# SAF-RC-233
# 100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil In-Process
# FINAL DATA PACKAGE

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt H4-21 KW 3/7/13
INITIAL/DATE

**COMMENTS:**

**SDG K4063 SAF-RC-233**

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

**Sample Location: 600-384**

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

5 March 2013

Joan Kessner
WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, WA 99354

Subject: Analytical Data Package

Dear Ms. Kessner:

Enclosed are the hard copy analytical reports for the batch number/fraction indicated (marked X) in the following table:

| | |
|---|---|
| LvLI Batch # | 1302013 |
| SDG # | K4063 |
| SAF # | RC-233 |
| Date Received | 02/01/13 |
| # Samples | 4 |
| Matrix | SOIL |
| Volatiles | |
| Semivolatiles | |
| Pest/PCB | |
| Glycols | |
| DRO/KRO/GRO | |
| PAHs | |
| Herbicides | |
| Metals | X |
| Inorganics | X |
| TCLP Metals | X |

The electronic data deliverable (EDD) has been emailed. If you have any questions, please don't hesitate to contact me at (610) 280-3012.

Sincerely,

Lionville Laboratory
A Division of Eberline Analytical Corporation

Orlette S. Johnson
Project Manager

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 47 pages.

# CHAIN OF CUSTODY

Lionville Laboratory Use Only

1302013

# Custody Transfer Record/Lab Work Request

Page 1 of 1

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

Lionville Laboratory
A Division of Eberline Analytical Corporation

Client WC Hanford SAF# RC-233

Est. Final Proj. Sampling Date

Project#

Project Contact/Phone#

Lionville Laboratory Project Manager O. Johnson

QC SN Del SN TAT 15 Days

Date Rec'd 2-1-13 Date Due 2-16-13

| Refrigerator # | | A | | B-1 | | C-1 | |
|---|---|---|---|---|---|---|---|
| #/Type Container | Liquid | 2 | | 2 | 1 | 2 | 1 |
| | Solid | 1P | | 1AG | 1 | 1P | 1 |
| Volume | Liquid | 125 | | 125 | 1 | 125 | 1 |
| | Solid | | | | 1 | | 1 |
| Preservatives | | | | | | | |

ANALYSES REQUESTED → ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: Metal 1ft, CN, TCLP Met, TCLP Hg, Anions, pH

Lionville Laboratory Use Only

MATRIX CODES: W Water; WW Waste Water; GW Groundwater; WST Waste; WI Wipe; SO Solid; S Soil; SL Sludge; SE Sediment; PC Paint Chips; O Oil; NAL Non-Aqueous Liquid; L Leachate; A Air; T Tissue; F Fish

| Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected | METALS | | TCLP METALS | 1 | ANIONS NO3N2 | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | J1RD82 | | | SOIL | 1-30-13 | 0845 | X | | X | X | X | X |
| 02 | J1RD83 | | | SOIL | 1-30-13 | 0900 | X | | X | X | X | X |
| 03 | J1RD84 | | | SOIL | 1-30-13 | 0915 | X | | X | X | X | X |
| 04 | J1RD85 | | | SOIL | 1-30-13 | 0920 | X | | X | X | X | X |

**Special Instructions:** MATRIX QC

METALS = HSL + B, Mo, Si (NOT L)

**Special Instructions:**

2-1-13 1. TCLP Metals are leach and holds

2.

3.

4.

5.

6.

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| FedEx | | 2-1-13 | 0950 |
| | | | |

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| | | | |
| | | | |

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| | | | |
| | | | |

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| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | RC-233-010 | Page 1 of 1 |
|---|---|---|---|---|
| Collector ~~Brackett, RA~~ DUNNUM, A | Company Contact: Joan Kessner | Telephone No.: 509-375-4688 | Project Coordinator: KESSNER, JH | Price Code: 8C |
| | | | | Data Turnaround: 15 Days |
| Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil In-Proce | Sampling Location: 600-384 | | SAF No.: RC-233 | |
| Ice Chest No.: RCC-08-028 | Field Logbook No.: EL-1666 | COA: 0603842600 | Method of Shipment: fedEX | |
| Shipped To: EBERLINE SERVICES/LIONVILLE | Offsite Property No.: A120731 | | Bill of Lading/Air Bill No.: SU-05PC | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*May contain hazardous substances at levels that present risk to humans and/or the environment*

**Special Handling and/or Storage**

*Maintain preservation as indicated in header*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | Cool 4C | None | Cool 4C | | | | | | | | |
| Type of Container | G/P | aG | G/P | | | | | | | | |
| No. of Container(s) | 1 | 1 | 1 | | | | | | | | |
| Volume | 125mL | 125mL | 125mL | | | | | | | | |
| **SAMPLE ANALYSIS** | See item (1) in Special Instructions. | See item (2) in Special Instructions. | See item (3) in Special Instructions. | | | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J1RD82 | SOIL | 1/30/13 | 0845 | X | X | X | | | | | | |
| J1RD83 | SOIL | 1/30/13 | 0900 | X | X | X | | | | | | |
| J1RD84 | SOIL | 1/30/13 | 0915 | X | X | X | | | | | | |
| J1RD85 | SOIL | 1/30/13 | 0920 | X | X | X | | | | | | |
| | | | | | | | | | | | | |

**CHAIN OF POSSESSION** — **Sign/Print Names**

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| ~~Brackett, RA~~ DUNNUM, A | 1-30-13 0930 | BHUDSON BHudson | 1/30/13 0930 |
| BHUDSON BHudson | 1/30/13 1000 | [illegible] Ingram | 1-30-13 1000 |
| [illegible] Ingram | 1-30-13 1135 | fed EX | |
| fedEX | 2-1-13 0950 | VICTOR HERNANDEZ | 2-1-13 0950 |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**

** Please leach and hold TCLP until directed to run analysis by Joan Kessner

(1) ICP Metals - 6010TR (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) Metals by ICP (TCLP) - 1311/6010 {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury (TCLP) - 1311/7470 {Mercury}
(3) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY AJ DATE 1-30-13

Matrix *: S=Soil, SE=Sediment, SO=Solid, SI=Sludge, W = Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

| | | | |
|---|---|---|---|
| LABORATORY SECTION | Received By | Title | Date/Time |
| FINAL SAMPLE DISPOSITION | Disposal Method | Disposed By | Date/Time |

WCH-EE-011

0000000004

Lionville Laboratory

# SAMPLE RECEIPT CHECKLIST (SRC)

**CLIENT:** WC Hanford **Date:** 2-1-13

Project/SAF/SOW/Release #: RC-233

**LvL Batch #:** 1302013 **Sample Custodian:**

NOTE: EXPLAIN ALL DISCREPANCIES

| | | | |
|---|---|---|---|
| **1.** Samples Hand Delivered or Shipped? | Carrier FED EX | | Airbill # 7946 3980 7977 |
| **2.** Custody Seals on coolers or shipping containers intact, signed & dated? | ☑ Yes | ☐ No | ☐ No Seals |
| **3.** Outside of coolers or shipping containers are free from damage? | ☑ Yes | ☐ No | *Comments:* |
| **4.** All expected paperwork received (coc & other client specific information) sealed in plactic bag and easily accessible? | ☐ Yes | ☐ No | |
| **5.** Samples received cooled or ambient? | **Temp** 2.3° | °C | Cooler # RCC-08-028 |
| How was the temperature taken? | ☑ IR | ☐ Temp. Blank | ☐ Other (Specify): |
| Is the Temp. Criteria met for these samples? (Hg in soils @ 4°C) | ☑ Yes | ☐ No | |
| **6.** Custody seals on sample containers intact, signed and dated? | ☑ Yes | ☐ No | ☐ No Seals |
| **7.** COC (Client & LvL) signed & dated? | ☑ Yes | ☐ No | |
| **8.** Sample containers are intact? | ☑ Yes | ☐ No | |
| **9.** All samples on COC received? | ☑ Yes | ☐ No | |
| All samples received on COC? | ☑ Yes | ☐ No | |
| **10.** All sample label information matches COC? | ☑ Yes | ☐ No | |
| **11.** Samples properly preserved? (If #5 is no, then this is no.) | ☑ Yes | ☐ No | |
| **12.** Samples received within hold times? | ☑ Yes | ☐ No | |
| Short holds taken to wet lab? | ☐ Yes | ☐ No | ☑ N/A |
| **13.** VOA, TOC, TOX, RSK-175, Sulfides, Non-Halogenated VOAs (Alcohol/Glycol) free of headspace? | ☐ Yes | ☐ No | ☑ N/A |
| **14.** QC stickers placed on bottles designated by client? | ☐ Yes | ☐ No | ☑ N/A |
| **15.** Shipment meets LvL Sample Acceptance Policy? (Identify all bottles that do not meet the policy, which is on the reverse of this page.) | ☐ Yes | ☐ No | |
| **16.** Project Manager contacted concerning any discrepancies? | ☐ Yes | ☐ No | ☑ N/A |

Person Contacted _____ Date _____

# METALS

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Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## Analytical Report for Metals by SW846 6000/7000 series

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1RD82 | 1302013-01 | Soil | 01/30/2013 08:45 | 02/01/2013 09:50 |
| J1RD83 | 1302013-02 | Soil | 01/30/2013 09:00 | 02/01/2013 09:50 |
| J1RD84 | 1302013-03 | Soil | 01/30/2013 09:15 | 02/01/2013 09:50 |
| J1RD85 | 1302013-04 | Soil | 01/30/2013 09:20 | 02/01/2013 09:50 |

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# Case Narrative

**Client:** WC-HANFORD RC-233
**LVL#:** 1302013
**SDG/SAF#:** K4063/RC-233

**W.O.#:** 60049-001-001-0001-00
**Date Received:** 02-01-13

## METALS

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvL) certifies that all test results meet the requirements of NELAC except as noted below.

