# SAF-RC-054
# 100K Burial Grounds –
# Soil In-Process
# FINAL DATA PACKAGE

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt H4-21 KW 12/19/12
INITIAL/DATE

**COMMENTS:**

**SDG KP0161 SAF-RC-054**

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

**Waste Site: 118-K-1 Stained Soil**

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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

17 December 2012

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 # | 1211119 |
| SDG # | KP0161 |
| SAF # | RC-054 |
| Date Received | 11/29/12 |
| # Samples | 1 |
| Matrix | SOIL |
| Volatiles | |
| Semivolatiles | |
| Pest/PCB | |
| Glycols | |
| DRO/KRO/GRO | |
| PAHs | |
| Herbicides | |
| Metals | X |
| Inorganics | 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 26 pages.

R:\GROUP\PM\ORLETTE\Hanford\Data\B_ltrs.DOC

# CHAIN OF CUSTODY

*REVISION*

| Lionville Laboratory Use Only |
|---|
| 12/11/19 |

# Custody Transfer Record/Lab Work Request

Page 1 of 1

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

Lionville Laboratory
A Division of Eberline Analytical Corporation

KP0161

Client: WC HANFORD SAF# RC-~~225~~ 054

Est. Final Proj. Sampling Date: OSJ 12/4/12

Project#:

Project Contact/Phone#:

Lionville Laboratory Project Manager: O. Johnson

QC: 8W Del: Std TAT: 7 Day

Date Rec'd: 11-29-12 Date Due: 12-6-12

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

ANALYSES REQUESTED →

| ORGANIC | | | | INORG | | |
|---|---|---|---|---|---|---|
| VOA | BNA | Pest/PCB | Herb | Metal Hg | CN | IC Anions |

Lionville Laboratory Use Only

| Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected | METALS + Hg | ANIONS NO3, pH |
|---|---|---|---|---|---|---|---|---|
| 01 | J1R612 | ✓ | ✓ | Soil | 11-26-12 | 1215 | X | X |

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

Special Instructions:
METALS = HSL + B, Mo, Si (NOTL)

Special Instructions:
12/4/12 1. SAF corrected to RC-054 per client osj
2.
3.
4.
5.
6.

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| [signature] | [signature] | 11/29/12 | 1000 |
| | | | |

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

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

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-225-078 | Page 1 of 1 |
|---|---|---|---|
| Collector BH 11/26/12 ~~Brackett, R~~ DUNNUM, A | Company Contact: Joan Kessner; Telephone No.: (509) 375-4688 | Project Coordinator: KESSNER, JH | Price Code: 8B; Data Turnaround: 7 Days |
| Project Designation: 100K Remaining Waste Sites - Soil In-Process | Sampling Location: 118-K-1 Stained Soil | SAF No.: RC-225 | |
| Ice Chest No.: WCH-12-021 | Field Logbook No.: EL-1602-10; COA: R118K12600 | Method of Shipment: FedEx | |
| Shipped To: EBERLINE SERVICES (LIONVILLE) | Offsite Property No.: A120647 | Bill of Lading/Air Bill No.: See OSPC | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*None*

**Special Handling and/or Storage**

*Cool 4C*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | Cool 4C | Cool 4C | None | None | None | | | | | | |
| Type of Container | G/P | G/P | G/P | G/P | G/P | | | | | | |
| No. of Container(s) | 1 | 1 | 1 | 1 | 1 | | | | | | |
| Volume | 125mL | 125mL | 500mL | 125mL | 60mL | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | See item (2) in Special Instructions. | See item (3) in Special Instructions | Gross Alpha & Gross Beta | RCF GEA Shipping Screen | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | RCF | 35019 | | | | | |
| J1R612 | SOIL | 11/26/12 | 1215 | X | X | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Aaron Dunnum | 11-26-12 1300 | BHUDSON BHudson | 11/26/12 1300 |
| BHUDSON BHudson | 11/26/12 1415 | 1060#3 A. Freier A. Freier | 1415 11-26-12 |
| 1060#3 A. Freier A. Freier | WCH 11-27-12 0945 | Fed Ex | |
| Fed Ex | 11-29-12 1000 | VICTOR HERNANDEZ | 11-29-12 1000 |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**

