# SAF-RC-190
# 100N Field Remediation – Soil In-Process
# FINAL DATA PACKAGE

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt H4-21 KW 1/16/13
INITIAL/DATE

**COMMENTS:**

**SDG KP0159 SAF-RC-190**

Rad only ☑ Chem only Rad & Chem

☑ Complete Partial

**Sample Location: 628-2**

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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

11 January 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 # | 1211103 |
| SDG # | KP0159 |
| SAF # | RC-190 |
| Date Received | 11/27/12 |
| # Samples | 1 |
| Matrix | SOIL |
| Volatiles | |
| Semivolatiles | X |
| Pest/PCB | |
| Glycols | |
| DRO/KRO/GRO | |
| PAHs | X |
| Herbicides | |
| Metals | X |
| Inorganics | |

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 78 pages.

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

# CHAIN OF CUSTODY

Lionville Laboratory Use Only

1211103

# Custody Transfer Record/Lab Work Request

Page 1 of 1

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

Lionville Laboratory
A Division of Eberline Analytical Corporation

KP6159

Client: WC Hanford SAF# RC-190
Est. Final Proj. Sampling Date:
Project#:
Project Contact/Phone#:
Lionville Laboratory Project Manager: O. Johnson
QC: SW  Del: Std  TAT: 7 Day

Date Rec'd: 11/27/12  Date Due: ~~12/25/12~~ 12-4-12 OS) 11/27/12

| | | A | | | B | | | C | | D-1 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Refrigerator # | | 2 | | | 2 | | | 2 | | 2 | 1 | | | | |
| #/Type Container | Liquid | | | | | | | | | | | | | | |
| | Solid | 1AG | | | 1AG | | | 1. | | 1 | 1 | | | | |
| Volume | Liquid | | | | | | | | | | | | | | |
| | Solid | 60 | | | 60 | | | 60 | | 120 | 1 | | | | |
| Preservatives | | — | | | — | | | — | | | | | | | |
| ANALYSES REQUESTED | | ORGANIC | | | | | | INORG | | | | | | | |
| | | VOA | BNA | Pest/PCB | Herb | PAHs | | Metal | CN | TCLP met | TCLP Hg | | | | |
| Lionville Laboratory Use Only | | | SW 8270 TCL | | | 8310 | | | METALS | | TCLP METALS | 1 | | | |

| MATRIX CODES: | Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 01 | T1R5X9 | | | Soil | 11-20-12 | 0949 | | X | | | X | | | X | | X | X | | | |
| | 02 | T1R600 | | | 1 | 1 | 0952 | | X | | | X | | | X | | X | X | | | |

**Special Instructions:**

METALS = HSL + B, Mo, Si (NOTL)

**Special Instructions:**

1.
2.
3.
4.
5.
6.

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| [illegible] | [illegible] | 11/27/12 | 1200 |
| | | | |

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

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

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-190-119 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector: Q. Stowe | Company Contact: Joan Kessner | Telephone No.: 375-4688 | Project Coordinator: KESSNER, JH |
| Price Code: ~~8L~~ 8J on 11/20/12 | Data Turnaround: ~~21~~ Days 7 21 11/20/12 | | |
| Project Designation: 100N Field Remediation - Soil In-Process | Sampling Location: 628-2 | | SAF No.: RC-190 |
| Ice Chest No.: RCC-08-022 | Field Logbook No.: EL-1652-07 | COA: 0628X22000 | Method of Shipment: FedEx |
| Shipped To: ~~EBERLINE SERVICES~~ / LIONVILLE on 11/20/12 | Offsite Property No.: A120646 | | Bill of Lading/Air Bill No.: See OSPC |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*None*

**Special Handling and/or Storage**

*Cool 4C*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | Cool 4C | None | Cool 4C | Cool 4C | | | | | | | |
| Type of Container | G/P | G/P | aG | aG | | | | | | | |
| No. of Container(s) | 1 | 1 | 1 | 1 | | | | | | | |
| Volume | 60mL | 120mL | 60mL | 60mL | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | See item (2) in Special Instructions. | Semi-VOA - 8270A (TCL) | PAHs - 8310 | | | | | | | |
| Sample No. / Matrix * / Sample Date / Sample Time | | | | | | | | | | | |
| J1R5X9 / SOIL / 11-20-12 / 0949 | X | X | X | X | | | | | | | |
| J1R600 / SOIL / 11-20-12 / 0952 | X | X | X | X | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

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

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Quincy Stowe | 11/20/12 1010 | Dennis Newman | 11/20/12 1010 |
| Dennis Newman | 11/20/12 1400 | Amy Burnham | 11-20-12 1400 |
| Amy Burnham | WCH 11-26-12 0840 | Fed Ex | |
| Fed Ex | 11-27-12 1000 | Victor Hernandez | 11-27-12 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) Metals by ICP (TCLP) - 1311/6010 {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury (TCLP) - 1311/7470 {Mercury}

KP0159

REVIEWED BY AJ DATE 11-26-12

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=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

Lionville Laboratory

# SAMPLE RECEIPT CHECKLIST (SRC)

**CLIENT:** WC Hanford **Date:** 11/27/12

Project/SAF/SOW/Release #: RC-190

**LvL Batch #:** 1211103 **Sample Custodian:** [signature]

NOTE: EXPLAIN ALL DISCREPANCIES

| | | | |
|---|---|---|---|
| 1. Samples Hand Delivered or Shipped? | Carrier Fed Ex | | Airbill # |
| 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 2-5 | °C | Cooler # RCC-08-022 |
| 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 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_____

SR-002-B-0412.doc

Lionville Laboratory Use Only

1211103

# Custody Transfer Record/Lab Work Request

Page 1 of 1

Lionville Laboratory
A Division of Eberline Analytical Corporation

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

KP6159

Client: WC Hanford SAF# RC-190

Est. Final Proj. Sampling Date:

Project#:

Project Contact/Phone#:

Lionville Laboratory Project Manager: O. Johnson

QC: SW  Del: STD  TAT: 7 Day

Date Rec'd: 11/27/12  Date Due: ~~12/25/12~~ 12-4-12 05) 11/27/12

| | | A | | | B | | | C | | D | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Refrigerator # | | 2 | | | 2 | | | 2 | | 2 | 1 | | | | |
| #/Type Container | Liquid | | | | | | | | | | | | | | |
| | Solid | 1AG | | | 1AG | | | 1 | | 1 | 1 | | | | |
| Volume | Liquid | | | | | | | | | | | | | | |
| | Solid | 60 | | | 60 | | | 60 | | 120 | 1 | | | | |
| Preservatives | | — | | | — | | | — | | | | | | | |
| ANALYSES REQUESTED | | ORGANIC | | | | | | INORG | | | | | | | |
| | | VOA | BNA | Pest/PCB | Herb | PAHs | | | Metal Sp | CN | TCLP met | TCLP Hg | | | |
| | | | SW 8270 TCL | | | 8310 | | | METALS | | TCLP METALS | 1 | | | |
| Lionville Laboratory Use Only | | | | | | | | | | | | | | | |
| Lab ID | Client ID/Description | | | | | | | | | | | | | | |
| 01 | T1R5X9 | | X | | | X | | | X | | X | X | | | |
| 02 | T1R600 | | X | | | X | | | X | | X | X | | | |

| Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected |
|---|---|---|---|---|---|---|
| 01 | T1R5X9 | | | Soil | 11-26-12 | 0949 |
| 02 | T1R600 | | | 1 | 1 | 0952 |

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:**

1.
2.
3.
4.
5.
6.