All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analysis of 4 soil samples.

2. The samples were prepared and analyzed in accordance with methods listed on the data report forms.

   The samples were analyzed with 3-fold dilutions for ICP metals due to sample matrix.

3. All analyses were performed within the required holding times.

4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvLI's sample acceptance policy.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within control limits.

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within method criteria.

7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation (3-10X the LOD or samples greater than 20X MB value}.

8. All ICP Interference Check Standards were within control limits.

9. All Standard Reference Material (SRM) analytes were within the Prediction Interval control limits supplied by the manufacturer.

10. The matrix spike (MS) recovery for 6 analytes was outside the 75-125% control limits.


The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of pages

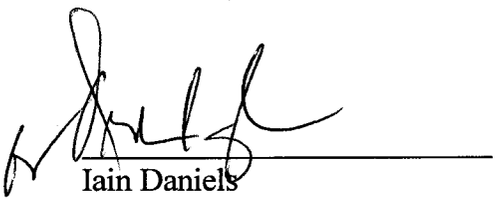
11. For analytes where the MS is out of control, a post-digestion MS (PDS) is performed. A PDS was prepared at meaningful concentration levels for the following analytes: Aluminum, Antimony, Barium, Iron, Lead, and Manganese.

12. The duplicate analyses for 2 analytes were outside the 20% Relative Percent Difference (RPD) control limit criteria. The ±20% RPD control limit applies to sample results greater than ten times the MDL. The sample results for Boron and Mercury were less than ten times the MDL.

13. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.

14. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

15. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.



Iain Daniels
Laboratory Manager
Lionville Laboratory

4/28/13
Date

m1302013hg%jjw.doc

LVL
LIONVILLE LABORATORY
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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## Notes and Definitions

| | |
|---|---|
| U | Analyte included in the analysis, but not detected |
| J | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). |
| B | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag) |
| * | Value outside QC acceptance criteria |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| wet | Sample results reported on a wet weight basis |
| RPD | Relative Percent Difference |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## J1RD82

### 1302013-01 (Soil)

### Lionville Laboratory

**Metals by SW846 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum** | **8210** | | 16.0 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Antimony | 1.93 | U | 1.93 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Arsenic** | **6.51** | | 3.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Barium** | **177** | | 1.60 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Beryllium** | **0.429** | B | 0.642 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Boron** | **6.02** | B | 6.42 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Cadmium** | **0.437** | B | 0.642 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Calcium** | **5240** | | 321 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Chromium** | **11.7** | | 0.642 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Cobalt** | **6.16** | B | 6.42 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Copper** | **13.4** | | 3.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Iron** | **18700** | | 64.2 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Lead** | **58.0** | | 1.60 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Magnesium** | **3620** | | 241 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Manganese** | **312** | | 16.0 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Molybdenum | 6.42 | U | 6.42 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Nickel** | **11.1** | B | 12.8 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Potassium** | **2430** | | 1280 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Selenium | 0.963 | U | 0.963 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Silicon** | **586** | | 6.42 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Silver | 0.642 | U | 0.642 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Sodium** | **207** | | 160 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Vanadium** | **49.8** | | 8.02 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Zinc** | **65.4** | | 32.1 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Mercury** | **0.0379** | | 0.0278 | mg/kg dry | 1 | L302108 | 02/14/2013 | 02/15/2013 | 7471A |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## J1RD83

### 1302013-02 (Soil)

### Lionville Laboratory

**Metals by SW846 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum** | **7680** | | 14.1 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Antimony** | **1.41** | B | 1.69 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Arsenic** | **16.3** | | 2.82 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Barium** | **125** | | 1.41 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Beryllium** | **0.348** | B | 0.564 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Boron** | **3.97** | B | 5.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Cadmium** | **0.311** | B | 0.564 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Calcium** | **4290** | | 282 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Chromium** | **10.8** | | 0.564 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Cobalt** | **5.59** | B | 5.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Copper** | **17.8** | | 2.82 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Iron** | **17700** | | 56.4 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Lead** | **96.1** | | 1.41 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Magnesium** | **3130** | | 212 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Manganese** | **244** | | 14.1 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Molybdenum** | **0.779** | B | 5.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Nickel** | **13.5** | | 11.3 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Potassium** | **2040** | | 1130 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Selenium | 0.847 | U | 0.847 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Silicon** | **511** | | 5.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Silver | 0.564 | U | 0.564 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Sodium** | **191** | | 141 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Vanadium** | **42.5** | | 7.06 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Zinc** | **96.8** | | 28.2 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Mercury** | **0.0255** | B | 0.0285 | mg/kg dry | 1 | L302108 | 02/14/2013 | 02/15/2013 | 7471A |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## J1RD84

### 1302013-03 (Soil)

### Lionville Laboratory

**Metals by SW846 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum** | **2870** | | 16.4 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Antimony | 1.97 | U | 1.97 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Arsenic** | **2.84** | B | 3.28 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Barium** | **50.0** | | 1.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Beryllium | 0.657 | U | 0.657 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Boron | 6.57 | U | 6.57 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Cadmium | 0.657 | U | 0.657 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Calcium** | **81500** | | 328 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Chromium** | **6.32** | | 0.657 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Cobalt | 6.57 | U | 6.57 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Copper** | **5.63** | | 3.28 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Iron** | **12600** | | 65.7 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Lead** | **8.78** | | 1.64 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Magnesium** | **1340** | | 246 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Manganese** | **88.3** | | 16.4 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Molybdenum | 6.57 | U | 6.57 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Nickel** | **3.77** | B | 13.1 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Potassium** | **864** | B | 1310 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Selenium | 0.985 | U | 0.985 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Silicon** | **454** | | 6.57 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Silver | 0.657 | U | 0.657 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Sodium** | **251** | | 164 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Vanadium** | **28.2** | | 8.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Zinc** | **17.3** | B | 32.8 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Mercury | 0.0293 | U | 0.0293 | mg/kg dry | 1 | L302108 | 02/14/2013 | 02/15/2013 | 7471A |

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Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## J1RD85

