UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

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

BERKELEY, CALIFORNIA 94720-1150

March 6, 2017

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 18, 2017, Sampling Event**
**Richmond Field Station Site**
**Berkeley Global Campus at Richmond Bay**
**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 at the Berkeley Global Campus at Richmond Bay on January 18, 2017. 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, and January 2016. This letter provides the rationale for the selected sampling locations, a summary of field sampling protocols, 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 sampled in January 2008, February 2009, February 2010, February 2011, February 2012, February 2013, February 2014, January 2015, January 2016, and during this event on January 18, 2017. The location and extent of the Western Stege Marsh Decision Unit 1 are presented on the figure at the end of this sampling 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 18, 2017. 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 50 subsamples, or increment locations, collected from 0 to 2 inches bgs.

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 50 locations with the decision unit. The location of these subsamples was not critical as long as they were distributed throughout the decision unit. The subsamples were collected using one disposable trowel for the decision unit.

2. The 50 subsamples were placed into clean, unused Ziploc bags as they were collected and mixed to form one composited ISM sample. After the samples had been collected, the Ziploc bags were placed in a cooler with ice.

3. The entire sample was immediately delivered to Curtis and Tompkins, Ltd., in Berkeley, California, after the sampling event, on January 18, 2017 for analysis by the Curtis and Tompkins Multi-Incremental Sub-Sampling (MIS) Procedure with subsampling to 30 gram sample for PCBs and Pesticides 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, pesticides, and polychlorinated biphenyls (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
- Pesticide analysis by EPA Method 8081A
- PCB analysis by EPA Method 8082

All organic constituents were reported at concentrations less than the laboratory reporting limits or less than their 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 a concentration below

its background concentration of 16 milligrams per kilogram. The sampling results and screening criteria are presented in the tables following this letter.

The January 2017 sampling results were compared with the 2008 through 2015 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 2017 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: Curtis & Tompkins Analytical Results Job Number 285268

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

| Screening Criteria | PCBs [a] | | |
|---|---|---|---|
| | **Aroclor-1248** | **Aroclor-1254** | **Aroclor-1260** |
| *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* |
| *Other* | *1*(2) | *1*(2) | *1*(2) |
| *Category I Criteria* | *1* | *1* | *1* |
| *Category II Criteria* | *1* | *1* | *1* |
| **Sample Location** | | | |
| WSM 16 discrete sample mean (3) March 1, 2005 | 0.19(4) | 0.14(5) | 0.054 |
| WSM 30 discrete sample mean (3) June 13, 2006 | 0.22(6) | ND | 0.016(7) |
| WSM DU1-001 January 17, 2008 | 0.081 | 0.053 | 0.021 J |
| WSM DU1-002 February 4, 2009 | 0.18 | 0.10 | 0.05 |
| WSM DU1-003 February 18, 2010 | 0.31 | 0.16 | 0.036 J |
| WSM DU1-004 February 22, 2011 | 0.048 U | 0.048 U | 0.048 U |
| WSM DU1-005 February 3, 2012 | 0.034 U | 0.096 | 0.068 |
| WSM DU1-006 February 4, 2013 | 0.010 U | 0.010 U | 0.010 U |
| WSM DU1-007 February 27, 2014 | 0.19 | 0.042 U | 0.03 J |
| WSM DU1-008 January 27, 2015 | 0.094 | 0.097 | 0.036 |
| WSM DU1-009 January 21, 2016 | 0.100 | ND (<0.0097) | ND (<0.0097) |
| WSMPHA17 January 18, 2017 | ND (<0.012) | 0.033 | 0.018 |

Notes:

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

Screening criteria based on the Final Soil Management Plan, Table C-1, July 18, 2014.

(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<br>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<br>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<br>January 21, 2016 | ND<br>(< 0.034) | ND<br>(< 0.034) | 0.040 | ND<br>(< 0.034) | ND<br>(< 0.034) | ND<br>(< 0.034) | ND<br>(< 0.067) | ND<br>(< 0.067) | ND<br>(< 0.067) | ND<br>(< 0.067) | ND<br>(< 0.067) | ND<br>(< 0.034) | ND<br>(< 0.034) | ND<br>(< 0.34) |
| WSMPHA17<br>January 18, 2017 | ND<br>(<0.033) | ND<br>(<0.033) | ND<br>(<0.033) | ND<br>(<0.033) | ND<br>(<0.033) | ND<br>(< 0.033) | ND<br>(< 0.065) | ND<br>(< 0.065) | ND<br>(< 0.065) | ND<br>(< 0.065) | ND<br>(< 0.065) | ND<br>(< 0.033) | ND<br>(< 0.033) | ND<br>(< 0.33) |

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, Table C-1, July 18, 2014.