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| [illegible] | [illegible] | 11/27/12 | 1000 |
| | | | |

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

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

000000006

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | RC-190-119 | Page 1 of 1 |
|---|---|---|---|---|
| Collector: Q. Stowe | Company Contact: Joan Kessner | Telephone No.: 375-4688 | Project Coordinator: KESSNER, JH | Price Code: ~~8L~~ 85 on 11/20/12 |
| Project Designation: 100N Field Remediation - Soil In-Process | Sampling Location: 628-2 | | SAF No.: RC-190 | Data Turnaround: ~~21~~ Days 7 on 11/20/12 |
| Ice Chest No.: RCC-08-022 | Field Logbook No.: EL-1652-07 | COA: 0628X22000 | Method of Shipment: FedEx | |
| Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE on 11/20/12 | Offsite Property No.: A120646 | | Bill of Lading/Air Bill No.: See OSPC | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*None*

**Special Handling and/or Storage**

*Cool 4C*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | Cool 4C | None | Cool 4C | Cool 4C | | | | | | | |
| Type of Container | G/P | G/P | aG | aG | | | | | | | |
| No. of Container(s) | 1 | 1 | 1 | 1 | | | | | | | |
| Volume | 60mL | 120mL | 60mL | 60mL | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | See item (2) in Special Instructions. | Semi-VOA - 8270A (TCL) | PAHs - 8310 | | | | | | | |
| Sample No. / Matrix * / Sample Date / Sample Time | | | | | | | | | | | |
| J1R5X9 / SOIL / 11-20-12 / 0949 | X | X | X | X | | | | | | | |
| J1R600 / SOIL / 11-20-12 / 0952 | X | X | X | X | | | | | | | |

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

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Quincy Stowe | 11/20/12 1010 | Dennis Newman | 11/20/12 1010 |
| Dennis Newman | 11/20/12 1400 | [illegible] | 11-20-12 1400 |
| [illegible] WCH | 11-26-12 0840 | Fed Ex | |
| Fed Ex | 11-27-12 1000 | Victor Hernandez | 11-27-12 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) Metals by ICP (TCLP) - 1311/6010 {Arsenic, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury (TCLP) - 1311/7470 {Mercury}

KP0159

REVIEWED BY AJ DATE 11-26-12

Matrix *: S=Soil, SE=Sediment, SO=Solid, Sl=Sludge, W = Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, Wl=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

Lionville Laboratory

# SAMPLE RECEIPT CHECKLIST (SRC)

**CLIENT:** WC Hanford
Project/SAF/SOW/Release #: RC-190

**Date:** 11/27/12

**LvL Batch #:** 1211103

**Sample Custodian:** [signature]

NOTE: EXPLAIN ALL DISCREPANCIES

| | | | |
|---|---|---|---|
| 1. Samples Hand Delivered or Shipped? | Carrier Fed Ex | | Airbill # |
| 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 2-5 °C | | Cooler # RCC-08-022 |
| 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 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 _____

SR-002-B-0412.doc

000000008

# SEMIVOLATILES

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Analytical Report for Semivolatile Organic Compounds by SW846 8270C

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1R5X9 | 1211103-01 | Soil | 11/20/2012 09:49 | 11/27/2012 10:00 |
| J1R600 | 1211103-02 | Soil | 11/20/2012 09:52 | 11/27/2012 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-190 KP0159
**LVL #:** 1211103

**W.O. #:** 60049-001-001-0001-00
**Date Received:** 11-27-2012

## SEMIVOLATILE

Two (2) soil samples were collected on 11-20-2012.

The samples and associated QC samples were extracted 11-30-2012 and analyzed 12-04,05-2012 according to Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3540C, and the analysis procedure was based on SW846 Method 8270C for TCL Semivolatile target compounds.

Lionville Laboratory (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. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements:

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

2. Samples were extracted and analyzed within holding time.

3. Non-target compounds were detected in these samples.

4. Due to the nature of the matrix, samples had elevated final volumes of 10 mls. Reporting limits have been adjusted to reflect these changes.

5. Samples J1R5X9, J1R600, L211273-MS3, and L211273-MSD3 required instrument dilutions. Reporting limits have been adjusted to reflect the necessary dilutions.

6. All obtainable surrogate recoveries were within acceptance criteria.

7. The method blank was below the reporting limit for all target compounds.

8. Three (3) of sixty-four blank spike recoveries were within acceptance criteria. A copy of the Sample Discrepancy Report (SDR# 12MS211) has been enclosed.

9. Thirty-six (36) of one hundred and twenty-eight (128) matrix spike recoveries were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR# 12MS211) has been enclosed.


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 samples were reported on a dry weight basis.

11. All initial calibrations associated with this data set were within acceptance criteria. Per method 8000B/8270C, the attached Table 1 shows the target compounds where the RSD exceeded 15%, and the mean RSD was used for evaluation of the initial calibration. Results associated with these compounds are considered to have greater uncertainty. Refer to the Analysis Batch Sequence Summary Forms to associate the calibration with client samples.

12. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

13. Internal standard area and retention time criteria were met.

14. Manual integrations are performed according to SOP QA-125 to produce quality data with the utmost integrity. All manual integrations are required to be technically valid and properly documented. Appropriate technical flags are defined in the Glossary ("Technical Flags For Manual Integration").

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 package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Iain Daniels
LvL Laboratory Manager

12/21/12
Date

# TABLE 1

## TCL - 8000B/8270C COMPOUNDS WHERE THE MEAN %RSD IS USED TO MEET CRITERIA FOR INITIAL CALIBRATION OF AN INDIVIDUAL COMPOUND

MEAN RSD USED FOR EVALUATION: 7.56 CALIBRATION: 1212002

11/30/12 5972N

| >15% RSD | Compound | >15% RSD | Compound | >15% RSD | Compound |
|---|---|---|---|---|---|
| | 1,2,4-Trichlorobenzene | | Di-n-butyl Phthalate | | Surrogates: |
| | 1,2-Dichlorobenzene | ✓ | Di-n-octyl Phthalate | | 2-Fluorophenol |
| | 1,3-Dichlorobenzene | | Fluoranthene | | Phenol-d5 |
| | 1,4-Dichlorobenzene | | Fluorene | | Nitrobenzene-d5 |
| | 2,4,5-Trichlorophenol | | Hexachlorobenzene | | 2-Fluorobiphenyl |
| | 2,4,6-Trichlorophenol | | Hexachlorobutadiene | ✓ | 2,4,6-Tribromophenol |
| | 2,4-Dichlorophenol | ✓ | Hexachlorocyclopentadiene | | p-Terphenyl-d14 |
| | 2,4-Dimethylphenol | | Hexachloroethane | | |
| ✓ | 2,4-Dinitrophenol | | Indeno[1,2,3-cd]pyrene | | |
| | 2,4-Dinitrotoluene | | Isophorone | | |
| | 2,6-Dinitrotoluene | | Naphthalene | | |
| | 2-Chloronaphthalene | | Nitrobenzene | | |
| | 2-Chlorophenol | | N-Nitrosodi-n-propylamine | | |
| | 2-Methylnaphthalene | | N-Nitrosodiphenylamine | | |
| | 2-Methylphenol | ✓ | Pentachlorophenol | | |
| | 2-Nitroaniline | | Phenanthrene | | |
| | 2-Nitrophenol | | Phenol | | |
| | 3- and/or 4-Methylphenol | | Pyrene | | |
| | 3,3'-Dichlorobenzidine | | | | |
| | 3-Nitroaniline | | | | |
| ✓ | 4,6-Dinitro-2-methylphenol | | **OLM04.2 TCL addons:** | | |
| | 4-Bromophenyl Phenyl Ether | | 1,1-Biphenyl | | |
| | 4-Chloro-3-methylphenol | | Atrazine | | |
| | 4-Chloroaniline | | Benzaldehyde | | |
| | 4-Chlorophenyl Phenyl Ether | | Caprolactam | | |
| | 4-Nitroaniline | | | | |
| ✓ | 4-Nitrophenol | | **NonTCL addons:** | | |
| | Acenaphthene | | 1,2-Diphenylhydrazine | | |
| | Acenaphthylene | | 1,4-Dioxane | | |
| | Anthracene | | 1-Methylnapthalene | | |
| | Benz[a]anthracene | | 2,3,4,6-Tetrachlorophenol | | |
| | Benzo[a] pyrene | | Acetophenone | | |
| | Benzo[b] fluoranthene | | Aniline | | |
| | Benzo[g,h,i] perylene | | Benzidine | | |
| | Benzo[k] fluoranthene | | Benzoic Acid | | |
| | Benzyl alcohol | | N-Nitrosodimethylamine | | |
| | Bis(2-chloroethoxy) methane | | Pyridine | | |
| | Bis(2-chloroethyl) ether | | Tributylphosphate | | |
| | Bis(2-chloroisopropyl) ether | | | | |
| ✓ | Bis(2-ethylhexyl) phthalate | | | | |
| | Butyl Benzyl Phthalate | | | | |
| | Carbazole | | | | |
| | Chrysene | | | | |
| | Dibenz[a,h]anthracene | | | | |
| | Dibenzofuran | | | | |
| | Diethyl Phthalate | | | | |
| | Dimethyl Phthalate | | | | |