### 1302013-04 (Soil)

### Lionville Laboratory

**Metals by SW846 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum** | **8930** | | 13.0 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Antimony | 1.56 | U | 1.56 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Arsenic** | **3.08** | | 2.60 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Barium** | **74.8** | | 1.30 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Beryllium** | **0.309** | B | 0.521 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Boron** | **1.51** | B | 5.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Cadmium | 0.521 | U | 0.521 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Calcium** | **3540** | | 260 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Chromium** | **13.2** | | 0.521 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Cobalt** | **6.82** | | 5.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Copper** | **13.7** | | 2.60 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Iron** | **22300** | | 52.1 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Lead** | **8.48** | | 1.30 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Magnesium** | **4330** | | 195 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Manganese** | **305** | | 13.0 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Molybdenum | 5.21 | U | 5.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Nickel** | **11.3** | | 10.4 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Potassium** | **1710** | | 1040 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Selenium | 0.781 | U | 0.781 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Silicon** | **485** | | 5.21 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Silver | 0.521 | U | 0.521 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Sodium** | **219** | | 130 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Vanadium** | **54.0** | | 6.51 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| **Zinc** | **43.3** | | 26.0 | mg/kg dry | 3 | L302109 | 02/14/2013 | 02/15/2013 | 6010B |
| Mercury | 0.0248 | U | 0.0248 | mg/kg dry | 1 | L302108 | 02/14/2013 | 02/15/2013 | 7471A |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## Metals by SW846 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302108 - SW 7471A Prep** | | | | | | | | | | |
| **Blank (L302108-BLK1)** | | | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Mercury | 0.0281 | U | 0.0281 | mg/kg wet | | | | | | |
| **Duplicate (L302108-DUP1)** | | **Source: 1302013-01** | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Mercury | 0.0661 | | 0.0295 | mg/kg dry | | 0.0379 | | | 54.3* | 20 |
| **Matrix Spike (L302108-MS1)** | | **Source: 1302013-01** | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Mercury | 0.242 | | 0.0295 | mg/kg dry | 0.16364 | 0.0379 | 125 | 75-125 | | 20 |
| **Reference (L302108-SRM1)** | | | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Mercury | 1.30 | | 0.0290 | mg/kg wet | 1.2900 | | 101 | 62.6-138 | | |
| **Batch L302109 - SW 3050B** | | | | | | | | | | |
| **Blank (L302109-BLK1)** | | | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Aluminum | 4.81 | U | 4.81 | mg/kg wet | | | | | | |
| Antimony | 0.577 | U | 0.577 | mg/kg wet | | | | | | |
| Arsenic | 0.962 | U | 0.962 | mg/kg wet | | | | | | |
| Barium | 0.481 | U | 0.481 | mg/kg wet | | | | | | |
| Beryllium | 0.192 | U | 0.192 | mg/kg wet | | | | | | |
| Boron | 1.92 | U | 1.92 | mg/kg wet | | | | | | |
| Cadmium | 0.192 | U | 0.192 | mg/kg wet | | | | | | |
| Calcium | 7.70 | B | 96.2 | mg/kg wet | | | | | | |
| Chromium | 0.192 | U | 0.192 | mg/kg wet | | | | | | |
| Cobalt | 1.92 | U | 1.92 | mg/kg wet | | | | | | |
| Copper | 0.962 | U | 0.962 | mg/kg wet | | | | | | |
| Iron | 19.2 | U | 19.2 | mg/kg wet | | | | | | |
| Lead | 0.481 | U | 0.481 | mg/kg wet | | | | | | |
| Magnesium | 4.32 | B | 72.1 | mg/kg wet | | | | | | |
| Manganese | 4.81 | U | 4.81 | mg/kg wet | | | | | | |
| Molybdenum | 1.92 | U | 1.92 | mg/kg wet | | | | | | |
| Nickel | 3.85 | U | 3.85 | mg/kg wet | | | | | | |
| Potassium | 385 | U | 385 | mg/kg wet | | | | | | |
| Selenium | 0.288 | U | 0.288 | mg/kg wet | | | | | | |
| Silicon | 1.92 | U | 1.92 | mg/kg wet | | | | | | |
| Silver | 0.192 | U | 0.192 | mg/kg wet | | | | | | |
| Sodium | 48.1 | U | 48.1 | mg/kg wet | | | | | | |
| Vanadium | 2.40 | U | 2.40 | mg/kg wet | | | | | | |
| Zinc | 9.62 | U | 9.62 | mg/kg wet | | | | | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## Metals by SW846 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302109 - SW 3050B** | | | | | | | | | | |
| **Duplicate (L302109-DUP1)** | **Source: 1302013-01** | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | | |
| Aluminum | 8750 | | 14.9 | mg/kg dry | | 8210 | | | 6.41 | 20 |
| Antimony | 1.79 | U | 1.79 | mg/kg dry | | 1.93 U | | | | 20 |
| Arsenic | 7.00 | | 2.98 | mg/kg dry | | 6.51 | | | 7.33 | 20 |
| Barium | 130 | | 1.49 | mg/kg dry | | 177 | | | 30.6* | 20 |
| Beryllium | 0.404 | B | 0.596 | mg/kg dry | | 0.429 | | | 5.92 | 20 |
| Boron | 4.91 | B | 5.96 | mg/kg dry | | 6.02 | | | 20.5* | 20 |
| Cadmium | 0.475 | B | 0.596 | mg/kg dry | | 0.437 | | | 8.38 | 20 |
| Calcium | 5060 | | 298 | mg/kg dry | | 5240 | | | 3.51 | 20 |
| Chromium | 12.3 | | 0.596 | mg/kg dry | | 11.7 | | | 4.77 | 20 |
| Cobalt | 6.18 | | 5.96 | mg/kg dry | | 6.16 | | | 0.405 | 20 |
| Copper | 13.5 | | 2.98 | mg/kg dry | | 13.4 | | | 0.837 | 20 |
| Iron | 19800 | | 59.6 | mg/kg dry | | 18700 | | | 5.99 | 20 |
| Lead | 463 | | 1.49 | mg/kg dry | | 58.0 | | | 155* | 20 |
| Magnesium | 3910 | | 224 | mg/kg dry | | 3620 | | | 7.68 | 20 |
| Manganese | 304 | | 14.9 | mg/kg dry | | 312 | | | 2.65 | 20 |
| Molybdenum | 5.96 | U | 5.96 | mg/kg dry | | 6.42 U | | | | 20 |
| Nickel | 11.8 | B | 11.9 | mg/kg dry | | 11.1 | | | 6.05 | 20 |
| Potassium | 2400 | | 1190 | mg/kg dry | | 2430 | | | 1.23 | 20 |
| Selenium | 0.894 | U | 0.894 | mg/kg dry | | 0.963 U | | | | 20 |
| Silicon | 572 | | 5.96 | mg/kg dry | | 586 | | | 2.50 | 20 |
| Silver | 0.596 | U | 0.596 | mg/kg dry | | 0.642 U | | | | 20 |
| Sodium | 229 | | 149 | mg/kg dry | | 207 | | | 10.0 | 20 |
| Vanadium | 46.5 | | 7.45 | mg/kg dry | | 49.8 | | | 6.77 | 20 |
| Zinc | 72.2 | | 29.8 | mg/kg dry | | 65.4 | | | 9.79 | 20 |
| **Matrix Spike (L302109-MS1)** | **Source: 1302013-01** | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | | |
| Aluminum | 9830 | | 14.4 | mg/kg dry | 191.85 | 8210 | 847* | 75-125 | | |
| Antimony | 19.3 | | 1.73 | mg/kg dry | 47.963 | 1.93 U | 40.3* | 75-125 | | |
| Arsenic | 180 | | 2.88 | mg/kg dry | 191.85 | 6.51 | 90.5 | 75-125 | | |
| Barium | 321 | | 1.44 | mg/kg dry | 191.85 | 177 | 74.8* | 75-125 | | |
| Beryllium | 4.83 | | 0.576 | mg/kg dry | 4.7963 | 0.429 | 91.7 | 75-125 | | |
| Boron | 90.0 | | 5.76 | mg/kg dry | 95.926 | 6.02 | 87.5 | 75-125 | | |
| Cadmium | 4.72 | | 0.576 | mg/kg dry | 4.7963 | 0.437 | 89.3 | 75-125 | | |
| Calcium | 7650 | | 288 | mg/kg dry | 2398.2 | 5240 | 100 | 75-125 | | |
| Chromium | 29.1 | | 0.576 | mg/kg dry | 19.185 | 11.7 | 90.5 | 75-125 | | |
| Cobalt | 49.4 | | 5.76 | mg/kg dry | 47.963 | 6.16 | 90.1 | 75-125 | | |
| Copper | 35.1 | | 2.88 | mg/kg dry | 23.982 | 13.4 | 90.7 | 75-125 | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/22/2013 14:56 |

## Metals by SW846 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| **Batch L302109 - SW 3050B** | | | | | | | | | |
| **Matrix Spike (L302109-MS1)** | | **Source: 1302013-01** | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Iron | 19300 | 57.6 | mg/kg dry | 95.926 | 18700 | 603* | 75-125 | | |
| Lead | 81.4 | 1.44 | mg/kg dry | 47.963 | 58.0 | 48.8* | 75-125 | | |
| Magnesium | 5960 | 216 | mg/kg dry | 2398.2 | 3620 | 97.4 | 75-125 | | |
| Manganese | 348 | 14.4 | mg/kg dry | 47.963 | 312 | 74.5* | 75-125 | | |
| Molybdenum | 86.0 | 5.76 | mg/kg dry | 95.926 | 6.42 U | 89.6 | 75-125 | | |
| Nickel | 54.0 | 11.5 | mg/kg dry | 47.963 | 11.1 | 89.4 | 75-125 | | |
| Potassium | 4610 | 1150 | mg/kg dry | 2398.2 | 2430 | 91.1 | 75-125 | | |
| Selenium | 176 | 0.863 | mg/kg dry | 191.85 | 0.963 U | 91.5 | 75-125 | | |
| Silicon | 697 | 5.76 | mg/kg dry | 95.926 | 586 | 116 | 75-125 | | |
| Silver | 4.24 | 0.576 | mg/kg dry | 4.7963 | 0.642 U | 88.4 | 75-125 | | |
| Sodium | 2570 | 144 | mg/kg dry | 2398.2 | 207 | 98.7 | 75-125 | | |
| Vanadium | 91.1 | 7.19 | mg/kg dry | 47.963 | 49.8 | 86.2 | 75-125 | | |
| Zinc | 111 | 28.8 | mg/kg dry | 47.963 | 65.4 | 94.5 | 75-125 | | |
| **Post Spike (L302109-PS1)** | | **Source: 1302013-01** | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Aluminum | 136000 | | ug/L | 66000 | 76700 | 89.3 | 75-125 | | |
| Antimony | 306 | | ug/L | 300.00 | -1.56 | 103 | 75-125 | | |
| Barium | 1940 | | ug/L | 300.00 | 1660 | 92.6 | 75-125 | | |
| Iron | 288000 | | ug/L | 126000 | 175000 | 89.8 | 75-125 | | |
| Lead | 826 | | ug/L | 300.00 | 542 | 94.9 | 75-125 | | |
| Manganese | 5640 | | ug/L | 3000.0 | 2920 | 90.6 | 75-125 | | |
| **Reference (L302109-SRM1)** | | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Aluminum | 10600 | 14.2 | mg/kg wet | 6670.0 | | 159 | 0-200.89 | | |
| Antimony | 44.3 | 1.70 | mg/kg wet | 53.000 | | 83.6 | 0-235.8 | | |
| Arsenic | 112 | 2.83 | mg/kg wet | 114.00 | | 97.9 | 82.8-117.54 | | |
| Barium | 300 | 1.42 | mg/kg wet | 307.00 | | 97.6 | 79.8-120.2 | | |
| Beryllium | 104 | 0.566 | mg/kg wet | 108.00 | | 96.0 | 82.8-117.6 | | |
| Boron | 76.9 | 5.66 | mg/kg wet | 85.100 | | 90.4 | 67.5-132.8 | | |
| Cadmium | 217 | 0.566 | mg/kg wet | 225.00 | | 96.3 | 83.6-116.4 | | |
| Calcium | 3260 | 283 | mg/kg wet | 3360.0 | | 97.0 | 83.3-116.9 | | |
| Chromium | 83.1 | 0.566 | mg/kg wet | 77.200 | | 108 | 73.3-126.4 | | |
| Cobalt | 158 | 5.66 | mg/kg wet | 166.00 | | 95.1 | 80.7-118.7 | | |
| Copper | 255 | 2.83 | mg/kg wet | 271.00 | | 94.0 | 80.8-119.2 | | |
| Iron | 8570 | 56.6 | mg/kg wet | 8420.0 | | 102 | 78.6-121.1 | | |
| Lead | 181 | 1.42 | mg/kg wet | 190.00 | | 95.1 | 81.6-118.4 | | |
| Magnesium | 8340 | 212 | mg/kg wet | 8570.0 | | 97.3 | 83.2-116.7 | | |
| Manganese | 943 | 14.2 | mg/kg wet | 965.00 | | 97.7 | 69.3-130.5 | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/22/2013 14:56 |