(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 and 2006 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* | *100,000* | *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* | *20,300* | *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* | *100,000* | *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* | *6,860,000* | -- | *745* | *686,000* | *1,330* | *762* | *NA* | -- | *356* | -- | -- | -- | *NA* | *68,600* | *41,200* | -- | *12,300* | *NA* | *2,740,0000* | -- | *NA* | -- | -- | -- |
| *Other* | | | *16[1]* | | | | | | | | | | | | | | | | | | | | | |
| *Category I Criteria* | *20,300* | *109* | *16* | *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* |
| *Category II Criteria* | *100,000* | *1,090* | *16* | *100,000* | *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 [2] 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 [2] June 13, 2006 | NA | 6.2[c] | **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 |

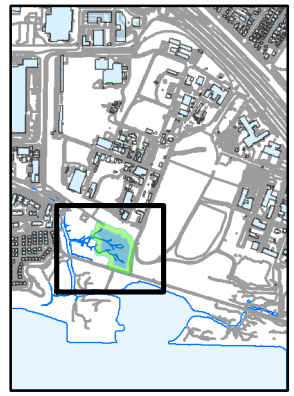
| | Aluminum | Antimony | Arsenic (1) | Barium | Beryllium | Cadmium | Calcium | Chromium | Cobalt | Copper | Iron | Lead | Magnesium | Manganese | Mercury | Molybdenum | Nickel | Potassium | Selenium | Silver | Sodium | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WSMPHA17 January 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 |

Notes:

**Bold values** indicate that the result exceeded the Category I criterion.
Screening criteria based on the Final Soil Management Plan, Table C-1, July 18, 2014.

| | |
|---|---|
| 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) | 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 |
| (3) | Fifteen detections |
| (4) | Eight detections |
| (5) | Eleven detections |
| (6) | Twenty-two detections |
| (7) | Twenty-six detections |
| (8) | Only thirteen detections |
| (9) | Two detections |

.

**2017 PHA Sampling Locations**

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

0 25 50 100 150 200

Feet

Berkeley EH&S

**Berkeley Global Campus**
**at Richmond Bay**
**Richmond Field Station Site**
**University of California, Berkeley**

# WESTERN STEGE MARSH NEAR SURFACE SAMPLING JANUARY 2017


Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 285268**
**ANALYTICAL REPORT**

| | |
|---|---|
| UC Berkeley Environ. Health & Safety | Project : STANDARD |
| 317 University Hall #1150 | Location : PHA2017 |
| Berkeley, CA 94720-1150 | Level : II |

| Sample ID | Lab ID |
|---|---|
| WSMPHA17 | 285268-001 |

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. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____ Date: 02/10/2017

Dina Ali
Project Manager
dina.ali@ctberk.com
(510) 204-2223 Ext 13105

CA ELAP# 2896, NELAP# 4044-001

Curtis & Tompkins, Ltd.

# CASE NARRATIVE

| | |
|---|---|
| Laboratory number: | **285268** |
| Client: | **UC Berkeley Environ. Health & Safety** |
| Location: | **PHA2017** |
| Request Date: | **01/18/17** |
| Samples Received: | **01/18/17** |

This data package contains sample and QC results for one soil sample, requested for the above referenced project on 01/18/17. The sample was received cold and intact. Revised report 2/10/17.

**Pesticides (EPA 8081A):**
All samples underwent sulfur cleanup using the copper option in EPA Method 3660B. All samples underwent florisil cleanup using EPA Method 3620C. High response was observed for dieldrin in the CCV analyzed 01/27/17 17:12; affected data was qualified with "b". High recoveries were observed for dieldrin in the MS/MSD for batch 243806; the parent sample was not a project sample, the LCS was within limits, the associated RPD was within limits, and this analyte was not detected at or above the RL in the associated sample. WSMPHA17 (lab # 285268-001) was diluted due to the color of the sample extract. No other analytical problems were encountered.