(1) ICP Metals - 6010TR (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) 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}
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}

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

REVIEWED BY CMB DATE 11-27-12

KP0161

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

WCH-EE-011

00000004

Lionville Laboratory

# SAMPLE RECEIPT CHECKLIST (SRC)

**CLIENT:** WC HANFORD **Date:** 11/29/12

Project/SAF/SOW/Release #: RC-225 KP0161

**LvL Batch #:** 1211119 **Sample Custodian:** Victor Hernandez

NOTE: EXPLAIN ALL DISCREPANCIES

| | | | |
|---|---|---|---|
| 1. Samples Hand Delivered or Shipped? | Carrier Fed Ex | | Airbill # 7941 5716 3425 |
| 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 2.2° °C | | Cooler # WCH-12-021 |
| 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 65 | ☑ No NO3 NO2 OPO4 | rec'd out of hold |
| Short holds taken to wet lab? | ☐ Yes | ☐ No | ☑ N/A |
| 13. VOA, TOC, TOX free of headspace? | ☐ Yes 11/30/12 | ☐ 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 11/30/12 | ☑ No | See #12 |
| 16. Project Manager contacted concerning any discrepancies? | ☐ Yes | ☐ No | ☑ N/A |

Person Contacted_____ Date_____

SR-002-B-0412.doc

000000005

# METALS

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

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

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1R612 | 1211119-01 | Soil | 11/26/2012 12:15 | 11/29/2012 10:00 |

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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

# Case Narrative

**Client:** WC-HANFORD RC-225
**LVL#:** 1211119
**SDG/SAF#:** KP0161/RC-225

**W.O.#:** 60049-001-001-0001-00
**Date Received:** 11-29-12

## 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 1 soil sample.

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

   All samples were analyzed and reported 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 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, samples were 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) recoveries for 5 analytes were 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, Iron, Antimony, Copper, and Silicon.

12. All duplicate analyses were within 20% Relative Percent Difference (RPD) control limit critieria. The ± 20% RPD control limit applies to sample results greater 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 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

12/7/12
Date

alm/11-119hg%

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

## 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 |

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

## J1R612
### 1211119-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Metals by SW846 6000/7000 series** | | | | | | | | | |
| **Aluminum** | **11200** | | 15.0 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Antimony | 1.80 | U | 1.80 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Arsenic** | **2.58** | B | 3.00 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Barium** | **79.6** | | 1.50 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Beryllium** | **0.348** | B | 0.599 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Boron** | **2.15** | B | 5.99 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Cadmium | 0.599 | U | 0.599 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Calcium** | **3950** | | 300 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Chromium** | **15.2** | | 0.599 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Cobalt** | **7.15** | | 5.99 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Copper** | **16.8** | | 3.00 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Iron** | **22600** | | 59.9 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Lead** | **5.11** | | 1.50 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Magnesium** | **4280** | | 225 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Manganese** | **358** | | 15.0 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Molybdenum | 5.99 | U | 5.99 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Nickel** | **12.1** | | 12.0 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Potassium** | **2180** | | 1200 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Selenium | 0.899 | U | 0.899 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Silicon** | **900** | | 5.99 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Silver | 0.599 | U | 0.599 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Sodium** | **261** | | 150 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Vanadium** | **50.6** | | 7.49 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| **Zinc** | **45.1** | | 30.0 | mg/kg dry | 3 | L212013 | 12/04/2012 | 12/05/2012 | 6010B |
| Mercury | 0.0317 | U | 0.0317 | mg/kg dry | 1 | L212014 | 12/04/2012 | 12/05/2012 | 7471A |