## Metals by SW846 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| **Batch L302109 - SW 3050B** | | | | | | | | | |
| **Reference (L302109-SRM1)** | | | Prepared: 02/14/2013 Analyzed: 02/15/2013 | | | | | | |
| Molybdenum | 228 | 5.66 | mg/kg wet | 235.00 | | 97.0 | 76.2-123.8 | | |
| Nickel | 218 | 11.3 | mg/kg wet | 221.00 | | 98.7 | 79.6-120.8 | | |
| Potassium | 14200 | 1130 | mg/kg wet | 14400 | | 98.9 | 81.9-118.1 | | |
| Selenium | 181 | 0.849 | mg/kg wet | 187.00 | | 96.9 | 75.9-124.6 | | |
| Silicon | 647 | 5.66 | mg/kg wet | 807.00 | | 80.2 | 0-219.3 | | |
| Silver | 80.6 | 0.566 | mg/kg wet | 83.500 | | 96.5 | 82.7-117.1 | | |
| Sodium | 9490 | 142 | mg/kg wet | 9730.0 | | 97.5 | 82.5-117.2 | | |
| Vanadium | 107 | 7.08 | mg/kg wet | 98.700 | | 109 | 75.9-123.6 | | |
| Zinc | 194 | 28.3 | mg/kg wet | 199.00 | | 97.3 | 78.4-121.6 | | |

**Lionville Laboratory** Logbook #: 1194

# SAMPLE DIGESTION RECORD

Digestion Batch #: L302109
Date/Time Initiated: 2/14/13 1050 weighed out 2/13 MM 2/13/13
Date/Time Completed: 2/14/13 1750
Analyst: MM
Matrix (circle): Soil Water Other
Method (circle one): 3005A 3010A 3050 200.7 (1994)
pH/Turbidity: N/A for Solids.
**NOTE**: All temperatures are recorded as corrected temperatures

Digested / Undigested (circle one)
Balance #: B14
Balance Cal Verification: Y NA
Temp: 94°
BLOCK 1 2 3 (circle one)

| Work Order # | Spike Vol (mL) | Initial Wt/Vol (g/mL) | Final Vol (mL) | pH <2 | Type: To/Sol/ TC | Texture | Color / Appearance | Artifact | Turb |
|---|---|---|---|---|---|---|---|---|---|
| L302013-01 | | 0.52 | 50 | | TO | fine | brown soil | N/A | |
| L302109-DUP1 | | 0.56 | 50 | | | " | " " | " | |
| MS1 | 0.5 | 0.58 | 50 | | | " | " " | " | |
| L302093-02 | | 0.59 | 50 | | | fine | dark brown soil | rocks, clay | |
| 03 | | 0.55 | 50 | | | coarse | dark brown soil | white clay, rocks | |
| 04 | | 0.62 | 50 | | | coarse | brown soil with brown lumps, | precipitation, rock | |
| L302014-01 | | 0.54 | 50 | | | not fine | brown soil | small tan lumps | |
| L302109-DUP2 | | 0.59 | 50 | | | " | " | " | |
| MS2 | 0.5 | 0.59 | 50 | | | " | " | " | |
| BLK1 | | 0.52 | 50 | | | coarse | boiling chips | | |
| SRM1 | ☆ | 0.53 | 50 | | | fine | pink, sandy | | |

MM 2/13/13

Spiking IDs / Expiration Date:
MS# : 1300144
LCS#: 1201014 ☆

Reagent IDs:
$HNO_3$ 0000003390
HCl 0000018301
$H_2O_2$ L11A03
1:1 $HNO_3$ 637-076-07
1:1 HCl

File ID#:

Data Review By/Date:
2/13

R:\group\QA\SOP\
Signed\SPI\Metals Digestion log.doc

Page #: 65

000000019

Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1198

Analyst: [signature]
Date 2/13/13 - 2/14/18
Start Time/Temp: 1315/94°
End Time/Temp: 1515/94°

Instrument ID: HG3.1
Balance # B14 /NA
Pipette Calibration (Daily) (Y) ____

Prep Batch: L302108 W.E. [illegible] 2/19/13
Worksheet: ~~HG-021401~~ HG021501
SOP No. ME-HgCVAA
BLOCK (1) 2 (circle one)

**NOTE: All temperatures are recorded as corrected temperatures.**

| LvL Work Order# | pH < 2 (Liq) | Spike Vol (mL) | Spike Conc. (µg/L) | Initial Wt. or Vol (g or mL) | Final Sample Vol (mL) | Comments, % Solids, etc. |
|---|---|---|---|---|---|---|
| Blank | | | W.E. jm | 10ml | 50 | |
| 0.2 µg/l | | 0.100 | ~~0.2~~ 2/14/13 | 10ml | 50 | |
| 1.0 µg/l | | 0.500 | | 10ml | 50 | |
| 2.0 µg/l | | 1.000 | | 10ml | 50 | |
| 5.0 µg/l | | 2.500 | | 10ml | 50 | |
| 10.0 µg/l | | 5.000 | | 10ml | 50 | |
| ICV | | 0.125 | 2.5 | 10 ml | 50 | |
| CCV | | 0.250 | 5.0 | 10 ml | 50 | |
| ICB/CCB | | | | 10 ml | 50 | |
| L302108-BLK1 | | | | 0.32 | 50 | |
| SRM1 | | (#) | (#) | 0.31 | 50 | |
| 1302013-01 | | | | 0.36 | 50 | |
| L302108-DUP1 | | | | 0.34 | 50 | |
| MS1 | | 0.500 | 1.0 | 0.34 | 50 | |
| 1302013-02 | | | | 0.35 | 50 | |
| 03 | | | | 0.37 | 50 | |
| 04 | | | 0.39 | ~~0.39~~ JW 2/13/13 | 50 | |
| 1302014-01 | | | | 0.34 | 50 | |
| L302108-DUP2 | | | | 0.37 | 50 | |
| MS2 | | 0.500 | 1.0 | 0.37 | 50 | |
| 1302015-01 | | | | 0.36 | 50 | |
| L302108-DUP3 | | | | 0.37 | 50 | } digestates lost |
| MS3 | | 0.500 | 1.0 | 0.36 | 50 | } |
| 1302015-02 | | | | 0.34 | 50 | |
| 1302030-01 | | | | 0.34 | 50 | |
| L302108-DUP4 | | | | 0.35 | 50 | |
| MS4 | | 0.500 | 1.0 | 0.34 | 50 | |

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | RI 1201235 | 2/14/1010 |
| ICV/CCV/LCS | (I.V. 1201411) | |

Reviewed By/Date: [signature] 2/19/13

see book # 1198 for std traceability information

Soil LCS True Value = 1.29 mg/Kg
Standard # 1201014

Water Matrix Spiking Solution Concentration = 0.1 µg/ml
Soil LCS Spiking Concentration: 1.0 µg/ml



000000044

000000020

Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1198

Analyst: [signature]
Date 2/13/13
Start Time/Temp: 0824
End Time/Temp: 0824

Instrument ID: HG3.1
Balance # B14 /NA
Pipette Calibration (Daily) (Y) ____

Prep Batch: L302108
Worksheet: HG021507
SOP No. ME-HgCVAA
BLOCK (1) 2 (circle one)