**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. No analytical problems were encountered.

**Metals (EPA 6010B and EPA 7471A):**
No analytical problems were encountered.

**Curtis & Tompkins, Ltd.**
Analytical Laboratory Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900 Phone
(510) 486-0532 Fax

# CHAIN OF CUSTODY



Chain of Custody # : _____

C&T LOGIN # 285268

Project No:
Project Name: PHA2017
EDD Format: _____ Rpt Level: ☐ II ☐ III ☐ IV
Turnaround Time: ☐ RUSH _____ x Standard

Sampler: Karl Hans
Report To: Karl Hans & David Scrimgeour
Company : UC Berkeley EH&S
Telephone: 510-812-1537 dscrimgeour@berkeley.edu
Email: khans@berkeley.edu

| Lab No. | Sample ID. | Sampling | | Matrix | | | | # of Containers | Chemical Preservative | | | | | Analytical Request | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Date | Time | Water | Soil | | | | HCl | $H_2SO_4$ | $HNO_3$ | NaOH | None | PCBs 8082 | Metals and Hg 6010/7471A | Pesticides 8081A | Multi-Incremental Samping Work up | | | | | | | | | | | | |
| | WSMPHA17 | 01/18/17 | 0930 | | x | | | 1 * | | | | | | x | x | x | X | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes:
Please subsample 50 increments for maximum aliquot size for analysis (10mg metals, 30mg PCBs & pesticide)
* Sample is in 2 bags – together they make one sample

SAMPLE RECEIPT
☒ Intact ☐ Cold
☐ On Ice ☒ Ambient

| RELINQUISHED BY: | RECEIVED BY: |
|---|---|
| 01/18/2017 1254 DATE/TIME | 1/18/17 12:59 DATE/TIME |
| DATE/TIME | DATE/TIME |
| DATE/TIME | DATE/TIME |

**COOLER RECEIPT CHECKLIST**

Curtis & Tompkins, Ltd.

Login # 285268 Date Received 1/18/17 Number of coolers 1
Client UCBerkeley EH&S Project PHA2017

Date Opened 1/18/17 By (print) ELM (sign)
Date Logged in 1/20 By (print) CTN (sign)
Date Labeled ↓ By (print) ↓ (sign)

1. Did cooler come with a shipping slip (airbill, etc) YES (NO)
   Shipping info
2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many Name Date
2B. Were custody seals intact upon arrival? YES NO (N/A)
3. Were custody papers dry and intact when received? (YES) NO
4. Were custody papers filled out properly (ink, signed, etc)? (YES) NO
5. Is the project identifiable from custody papers? (If so fill out top of form) (YES) NO
6. Indicate the packing in cooler: (if other, describe)

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

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☐ Blue/Gel ☒ None Temp(°C)

☐ Temperature blank(s) included? ☐ Thermometer# ☐ IR Gun#

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

8. Were Method 5035 sampling containers present? YES (NO)
   If YES, what time were they transferred to freezer?
9. Did all bottles arrive unbroken/unopened? (YES) NO
10. Are there any missing / extra samples? YES (NO)
11. Are samples in the appropriate containers for indicated tests? (YES) NO
12. Are sample labels present, in good condition and complete? (YES) NO
13. Do the sample labels agree with custody papers? (YES) NO
14. Was sufficient amount of sample sent for tests requested? (YES) NO
15. Are the samples appropriately preserved? YES NO (N/A)
16. Did you check preservatives for all bottles for each sample? YES NO (N/A)
17. Did you document your preservative check? (pH strip lot#) YES NO (N/A)
18. Did you change the hold time in LIMS for unpreserved VOAs? YES NO (N/A)
19. Did you change the hold time in LIMS for preserved terracores? YES NO (N/A)
20. Are bubbles > 6mm absent in VOA samples? YES NO (N/A)
21. Was the client contacted concerning this sample delivery? YES (NO)
   If YES, Who was called? By Date:

COMMENTS

Curtis & Tompkins, Ltd.

