	1.0		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Nickel	47		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Vanadium	49		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B
Zinc	140		0.99	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

ENTHALPY ANALYTICAL

Polychlorinated Biphenyls (PCBs)

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	EPA 3540C
Project#:	STANDARD	Analysis:	EPA 8082
Field ID:	WSM-PHA-2019	Sampled:	01/25/19
Units:	ug/Kg	Received:	01/25/19
Basis:	as received	Prepared:	01/30/19
Batch#:	267378	Analyzed:	01/31/19

Type:	SAMPLE	Matrix:	Soil
Lab ID:	306718-001	Diln Fac:	20.00

Analyte	Result	RL
Aroclor-1016	ND	66
Aroclor-1221	ND	130
Aroclor-1232	ND	66
Aroclor-1242	ND	66
Aroclor-1248	ND	66
Aroclor-1254	ND	66
Aroclor-1260	ND	66

Surrogate	%REC	Limits
Decachlorobiphenyl	DO	49-157

Type:	BLANK	Matrix:	Miscell.
Lab ID:	QC963134	Diln Fac:	1.000

Analyte	Result	RL
Aroclor-1016	ND	4.8
Aroclor-1221	ND	9.6
Aroclor-1232	ND	4.8
Aroclor-1242	ND	4.8
Aroclor-1248	ND	4.8
Aroclor-1254	ND	4.8
Aroclor-1260	ND	4.8

Surrogate	%REC	Limits
Decachlorobiphenyl	110	49-157

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	EPA 3540C
Project#:	STANDARD	Analysis:	EPA 8082
Matrix:	Miscell.	Batch#:	267378
Units:	ug/Kg	Prepared:	01/30/19
Diln Fac:	1.000	Analyzed:	01/31/19

Type: BS Lab ID: QC963135

Analyte	Spiked	Result	%REC	Limits
Aroclor-1016	83.33	62.56	75	63-143
Aroclor-1260	83.33	59.00	71	59-157

Surrogate	%REC	Limits
Decachlorobiphenyl	74	49-157

Type: BSD Lab ID: QC963136

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Aroclor-1016	83.33	65.75	79	63-143	5	44
Aroclor-1260	83.33	67.44	81	59-157	13	36

Surrogate	%REC	Limits
Decachlorobiphenyl	90	49-157

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

California Title 22 Metals

Lab #: 306718		Project#:	STANDARD
Client: UC Berkeley Environ. Health & Safety		Location:	WSM-PHA
Field ID:	WSM-PHA-2019	Basis:	as received
Lab ID:	306718-001	Diln Fac:	1.000
Matrix:	Soil	Sampled:	01/25/19
Units:	mg/Kg	Received:	01/25/19

Analyte	Result	RL	Batch#	Prepared	Analyzed	Prep	Analysis
Antimony	ND	2.0	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Arsenic	16	1.5	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Barium	33	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Beryllium	0.43	0.099	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Cadmium	0.49	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Chromium	53	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Cobalt	9.3	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Copper	52	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Lead	34	0.99	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Mercury	0.32	0.017	267370	01/30/19	01/30/19	METHOD	EPA 7471A
Molybdenum	1.0	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Nickel	47	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Selenium	ND	2.0	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Silver	ND	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Thallium	ND	0.49	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Vanadium	49	0.25	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B
Zinc	140	0.99	267433	01/31/19	02/01/19	EPA 3050B	EPA 6010B

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

California Title 22 Metals

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA 7471A
Analyte:	Mercury	Diln Fac:	1.000
Type:	BLANK	Batch#:	267370
Lab ID:	QC963101	Prepared:	01/30/19
Matrix:	Soil	Analyzed:	01/30/19
Units:	mg/Kg		

Result	RL
ND	0.017

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

California Title 22 Metals

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA 7471A
Analyte:	Mercury	Batch#:	267370
Matrix:	Soil	Prepared:	01/30/19
Units:	mg/Kg	Analyzed:	01/30/19
Diln Fac:	1.000		