**NOTE: All temperatures are recorded as corrected temperatures.**

| LvL Work Order# | pH < 2 (Liq) | Spike Vol (mL) | Spike Conc. (µg/L) | Initial Wt. or Vol (g or mL) | Final Sample Vol (mL) | Comments, % Solids, etc. |
|---|---|---|---|---|---|---|
| 1302030-02 | | | | 0.36 | 50 | |
| 03 | | | | 0.38 | 50 | |
| 1302031-01 | | | | 0.38 | 50 | |
| L302108-DUP5 | | | | 0.36 | 50 | |
| MS5 | | 0.500 | 1.0 | 0.34 | 50 | |
| 1302031-02 | | | | 0.38 | 50 | |
| 03 | | | | 0.33 | 50 | |

2/13/13

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | | |
| ICV/CCV/LCS | | |

Soil LCS True Value = [illegible] mg/Kg
Standard # [illegible] 0824

Reviewed By/Date: [signature] 2/13/13

see book # 1198 for std traceability information

Water Matrix Spiking Solution Concentration = 0.1 µg/ml
Water LCS Spiking Concentration: 1.0 µg/ml



0000000021

# WET CHEMISTRY

Lionville Laboratory, PADEP Lab ID# 15-00009
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Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

## Analytical Report for Wet Chemistry

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1RD82 | 1302013-01 | Soil | 01/30/2013 08:45 | 02/01/2013 09:50 |
| J1RD83 | 1302013-02 | Soil | 01/30/2013 09:00 | 02/01/2013 09:50 |
| J1RD84 | 1302013-03 | Soil | 01/30/2013 09:15 | 02/01/2013 09:50 |
| J1RD85 | 1302013-04 | Soil | 01/30/2013 09:20 | 02/01/2013 09:50 |

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# Case Narrative

**Client:** WC-HANFORD RC-233 K4063
**LVL#:** 1302013 **Date Received:** 02-01-13

## INORGANIC NARRATIVE

1. This narrative covers the analyses of 4 soil samples.

2. The samples were prepared and analyzed in accordance with the methods indicated on the data summary report. Results for soil or solid pH are measured in water at 25°C unless otherwise specified.

   Lionville Lab (LvL) is NELAP accredited by the State of Pennsylvania. For a complete list of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements.

3. Sample holding times as required by the method and/or contract were met with the exceptions of Nitrate, Nitrite and Orthophophate.

4. The results presented in this report are derived from samples that met LvL's sample acceptance policy.

5. The method blanks were within the method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits and method criteria.

7. The matrix spike recoveries were within the 75-125% control limits.

8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.

9. Results for soil samples are reported on a dry weight basis.

10. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. The Laboratory Manager or a designee, as verified by the following signature, has authorized release of the data contained in this hard copy package.

Iain Daniels
Laboratory Manager
Lionville Laboratory

2/28/13
Date

njp\i02-013

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 11 pages.

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|---|---|---|
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| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

## Notes and Definitions

| | |
|---|---|
| U | Analyte included in the analysis, but not detected |
| D | Results reported from a dilution; related reporting limits are elevated due to the presence of an interference or a high target value. |
| B | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). |
| * | Value outside QC acceptance criteria |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| Dry | Sample results reported on a dry weight basis |
| Wet | Sample results reported on a wet weight basis |
| RPD | Relative Percent Difference |
| LOD | Limit of Detection (LOD): the minimum estimated concentration of a target analyte that can be detected reliably. Concentrations at the LOD or between the LOD and LOQ are flagged estimated with either a 'J' qualifier or client-specific qualifier. |
| LOQ | Limit of Quantitation (LOQ): the minimum concentration of a target analyte that can be quantified reliably |

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|---|---|---|
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| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

# Wet Chemistry

## Lionville Laboratory

| Analyte | Result and Qualifier | LOD | LOQ | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **J1RD82 (1302013-01) Soil** | | | | | | | | | |
| **%Solids** | **89.9** | | 0.1 | % by Weight | 1 | L302030 | 02/04/2013 15:33 | 02/04/2013 15:33 | SM2540G |
| Bromide | 1.1 U | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Chloride** | **1.1** B | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| Fluoride | 1.1 U | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Nitrate** | **18.7** | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| Nitrite | 1.1 U | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| Orthophosphate | 2.2 U | 2.2 | 11.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Sulfate** | **21.9** | 1.1 | 5.5 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Nitrate/Nitrite as N** | **4.68** | 0.11 | 0.55 | mg/kg dry | 1 | L302075 | 02/06/2013 14:31 | 02/08/2013 14:18 | EPA 353.2 |
| **pH** | **5.08** | | 0.10 | pH Units | 1 | L302047 | 02/05/2013 12:53 | 02/05/2013 12:53 | SW846 9045D |
| **J1RD83 (1302013-02) Soil** | | | | | | | | | |
| **%Solids** | **90.1** | | 0.1 | % by Weight | 1 | L302030 | 02/04/2013 15:33 | 02/04/2013 15:33 | SM2540G |
| Bromide | 1.1 U | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Chloride** | **1.2** B | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| Fluoride | 1.1 U | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Nitrate** | **6.3** | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| Nitrite | 1.1 U | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Orthophosphate** | **38.2** | 2.2 | 11.2 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Sulfate** | **18.1** | 1.1 | 5.6 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 17:18 | EPA 300.0 (1993) |
| **Nitrate/Nitrite as N** | **1.51** | 0.11 | 0.56 | mg/kg dry | 1 | L302075 | 02/06/2013 14:31 | 02/08/2013 14:19 | EPA 353.2 |
| **pH** | **4.74** | | 0.10 | pH Units | 1 | L302047 | 02/05/2013 13:03 | 02/05/2013 13:03 | SW846 9045D |
| **J1RD84 (1302013-03) Soil** | | | | | | | | | |
| **%Solids** | **83.0** | | 0.1 | % by Weight | 1 | L302030 | 02/04/2013 15:33 | 02/04/2013 15:33 | SM2540G |
| Bromide | 1.2 U | 1.2 | 6.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| **Chloride** | **2.0** B | 1.2 | 6.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Fluoride | 1.2 U | 1.2 | 6.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrate | 1.2 U | 1.2 | 6.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrite | 1.2 U | 1.2 | 6.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Orthophosphate | 2.4 U | 2.4 | 12.0 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| **Sulfate** | **17700** D | 599 | 3000 | mg/kg dry | 500 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrate/Nitrite as N | 0.12 U | 0.12 | 0.60 | mg/kg dry | 1 | L302075 | 02/06/2013 14:31 | 02/08/2013 14:23 | EPA 353.2 |
| **pH** | **3.33** | | 0.10 | pH Units | 1 | L302047 | 02/05/2013 13:06 | 02/05/2013 13:06 | SW846 9045D |

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| | | |
|---|---|---|
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| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

# Wet Chemistry

## Lionville Laboratory

| Analyte | Result and Qualifier | LOD | LOQ | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **J1RD85 (1302013-04) Soil** | | | | | | | | | |
| **%Solids** | **92.9** | | 0.1 | % by Weight | 1 | L302030 | 02/04/2013 15:33 | 02/04/2013 15:33 | SM2540G |
| Bromide | 1.1 U | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Chloride | 1.1 U | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Fluoride | 1.1 U | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrate | 1.1 U | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrite | 1.1 U | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| **Orthophosphate** | **2.5** B | 2.1 | 10.7 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| **Sulfate** | **7.2** | 1.1 | 5.3 | mg/kg dry | 1 | L302081 | 02/06/2013 14:30 | 02/07/2013 19:49 | EPA 300.0 (1993) |
| Nitrate/Nitrite as N | 0.11 U | 0.11 | 0.53 | mg/kg dry | 1 | L302075 | 02/06/2013 14:31 | 02/08/2013 14:27 | EPA 353.2 |
| **pH** | **5.76** | | 0.10 | pH Units | 1 | L302047 | 02/05/2013 13:11 | 02/05/2013 13:11 | SW846 9045D |

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| | | |
|---|---|---|
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| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