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

## 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 L212013 - SW 3050B** | | | | | | | | | | |
| **Blank (L212013-BLK1)** | | | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| 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 | 96.2 | U | 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 | 72.1 | U | 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 | | | | | | |
| **Duplicate (L212013-DUP3)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Aluminum | 10400 | | 14.7 | mg/kg dry | | 11200 | | | 7.31 | 20 |
| Antimony | 1.77 | U | 1.77 | mg/kg dry | | 1.80 U | | | | 20 |
| Arsenic | 2.62 | B | 2.95 | mg/kg dry | | 2.58 | | | 1.84 | 20 |
| Barium | 78.4 | | 1.47 | mg/kg dry | | 79.6 | | | 1.50 | 20 |
| Beryllium | 0.327 | B | 0.589 | mg/kg dry | | 0.348 | | | 6.41 | 20 |
| Boron | 2.02 | B | 5.89 | mg/kg dry | | 2.15 | | | 6.26 | 20 |
| Cadmium | 0.589 | U | 0.589 | mg/kg dry | | 0.599 U | | | | 20 |
| Calcium | 3680 | | 295 | mg/kg dry | | 3950 | | | 7.11 | 20 |
| Chromium | 15.5 | | 0.589 | mg/kg dry | | 15.2 | | | 1.71 | 20 |
| Cobalt | 7.25 | | 5.89 | mg/kg dry | | 7.15 | | | 1.36 | 20 |
| Copper | 14.0 | | 2.95 | mg/kg dry | | 16.8 | | | 17.9 | 20 |

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

# 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 L212013 - SW 3050B** | | | | | | | | | | |
| **Duplicate (L212013-DUP3)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Iron | 22800 | | 58.9 | mg/kg dry | | 22600 | | | 1.10 | 20 |
| Lead | 5.06 | | 1.47 | mg/kg dry | | 5.11 | | | 0.952 | 20 |
| Magnesium | 4110 | | 221 | mg/kg dry | | 4280 | | | 4.06 | 20 |
| Manganese | 364 | | 14.7 | mg/kg dry | | 358 | | | 1.80 | 20 |
| Molybdenum | 5.89 | U | 5.89 | mg/kg dry | | 5.99 U | | | | 20 |
| Nickel | 11.7 | B | 11.8 | mg/kg dry | | 12.1 | | | 3.58 | 20 |
| Potassium | 2040 | | 1180 | mg/kg dry | | 2180 | | | 6.37 | 20 |
| Selenium | 0.884 | U | 0.884 | mg/kg dry | | 0.899 U | | | | 20 |
| Silicon | 937 | | 5.89 | mg/kg dry | | 900 | | | 4.01 | 20 |
| Silver | 0.589 | U | 0.589 | mg/kg dry | | 0.599 U | | | | 20 |
| Sodium | 228 | | 147 | mg/kg dry | | 261 | | | 13.8 | 20 |
| Vanadium | 55.0 | | 7.37 | mg/kg dry | | 50.6 | | | 8.42 | 20 |
| Zinc | 43.8 | | 29.5 | mg/kg dry | | 45.1 | | | 2.72 | 20 |
| **Matrix Spike (L212013-MS3)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Aluminum | 11600 | | 14.3 | mg/kg dry | 190.21 | 11200 | 212* | 75-125 | | |
| Antimony | 14.8 | | 1.71 | mg/kg dry | 47.553 | 1.80 U | 31.1* | 75-125 | | |
| Arsenic | 162 | | 2.85 | mg/kg dry | 190.21 | 2.58 | 83.6 | 75-125 | | |
| Barium | 245 | | 1.43 | mg/kg dry | 190.21 | 79.6 | 87.0 | 75-125 | | |
| Beryllium | 4.46 | | 0.571 | mg/kg dry | 4.7553 | 0.348 | 86.5 | 75-125 | | |
| Boron | 80.4 | | 5.71 | mg/kg dry | 95.105 | 2.15 | 82.3 | 75-125 | | |
| Cadmium | 3.85 | | 0.571 | mg/kg dry | 4.7553 | 0.599 U | 80.9 | 75-125 | | |
| Calcium | 6170 | | 285 | mg/kg dry | 2377.6 | 3950 | 93.3 | 75-125 | | |
| Chromium | 31.2 | | 0.571 | mg/kg dry | 19.021 | 15.2 | 83.8 | 75-125 | | |
| Cobalt | 47.7 | | 5.71 | mg/kg dry | 47.553 | 7.15 | 85.2 | 75-125 | | |
| Copper | 34.4 | | 2.85 | mg/kg dry | 23.776 | 16.8 | 74.0* | 75-125 | | |
| Iron | 22500 | | 57.1 | mg/kg dry | 95.105 | 22600 | -29.2* | 75-125 | | |
| Lead | 45.0 | | 1.43 | mg/kg dry | 47.553 | 5.11 | 83.8 | 75-125 | | |
| Magnesium | 6220 | | 214 | mg/kg dry | 2377.6 | 4280 | 81.4 | 75-125 | | |
| Manganese | 403 | | 14.3 | mg/kg dry | 47.553 | 358 | 95.0 | 75-125 | | |
| Molybdenum | 80.8 | | 5.71 | mg/kg dry | 95.105 | 5.99 U | 85.0 | 75-125 | | |
| Nickel | 52.1 | | 11.4 | mg/kg dry | 47.553 | 12.1 | 84.2 | 75-125 | | |
| Potassium | 4160 | | 1140 | mg/kg dry | 2377.6 | 2180 | 83.3 | 75-125 | | |
| Selenium | 158 | | 0.856 | mg/kg dry | 190.21 | 0.899 U | 83.0 | 75-125 | | |
| Silicon | 1150 | | 5.71 | mg/kg dry | 95.105 | 900 | 259* | 75-125 | | |
| Silver | 3.93 | | 0.571 | mg/kg dry | 4.7553 | 0.599 U | 82.7 | 75-125 | | |
| Sodium | 2440 | | 143 | mg/kg dry | 2377.6 | 261 | 91.6 | 75-125 | | |