# ANALYSIS BATCH (SEQUENCE) SUMMARY
## 8270C

| | | | |
|---|---|---|---|
| Laboratory: | Lionville Laboratory | SDG: | KP0159 |
| Client: | WC-Hanford, Inc. | Project: | RC-190 |
| Sequence: | 2120004 | Instrument: | HP5972N |
| Matrix: | Solid | Calibration: | 1212002 |

| Sample Name | Lab Sample ID | Lab File ID | Analysis Date/Time |
|---|---|---|---|
| MS Tune | 2120004-TUN1 | N113001.D | 11/30/12 11:50 |
| Cal Standard | 2120004-CAL2 | N113003.D | 11/30/12 13:00 |
| Cal Standard | 2120004-CAL5 | N113004.D | 11/30/12 13:47 |
| Cal Standard | 2120004-CAL1 | N113005.D | 11/30/12 14:32 |
| Cal Standard | 2120004-CAL3 | N113006.D | 11/30/12 15:17 |
| Cal Standard | 2120004-CAL4 | N113007.D | 11/30/12 16:02 |
| Secondary Cal Check | 2120004-SCV1 | N113008.D | 11/30/12 16:47 |

# ANALYSIS BATCH (SEQUENCE) SUMMARY
## 8270C

| | | | |
|---|---|---|---|
| Laboratory: | Lionville Laboratory | SDG: | KP0159 |
| Client: | WC-Hanford, Inc. | Project: | RC-190 |
| Sequence: | 2120030 | Instrument: | HP5972N |
| Matrix: | Solid | Calibration: | 1212002 |

| Sample Name | Lab Sample ID | Lab File ID | Analysis Date/Time |
|---|---|---|---|
| MS Tune | 2120030-TUN1 | N120401.D | 12/04/12 13:08 |
| Calibration Check | 2120030-CCV1 | N120402.D | 12/04/12 13:35 |
| LCS | L211273-BS1 | N120403.D | 12/04/12 15:38 |
| Blank | L211273-BLK1 | N120404.D | 12/04/12 16:23 |

# ANALYSIS BATCH (SEQUENCE) SUMMARY
## 8270C

| | | | |
|---|---|---|---|
| Laboratory: | Lionville Laboratory | SDG: | KP0159 |
| Client: | WC-Hanford, Inc. | Project: | RC-190 |
| Sequence: | 2120032 | Instrument: | HP5972N |
| Matrix: | Solid | Calibration: | 1212002 |

| Sample Name | Lab Sample ID | Lab File ID | Analysis Date/Time |
|---|---|---|---|
| MS Tune | 2120032-TUN1 | N120501.D | 12/05/12 10:23 |
| Calibration Check | 2120032-CCV1 | N120502.D | 12/05/12 10:45 |
| J1R5X9 | 1211103-01 | N120511.D | 12/05/12 17:42 |
| J1R600 | 1211103-02 | N120512.D | 12/05/12 18:27 |
| J1R600 | L211273-MS3 | N120513.D | 12/05/12 19:12 |
| J1R600 | L211273-MSD3 | N120514.D | 12/05/12 19:57 |

# Lionville Laboratory Sample Discrepancy Report (SDR)

SDR #: 12MS211

Initiator: Sharon Saylor
Date: 12-7-12
Client: WCHanford RC190 EP0159

Batch: 1211103
Samples: L211273-BS1, MS3, MSD3
Method: SW846/MCAWW/CLP/

Parameter: 8270C
Matrix: SOIL
Prep Batch: L211273

**1. Reason for SDR**

**a. COC Discrepancy** __ Tech Profile Error __ Client Request __ Sampler Error on C-O-C __ Transcription Error __ Wrong Test Code __ Other _____

**b. General Discrepancy***

__ Missing Sample/Extract* __ Container Broken* __ Wrong Sample Pulled __ Label ID's Illegible
__ Hold Time Exceeded __ Insufficient Sample* __ Preservation Wrong __ Received Past Hold
__ Improper Bottle Type __ Not Amenable to Analysis

Note*: Verified by [Log-In] or [Prep Group] (circle)...signature/date: _____

**c. Problem** (Include all relevant specific results; attach data if necessary)

① Spike recoveries outside QC acceptance limits in L211273-BS1, L211273-MS3, and L211273-MSD3

**2. Known or Probable Causes(s)** Acidic phenols subject to erratic chromatographic behavior. MS/MSD possible matrix effect, samples required a 10 fold dilution for analysis, in addition had an elevated final volume of 10 mls RW 12/7/12

**3. Discussion and Proposed Action** Other Description:

__ Re-log
__ Entire Batch
__ Following Samples: _____
__ Re-leach
__ Re-extract
__ Re-digest
__ Revise EDD
__ Change Test Code to _____
__ Place On/Take Off Hold (circle)

narrate

12/21/12

**4. Project Manager Instructions**...signature/date: 12/21/12

__ Concur with Proposed Action
__ Disagree with Proposed Action; See Instruction
✓ Include in Case Narrative
__ Client Contacted:
Date/Person _____
__ Add
__ Cancel

**5. Final Action**...signature/date: 12/21/12 Other Explanation:

__ Verified re-[log][leach][extract][digest][analysis] (circle)
✓ Included in Case Narrative
__ Hard Copy COC Revised
__ Electronic COC Revised
__ EDD Corrections Completed

**When Final Action has been recorded, forward original to QA for diposition.**

Route
✓ Lab Manager: Daniels
✓ Project Mgr (circle): Johnson / Stone
__ Sample Prep (circle): Ford
__ Log-in: King

Route
__ Metals: Welsh / _____
__ Inorganic: Perrone / _____
__ GC/LC: Carey / _____
__ MS VOA: Rubino / _____
✓ MS BNA: Carden / _____
__ Other: _____

QA-139-A-0208

# GLOSSARY

## DATA QUALIFIERS

| | | |
|---|---|---|
| U | = | Indicates that the compound was analyzed for but not detected. The associated numerical value is the estimated sample quantitation limit, which is included and corrected for dilution and percent moisture. |
| J | = | Indicates an estimated value. This flag is used under the following circumstances: 1) when estimating a concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed; or 2) when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero. For example, if the limit of detection is 10 ug/L and a concentration of 3 ug/L is calculated, it is reported as 3J. |
| B | = | This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination. This flag is also used for a TIC as well as for a positively identified TCL compound. |
| E | = | Indicates that the compound was detected beyond the calibration range and was subsequently analyzed at a dilution. |
| D | = | Identifies all compounds identified in an analysis at a secondary dilution factor. |
| I | = | Interference. |
| NQ | = | Result qualitatively confirmed but not able to quantify. |
| A | = | Indicates that a TIC is a suspected aldol-condensation product. |
| N | = | Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N code is not used. |
| X | = | This flag is used for a TIC compound which is quantified relative to a response factor generated from a daily calibration standard (rather than quantified relative to the closest internal standard). |
| Y | = | Additional qualifiers used as required are explained in the case narrative. |

# GLOSSARY

## ABBREVIATIONS

| | | |
|---|---|---|
| BS | = | Indicates blank spike in which reagent grade water is spiked with the CLP matrix spike solutions and carried through all the steps in the method. Spike recoveries are reported. |
| BSD | = | Indicates blank spike duplicate. |
| MS | = | Indicates matrix spike. |
| MSD | = | Indicates matrix spike duplicate. |
| DL | = | Suffix added to sample number to indicate that results are from a diluted analysis. |
| NA | = | Not Applicable. |
| DF | = | Dilution Factor. |
| NR | = | Not Required. |
| SP, Z | = | Indicates Spiked Compound. |

## TECHNICAL FLAGS FOR MANUAL INTEGRATION

Manual quantitation modifications are performed routinely to improve the data quality for a variety of technical reasons. Documentation of these modifications should be clear and concise. The following "flags" are used to indicate the technical reasons for quantitation modifications:

| | | |
|---|---|---|
| MP | - | Missed Peak: Manually added peak not found by automatic quantitation program. |
| PA | - | Peak Assignment: quantitation report was changed to reflect correct peak assignment. |
| RI | - | Routine Integration: routine integrations are performed for some analytes that are consistently integrated improperly by the automatic integration programs. Examples are the dichlorobenzene isomers on the VOA packed column and benzo(b)fluoranthene/benzo(k)fluoranthene, which are poorly resolved on the BNA column. |
| SP | - | Split Peak: the automatic integration improperly split the peak; a manual integration was performed to get the correct area. |
| CB | - | Coelution/Background: peak was manually integrated to eliminate contribution from coeluting compounds, background |
| PI | - | Proper Integration: a peak with poor or inconsistent integration (e.g., excessive tail) was properly integrated manually. |