# Wet Chemistry - Quality Control
## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302030 - % Solids** | | | | | | | | | | |
| **Duplicate (L302030-DUP7)** | **Source: 1302013-01** | | | Prepared & Analyzed: 02/04/2013 15:33 | | | | | | |
| %Solids | 89.7 | | 0.1 | % by Weight | | 89.9 | | | 0.1 | 20 |
| **Batch L302047 - Default Prep GenChem** | | | | | | | | | | |
| **Duplicate (L302047-DUP3)** | **Source: 1302013-01** | | | Prepared & Analyzed: 02/05/2013 12:55 | | | | | | |
| pH | 5.03 | | 0.10 | pH Units | | 5.08 | | | 0.989 | 20 |
| **Reference (L302047-SRM1)** | | | | Prepared & Analyzed: 02/05/2013 12:23 | | | | | | |
| pH | 9.99 | | 0.10 | pH Units | 10.000 | | 99.9 | 99-101 | | |
| **Reference (L302047-SRM2)** | | | | Prepared & Analyzed: 02/05/2013 13:00 | | | | | | |
| pH | 3.97 | | 0.10 | pH Units | 4.0000 | | 99.2 | 99-101 | | |
| **Reference (L302047-SRM3)** | | | | Prepared & Analyzed: 02/05/2013 13:23 | | | | | | |
| pH | 10.0 | | 0.10 | pH Units | 10.000 | | 100 | 99-101 | | |
| **Batch L302075 - Default Prep GenChem** | | | | | | | | | | |
| **Blank (L302075-BLK1)** | | | | Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 13:55 | | | | | | |
| Nitrate/Nitrite as N | 0.10 U | 0.10 | 0.50 | mg/kg wet | | | | | | |
| **LCS (L302075-BS1)** | | | | Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 13:54 | | | | | | |
| Nitrate/Nitrite as N | 5.27 | 0.10 | 0.50 | mg/kg wet | 5.0000 | | 105 | 90-110 | | |
| **Duplicate (L302075-DUP3)** | **Source: 1302013-03** | | | Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 14:24 | | | | | | |
| Nitrate/Nitrite as N | 0.11 U | 0.11 | 0.57 | mg/kg dry | | 0.12 U | | | | 20 |

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|---|---|---|
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| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

# Wet Chemistry - Quality Control
## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302075 - Default Prep GenChem** | | | | | | | | | | |
| **Matrix Spike (L302075-MS3)** | **Source: 1302013-03** | | | Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 14:25 | | | | | | |
| Nitrate/Nitrite as N | 5.32 | 0.10 | 0.52 | mg/kg dry | 5.1548 | 0.12 U | 103 | 75-125 | | |
| **Batch L302081 - Default Prep GenChem** | | | | | | | | | | |
| **Blank (L302081-BLK1)** | | | | Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 14:16 | | | | | | |
| Fluoride | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| Chloride | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| Bromide | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| Orthophosphate | 2.0 U | 2.0 | 10.0 | mg/kg wet | | | | | | |
| Sulfate | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| Nitrate | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| Nitrite | 1.0 U | 1.0 | 5.0 | mg/kg wet | | | | | | |
| **LCS (L302081-BS1)** | | | | Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 14:16 | | | | | | |
| Fluoride | 51.2 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 102 | 80-120 | | |
| Chloride | 47.5 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 95.0 | 80-120 | | |
| Bromide | 48.5 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 97.0 | 80-120 | | |
| Orthophosphate | 48.0 | 2.0 | 10.0 | mg/kg wet | 50.000 | | 96.0 | 80-120 | | |
| Sulfate | 49.2 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 98.4 | 80-120 | | |
| Nitrate | 48.5 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 97.0 | 80-120 | | |
| Nitrite | 48.6 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 97.2 | 80-120 | | |
| **Duplicate (L302081-DUP3)** | **Source: 1302013-03** | | | Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 19:49 | | | | | | |
| Fluoride | 1.1 U | 1.1 | 5.7 | mg/kg dry | | 1.2 U | | | | 20 |
| Chloride | 1.8 B | 1.1 | 5.7 | mg/kg dry | | 2.0 | | | 10.4 | 20 |
| Bromide | 1.1 U | 1.1 | 5.7 | mg/kg dry | | 1.2 U | | | | 20 |
| Orthophosphate | 2.3 U | 2.3 | 11.5 | mg/kg dry | | 2.4 U | | | | 20 |
| Sulfate | 16400 D | 574 | 2870 | mg/kg dry | | 17700 | | | 8.20 | 20 |
| Nitrate | 1.1 U | 1.1 | 5.7 | mg/kg dry | | 1.2 U | | | | 20 |
| Nitrite | 1.1 U | 1.1 | 5.7 | mg/kg dry | | 1.2 U | | | | 20 |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-233 | |
| 2620 Fermi Avenue | Project Number: K4063 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 02/11/2013 16:04 |

## Wet Chemistry - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302081 - Default Prep GenChem** | | | | | | | | | | |
| **Matrix Spike (L302081-MS3)** | **Source: 1302013-03** | | | Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 19:49 | | | | | | |
| Fluoride | 52.0 | 1.0 | 5.2 | mg/kg dry | 51.548 | 1.2 U | 101 | 75-125 | | |
| Chloride | 51.8 | 1.0 | 5.2 | mg/kg dry | 51.548 | 2.0 | 96.4 | 75-125 | | |
| Bromide | 52.4 | 1.0 | 5.2 | mg/kg dry | 51.548 | 1.2 U | 102 | 75-125 | | |
| Orthophosphate | 42.8 | 2.1 | 10.3 | mg/kg dry | 51.548 | 2.4 U | 83.0 | 75-125 | | |
| Nitrate | 53.1 | 1.0 | 5.2 | mg/kg dry | 51.548 | 1.2 U | 103 | 75-125 | | |
| Nitrite | 42.5 | 1.0 | 5.2 | mg/kg dry | 51.548 | 1.2 U | 82.4 | 75-125 | | |
| **Matrix Spike (L302081-MS4)** | **Source: 1302013-03** | | | Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 19:49 | | | | | | |
| Sulfate | 68600 D | 1030 | 5150 | mg/kg dry | 51548 | 17700 | 98.6 | 75-125 | | |

# TCLP METALS

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## Analytical Report for TCLP Metals by SW846 1311 6000/7000 series

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1RD82 | 1302013-01 | Soil | 01/30/2013 08:45 | 02/01/2013 09:50 |
| J1RD83 | 1302013-02 | Soil | 01/30/2013 09:00 | 02/01/2013 09:50 |
| J1RD84 | 1302013-03 | Soil | 01/30/2013 09:15 | 02/01/2013 09:50 |
| J1RD85 | 1302013-04 | Soil | 01/30/2013 09:20 | 02/01/2013 09:50 |

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**Case Narrative**

**Client:** WC-HANFORD RC-233
**LVL#:** 1302013
**SDG/SAF#:** K4063/RC-233

**W.O.#:** 60049-001-001-0001-00
**Date Received:** 02-01-13

## METALS

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvL) certifies that all test results meet the requirements of NELAC except as noted below.

All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analyses of 4 TCLP leachate samples.

2. The samples were prepared and analyzed in accordance with methods listed on the data report forms.

   The TCLP leachate samples were analyzed and reported with a 5-fold dilution for ICP metals due to sample matrix.

3. All analyses were performed within the required holding times.

4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvL's sample acceptance policy.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the LOQ).

7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, MB value less than 5% of the RCRA limit, or samples were greater than 20X MB value}.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the 80-120% control limits.


The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of pages.

10. The TCLP leachate duplicate analyses were within the 20% Relative Percent Difference (RPD) control limit critieria. The ± 20% RPD control limit applies to sample results greater than ten times the MDL.

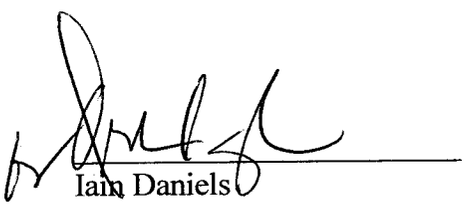
11. The TCLP extract from sample J1RD82 was selected for the matrix spike (MS) for this analytical batch.

    The matrix spike (MS) concentration for Mercury was equivalent to the regulatory level (200 ppb) as per SW846 method 1311. The required spike concentration is above the linear range of the instrument, resulting in a 50-fold dilution. The MS recovery was greater than 50% as per method criteria.

12. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.

13. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

14. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.



Iain Daniels
Laboratory Manager
Lionville Laboratory

2/28/13
Date

jjw/m02-013tc2013

LVL
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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## Notes and Definitions

| | |
|---|---|
| U | Analyte included in the analysis, but not detected |
| J | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). |
| B | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag) |
| * | Value outside QC acceptance criteria |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| wet | Sample results reported on a wet weight basis |
| RPD | Relative Percent Difference |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## J1RD82

### 1302013-01 (Soil)

### Lionville Laboratory

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Metals by SW846 1311 6000/7000 series** | | | | | | | | | |
| **Arsenic** | **0.0136** | B | 0.0750 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| **Barium** | **0.101** | | 0.00500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Chromium | 0.0250 | U | 0.0250 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Lead | 0.0500 | U | 0.0500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L302147 | 02/26/2013 | 02/27/2013 | 7470 |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## J1RD83

### 1302013-02 (Soil)

### Lionville Laboratory

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Metals by SW846 1311 6000/7000 series** | | | | | | | | | |
| Arsenic | 0.0750 | U | 0.0750 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| **Barium** | **0.0904** | | 0.00500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Chromium | 0.0250 | U | 0.0250 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Lead | 0.0500 | U | 0.0500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L302147 | 02/26/2013 | 02/27/2013 | 7470 |

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|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## J1RD84

### 1302013-03 (Soil)

### Lionville Laboratory

**TCLP Metals by SW846 1311 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 0.0750 | U | 0.0750 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| **Barium** | **0.0219** | | 0.00500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| **Chromium** | **0.00293** | B | 0.0250 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Lead | 0.0500 | U | 0.0500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L302147 | 02/26/2013 | 02/27/2013 | 7470 |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## J1RD85