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

# 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 L212013 - SW 3050B** | | | | | | | | | |
| **Matrix Spike (L212013-MS3)** | | **Source: 1211119-01** | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Vanadium | 92.9 | 7.13 | mg/kg dry | 47.553 | 50.6 | 88.9 | 75-125 | | |
| Zinc | 84.9 | 28.5 | mg/kg dry | 47.553 | 45.1 | 83.9 | 75-125 | | |
| **Post Spike (L212013-PS3)** | | **Source: 1211119-01** | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Aluminum | 167000 | | ug/L | 66000 | 112000 | 83.2 | 75-125 | | |
| Antimony | 288 | | ug/L | 300.00 | 3.50 | 94.9 | 75-125 | | |
| Copper | 464 | | ug/L | 300.00 | 168 | 98.8 | 75-125 | | |
| Iron | 333000 | | ug/L | 126000 | 226000 | 84.9 | 75-125 | | |
| Silicon | 15000 | | ug/L | 6300.0 | 9010 | 94.6 | 75-125 | | |
| **Reference (L212013-SRM1)** | | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Aluminum | 10500 | 14.4 | mg/kg wet | 6670.0 | | 158 | 0-200.89 | | |
| Antimony | 41.5 | 1.73 | mg/kg wet | 53.000 | | 78.4 | 0-235.8 | | |
| Arsenic | 113 | 2.88 | mg/kg wet | 114.00 | | 98.9 | 82.8-117.54 | | |
| Barium | 303 | 1.44 | mg/kg wet | 307.00 | | 98.6 | 79.8-120.2 | | |
| Beryllium | 107 | 0.577 | mg/kg wet | 108.00 | | 99.5 | 82.8-117.6 | | |
| Boron | 81.7 | 5.77 | mg/kg wet | 85.100 | | 96.0 | 67.5-132.8 | | |
| Cadmium | 222 | 0.577 | mg/kg wet | 225.00 | | 98.7 | 83.6-116.4 | | |
| Calcium | 3390 | 288 | mg/kg wet | 3360.0 | | 101 | 83.3-116.9 | | |
| Chromium | 82.2 | 0.577 | mg/kg wet | 77.200 | | 106 | 73.3-126.4 | | |
| Cobalt | 162 | 5.77 | mg/kg wet | 166.00 | | 97.9 | 80.7-118.7 | | |
| Copper | 262 | 2.88 | mg/kg wet | 271.00 | | 96.6 | 80.8-119.2 | | |
| Iron | 8740 | 57.7 | mg/kg wet | 8420.0 | | 104 | 78.6-121.1 | | |
| Lead | 177 | 1.44 | mg/kg wet | 190.00 | | 93.0 | 81.6-118.4 | | |
| Magnesium | 9200 | 216 | mg/kg wet | 8570.0 | | 107 | 83.2-116.7 | | |
| Manganese | 968 | 14.4 | mg/kg wet | 965.00 | | 100 | 69.3-130.5 | | |
| Molybdenum | 232 | 5.77 | mg/kg wet | 235.00 | | 98.6 | 76.2-123.8 | | |
| Nickel | 220 | 11.5 | mg/kg wet | 221.00 | | 99.4 | 79.6-120.8 | | |
| Potassium | 14800 | 1150 | mg/kg wet | 14400 | | 103 | 81.9-118.1 | | |
| Selenium | 185 | 0.865 | mg/kg wet | 187.00 | | 98.9 | 75.9-124.6 | | |
| Silicon | 1020 | 5.77 | mg/kg wet | 807.00 | | 126 | 0-219.3 | | |
| Silver | 81.5 | 0.577 | mg/kg wet | 83.500 | | 97.6 | 82.7-117.1 | | |
| Sodium | 9960 | 144 | mg/kg wet | 9730.0 | | 102 | 82.5-117.2 | | |
| Vanadium | 105 | 7.21 | mg/kg wet | 98.700 | | 106 | 75.9-123.6 | | |
| Zinc | 198 | 28.8 | mg/kg wet | 199.00 | | 99.4 | 78.4-121.6 | | |