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## J1R5X9
### 1211103-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Semivolatile Organic Compounds by SW846 8270C** | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,2-Dichlorobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,3-Dichlorobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,4-Dichlorobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4,5-Trichlorophenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4,6-Trichlorophenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dichlorophenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dimethylphenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dinitrophenol | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dinitrotoluene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,6-Dinitrotoluene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Chloronaphthalene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Chlorophenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Methylnaphthalene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Methylphenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Nitroaniline | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Nitrophenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3,3'-Dichlorobenzidine | 74900 | U | 74900 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3-Nitroaniline | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4,6-Dinitro-2-methylphenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Bromophenyl Phenyl Ether | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chloro-3-methylphenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chloroaniline | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chlorophenyl Phenyl Ether | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3- and/or 4-Methylphenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Nitroaniline | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Nitrophenol | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Acenaphthene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Acenaphthylene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Anthracene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benz[a]anthracene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[a] pyrene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[b] fluoranthene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[g,h,i] perylene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[k] fluoranthene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-chloroethoxy) methane | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## J1R5X9
### 1211103-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Semivolatile Organic Compounds by SW846 8270C** | | | | | | | | | |
| Bis(2-chloroethyl) ether | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-chloroisopropyl) ether | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-ethylhexyl) phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Butyl Benzyl Phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Carbazole | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Chrysene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dibenz[a,h]anthracene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dibenzofuran | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Diethyl Phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dimethyl Phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Di-n-butyl Phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Di-n-octyl Phthalate | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Fluoranthene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Fluorene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorobutadiene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorocyclopentadiene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachloroethane | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Indeno[1,2,3-cd]pyrene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Isophorone | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Naphthalene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Nitrobenzene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| N-Nitrosodi-n-propylamine | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| N-Nitrosodiphenylamine | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Pentachlorophenol | 187000 | U | 187000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Phenanthrene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Phenol | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Pyrene | 37500 | U | 37500 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Unknown 1** | **11100** | J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Aldol Condensate 1** | **192000** | A, B, J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| *Surrogate: 2-Fluorophenol* | *70 %* | | *25-121* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: Phenol-d5* | *67 %* | | *24-113* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: Nitrobenzene-d5* | *76 %* | | *23-120* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: 2-Fluorobiphenyl* | *80 %* | | *30-115* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: 2,4,6-Tribromophenol* | *25 %* | | *19-122* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: p-Terphenyl-d14* | *72 %* | | *18-137* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## J1R600
### 1211103-02 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Semivolatile Organic Compounds by SW846 8270C** | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,2-Dichlorobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,3-Dichlorobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 1,4-Dichlorobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4,5-Trichlorophenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4,6-Trichlorophenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dichlorophenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dimethylphenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dinitrophenol | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,4-Dinitrotoluene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2,6-Dinitrotoluene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Chloronaphthalene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Chlorophenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Methylnaphthalene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Methylphenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Nitroaniline | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 2-Nitrophenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3,3'-Dichlorobenzidine | 70100 | U | 70100 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3-Nitroaniline | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4,6-Dinitro-2-methylphenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Bromophenyl Phenyl Ether | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chloro-3-methylphenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chloroaniline | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Chlorophenyl Phenyl Ether | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 3- and/or 4-Methylphenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Nitroaniline | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| 4-Nitrophenol | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Acenaphthene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Acenaphthylene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Anthracene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benz[a]anthracene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[a] pyrene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[b] fluoranthene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[g,h,i] perylene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Benzo[k] fluoranthene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-chloroethoxy) methane | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |

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|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## J1R600
### 1211103-02 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| | | | **Lionville Laboratory** | | | | | | |
| **Semivolatile Organic Compounds by SW846 8270C** | | | | | | | | | |
| Bis(2-chloroethyl) ether | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-chloroisopropyl) ether | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Bis(2-ethylhexyl) phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Butyl Benzyl Phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Carbazole | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Chrysene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dibenz[a,h]anthracene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dibenzofuran | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Diethyl Phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Dimethyl Phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Di-n-butyl Phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Di-n-octyl Phthalate | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Fluoranthene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Fluorene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorobutadiene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachlorocyclopentadiene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Hexachloroethane | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Indeno[1,2,3-cd]pyrene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Isophorone | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Naphthalene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Nitrobenzene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| N-Nitrosodi-n-propylamine | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| N-Nitrosodiphenylamine | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Pentachlorophenol | 175000 | U | 175000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Phenanthrene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Phenol | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| Pyrene | 35000 | U | 35000 | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Alkane 4** | **48100** | J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Alkane 3** | **108000** | J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Alkane 2** | **49900** | J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Alkane 1** | **30600** | J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| **TIC:Aldol Condensate 1** | **178000** | A, B, J, D | | ug/kg dry | 10 | L211273 | 11/30/2012 | 12/05/2012 | 8270C |
| *Surrogate: 2-Fluorophenol* | *82 %* | | *25-121* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: Phenol-d5* | *74 %* | | *24-113* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: Nitrobenzene-d5* | *82 %* | | *23-120* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |

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| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## J1R600
### 1211103-02 (Soil)

| Analyte | Result and Qualifier | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | |
| **Semivolatile Organic Compounds by SW846 8270C** | | | | | | | | |
| *Surrogate: 2-Fluorobiphenyl* | *92 %* | *30-115* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: 2,4,6-Tribromophenol* | *54 %* | *19-122* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |
| *Surrogate: p-Terphenyl-d14* | *93 %* | *18-137* | | | *L211273* | *11/30/2012* | *12/05/2012* | *8270C* |

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|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **Blank (L211273-BLK1)** | | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| 1,2,4-Trichlorobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| 1,2-Dichlorobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| 1,3-Dichlorobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| 1,4-Dichlorobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,4,5-Trichlorophenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,4,6-Trichlorophenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,4-Dichlorophenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,4-Dimethylphenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,4-Dinitrophenol | 1650 | U | 1650 | ug/kg wet | | | | | | |
| 2,4-Dinitrotoluene | 330 | U | 330 | ug/kg wet | | | | | | |
| 2,6-Dinitrotoluene | 330 | U | 330 | ug/kg wet | | | | | | |
| 2-Chloronaphthalene | 330 | U | 330 | ug/kg wet | | | | | | |
| 2-Chlorophenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2-Methylnaphthalene | 330 | U | 330 | ug/kg wet | | | | | | |
| 2-Methylphenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 2-Nitroaniline | 1650 | U | 1650 | ug/kg wet | | | | | | |
| 2-Nitrophenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 3,3'-Dichlorobenzidine | 660 | U | 660 | ug/kg wet | | | | | | |
| 3-Nitroaniline | 1650 | U | 1650 | ug/kg wet | | | | | | |
| 4,6-Dinitro-2-methylphenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 4-Bromophenyl Phenyl Ether | 330 | U | 330 | ug/kg wet | | | | | | |
| 4-Chloro-3-methylphenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 4-Chloroaniline | 330 | U | 330 | ug/kg wet | | | | | | |
| 4-Chlorophenyl Phenyl Ether | 330 | U | 330 | ug/kg wet | | | | | | |
| 3- and/or 4-Methylphenol | 330 | U | 330 | ug/kg wet | | | | | | |
| 4-Nitroaniline | 1650 | U | 1650 | ug/kg wet | | | | | | |
| 4-Nitrophenol | 1650 | U | 1650 | ug/kg wet | | | | | | |
| Acenaphthene | 330 | U | 330 | ug/kg wet | | | | | | |
| Acenaphthylene | 330 | U | 330 | ug/kg wet | | | | | | |
| Anthracene | 330 | U | 330 | ug/kg wet | | | | | | |
| Benz[a]anthracene | 330 | U | 330 | ug/kg wet | | | | | | |
| Benzo[a] pyrene | 330 | U | 330 | ug/kg wet | | | | | | |
| Benzo[b] fluoranthene | 330 | U | 330 | ug/kg wet | | | | | | |
| Benzo[g,h,i] perylene | 330 | U | 330 | ug/kg wet | | | | | | |
| Benzo[k] fluoranthene | 330 | U | 330 | ug/kg wet | | | | | | |
| Bis(2-chloroethoxy) methane | 330 | U | 330 | ug/kg wet | | | | | | |