### 1302013-04 (Soil)

### Lionville Laboratory

**TCLP Metals by SW846 1311 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 0.0750 | U | 0.0750 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| **Barium** | **0.208** | | 0.00500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Chromium | 0.0250 | U | 0.0250 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Lead | 0.0500 | U | 0.0500 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L302146 | 02/26/2013 | 02/27/2013 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L302147 | 02/26/2013 | 02/27/2013 | 7470 |

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| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## TCLP Metals by SW846 1311 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302146 - SW 3010A** | | | | | | | | | | |
| **Blank (L302146-BLK1)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Arsenic | 0.0150 | U | 0.0150 | mg/L | | | | | | |
| Barium | 0.00100 | U | 0.00100 | mg/L | | | | | | |
| Cadmium | 0.00300 | U | 0.00300 | mg/L | | | | | | |
| Chromium | 0.00500 | U | 0.00500 | mg/L | | | | | | |
| Lead | 0.0100 | U | 0.0100 | mg/L | | | | | | |
| Selenium | 0.0200 | U | 0.0200 | mg/L | | | | | | |
| Silver | 0.00600 | U | 0.00600 | mg/L | | | | | | |
| **Blank (L302146-BLK2)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Arsenic | 0.0750 | U | 0.0750 | mg/L | | | | | | |
| Barium | 0.00500 | U | 0.00500 | mg/L | | | | | | |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | | | | | | |
| Chromium | 0.0250 | U | 0.0250 | mg/L | | | | | | |
| Lead | 0.0500 | U | 0.0500 | mg/L | | | | | | |
| Selenium | 0.100 | U | 0.100 | mg/L | | | | | | |
| Silver | 0.0300 | U | 0.0300 | mg/L | | | | | | |
| **LCS (L302146-BS1)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Arsenic | 9.81 | | 0.0150 | mg/L | 10.000 | | 98.1 | 80-120 | | |
| Barium | 4.83 | | 0.00100 | mg/L | 5.0000 | | 96.6 | 80-120 | | |
| Cadmium | 0.229 | | 0.00300 | mg/L | 0.25000 | | 91.6 | 80-120 | | |
| Chromium | 0.506 | | 0.00500 | mg/L | 0.50000 | | 101 | 80-120 | | |
| Lead | 2.42 | | 0.0100 | mg/L | 2.5000 | | 96.8 | 80-120 | | |
| Selenium | 9.47 | | 0.0200 | mg/L | 10.000 | | 94.7 | 80-120 | | |
| Silver | 0.498 | | 0.00600 | mg/L | 0.50000 | | 99.5 | 80-120 | | |
| **Duplicate (L302146-DUP5)** | | | **Source: 1302013-01** | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Arsenic | 0.0115 | B | 0.0750 | mg/L | | 0.0136 | | | 16.3 | 20 |
| Barium | 0.103 | | 0.00500 | mg/L | | 0.101 | | | 2.01 | 20 |
| Cadmium | 0.0150 | U | 0.0150 | mg/L | | 0.0150 U | | | | 20 |
| Chromium | 0.0250 | U | 0.0250 | mg/L | | 0.0250 U | | | | 20 |
| Lead | 0.0500 | U | 0.0500 | mg/L | | 0.0500 U | | | | 20 |
| Selenium | 0.100 | U | 0.100 | mg/L | | 0.100 U | | | | 20 |
| Silver | 0.0300 | U | 0.0300 | mg/L | | 0.0300 U | | | | 20 |

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|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-233<br>Project Number: K4063<br>Project Manager: Joan Kessner | **Reported:**<br>02/28/2013 13:06 |

## TCLP Metals by SW846 1311 6000/7000 series - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L302146 - SW 3010A** | | | | | | | | | | |
| **Matrix Spike (L302146-MS5)** | | **Source: 1302013-01** | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Arsenic | 5.10 | | 0.0750 | mg/L | 5.0000 | 0.0136 | 102 | 50-1000 | | |
| Barium | 93.4 | | 0.00500 | mg/L | 100.00 | 0.101 | 93.2 | 50-1000 | | |
| Cadmium | 0.988 | | 0.0150 | mg/L | 1.0000 | 0.0150 U | 98.8 | 50-1000 | | |
| Chromium | 5.22 | | 0.0250 | mg/L | 5.0000 | 0.0250 U | 104 | 50-1000 | | |
| Lead | 4.86 | | 0.0500 | mg/L | 5.0000 | 0.0500 U | 97.2 | 50-1000 | | |
| Selenium | 0.974 | | 0.100 | mg/L | 1.0000 | 0.100 U | 97.4 | 50-1000 | | |
| Silver | 5.04 | | 0.0300 | mg/L | 5.0000 | 0.0300 U | 101 | 50-1000 | | |
| **Batch L302147 - SW 7470A Prep** | | | | | | | | | | |
| **Blank (L302147-BLK1)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | | | | | |
| **Blank (L302147-BLK2)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | | | | | |
| **Blank (L302147-BLK3)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | | | | | |
| **LCS (L302147-BS1)** | | | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.00527 | | 0.000200 | mg/L | 0.0050000 | | 105 | 80-120 | | |
| **Duplicate (L302147-DUP8)** | | **Source: 1302013-01** | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | 0.000200 U | | | | 20 |
| **Matrix Spike (L302147-MS8)** | | **Source: 1302013-01** | | Prepared: 02/26/2013 Analyzed: 02/27/2013 | | | | | | |
| Mercury | 0.240 | | 0.0100 | mg/L | 0.20000 | 0.000200 U | 120 | 50-1000 | | |

Lionville Laboratory

# TCLP EXTRACTION RECORD
## (NON-VOLATILES)

LOGBOOK # 1252

| | | |
|---|---|---|
| Start Date: 2-5-13<br>Start Time: ~~RH~~ 13:12<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 2-6-13<br>End Time: 7:00<br>Analyst: RH<br>Method: 1311 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L302031<br>Leachate Page: 1 of 3<br>Room Temp. (°C):<br>Start 21 /Finish 21<br>**Room Temp. Acceptance Criteria:**<br>**23°C ± 2°** |

| | |
|---|---|
| LvL #: 1302003-01<br>Client ID#: JIRD44<br>pH After 5 Min: 5.84<br>pH After Acid/Heat: 2.05<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.94 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL #: 1302004-01<br>Client ID#: JIRD74<br>pH After 5 Min: 5.57<br>pH After Acid/Heat: 2.35<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.95 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL # 1302005-01<br>Client ID#: JIRD77<br>pH After 5 Min: 4.52<br>pH After Acid/Heat: N/A<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.90 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL #: 1302005-02<br>Client ID#: JIRD78<br>pH After 5 Min: 6.35<br>pH After Acid/Heat: 2.15<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.92 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1300077 | 1/28/13 | 7/28/13 | 4.93 ± 0.05 |
| **Fluid # 2** | ~~~~ | | ~~~~ | 2.88 ± 0.05 |



Reviewed By/Date RH 2/6/13



[redacted] 05 14 3/7/13

**Lionville Laboratory** **TCLP EXTRACTION RECORD (NON-VOLATILES)** LOGBOOK # 1252

| | | |
|---|---|---|
| Start Date: 2-5-13<br>Start Time: 13:12<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 2-6-13<br>End Time: 7:00<br>Analyst: RH<br>Method: 1311.1 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L302031<br>Leachate Page: 2 of 3<br>Room Temp. (°C):<br>Start 21 /Finish 21<br>**Room Temp. Acceptance Criteria:**<br>**23°C ± 2°** |

| | |
|---|---|
| LvL #: 1302013-01<br>Client ID#: JIRD82<br>pH After 5 Min: 6.02<br>pH After Acid/Heat: 2.35<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.91 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL #: 1302013-02<br>Client ID#: JIRD83<br>pH After 5 Min: 5.81<br>pH After Acid/Heat: 2.41<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.89 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL # 1302013-03<br>Client ID#: JIRD84<br>pH After 5 Min: 4.31<br>pH After Acid/Heat: N/A<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.87 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL #: 1302013-04<br>Client ID#: JIRD85<br>pH After 5 Min: 5.45<br>pH After Acid/Heat: 2.35<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.93 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1300077 | 1/28/13 | 7/28/13 | 4.93 ± 0.05 |
| **Fluid # 2** | ~~~ | | | 2.88 ± 0.05 |