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 09:51 |

## 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 L212014 - SW 7471A Prep** | | | | | | | | | | |
| **Blank (L212014-BLK1)** | | | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Mercury | 0.0300 | U | 0.0300 | mg/kg wet | | | | | | |
| **Duplicate (L212014-DUP4)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Mercury | 0.0284 | U | 0.0284 | mg/kg dry | | 0.0317 U | | | | 20 |
| **Matrix Spike (L212014-MS4)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Mercury | 0.181 | | 0.0284 | mg/kg dry | 0.15767 | 0.0317 U | 115 | 75-125 | | 20 |
| **Reference (L212014-SRM1)** | | | | Prepared: 12/04/2012 Analyzed: 12/05/2012 | | | | | | |
| Mercury | 1.27 | | 0.0290 | mg/kg wet | 1.2900 | | 98.5 | 62.6-138 | | |

**Lionville Laboratory** Logbook #: 1194

## SAMPLE DIGESTION RECORD

Digestion Batch #: L212013
Date/Time Initiated: 12/4/12 1150
Date/Time Completed: 12/4/12 1920
Analyst: NW
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: 97°
BLOCK 1 2 (circle one)
3

| Work Order # | Spike Vol (mL) | Initial Wt/Vol (g/mL) | Final Vol (mL) | pH <2 | Type: To/Sol/ TC | Texture | Color / Appearance | Artifact | Turb |
|---|---|---|---|---|---|---|---|---|---|
| 1211068-01 | | 0.58 | 50 | | TO | not fine | brown sandy | N/A | |
| L212013-DUP1 | | 0.63 | 50 | | | | | | |
| MS1 | 0.5 * | 0.62 | 50 | | | | | | |
| 1211118-01 | | 0.57 | 50 | | | coarse | dark brown gravelly | rocks | RAD I |
| L212013-DUP2 | | 0.55 | 50 | | | | | | |
| MS2 | 0.5 | 0.55 | 50 | | | | | | |
| BLK1 | | 0.52 | 50 | | | coarse | boiling chips | N/A | |
| SRM1 | * | 0.52 | 50 | | | fine | pink sandy | | |
| 1211119-01 | | 0.60 | 50 | | | fine | brown soil | rock | x-ferred from L212012 |
| L212013-DUP3 | | 0.61 | 50 | | | | | | |
| MS3 | 0.5 | 0.63 | 50 | | | | | | |

NW 12/4/12

Spiking IDs / Expiration Date:
MS#: 1201581

LCS#: 1201014 *

Reagent IDs:
$HNO_3$ 0000003390
HCl L13029
$H_2O_2$ L11A03
1:1 $HNO_3$ 637-076-07
1:1 HCl

File ID#:

Data Review By/Date: QEM 12/5/12

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

* also 0.250 ml (0-)
0.250 ml (2r)

Page #:



000000016

# PREPARATION BENCH SHEET

L212013

**Lionville Laboratory**

**Printed: 12/4/2012 8:56:36PM**

**Matrix: Solid** **Prepared using: METALS - SW 3050B** **(No Surrogate)**

| Lab Number | Analysis | Prepared | Initial (g) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211068-01 | 6010B HSL Metals | 12/04/2012 11:50 | 0.58 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Li, Mo, Si, U, Zr (No TL) |
| 1211118-01 | 6010B HSL Metals | 12/04/2012 11:50 | 0.57 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211119-01 | 6010B HSL Metals | 12/04/2012 11:50 | 0.6 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| L212013-BLK1 | QC | 12/04/2012 11:50 | 0.52 | 50 | | | | | | |
| L212013-DUP1 | QC | 12/04/2012 11:50 | 0.63 | 50 | | 1211068-01 | | | | |
| L212013-DUP2 | QC | 12/04/2012 11:50 | 0.55 | 50 | | 1211118-01 | | | | |
| L212013-DUP3 | QC | 12/04/2012 11:50 | 0.61 | 50 | | 1211119-01 | | | | |
| L212013-MS1 | QC | 12/04/2012 11:50 | 0.62 | 50 | 1201581 | 1211068-01 | 500 | | | |
| L212013-MS2 | QC | 12/04/2012 11:50 | 0.55 | 50 | 1201581 | 1211118-01 | 500 | | | |
| L212013-MS3 | QC | 12/04/2012 11:50 | 0.63 | 50 | 1201581 | 1211119-01 | 500 | | | |
| L212013-PS1 | QC | 12/04/2012 11:50 | 0.58 | 50 | 1201582 | 1211068-01 | 100 | | | |
| L212013-PS2 | QC | 12/04/2012 11:50 | 0.57 | 50 | 1201582 | 1211118-01 | 100 | | | |
| L212013-PS3 | QC | 12/04/2012 11:50 | 0.6 | 50 | 1201582 | 1211119-01 | 100 | | | |
| L212013-SRM1 | QC | 12/04/2012 11:50 | 0.52 | 50 | 1201014 | | 520 | | | |

Extracts Relinquished By — Date: 12/4/12

Extracts Received By — Date: 12/05/12

Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1153

Analyst: [illegible]
Date 12/4/12
Start Time/Temp: 1938/94°
End Time/Temp:

Instrument ID: HG3.1
Balance # 614 /NA
Pipette Calibration (Daily) Y

Prep Batch: L212014
Worksheet: HG 120501
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 | | | | 10 ml | 50 | |
| 0.2 µg/l | | 0.100 | | 10 ml | 50 | |
| 1.0 µg/l | | 0.500 | | 10 ml | 50 | |
| 2.0 µg/l | | 1.000 | | 10 ml | 50 | |
| 5.0 µg/l | | 2.500 | | 10 ml | 50 | |
| 10.0 µg/l | | 5.000 | | 10 ml | 50 | |
| ICV | | 0.125 | 2.5 | 10 ml | 50 | |
| CCV | | 0.250 | 5.0 | 10 ml | 50 | |
| ICB/CCB | | | | ~~0.30~~ 10 ml | 50 | |
| L212014-BLK1 | | | | 0.30 | 50 | |
| SRM1 | | | | 0.31 | 50 | |
| 1211068-01 | | | | 0.36 | 50 | |
| L212014-DUP1 | | | | 0.34 | 50 | |
| MS1 | | 0.500 | 1.0 | 0.36 | 50 | |
| 1211115-01 | | | | 0.35 | 50 | |
| L212014-DUP2 | | | | 0.34 | 50 | |
| MS2 | | 0.500 | 1.0 | 0.37 | 50 | |
| 1211115-02 | | | | 0.37 | 50 | |
| 1211118-01 | | | | 0.37 | 50 | RAD |
| L212014-DUP3 | | | | ~~0.36~~ 0.36 | 50 | ↓ |
| MS3 | | 0.500 | 1.0 | 0.35 | 50 | ↓ |
| 1211119-01 | | | | 0.34 | 50 | |
| L212014-DUP4 | | | | 0.38 | 50 | |
| MS4 | | 0.500 | 1.0 | 0.38 | 50 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

[illegible] 12/4/12

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | RI 120235 | |
| ICV/CCV/LCS | C.V. 120411 | |

Reviewed By/Date: [illegible] 12/6/12

see book # 1153 for std traceability information

Soil LCS True Value = 1.29 mg/Kg
Standard # 120104

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

ME-HgCVAA-Prep0910

Page #:

000000018

# WET CHEMISTRY

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

## Analytical Report for Wet Chemistry

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1R612 | 1211119-01 | Soil | 11/26/2012 12:15 | 11/29/2012 10:00 |

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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

# Case Narrative

**Client:** WC-HANFORD RC-054 KP0161
**LVL#:** 1211119 **Date Received:** 11-29-12

## INORGANIC NARRATIVE

1. This narrative covers the analyses of 1 soil sample.

2. The sample was 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 Orthophosphate that were received past hold.

4. The results presented in this report are derived from samples that met LvL's sample acceptance policy with the exceptions noted on the Sample Receipt Checklist.

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.

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. Release of the data contained in this hard copy package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Iain Daniels
Laboratory Manager
Lionville Laboratory

12/17/12
Date

njp\i11-119

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 10 pages.

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

## Notes and Definitions

| | |
|---|---|
| U | Analyte included in the analysis, but not detected |
| 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 |

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

# Wet Chemistry

## Lionville Laboratory

| Analyte | Result and Qualifier | | LOD | LOQ | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| **J1R612 (1211119-01) Soil** | | | | | | | | | | |
| **%Solids** | **83.4** | | | 0.1 | % by Weight | 1 | L212017 | 12/04/2012 12:00 | 12/04/2012 12:00 | SM2540G |
| Bromide | 1.1 | U | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| Chloride | 1.1 | U | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| **Fluoride** | **1.1** | B | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| **Nitrate** | **4.2** | B | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| Nitrite | 1.1 | U | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| **Orthophosphate** | **7.1** | B | 2.2 | 11.1 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| **Sulfate** | **3.8** | B | 1.1 | 5.6 | mg/kg dry | 1 | L212038 | 12/04/2012 13:50 | 12/04/2012 19:00 | EPA 300.0 (1993) |
| **Nitrate/Nitrite as N** | **1.22** | | 0.11 | 0.56 | mg/kg dry | 1 | L212062 | 12/04/2012 13:50 | 12/06/2012 12:00 | EPA 353.2 |
| **pH** | **7.61** | | 0.10 | 0.10 | pH Units | 1 | L212050 | 12/07/2012 09:52 | 12/07/2012 11:02 | SW846 9045D |

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

# Wet Chemistry - Quality Control
## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L212017 - % Solids** | | | | | | | | | | |
| **Duplicate (L212017-DUP3)** | **Source: 1211119-01** | | | Prepared & Analyzed: 12/04/2012 12:00 | | | | | | |
| %Solids | 81.2 | | 0.1 | % by Weight | | 83.4 | | | 3 | 20 |
| **Batch L212038 - Default Prep GenChem** | | | | | | | | | | |
| **Blank (L212038-BLK1)** | | | | Prepared: 12/04/2012 13:50 Analyzed: 12/04/2012 19:00 | | | | | | |
| 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 (L212038-BS1)** | | | | Prepared: 12/04/2012 13:50 Analyzed: 12/04/2012 19:00 | | | | | | |
| Fluoride | 45.7 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 91.4 | 80-120 | | |
| Chloride | 46.2 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 92.4 | 80-120 | | |
| Bromide | 47.3 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 94.6 | 80-120 | | |
| Orthophosphate | 46.2 | 2.0 | 10.0 | mg/kg wet | 50.000 | | 92.4 | 80-120 | | |
| Sulfate | 48.1 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 96.2 | 80-120 | | |
| Nitrate | 47.2 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 94.4 | 80-120 | | |
| Nitrite | 48.0 | 1.0 | 5.0 | mg/kg wet | 50.000 | | 96.0 | 80-120 | | |
| **Duplicate (L212038-DUP1)** | **Source: 1211119-01** | | | Prepared: 12/04/2012 13:50 Analyzed: 12/04/2012 19:00 | | | | | | |
| Fluoride | 1.2 U | 1.2 | 5.9 | mg/kg dry | | 1.1 | | | | 20 |
| Chloride | 1.2 U | 1.2 | 5.9 | mg/kg dry | | 1.1 U | | | | 20 |
| Bromide | 1.2 U | 1.2 | 5.9 | mg/kg dry | | 1.1 U | | | | 20 |
| Orthophosphate | 6.3 B | 2.4 | 11.9 | mg/kg dry | | 7.1 | | | 12.3 | 20 |
| Sulfate | 4.3 B | 1.2 | 5.9 | mg/kg dry | | 3.8 | | | 12.2 | 20 |
| Nitrate | 4.1 B | 1.2 | 5.9 | mg/kg dry | | 4.2 | | | 1.71 | 20 |
| Nitrite | 1.2 U | 1.2 | 5.9 | mg/kg dry | | 1.1 U | | | | 20 |