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|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **Blank (L211273-BLK1)** | | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| Bis(2-chloroethyl) ether | 330 | U | 330 | ug/kg wet | | | | | | |
| Bis(2-chloroisopropyl) ether | 330 | U | 330 | ug/kg wet | | | | | | |
| Bis(2-ethylhexyl) phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Butyl Benzyl Phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Carbazole | 330 | U | 330 | ug/kg wet | | | | | | |
| Chrysene | 330 | U | 330 | ug/kg wet | | | | | | |
| Dibenz[a,h]anthracene | 330 | U | 330 | ug/kg wet | | | | | | |
| Dibenzofuran | 330 | U | 330 | ug/kg wet | | | | | | |
| Diethyl Phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Dimethyl Phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Di-n-butyl Phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Di-n-octyl Phthalate | 330 | U | 330 | ug/kg wet | | | | | | |
| Fluoranthene | 330 | U | 330 | ug/kg wet | | | | | | |
| Fluorene | 330 | U | 330 | ug/kg wet | | | | | | |
| Hexachlorobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| Hexachlorobutadiene | 330 | U | 330 | ug/kg wet | | | | | | |
| Hexachlorocyclopentadiene | 330 | U | 330 | ug/kg wet | | | | | | |
| Hexachloroethane | 330 | U | 330 | ug/kg wet | | | | | | |
| Indeno[1,2,3-cd]pyrene | 330 | U | 330 | ug/kg wet | | | | | | |
| Isophorone | 330 | U | 330 | ug/kg wet | | | | | | |
| Naphthalene | 330 | U | 330 | ug/kg wet | | | | | | |
| Nitrobenzene | 330 | U | 330 | ug/kg wet | | | | | | |
| N-Nitrosodi-n-propylamine | 330 | U | 330 | ug/kg wet | | | | | | |
| N-Nitrosodiphenylamine | 330 | U | 330 | ug/kg wet | | | | | | |
| Pentachlorophenol | 1650 | U | 1650 | ug/kg wet | | | | | | |
| Phenanthrene | 330 | U | 330 | ug/kg wet | | | | | | |
| Phenol | 330 | U | 330 | ug/kg wet | | | | | | |
| Pyrene | 330 | U | 330 | ug/kg wet | | | | | | |
| Unknown 1 | 142 | J | | ug/kg wet | | | | | | |
| Aldol Condensate 4 | 278 | A, J | | ug/kg wet | | | | | | |
| Aldol Condensate 3 | 673 | A, J | | ug/kg wet | | | | | | |
| Aldol Condensate 2 | 54000 | A, J | | ug/kg wet | | | | | | |
| Aldol Condensate 1 | 1510 | A, J | | ug/kg wet | | | | | | |
| *Surrogate: 2-Fluorophenol* | *1370* | | | *ug/kg wet* | *2500.0* | | *55* | *25-121* | | |
| *Surrogate: Phenol-d5* | *1450* | | | *ug/kg wet* | *2500.0* | | *58* | *24-113* | | |
| *Surrogate: Nitrobenzene-d5* | *992* | | | *ug/kg wet* | *1666.7* | | *60* | *23-120* | | |

TICS [illegible]

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| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | |
| **Blank (L211273-BLK1)** | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| *Surrogate: 2-Fluorobiphenyl* | *1030* | | *ug/kg wet* | *1666.7* | | *62* | *30-115* | | |
| *Surrogate: 2,4,6-Tribromophenol* | *988* | | *ug/kg wet* | *2500.0* | | *40* | *19-122* | | |
| *Surrogate: p-Terphenyl-d14* | *1030* | | *ug/kg wet* | *1666.7* | | *62* | *18-137* | | |
| **LCS (L211273-BS1)** | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| 1,2,4-Trichlorobenzene | 997 | | ug/kg wet | 2000.0 | | 50 | 45-110 | | |
| 1,2-Dichlorobenzene | 1070 | | ug/kg wet | 2000.0 | | 53 | 45-105 | | |
| 1,3-Dichlorobenzene | 1020 | | ug/kg wet | 2000.0 | | 51 | 40-100 | | |
| 1,4-Dichlorobenzene | 1030 | | ug/kg wet | 2000.0 | | 51 | 35-105 | | |
| 2,4,5-Trichlorophenol | 1110 | | ug/kg wet | 2000.0 | | 55 | 30-140 | | |
| 2,4,6-Trichlorophenol | 912 | | ug/kg wet | 2000.0 | | 46 | 20-110 | | |
| 2,4-Dichlorophenol | 1030 | | ug/kg wet | 2000.0 | | 51 | 40-110 | | |
| 2,4-Dimethylphenol | 1160 | | ug/kg wet | 2000.0 | | 58 | 30-105 | | |
| 2,4-Dinitrophenol | 121 | | ug/kg wet | 2000.0 | | 6* | 25-130 | | |
| 2,4-Dinitrotoluene | 1190 | | ug/kg wet | 2000.0 | | 59 | 50-115 | | |
| 2,6-Dinitrotoluene | 1170 | | ug/kg wet | 2000.0 | | 59 | 40-120 | | |
| 2-Chloronaphthalene | 1140 | | ug/kg wet | 2000.0 | | 57 | 45-115 | | |
| 2-Chlorophenol | 1120 | | ug/kg wet | 2000.0 | | 56 | 45-105 | | |
| 2-Methylnaphthalene | 1030 | | ug/kg wet | 2000.0 | | 52 | 45-110 | | |
| 2-Methylphenol | 1190 | | ug/kg wet | 2000.0 | | 60 | 40-120 | | |
| 2-Nitroaniline | 1390 | | ug/kg wet | 2000.0 | | 70 | 45-120 | | |
| 2-Nitrophenol | 1090 | | ug/kg wet | 2000.0 | | 55 | 40-110 | | |
| 3,3'-Dichlorobenzidine | 1030 | | ug/kg wet | 2000.0 | | 52 | 15-130 | | |
| 3-Nitroaniline | 1180 | | ug/kg wet | 2000.0 | | 59 | 40-130 | | |
| 4,6-Dinitro-2-methylphenol | 372 | | ug/kg wet | 2000.0 | | 19* | 20-140 | | |
| 4-Bromophenyl Phenyl Ether | 1150 | | ug/kg wet | 2000.0 | | 57 | 45-115 | | |
| 4-Chloro-3-methylphenol | 1160 | | ug/kg wet | 2000.0 | | 58 | 35-115 | | |
| 4-Chloroaniline | 985 | | ug/kg wet | 2000.0 | | 49 | 10-100 | | |
| 4-Chlorophenyl Phenyl Ether | 1120 | | ug/kg wet | 2000.0 | | 56 | 45-110 | | |
| 3- and/or 4-Methylphenol | 1190 | | ug/kg wet | 2000.0 | | 60 | 40-120 | | |
| 4-Nitroaniline | 1280 | | ug/kg wet | 2000.0 | | 64 | 40-130 | | |
| 4-Nitrophenol | 1060 | | ug/kg wet | 2000.0 | | 53 | 15-140 | | |
| Acenaphthene | 1160 | | ug/kg wet | 2000.0 | | 58 | 45-110 | | |
| Acenaphthylene | 1230 | | ug/kg wet | 2000.0 | | 61 | 45-115 | | |
| Anthracene | 1160 | | ug/kg wet | 2000.0 | | 58 | 45-130 | | |
| Benz[a]anthracene | 1230 | | ug/kg wet | 2000.0 | | 61 | 45-130 | | |
| Benzo[a] pyrene | 1170 | | ug/kg wet | 2000.0 | | 59 | 45-130 | | |