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC963102	0.1587	0.1485	94	80-120		
BSD	QC963103	0.1695	0.1537	91	80-120	3	20

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Batch QC Report

California Title 22 Metals

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA 7471A
Analyte:	Mercury	Diln Fac:	1.000
Field ID:	ZZZZZZZZZZ	Batch#:	267370
MSS Lab ID:	306794-001	Sampled:	01/28/19
Matrix:	Soil	Received:	01/28/19
Units:	mg/Kg	Prepared:	01/30/19
Basis:	as received	Analyzed:	01/30/19

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim
MS	QC963104	0.04747	0.1563	0.1887	90	80-120		
MSD	QC963105		0.1754	0.2052	90	80-120	1	20

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Batch QC Report

California Title 22 Metals

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	EPA 3050B
Project#:	STANDARD	Analysis:	EPA 6010B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC963346	Batch#:	267433
Matrix:	Soil	Prepared:	01/31/19
Units:	mg/Kg	Analyzed:	02/01/19

Analyte	Result	RL
Antimony	ND	2.0
Arsenic	ND	1.5
Barium	ND	0.25
Beryllium	ND	0.10
Cadmium	ND	0.25
Chromium	ND	0.25
Cobalt	ND	0.25
Copper	ND	0.25
Lead	ND	1.0
Molybdenum	ND	0.25
Nickel	ND	0.25
Selenium	ND	2.0
Silver	ND	0.25
Thallium	ND	0.50
Vanadium	ND	0.25
Zinc	ND	1.0

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

California Title 22 Metals

Lab #:	306718	Location:	WSM-PHA
Client:	UC Berkeley Environ. Health & Safety	Prep:	EPA 3050B
Project#:	STANDARD	Analysis:	EPA 6010B
Matrix:	Soil	Batch#:	267433
Units:	mg/Kg	Prepared:	01/31/19
Diln Fac:	1.000	Analyzed:	02/01/19

Type: BS Lab ID: QC963347

Analyte	Spiked	Result	%REC	Limits
Antimony	49.60	49.92	101	80-120
Arsenic	49.60	49.92	101	80-120
Barium	49.60	49.54	100	80-120
Beryllium	24.80	23.80	96	80-120
Cadmium	49.60	46.60	94	80-120
Chromium	49.60	49.45	100	80-120
Cobalt	49.60	47.76	96	80-120
Copper	49.60	47.05	95	80-120
Lead	49.60	47.11	95	80-120
Molybdenum	49.60	46.07	93	80-120
Nickel	49.60	44.99	91	80-120
Selenium	49.60	49.14	99	80-120
Silver	4.960	4.395	89	80-120
Thallium	49.60	50.74	102	80-120
Vanadium	49.60	50.34	101	80-120
Zinc	49.60	48.23	97	80-120

Type: BSD Lab ID: QC963348

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Antimony	49.70	50.21	101	80-120	0	20
Arsenic	49.70	50.37	101	80-120	1	20
Barium	49.70	49.67	100	80-120	0	20
Beryllium	24.85	24.07	97	80-120	1	20
Cadmium	49.70	47.42	95	80-120	2	20
Chromium	49.70	50.32	101	80-120	2	20
Cobalt	49.70	48.56	98	80-120	1	20
Copper	49.70	47.94	96	80-120	2	20
Lead	49.70	47.82	96	80-120	1	20
Molybdenum	49.70	46.47	94	80-120	1	20
Nickel	49.70	45.90	92	80-120	2	20
Selenium	49.70	49.43	99	80-120	0	20
Silver	4.970	4.442	89	80-120	1	20
Thallium	49.70	50.84	102	80-120	0	20
Vanadium	49.70	51.09	103	80-120	1	20
Zinc	49.70	49.20	99	80-120	2	20

RPD= Relative Percent Difference