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

# Wet Chemistry - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L212038 - Default Prep GenChem** | | | | | | | | | | |
| **Matrix Spike (L212038-MS1)** | **Source: 1211119-01** | | | Prepared: 12/04/2012 13:50 Analyzed: 12/04/2012 19:00 | | | | | | |
| Fluoride | 52.0 | 1.1 | 5.3 | mg/kg dry | 53.102 | 1.1 | 95.9 | 75-125 | | |
| Chloride | 52.1 | 1.1 | 5.3 | mg/kg dry | 53.102 | 1.1 U | 98.2 | 75-125 | | |
| Bromide | 52.6 | 1.1 | 5.3 | mg/kg dry | 53.102 | 1.1 U | 99.0 | 75-125 | | |
| Orthophosphate | 56.0 | 2.1 | 10.6 | mg/kg dry | 53.102 | 7.1 | 92.0 | 75-125 | | |
| Sulfate | 56.5 | 1.1 | 5.3 | mg/kg dry | 53.102 | 3.8 | 99.3 | 75-125 | | |
| Nitrate | 57.2 | 1.1 | 5.3 | mg/kg dry | 53.102 | 4.2 | 99.9 | 75-125 | | |
| Nitrite | 53.6 | 1.1 | 5.3 | mg/kg dry | 53.102 | 1.1 U | 101 | 75-125 | | |
| **Batch L212050 - NO PREP** | | | | | | | | | | |
| **Duplicate (L212050-DUP1)** | **Source: 1211119-01** | | | Prepared: 12/07/2012 09:53 Analyzed: 12/07/2012 11:04 | | | | | | |
| pH | 7.64 | 0.10 | 0.10 | pH Units | | 7.61 | | | 0.393 | 20 |
| **Reference (L212050-SRM1)** | | | | Prepared & Analyzed: 12/07/2012 11:17 | | | | | | |
| pH | 7.02 | 0.10 | 0.10 | pH Units | 7.0000 | | 100 | 99-101 | | |
| **Batch L212062 - Default Prep GenChem** | | | | | | | | | | |
| **Blank (L212062-BLK1)** | | | | Prepared: 12/04/2012 13:50 Analyzed: 12/06/2012 11:59 | | | | | | |
| Nitrate/Nitrite as N | 0.10 U | 0.10 | 0.50 | mg/kg wet | | | | | | |
| **LCS (L212062-BS1)** | | | | Prepared: 12/04/2012 13:50 Analyzed: 12/06/2012 11:58 | | | | | | |
| Nitrate/Nitrite as N | 5.15 | 0.10 | 0.50 | mg/kg wet | 5.0000 | | 103 | 90-110 | | |
| **Duplicate (L212062-DUP1)** | **Source: 1211119-01** | | | Prepared: 12/04/2012 13:50 Analyzed: 12/06/2012 12:01 | | | | | | |
| Nitrate/Nitrite as N | 1.19 | 0.12 | 0.59 | mg/kg dry | | 1.22 | | | 3.02 | 20 |

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-054 | |
| 2620 Fermi Avenue | Project Number: KP0161 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/10/2012 16:39 |

## Wet Chemistry - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | LOD | LOQ | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L212062 - Default Prep GenChem** | | | | | | | | | | |
| **Matrix Spike (L212062-MS1)** | | **Source: 1211119-01** | | Prepared: 12/04/2012 13:50 Analyzed: 12/06/2012 12:02 | | | | | | |
| Nitrate/Nitrite as N | 6.67 | 0.11 | 0.53 | mg/kg dry | 5.3102 | 1.22 | 103 | 75-125 | | |