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|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-190<br>Project Number: KP0159<br>Project Manager: Joan Kessner | **Reported:**<br>12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | |
| **LCS (L211273-BS1)** | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| Benzo[b] fluoranthene | 1180 | | ug/kg wet | 2000.0 | | 59 | 40-130 | | |
| Benzo[g,h,i] perylene | 1170 | | ug/kg wet | 2000.0 | | 59 | 45-125 | | |
| Benzo[k] fluoranthene | 1250 | | ug/kg wet | 2000.0 | | 63 | 45-125 | | |
| Bis(2-chloroethoxy) methane | 1130 | | ug/kg wet | 2000.0 | | 56 | 45-110 | | |
| Bis(2-chloroethyl) ether | 1210 | | ug/kg wet | 2000.0 | | 60 | 40-110 | | |
| Bis(2-chloroisopropyl) ether | 1280 | | ug/kg wet | 2000.0 | | 64 | 30-115 | | |
| Bis(2-ethylhexyl) phthalate | 1280 | | ug/kg wet | 2000.0 | | 64 | 40-145 | | |
| Butyl Benzyl Phthalate | 1290 | | ug/kg wet | 2000.0 | | 64 | 50-125 | | |
| Carbazole | 1170 | | ug/kg wet | 2000.0 | | 59 | 40-140 | | |
| Chrysene | 1260 | | ug/kg wet | 2000.0 | | 63 | 45-130 | | |
| Dibenz[a,h]anthracene | 1150 | | ug/kg wet | 2000.0 | | 57 | 45-125 | | |
| Dibenzofuran | 1170 | | ug/kg wet | 2000.0 | | 59 | 45-120 | | |
| Diethyl Phthalate | 1160 | | ug/kg wet | 2000.0 | | 58 | 50-125 | | |
| Dimethyl Phthalate | 1130 | | ug/kg wet | 2000.0 | | 56 | 45-130 | | |
| Di-n-butyl Phthalate | 1150 | | ug/kg wet | 2000.0 | | 58 | 50-130 | | |
| Di-n-octyl Phthalate | 1220 | | ug/kg wet | 2000.0 | | 61 | 40-150 | | |
| Fluoranthene | 1140 | | ug/kg wet | 2000.0 | | 57 | 45-130 | | |
| Fluorene | 1150 | | ug/kg wet | 2000.0 | | 58 | 45-120 | | |
| Hexachlorobenzene | 1180 | | ug/kg wet | 2000.0 | | 59 | 45-130 | | |
| Hexachlorobutadiene | 1080 | | ug/kg wet | 2000.0 | | 54 | 45-105 | | |
| Hexachlorocyclopentadiene | 776 | | ug/kg wet | 2000.0 | | 39 | 10-100 | | |
| Hexachloroethane | 1030 | | ug/kg wet | 2000.0 | | 51 | 35-110 | | |
| Indeno[1,2,3-cd]pyrene | 1160 | | ug/kg wet | 2000.0 | | 58 | 45-130 | | |
| Isophorone | 1140 | | ug/kg wet | 2000.0 | | 57 | 40-110 | | |
| Naphthalene | 1170 | | ug/kg wet | 2000.0 | | 58 | 40-110 | | |
| Nitrobenzene | 1120 | | ug/kg wet | 2000.0 | | 56 | 40-105 | | |
| N-Nitrosodi-n-propylamine | 1320 | | ug/kg wet | 2000.0 | | 66 | 30-130 | | |
| N-Nitrosodiphenylamine | 1220 | | ug/kg wet | 2000.0 | | 61 | 50-120 | | |
| Pentachlorophenol | 354 | | ug/kg wet | 2000.0 | | 18* | 25-120 | | |
| Phenanthrene | 1180 | | ug/kg wet | 2000.0 | | 59 | 50-120 | | |
| Phenol | 1210 | | ug/kg wet | 2000.0 | | 60 | 40-115 | | |
| Pyrene | 1230 | | ug/kg wet | 2000.0 | | 61 | 45-125 | | |
| *Surrogate: 2-Fluorophenol* | *1400* | | *ug/kg wet* | *2500.0* | | *56* | *25-121* | | |
| *Surrogate: Phenol-d5* | *1520* | | *ug/kg wet* | *2500.0* | | *61* | *24-113* | | |
| *Surrogate: Nitrobenzene-d5* | *988* | | *ug/kg wet* | *1666.7* | | *59* | *23-120* | | |
| *Surrogate: 2-Fluorobiphenyl* | *995* | | *ug/kg wet* | *1666.7* | | *60* | *30-115* | | |
| *Surrogate: 2,4,6-Tribromophenol* | *849* | | *ug/kg wet* | *2500.0* | | *34* | *19-122* | | |

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

# Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **LCS (L211273-BS1)** | | | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| *Surrogate: p-Terphenyl-d14* | *936* | | | *ug/kg wet* | *1666.7* | | *56* | *18-137* | | |
| **Matrix Spike (L211273-MS3)** | | **Source: 1211103-02** | | Prepared: 11/30/2012 Analyzed: 12/05/2012 | | | | | | |
| 1,2,4-Trichlorobenzene | 1910 | D | | ug/kg dry | 2121.2 | 35000 U | 90 | 45-110 | | |
| 1,2-Dichlorobenzene | 2080 | D | | ug/kg dry | 2121.2 | 35000 U | 98 | 45-105 | | |
| 1,3-Dichlorobenzene | 1930 | D | | ug/kg dry | 2121.2 | 35000 U | 91 | 40-100 | | |
| 1,4-Dichlorobenzene | 1980 | D | | ug/kg dry | 2121.2 | 35000 U | 93 | 35-105 | | |
| 2,4,5-Trichlorophenol | 1950 | D | | ug/kg dry | 2121.2 | 35000 U | 92 | 30-140 | | |
| 2,4,6-Trichlorophenol | 1550 | D | | ug/kg dry | 2121.2 | 35000 U | 73 | 20-110 | | |
| 2,4-Dichlorophenol | 1660 | D | | ug/kg dry | 2121.2 | 35000 U | 78 | 40-110 | | |
| 2,4-Dimethylphenol | 2130 | D | | ug/kg dry | 2121.2 | 35000 U | 101 | 30-105 | | |
| 2,4-Dinitrophenol | 0.00 | U | | ug/kg dry | 2121.2 | 175000 U | * | 25-130 | | |
| 2,4-Dinitrotoluene | 0.00 | U | | ug/kg dry | 2121.2 | 35000 U | * | 50-115 | | |
| 2,6-Dinitrotoluene | 1780 | D | | ug/kg dry | 2121.2 | 35000 U | 84 | 40-120 | | |
| 2-Chloronaphthalene | 2040 | D | | ug/kg dry | 2121.2 | 35000 U | 96 | 45-115 | | |
| 2-Chlorophenol | 2010 | D | | ug/kg dry | 2121.2 | 35000 U | 95 | 45-105 | | |
| 2-Methylnaphthalene | 2030 | D | | ug/kg dry | 2121.2 | 35000 U | 96 | 45-110 | | |
| 2-Methylphenol | 2300 | D | | ug/kg dry | 2121.2 | 35000 U | 108 | 40-120 | | |
| 2-Nitroaniline | 2250 | D | | ug/kg dry | 2121.2 | 175000 U | 106 | 45-120 | | |
| 2-Nitrophenol | 1300 | D | | ug/kg dry | 2121.2 | 35000 U | 61 | 40-110 | | |
| 3,3'-Dichlorobenzidine | 7280 | D | | ug/kg dry | 2121.2 | 70100 U | 343* | 15-130 | | |
| 3-Nitroaniline | 842 | D | | ug/kg dry | 2121.2 | 175000 U | 40 | 40-130 | | |
| 4,6-Dinitro-2-methylphenol | 0.00 | U | | ug/kg dry | 2121.2 | 35000 U | * | 20-140 | | |
| 4-Bromophenyl Phenyl Ether | 2160 | D | | ug/kg dry | 2121.2 | 35000 U | 102 | 45-115 | | |
| 4-Chloro-3-methylphenol | 2030 | D | | ug/kg dry | 2121.2 | 35000 U | 96 | 35-115 | | |
| 4-Chloroaniline | 0.00 | U | | ug/kg dry | 2121.2 | 35000 U | * | 10-100 | | |
| 4-Chlorophenyl Phenyl Ether | 2130 | D | | ug/kg dry | 2121.2 | 35000 U | 100 | 45-110 | | |
| 3- and/or 4-Methylphenol | 2680 | D | | ug/kg dry | 2121.2 | 35000 U | 126* | 40-120 | | |
| 4-Nitroaniline | 1460 | D | | ug/kg dry | 2121.2 | 175000 U | 69 | 40-130 | | |
| 4-Nitrophenol | 0.00 | U | | ug/kg dry | 2121.2 | 175000 U | * | 15-140 | | |
| Acenaphthene | 2200 | D | | ug/kg dry | 2121.2 | 35000 U | 104 | 45-110 | | |
| Acenaphthylene | 2140 | D | | ug/kg dry | 2121.2 | 35000 U | 101 | 45-115 | | |
| Anthracene | 2150 | D | | ug/kg dry | 2121.2 | 35000 U | 102 | 45-130 | | |
| Benz[a]anthracene | 3090 | D | | ug/kg dry | 2121.2 | 35000 U | 146* | 45-130 | | |
| Benzo[a] pyrene | 2180 | D | | ug/kg dry | 2121.2 | 35000 U | 103 | 45-130 | | |
| Benzo[b] fluoranthene | 2230 | D | | ug/kg dry | 2121.2 | 35000 U | 105 | 40-130 | | |
| Benzo[g,h,i] perylene | 2680 | D | | ug/kg dry | 2121.2 | 35000 U | 126* | 45-125 | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **Matrix Spike (L211273-MS3)** | | **Source: 1211103-02** | | Prepared: 11/30/2012 Analyzed: 12/05/2012 | | | | | | |
| Benzo[k] fluoranthene | 2220 | D | | ug/kg dry | 2121.2 | 35000 U | 105 | 45-125 | | |
| Bis(2-chloroethoxy) methane | 2210 | D | | ug/kg dry | 2121.2 | 35000 U | 104 | 45-110 | | |
| Bis(2-chloroethyl) ether | 2420 | D | | ug/kg dry | 2121.2 | 35000 U | 114* | 40-110 | | |
| Bis(2-chloroisopropyl) ether | 2680 | D | | ug/kg dry | 2121.2 | 35000 U | 126* | 30-115 | | |
| Bis(2-ethylhexyl) phthalate | 14900 | D | | ug/kg dry | 2121.2 | 35000 U | 705* | 40-145 | | |
| Butyl Benzyl Phthalate | 3690 | D | | ug/kg dry | 2121.2 | 35000 U | 174* | 50-125 | | |
| Carbazole | 2380 | D | | ug/kg dry | 2121.2 | 35000 U | 112 | 40-140 | | |
| Chrysene | 2910 | D | | ug/kg dry | 2121.2 | 35000 U | 137* | 45-130 | | |
| Dibenz[a,h]anthracene | 2630 | D | | ug/kg dry | 2121.2 | 35000 U | 124 | 45-125 | | |
| Dibenzofuran | 2160 | D | | ug/kg dry | 2121.2 | 35000 U | 102 | 45-120 | | |
| Diethyl Phthalate | 2230 | D | | ug/kg dry | 2121.2 | 35000 U | 105 | 50-125 | | |
| Dimethyl Phthalate | 2170 | D | | ug/kg dry | 2121.2 | 35000 U | 102 | 45-130 | | |
| Di-n-butyl Phthalate | 2830 | D | | ug/kg dry | 2121.2 | 35000 U | 133* | 50-130 | | |
| Di-n-octyl Phthalate | 3760 | D | | ug/kg dry | 2121.2 | 35000 U | 177* | 40-150 | | |
| Fluoranthene | 2430 | D | | ug/kg dry | 2121.2 | 35000 U | 114 | 45-130 | | |
| Fluorene | 2190 | D | | ug/kg dry | 2121.2 | 35000 U | 103 | 45-120 | | |
| Hexachlorobenzene | 1930 | D | | ug/kg dry | 2121.2 | 35000 U | 91 | 45-130 | | |
| Hexachlorobutadiene | 1950 | D | | ug/kg dry | 2121.2 | 35000 U | 92 | 45-105 | | |
| Hexachlorocyclopentadiene | 388 | D | | ug/kg dry | 2121.2 | 35000 U | 18 | 10-100 | | |
| Hexachloroethane | 1880 | D | | ug/kg dry | 2121.2 | 35000 U | 89 | 35-110 | | |
| Indeno[1,2,3-cd]pyrene | 2410 | D | | ug/kg dry | 2121.2 | 35000 U | 114 | 45-130 | | |
| Isophorone | 2110 | D | | ug/kg dry | 2121.2 | 35000 U | 100 | 40-110 | | |
| Naphthalene | 2430 | D | | ug/kg dry | 2121.2 | 35000 U | 115* | 40-110 | | |
| Nitrobenzene | 2410 | D | | ug/kg dry | 2121.2 | 35000 U | 113* | 40-105 | | |
| N-Nitrosodi-n-propylamine | 2440 | D | | ug/kg dry | 2121.2 | 35000 U | 115 | 30-130 | | |
| N-Nitrosodiphenylamine | 2150 | D | | ug/kg dry | 2121.2 | 35000 U | 102 | 50-120 | | |
| Pentachlorophenol | 1390 | D | | ug/kg dry | 2121.2 | 175000 U | 65 | 25-120 | | |
| Phenanthrene | 2490 | D | | ug/kg dry | 2121.2 | 35000 U | 118 | 50-120 | | |
| Phenol | 5530 | D | | ug/kg dry | 2121.2 | 35000 U | 260* | 40-115 | | |
| Pyrene | 2260 | D | | ug/kg dry | 2121.2 | 35000 U | 107 | 45-125 | | |
| *Surrogate: 2-Fluorophenol* | *2420* | | | *ug/kg dry* | *2651.5* | | *91* | *25-121* | | |
| *Surrogate: Phenol-d5* | *2420* | | | *ug/kg dry* | *2651.5* | | *91* | *24-113* | | |
| *Surrogate: Nitrobenzene-d5* | *1800* | | | *ug/kg dry* | *1767.7* | | *102* | *23-120* | | |
| *Surrogate: 2-Fluorobiphenyl* | *1720* | | | *ug/kg dry* | *1767.7* | | *98* | *30-115* | | |
| *Surrogate: 2,4,6-Tribromophenol* | *1790* | | | *ug/kg dry* | *2651.5* | | *67* | *19-122* | | |
| *Surrogate: p-Terphenyl-d14* | *1780* | | | *ug/kg dry* | *1767.7* | | *101* | *18-137* | | |