# Detections Summary for 285268

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

Client : UC Berkeley Environ. Health & Safety
Project : STANDARD
Location : PHA2017

Client Sample ID : WSMPHA17 Laboratory Sample ID : 285268-001

| Analyte | Result | Flags | RL | Units | Basis | IDF | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|
| Aroclor-1254 | 33 | | 12 | ug/Kg | As Recd | 1.000 | EPA 8082 | EPA 3550B |
| Aroclor-1260 | 18 | | 12 | ug/Kg | As Recd | 1.000 | EPA 8082 | EPA 3550B |
| Arsenic | 6.8 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Barium | 20 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Beryllium | 0.17 | | 0.098 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Cadmium | 0.64 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Chromium | 30 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Cobalt | 4.6 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Copper | 29 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Lead | 19 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Mercury | 0.54 | | 0.017 | mg/Kg | As Recd | 1.000 | EPA 7471A | METHOD |
| Molybdenum | 0.94 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Nickel | 28 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Vanadium | 29 | | 0.25 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |
| Zinc | 110 | | 0.98 | mg/Kg | As Recd | 1.000 | EPA 6010B | EPA 3050B |

Curtis & Tompkins, Ltd.

# Organochlorine Pesticides

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8081A |
| Field ID: | WSMPHA17 | Batch#: | 243806 |
| Lab ID: | 285268-001 | Sampled: | 01/18/17 |
| Matrix: | Soil | Received: | 01/18/17 |
| Units: | ug/Kg | Prepared: | 01/26/17 |
| Basis: | as received | Analyzed: | 01/27/17 |
| Diln Fac: | 20.00 | | |

| Analyte | Result | RL |
|---|---|---|
| alpha-BHC | ND | 33 |
| beta-BHC | ND | 33 |
| gamma-BHC | ND | 33 |
| delta-BHC | ND | 33 |
| Heptachlor | ND | 33 |
| Aldrin | ND | 33 |
| Heptachlor epoxide | ND | 33 |
| Endosulfan I | ND | 33 |
| Dieldrin | ND | 33 |
| 4,4'-DDE | ND | 65 |
| Endrin | ND | 65 |
| Endosulfan II | ND | 65 |
| Endosulfan sulfate | ND | 65 |
| 4,4'-DDD | ND | 65 |
| Endrin aldehyde | ND | 65 |
| 4,4'-DDT | ND | 65 |
| alpha-Chlordane | ND | 33 |
| gamma-Chlordane | ND | 33 |
| Methoxychlor | ND | 330 |
| Toxaphene | ND | 1,200 |

| Surrogate | %REC | Limits |
|---|---|---|
| TCMX | DO | 44-125 |
| Decachlorobiphenyl | DO | 39-121 |

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

Curtis & Tompkins, Ltd.

Batch QC Report

## Organochlorine Pesticides

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8081A |
| Type: | BLANK | Diln Fac: | 1.000 |
| Lab ID: | QC870164 | Batch#: | 243806 |
| Matrix: | Soil | Prepared: | 01/26/17 |
| Units: | ug/Kg | Analyzed: | 01/27/17 |

| Analyte | Result | RL |
|---|---|---|
| alpha-BHC | ND | 1.7 |
| beta-BHC | ND | 1.7 |
| gamma-BHC | ND | 1.7 |
| delta-BHC | ND # | 1.7 |
| Heptachlor | ND | 1.7 |
| Aldrin | ND # | 1.7 |
| Heptachlor epoxide | ND | 1.7 |
| Endosulfan I | ND | 1.7 |
| Dieldrin | ND | 1.7 |
| 4,4'-DDE | ND | 3.3 |
| Endrin | ND | 3.3 |
| Endosulfan II | ND | 3.3 |
| Endosulfan sulfate | ND # | 3.3 |
| 4,4'-DDD | ND | 3.3 |
| Endrin aldehyde | ND | 3.3 |
| 4,4'-DDT | ND | 3.3 |
| alpha-Chlordane | ND # | 1.7 |
| gamma-Chlordane | ND | 1.7 |
| Methoxychlor | ND | 17 |
| Toxaphene | ND | 60 |

| Surrogate | %REC | Limits |
|---|---|---|
| TCMX | 73 | 44-125 |
| Decachlorobiphenyl | 50 | 39-121 |

#= CCV drift outside limits; average CCV drift within limits per method requirements
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## Organochlorine Pesticides

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8081A |
| Type: | LCS | Diln Fac: | 1.000 |
| Lab ID: | QC870165 | Batch#: | 243806 |
| Matrix: | Soil | Prepared: | 01/26/17 |
| Units: | ug/Kg | Analyzed: | 01/27/17 |

| Analyte | Spiked | Result | %REC | Limits |
|---|---|---|---|---|
| gamma-BHC | 13.22 | 9.043 | 68 | 44-121 |
| Heptachlor | 13.22 | 9.317 | 70 | 45-129 |
| Aldrin | 13.22 | 9.237 # | 70 | 45-120 |
| Dieldrin | 13.22 | 17.20 | 130 | 49-131 |
| Endrin | 13.22 | 11.44 | 87 | 43-135 |
| 4,4'-DDT | 13.22 | 9.466 | 72 | 37-141 |

| Surrogate | %REC | Limits |
|---|---|---|
| TCMX | 107 | 44-125 |
| Decachlorobiphenyl | 69 | 39-121 |

#= CCV drift outside limits; average CCV drift within limits per method requirements

Curtis & Tompkins, Ltd.