SPI-1311.1-A-0310 Reviewed By/Date 2/7/13



3/7/13

**Lionville Laboratory** **TCLP EXTRACTION RECORD**
**(NON-VOLATILES)** LOGBOOK # 1252

| | | |
|---|---|---|
| Start Date: 2-5-13<br>Start Time: 13:12<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 2-6-13<br>End Time: 7:00<br>Analyst: RH<br>Method: 1311.1 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L302031<br>Leachate Page: 3 of 3<br>Room Temp. (°C):<br>Start 21 /Finish 21<br>**Room Temp. Acceptance Criteria:**<br>**23°C ± 2°** |

| | |
|---|---|
| LvL #: 1302014-01<br>Client ID#: JRD81<br>pH After 5 Min: 5.93<br>pH After Acid/Heat: 2.26<br>Extraction Fluid/pH: #1 4.92<br>Sample Wt.(g): 25 Grm<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 6.15 | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |
| LvL #: L302031<br>Client ID#: N/A<br>pH After 5 Min:<br>pH After Acid/Heat:<br>Extraction Fluid/pH:<br>Sample Wt.(g): N/A<br>Extract Fluid Vol.(mL):<br>pH After Extraction: | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: Blank |
| LvL #<br>Client ID#:<br>pH After 5 Min:<br>pH After Acid/Heat:<br>Extraction Fluid/pH:<br>Sample Wt.(g):<br>Extract Fluid Vol.(mL):<br>pH After Extraction: | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: 2-6-13 |
| LvL #:<br>Client ID#:<br>pH After 5 Min:<br>pH After Acid/Heat:<br>Extraction Fluid/pH:<br>Sample Wt.(g):<br>Extract Fluid Vol.(mL):<br>pH After Extraction: | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1300077 | 1/28/13 | 7/28/13 | 4.93 ± 0.05 |
| **Fluid # 2** | | | | 2.88 ± 0.05 |



Reviewed By/Date RH 2/7/13



3/7/13

**Lionville Laboratory** Logbook #: 1194

# SAMPLE DIGESTION RECORD

Digestion Batch #: L302146
Date/Time Initiated: 2/26/13 1150
Date/Time Completed: 2/27/13 1145
Analyst: MW
Matrix (circle): Soil Water Other TCLP
Method (circle one): 3005A 3010A 3050 200.7 (1994)
pH/Turbidity: N/A for Solids.
NOTE: All temperatures are recorded as corrected temperatures

(Digested) / Undigested (circle one)
Balance #:
Balance Cal Verification: Y (NA)
Temp: 95°
BLOCK 1 2 (3) (circle one)

| Work Order # | Spike Vol (mL) | Initial Wt/Vol (g/mL) | Final Vol (mL) | pH <2 | Type: To/Sol/ TC | Texture | Color / Appearance | Artifact | Turb |
|---|---|---|---|---|---|---|---|---|---|
| 1301060-01 | | 50 | 50 | < | TC | | clear, colorless | | |
| 02 | | 50 | 50 | < | | | clear, colorless | | |
| 03 | | 50 | 50 | < | | | clear, colorless | | |
| L302146-DUP1 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS1 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| 1302003-01 | | 50 | 50 | < | | | clear, light yellow | | |
| L302146-DUP2 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS2 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| 1302004-01 | | 50 | 50 | < | | | clear, yellow | | |
| L302146-DUP3 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS3 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| 1302005-01 | | 50 | 50 | < | | | clear, barely yellow | | |
| L302146-DUP4 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS4 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| 1302005-02 | | 50 | 50 | < | | | clear, barely yellow | | |
| 1302013-01 | | 50 | 50 | < | | | clear, yellow | | |
| L302146-DUP5 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS5 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| 1302013-02 | | 50 | 50 | < | | | clear, yellow | | |
| 03 | | 50 | 50 | < | | | clear, colorless | | |
| 04 | | 50 | 50 | < | | | clear, barely yellow | | |
| 1302014-01 | | 50 | 50 | < | | | clear, barely yellow | | |
| L302146-DUP6 | | 50 | 50 | < | | | ↓ ↓ | | |
| MS6 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| BLK1 | | 50 | 50 | | | | clear, colorless | | |
| BS1 | 0.5 | 50 | 50 | | | | ↓ ↓ | | |
| BLK2 (X) | | 50 | 50 | < | ↓ | | ↓ ↓ | | |

Spiking IDs / Expiration Date:
MS#: 1201195
1250388
LCS#: 1201583

Reagent IDs:
$HNO_3$ 0000003390
HCl
$H_2O_2$
1:1 $HNO_3$
1:1 HCl 637-069-01

File ID#:

Data Review By/Date:
RMP, 02/28/13

J.E. MW 2/26/13
(X) L17: L302051-BLK1

R:\group\QA\SOP\
Signed\SPI\Metals Digestion log.doc

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Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1198

Analyst: [signature]
Date 2/26/13
Start Time/Temp: 1730/95°
End Time/Temp: 1940/97°

Instrument ID: HG3.1
Balance # (NA)
Pipette Calibration (Daily) (Y)

Prep Batch: L302147
Worksheet: HG022701
SOP No. ME-HgCVAA
BLOCK (1) 2 (circle one)

**NOTE: All temperatures are recorded as corrected temperatures.**

| LvL Work Order# | pH < 2 (Liq) | Spike Vol (mL) | Spike Conc. (µg/L) | Initial Wt. or Vol (g or (mL)) | Final Sample Vol (mL) | Comments, % Solids, etc. |
|---|---|---|---|---|---|---|
| Blank | | | | 35 | 35 | |
| 0.2 ug/L | | 0.070 | | 35 | 35 | |
| 1.0 ug/L | | 0.350 | | 35 | 35 | |
| 2.0 ug/L | | 0.700 | | 35 | 35 | |
| 5.0 ug/L | | 1.750 | | 35 | 35 | |
| 10.0 ug/L | | 3.500 | | 35 | 35 | |
| ICV | | 0.0875 | 2.5 | 35 | 35 | |
| CCV | | 0.175 | 5.0 | 35 | 35 | |
| ICB/CCB | | | | 35 | 35 | |
| L302147-BLK1 | | | | 35 | 35 | |
| BS1 | | 0.175 | 5.0 | 35 | 35 | |
| BLK2 | < | | | 35 | 35 | |
| BLK3 | < | | | 35 | 35 | |
| 1301060-01 | < | | | 35 | 35 | |
| 02 | < | | | 35 | 35 | |
| 03 | < | | | 35 | 35 | |
| L302147-DUP1 | < | | | 35 | 35 | |
| MS1 | | 0.700 | 200 * | 35 | 35 | |
| 1301062-01 | < | | | 35 | 35 | |
| L302147-DUP2 | < | | | 35 | 35 | |
| MS2 | | 0.700 | 200 * | 35 | 35 | |
| 1301065-01 | < | | | 35 | 35 | |
| L302147-DUP3 | < | | | 35 | 35 | |
| MS3 | | 0.700 | 200 * | 35 | 35 | |
| 1301066-01 | < | | | 35 | 35 | |
| L302147-DUP4 | < | | | 35 | 35 | |
| MS4 | | 0.700 | 200 * | 35 | 35 | |

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | RI 120/235 | 2/26/13 1125 |
| ICV/CCV/LCS | (I.V. 120/411) | N/A |

Reviewed By/Date: [signature] 02/28/13

se book # 1198 for std traceability information

Soil LCS True Value = N/A mg/Kg
Standard # _____

Water Matrix Spiking Solution Concentration = 0.1 µg/ml
ater LCS Spiking Concentration: 1.0 µg/ml

* used 1201234 (10 ug/mL)



3/1/13

Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1198

Analyst: MLH
Date 2/26/13
Start Time/Temp: 1245 051
End Time/Temp: 1245 051

Instrument ID: HG3.1
Balance # (NA)
Pipette Calibration (Daily) (Y) ____

Prep Batch: L302147
Worksheet: HG022701
SOP No. ME-HgCVAA
BLOCK (1) 2 (circle one)

**NOTE: All temperatures are recorded as corrected temperatures.**

| LvL Work Order# | pH < 2 (Liq) | Spike Vol (mL) | Spike Conc. (µg/L) | Initial Wt. or Vol (g or mL) | Final Sample Vol (mL) | Comments, % Solids, etc. |
|---|---|---|---|---|---|---|
| 1302003-01 | | | | 35 | 35 | |
| L302147-DUP5 | | | | 35 | 35 | |
| MS5 | | 0.700 | 200* | 35 | 35 | |
| 1302004-01 | | | | 35 | 35 | cancelled |
| L302147-DUP6 | | | | 35 | 35 | |
| MS6 | | 0.700 | 200* | 35 | 35 | |
| 1302005-01 | | | | 35 | 35 | |
| L302147-DUP7 | | | | 35 | 35 | |
| MS7 | | 0.700 | 200* | 35 | 35 | |
| 1302005-02 | | | | 35 | 35 | |
| 1302013-01 | | | | 35 | 35 | |
| L302147-DUP8 | | | | 35 | 35 | |
| MS8 | | 0.700 | 200* | 35 | 35 | |
| 1302013-02 | | | | 35 | 35 | |
| 03 | | | | 35 | 35 | |
| 04 | | | | 35 | 35 | |
| 1302014-01 | | | | 35 | 35 | cancelled |
| L302147-DUP9 | | | | 35 | 35 | |
| MS9 | | 0.700 | 200* | 35 | 35 | |

MW 2/26/13

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | | |
| ICV/CCV/LCS | | |

Soil LCS True Value = 1245 051 mg/Kg
Standard # ____

Reviewed By/Date: BMP, 02/28/13

se book # 1198 for std traceability information

Water Matrix Spiking Solution Concentration = 0.1 µg/ml
after LCS Spiking Concentration: 1.0 µg/ml

* see page 51A

ME-HgCVAA-Prep0910

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DESTROYED