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **Matrix Spike Dup (L211273-MSD3)** | | **Source: 1211103-02** | | Prepared: 11/30/2012 Analyzed: 12/05/2012 | | | | | | |
| 1,2,4-Trichlorobenzene | 1900 | D | | ug/kg dry | 2143.8 | 35000 U | 88 | 45-110 | 2 | 40 |
| 1,2-Dichlorobenzene | 2040 | D | | ug/kg dry | 2143.8 | 35000 U | 95 | 45-105 | 3 | 40 |
| 1,3-Dichlorobenzene | 1950 | D | | ug/kg dry | 2143.8 | 35000 U | 91 | 40-100 | 0.2 | 40 |
| 1,4-Dichlorobenzene | 1900 | D | | ug/kg dry | 2143.8 | 35000 U | 89 | 35-105 | 5 | 40 |
| 2,4,5-Trichlorophenol | 2170 | D | | ug/kg dry | 2143.8 | 35000 U | 101 | 30-140 | 10 | 40 |
| 2,4,6-Trichlorophenol | 1720 | D | | ug/kg dry | 2143.8 | 35000 U | 80 | 20-110 | 9 | 40 |
| 2,4-Dichlorophenol | 1640 | D | | ug/kg dry | 2143.8 | 35000 U | 77 | 40-110 | 2 | 40 |
| 2,4-Dimethylphenol | 2270 | D | | ug/kg dry | 2143.8 | 35000 U | 106* | 30-105 | 5 | 40 |
| 2,4-Dinitrophenol | 0.00 | U | | ug/kg dry | 2143.8 | 175000 U | * | 25-130 | | 40 |
| 2,4-Dinitrotoluene | 1840 | D | | ug/kg dry | 2143.8 | 35000 U | 86 | 50-115 | | 40 |
| 2,6-Dinitrotoluene | 1860 | D | | ug/kg dry | 2143.8 | 35000 U | 87 | 40-120 | 3 | 40 |
| 2-Chloronaphthalene | 2160 | D | | ug/kg dry | 2143.8 | 35000 U | 101 | 45-115 | 5 | 40 |
| 2-Chlorophenol | 1960 | D | | ug/kg dry | 2143.8 | 35000 U | 92 | 45-105 | 3 | 40 |
| 2-Methylnaphthalene | 2050 | D | | ug/kg dry | 2143.8 | 35000 U | 96 | 45-110 | 0.2 | 40 |
| 2-Methylphenol | 2520 | D | | ug/kg dry | 2143.8 | 35000 U | 118 | 40-120 | 8 | 40 |
| 2-Nitroaniline | 2520 | D | | ug/kg dry | 2143.8 | 175000 U | 117 | 45-120 | 10 | 40 |
| 2-Nitrophenol | 1360 | D | | ug/kg dry | 2143.8 | 35000 U | 64 | 40-110 | 4 | 40 |
| 3,3'-Dichlorobenzidine | 8920 | D | | ug/kg dry | 2143.8 | 70100 U | 416* | 15-130 | 19 | 40 |
| 3-Nitroaniline | 884 | D | | ug/kg dry | 2143.8 | 175000 U | 41 | 40-130 | 4 | 40 |
| 4,6-Dinitro-2-methylphenol | 0.00 | U | | ug/kg dry | 2143.8 | 35000 U | * | 20-140 | | 40 |
| 4-Bromophenyl Phenyl Ether | 2220 | D | | ug/kg dry | 2143.8 | 35000 U | 104 | 45-115 | 2 | 40 |
| 4-Chloro-3-methylphenol | 2270 | D | | ug/kg dry | 2143.8 | 35000 U | 106 | 35-115 | 10 | 40 |
| 4-Chloroaniline | 236 | D | | ug/kg dry | 2143.8 | 35000 U | 11 | 10-100 | | 40 |
| 4-Chlorophenyl Phenyl Ether | 2120 | D | | ug/kg dry | 2143.8 | 35000 U | 99 | 45-110 | 1 | 40 |
| 3- and/or 4-Methylphenol | 2270 | D | | ug/kg dry | 2143.8 | 35000 U | 106 | 40-120 | 18 | 40 |
| 4-Nitroaniline | 1610 | D | | ug/kg dry | 2143.8 | 175000 U | 75 | 40-130 | 9 | 40 |
| 4-Nitrophenol | 0.00 | U | | ug/kg dry | 2143.8 | 175000 U | * | 15-140 | | 40 |
| Acenaphthene | 2300 | D | | ug/kg dry | 2143.8 | 35000 U | 107 | 45-110 | 4 | 40 |
| Acenaphthylene | 2300 | D | | ug/kg dry | 2143.8 | 35000 U | 107 | 45-115 | 6 | 40 |
| Anthracene | 2200 | D | | ug/kg dry | 2143.8 | 35000 U | 103 | 45-130 | 1 | 40 |
| Benz[a]anthracene | 2680 | D | | ug/kg dry | 2143.8 | 35000 U | 125 | 45-130 | 15 | 40 |
| Benzo[a] pyrene | 1720 | D | | ug/kg dry | 2143.8 | 35000 U | 80 | 45-130 | 25 | 40 |
| Benzo[b] fluoranthene | 2540 | D | | ug/kg dry | 2143.8 | 35000 U | 119 | 40-130 | 12 | 40 |
| Benzo[g,h,i] perylene | 2940 | D | | ug/kg dry | 2143.8 | 35000 U | 137* | 45-125 | 8 | 40 |
| Benzo[k] fluoranthene | 2120 | D | | ug/kg dry | 2143.8 | 35000 U | 99 | 45-125 | 6 | 40 |
| Bis(2-chloroethoxy) methane | 2250 | D | | ug/kg dry | 2143.8 | 35000 U | 105 | 45-110 | 0.6 | 40 |