Batch QC Report

## Organochlorine Pesticides

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8081A |
| Field ID: | ZZZZZZZZZZ | Batch#: | 243806 |
| MSS Lab ID: | 285435-003 | Sampled: | 12/12/16 |
| Matrix: | Soil | Received: | 12/12/16 |
| Units: | ug/Kg | Prepared: | 01/26/17 |
| Basis: | as received | Analyzed: | 01/27/17 |
| Diln Fac: | 2.000 | | |

Type: MS Lab ID: QC870166

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| gamma-BHC | <0.9236 | 13.46 | 8.082 | 60 | 51-126 |
| Heptachlor | <1.010 | 13.46 | 8.429 | 63 | 53-135 |
| Aldrin | <0.9998 | 13.46 | 8.431 # | 63 | 52-121 |
| Dieldrin | <0.5752 | 13.46 | 18.72 b | 139 * | 50-138 |
| Endrin | 3.260 | 13.46 | 10.67 | 55 | 41-156 |
| 4,4'-DDT | 3.107 | 13.46 | 11.56 | 63 | 30-156 |

| Surrogate | %REC | Limits |
|---|---|---|
| TCMX | 45 | 44-125 |
| Decachlorobiphenyl | 64 | 39-121 |

Type: MSD Lab ID: QC870167

| Analyte | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|
| gamma-BHC | 13.20 | 8.309 | 63 | 51-126 | 5 | 40 |
| Heptachlor | 13.20 | 8.371 | 63 | 53-135 | 1 | 34 |
| Aldrin | 13.20 | 8.530 # | 65 | 52-121 | 3 | 44 |
| Dieldrin | 13.20 | 18.81 b | 142 * | 50-138 | 2 | 38 |
| Endrin | 13.20 | 10.76 | 57 | 41-156 | 2 | 38 |
| 4,4'-DDT | 13.20 | 12.10 | 68 | 30-156 | 6 | 58 |

| Surrogate | %REC | Limits |
|---|---|---|
| TCMX | 49 | 44-125 |
| Decachlorobiphenyl | 65 | 39-121 |

#= CCV drift outside limits; average CCV drift within limits per method requirements
*= Value outside of QC limits; see narrative
b= See narrative
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

# Polychlorinated Biphenyls (PCBs)

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8082 |
| Field ID: | WSMPHA17 | Batch#: | 243754 |
| Matrix: | Soil | Sampled: | 01/18/17 |
| Units: | ug/Kg | Received: | 01/18/17 |
| Basis: | as received | Prepared: | 01/25/17 |
| Diln Fac: | 1.000 | | |

Type: SAMPLE Lab ID: 285268-001

| Analyte | Result | RL | Analyzed |
|---|---|---|---|
| Aroclor-1016 | ND | 12 | 02/01/17 |
| Aroclor-1221 | ND | 24 | 02/01/17 |
| Aroclor-1232 | ND | 12 | 02/01/17 |
| Aroclor-1242 | ND | 12 | 02/09/17 |
| Aroclor-1248 | ND | 12 | 02/01/17 |
| Aroclor-1254 | 33 | 12 | 02/01/17 |
| Aroclor-1260 | 18 | 12 | 02/01/17 |

| Surrogate | %REC | Limits | Analyzed |
|---|---|---|---|
| Decachlorobiphenyl | 104 | 25-135 | 02/01/17 |

Type: BLANK Analyzed: 01/26/17
Lab ID: QC869970

| Analyte | Result | RL |
|---|---|---|
| Aroclor-1016 | ND | 12 |
| Aroclor-1221 | ND | 24 |
| Aroclor-1232 | ND | 12 |
| Aroclor-1242 | ND | 12 |
| Aroclor-1248 | ND | 12 |
| Aroclor-1254 | ND | 12 |
| Aroclor-1260 | ND | 12 |

| Surrogate | %REC | Limits |
|---|---|---|
| Decachlorobiphenyl | 102 | 25-135 |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## Polychlorinated Biphenyls (PCBs)

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8082 |
| Type: | LCS | Diln Fac: | 1.000 |
| Lab ID: | QC869971 | Batch#: | 243754 |
| Matrix: | Soil | Prepared: | 01/25/17 |
| Units: | ug/Kg | Analyzed: | 01/26/17 |

| Analyte | Spiked | Result | %REC | Limits |
|---|---|---|---|---|
| Aroclor-1016 | 165.7 | 164.4 | 99 | 64-140 |
| Aroclor-1260 | 165.7 | 175.6 | 106 | 65-146 |

| Surrogate | %REC | Limits |
|---|---|---|
| Decachlorobiphenyl | 98 | 25-135 |

Curtis & Tompkins, Ltd.

Batch QC Report

## Polychlorinated Biphenyls (PCBs)

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3550B |
| Project#: | STANDARD | Analysis: | EPA 8082 |
| Field ID: | ZZZZZZZZZZ | Batch#: | 243754 |
| MSS Lab ID: | 285244-020 | Sampled: | 01/18/17 |
| Matrix: | Soil | Received: | 01/18/17 |
| Units: | ug/Kg | Prepared: | 01/25/17 |
| Basis: | as received | Analyzed: | 01/26/17 |
| Diln Fac: | 1.000 | | |

Type: MS Lab ID: QC869972

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| Aroclor-1016 | <14.76 | 167.3 | 182.8 | 109 | 60-161 |
| Aroclor-1260 | 27.58 | 167.3 | 161.1 | 80 | 42-166 |

| Surrogate | %REC | Limits |
|---|---|---|
| Decachlorobiphenyl | 100 | 25-135 |

Type: MSD Lab ID: QC869973

| Analyte | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|
| Aroclor-1016 | 168.4 | 170.9 | 102 | 60-161 | 7 | 43 |
| Aroclor-1260 | 168.4 | 178.9 | 90 | 42-166 | 10 | 51 |

| Surrogate | %REC | Limits |
|---|---|---|
| Decachlorobiphenyl | 106 | 25-135 |

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

# California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: 285268 | | Project#: | STANDARD |
| Client: UC Berkeley Environ. Health & Safety | | Location: | PHA2017 |
| Field ID: | WSMPHA17 | Basis: | as received |
| Lab ID: | 285268-001 | Diln Fac: | 1.000 |
| Matrix: | Soil | Sampled: | 01/18/17 |
| Units: | mg/Kg | Received: | 01/18/17 |

| Analyte | Result | RL | Batch# | Prepared | Analyzed | Prep | Analysis |
|---|---|---|---|---|---|---|---|
| Antimony | ND | 2.0 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Arsenic | 6.8 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Barium | 20 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Beryllium | 0.17 | 0.098 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Cadmium | 0.64 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Chromium | 30 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Cobalt | 4.6 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Copper | 29 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Lead | 19 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Mercury | 0.54 | 0.017 | 243795 | 01/26/17 | 01/26/17 | METHOD | EPA 7471A |
| Molybdenum | 0.94 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Nickel | 28 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Selenium | ND | 2.0 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Silver | ND | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Thallium | ND | 0.49 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Vanadium | 29 | 0.25 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |
| Zinc | 110 | 0.98 | 243683 | 01/23/17 | 01/25/17 | EPA 3050B | EPA 6010B |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3050B |
| Project#: | STANDARD | Analysis: | EPA 6010B |
| Type: | BLANK | Diln Fac: | 1.000 |
| Lab ID: | QC869689 | Batch#: | 243683 |
| Matrix: | Soil | Prepared: | 01/23/17 |
| Units: | mg/Kg | Analyzed: | 01/25/17 |

| Analyte | Result | RL |
|---|---|---|
| Antimony | ND | 2.0 |
| Arsenic | ND | 0.27 |
| Barium | ND | 0.27 |
| Beryllium | ND | 0.11 |
| Cadmium | ND | 0.27 |
| Chromium | ND | 0.27 |
| Cobalt | ND | 0.27 |
| Copper | ND | 0.27 |
| Lead | ND | 0.27 |
| Molybdenum | ND | 0.27 |
| Nickel | ND | 0.27 |
| Selenium | ND | 2.0 |
| Silver | ND | 0.27 |
| Thallium | ND | 0.54 |
| Vanadium | ND | 0.27 |
| Zinc | ND | 1.1 |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3050B |
| Project#: | STANDARD | Analysis: | EPA 6010B |
| Matrix: | Soil | Batch#: | 243683 |
| Units: | mg/Kg | Prepared: | 01/23/17 |
| Diln Fac: | 1.000 | Analyzed: | 01/25/17 |

Type: BS Lab ID: QC869690

| Analyte | Spiked | Result | %REC | Limits |
|---|---|---|---|---|
| Antimony | 52.08 | 53.75 | 103 | 80-120 |
| Arsenic | 52.08 | 53.18 | 102 | 80-120 |
| Barium | 52.08 | 54.01 | 104 | 80-120 |
| Beryllium | 26.04 | 27.09 | 104 | 80-120 |
| Cadmium | 52.08 | 54.45 | 105 | 80-120 |
| Chromium | 52.08 | 54.04 | 104 | 80-120 |
| Cobalt | 52.08 | 53.04 | 102 | 80-120 |
| Copper | 52.08 | 53.69 | 103 | 80-120 |
| Lead | 52.08 | 53.14 | 102 | 80-120 |
| Molybdenum | 52.08 | 52.84 | 101 | 80-120 |
| Nickel | 52.08 | 53.12 | 102 | 80-120 |
| Selenium | 52.08 | 52.59 | 101 | 80-120 |
| Silver | 5.208 | 5.143 | 99 | 80-120 |
| Thallium | 52.08 | 53.17 | 102 | 80-120 |
| Vanadium | 52.08 | 53.16 | 102 | 80-120 |
| Zinc | 52.08 | 52.24 | 100 | 80-120 |

Type: BSD Lab ID: QC869691

| Analyte | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|
| Antimony | 54.95 | 56.53 | 103 | 80-120 | 0 | 20 |
| Arsenic | 54.95 | 56.78 | 103 | 80-120 | 1 | 20 |
| Barium | 54.95 | 57.21 | 104 | 80-120 | 0 | 20 |
| Beryllium | 27.47 | 28.57 | 104 | 80-120 | 0 | 20 |
| Cadmium | 54.95 | 57.46 | 105 | 80-120 | 0 | 20 |
| Chromium | 54.95 | 56.91 | 104 | 80-120 | 0 | 20 |
| Cobalt | 54.95 | 56.33 | 103 | 80-120 | 1 | 20 |
| Copper | 54.95 | 56.76 | 103 | 80-120 | 0 | 20 |
| Lead | 54.95 | 56.18 | 102 | 80-120 | 0 | 20 |
| Molybdenum | 54.95 | 55.80 | 102 | 80-120 | 0 | 20 |
| Nickel | 54.95 | 56.03 | 102 | 80-120 | 0 | 20 |
| Selenium | 54.95 | 55.67 | 101 | 80-120 | 0 | 20 |
| Silver | 5.495 | 5.446 | 99 | 80-120 | 0 | 20 |
| Thallium | 54.95 | 56.30 | 102 | 80-120 | 0 | 20 |
| Vanadium | 54.95 | 56.00 | 102 | 80-120 | 0 | 20 |
| Zinc | 54.95 | 55.00 | 100 | 80-120 | 0 | 20 |

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | EPA 3050B |
| Project#: | STANDARD | Analysis: | EPA 6010B |
| Field ID: | ZZZZZZZZZZ | Batch#: | 243683 |
| MSS Lab ID: | 285059-001 | Sampled: | 01/09/17 |
| Matrix: | Miscell. | Received: | 01/13/17 |
| Units: | mg/Kg | Prepared: | 01/23/17 |
| Basis: | as received | Analyzed: | 01/25/17 |
| Diln Fac: | 1.000 | | |

Type: MS Lab ID: QC869692

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| Antimony | <0.1480 | 48.08 | 22.34 | 46 | 15-120 |
| Arsenic | 1.066 | 48.08 | 48.41 | 98 | 69-120 |
| Barium | 23.22 | 48.08 | 63.75 | 84 | 35-154 |
| Beryllium | 0.1675 | 24.04 | 24.32 | 100 | 75-120 |
| Cadmium | 0.08270 | 48.08 | 47.63 | 99 | 71-120 |
| Chromium | 1.200 | 48.08 | 47.90 | 97 | 57-133 |
| Cobalt | 1.166 | 48.08 | 47.62 | 97 | 56-125 |
| Copper | 3.242 | 48.08 | 49.77 | 97 | 54-144 |
| Lead | 3.106 | 48.08 | 48.52 | 94 | 53-125 |
| Molybdenum | 1.028 | 48.08 | 44.74 | 91 | 66-120 |
| Nickel | 8.101 | 48.08 | 54.21 | 96 | 44-141 |
| Selenium | 1.297 | 48.08 | 49.63 | 101 | 61-120 |
| Silver | <0.03947 | 4.808 | 4.065 | 85 | 69-120 |
| Thallium | <0.1390 | 48.08 | 41.53 | 86 | 59-120 |
| Vanadium | 24.18 | 48.08 | 73.60 | 103 | 52-144 |
| Zinc | 3.662 | 48.08 | 49.54 | 95 | 45-145 |

Type: MSD Lab ID: QC869693

| Analyte | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|
| Antimony | 51.55 | 22.81 | 44 | 15-120 | 5 | 41 |
| Arsenic | 51.55 | 52.63 | 100 | 69-120 | 2 | 35 |
| Barium | 51.55 | 73.02 | 97 | 35-154 | 9 | 36 |
| Beryllium | 25.77 | 26.72 | 103 | 75-120 | 2 | 20 |
| Cadmium | 51.55 | 52.09 | 101 | 71-120 | 2 | 25 |
| Chromium | 51.55 | 52.65 | 100 | 57-133 | 3 | 33 |
| Cobalt | 51.55 | 52.15 | 99 | 56-125 | 2 | 36 |
| Copper | 51.55 | 54.79 | 100 | 54-144 | 3 | 38 |
| Lead | 51.55 | 52.67 | 96 | 53-125 | 2 | 42 |
| Molybdenum | 51.55 | 48.37 | 92 | 66-120 | 1 | 20 |
| Nickel | 51.55 | 56.23 | 93 | 44-141 | 2 | 39 |
| Selenium | 51.55 | 53.35 | 101 | 61-120 | 0 | 33 |
| Silver | 5.155 | 4.536 | 88 | 69-120 | 4 | 22 |
| Thallium | 51.55 | 44.50 | 86 | 59-120 | 0 | 27 |
| Vanadium | 51.55 | 70.66 | 90 | 52-144 | 9 | 29 |
| Zinc | 51.55 | 53.47 | 97 | 45-145 | 1 | 39 |

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7471A |
| Analyte: | Mercury | Diln Fac: | 1.000 |
| Type: | BLANK | Batch#: | 243795 |
| Lab ID: | QC870119 | Prepared: | 01/26/17 |
| Matrix: | Soil | Analyzed: | 01/26/17 |
| Units: | mg/Kg | | |

| Result | RL |
|---|---|
| ND | 0.017 |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7471A |
| Analyte: | Mercury | Batch#: | 243795 |
| Matrix: | Soil | Prepared: | 01/26/17 |
| Units: | mg/Kg | Analyzed: | 01/26/17 |
| Diln Fac: | 1.000 | | |

| Type | Lab ID | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|---|
| BS | QC870120 | 0.2016 | 0.2026 | 100 | 80-120 | | |
| BSD | QC870121 | 0.2273 | 0.2332 | 103 | 80-120 | 2 | 20 |

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

## California Title 22 Metals

| | | | |
|---|---|---|---|
| Lab #: | 285268 | Location: | PHA2017 |
| Client: | UC Berkeley Environ. Health & Safety | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7471A |
| Analyte: | Mercury | Diln Fac: | 1.000 |
| Field ID: | ZZZZZZZZZZ | Batch#: | 243795 |
| MSS Lab ID: | 285270-001 | Sampled: | 01/19/17 |
| Matrix: | Soil | Received: | 01/19/17 |
| Units: | mg/Kg | Prepared: | 01/26/17 |
| Basis: | as received | Analyzed: | 01/26/17 |

| Type | Lab ID | MSS Result | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|---|---|
| MS | QC870122 | 0.1146 | 0.2193 | 0.2935 | 82 | 69-142 | | |
| MSD | QC870123 | | 0.1923 | 0.2795 | 86 | 69-142 | 4 | 36 |

RPD= Relative Percent Difference