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 16:35 |

## Semivolatile Organic Compounds by SW846 8270C - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211273 - SW 3540C** | | | | | | | | | | |
| **Matrix Spike Dup (L211273-MSD3)** | | **Source: 1211103-02** | | Prepared: 11/30/2012 Analyzed: 12/05/2012 | | | | | | |
| Bis(2-chloroethyl) ether | 2380 | D | | ug/kg dry | 2143.8 | 35000 U | 111* | 40-110 | 3 | 40 |
| Bis(2-chloroisopropyl) ether | 2620 | D | | ug/kg dry | 2143.8 | 35000 U | 122* | 30-115 | 3 | 40 |
| Bis(2-ethylhexyl) phthalate | 12800 | D | | ug/kg dry | 2143.8 | 35000 U | 599* | 40-145 | 16 | 40 |
| Butyl Benzyl Phthalate | 3490 | D | | ug/kg dry | 2143.8 | 35000 U | 163* | 50-125 | 7 | 40 |
| Carbazole | 2380 | D | | ug/kg dry | 2143.8 | 35000 U | 111 | 40-140 | 0.8 | 40 |
| Chrysene | 3120 | D | | ug/kg dry | 2143.8 | 35000 U | 146* | 45-130 | 6 | 40 |
| Dibenz[a,h]anthracene | 2760 | D | | ug/kg dry | 2143.8 | 35000 U | 129* | 45-125 | 4 | 40 |
| Dibenzofuran | 2220 | D | | ug/kg dry | 2143.8 | 35000 U | 104 | 45-120 | 2 | 40 |
| Diethyl Phthalate | 2210 | D | | ug/kg dry | 2143.8 | 35000 U | 103 | 50-125 | 2 | 40 |
| Dimethyl Phthalate | 2160 | D | | ug/kg dry | 2143.8 | 35000 U | 101 | 45-130 | 2 | 40 |
| Di-n-butyl Phthalate | 3030 | D | | ug/kg dry | 2143.8 | 35000 U | 141* | 50-130 | 6 | 40 |
| Di-n-octyl Phthalate | 3730 | D | | ug/kg dry | 2143.8 | 35000 U | 174* | 40-150 | 2 | 40 |
| Fluoranthene | 2520 | D | | ug/kg dry | 2143.8 | 35000 U | 117 | 45-130 | 3 | 40 |
| Fluorene | 2240 | D | | ug/kg dry | 2143.8 | 35000 U | 105 | 45-120 | 2 | 40 |
| Hexachlorobenzene | 2070 | D | | ug/kg dry | 2143.8 | 35000 U | 97 | 45-130 | 6 | 40 |
| Hexachlorobutadiene | 2010 | D | | ug/kg dry | 2143.8 | 35000 U | 94 | 45-105 | 2 | 40 |
| Hexachlorocyclopentadiene | 410 | D | | ug/kg dry | 2143.8 | 35000 U | 19 | 10-100 | 4 | 40 |
| Hexachloroethane | 1900 | D | | ug/kg dry | 2143.8 | 35000 U | 88 | 35-110 | 0.3 | 40 |
| Indeno[1,2,3-cd]pyrene | 2470 | D | | ug/kg dry | 2143.8 | 35000 U | 115 | 45-130 | 1 | 40 |
| Isophorone | 2080 | D | | ug/kg dry | 2143.8 | 35000 U | 97 | 40-110 | 2 | 40 |
| Naphthalene | 2420 | D | | ug/kg dry | 2143.8 | 35000 U | 113* | 40-110 | 2 | 40 |
| Nitrobenzene | 2460 | D | | ug/kg dry | 2143.8 | 35000 U | 115* | 40-105 | 1 | 40 |
| N-Nitrosodi-n-propylamine | 2610 | D | | ug/kg dry | 2143.8 | 35000 U | 122 | 30-130 | 6 | 40 |
| N-Nitrosodiphenylamine | 2070 | D | | ug/kg dry | 2143.8 | 35000 U | 96 | 50-120 | 5 | 40 |
| Pentachlorophenol | 1220 | D | | ug/kg dry | 2143.8 | 175000 U | 57 | 25-120 | 14 | 40 |
| Phenanthrene | 2470 | D | | ug/kg dry | 2143.8 | 35000 U | 115 | 50-120 | 2 | 40 |
| Phenol | 5330 | D | | ug/kg dry | 2143.8 | 35000 U | 249* | 40-115 | 5 | 40 |
| Pyrene | 2290 | D | | ug/kg dry | 2143.8 | 35000 U | 107 | 45-125 | 0.2 | 40 |
| *Surrogate: 2-Fluorophenol* | *2580* | | | *ug/kg dry* | *2679.7* | | *96* | *25-121* | | |
| *Surrogate: Phenol-d5* | *2590* | | | *ug/kg dry* | *2679.7* | | *97* | *24-113* | | |
| *Surrogate: Nitrobenzene-d5* | *1900* | | | *ug/kg dry* | *1786.5* | | *107* | *23-120* | | |
| *Surrogate: 2-Fluorobiphenyl* | *1820* | | | *ug/kg dry* | *1786.5* | | *102* | *30-115* | | |
| *Surrogate: 2,4,6-Tribromophenol* | *1990* | | | *ug/kg dry* | *2679.7* | | *74* | *19-122* | | |
| *Surrogate: p-Terphenyl-d14* | *2320* | | | *ug/kg dry* | *1786.5* | | *130* | *18-137* | | |

# PREPARATION BENCH SHEET

L211273

**Lionville Laboratory**

**Printed: 12/4/2012 3:24:23PM**

000000034

**Matrix: Solid** **Prepared using: Extraction - SW 3540C** **Surrogate used: 1201561**

| Lab Number | Analysis | Prepared | Initial (g) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211101-01 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.02 | 2 | | | | 500 | WC-Hanford, Inc. | |
| 1211102-01 | 8270C TCL SVOC | 11/30/2012 15:25 | 29.87 | 4 | | | | 500 | WC-Hanford, Inc. | |
| 1211102-02 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.81 | 4 | | | | 500 | WC-Hanford, Inc. | |
| 1211102-03 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.07 | 4 | | | | 500 | WC-Hanford, Inc. | |
| 1211102-04 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.09 | 2 | | | | 500 | WC-Hanford, Inc. | |
| 1211103-01 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.67 | 10 | | | | 500 | WC-Hanford, Inc. | |
| 1211103-02 | 8270C TCL SVOC | 11/30/2012 15:25 | 30.36 | 10 | | | | 500 | WC-Hanford, Inc. | |
| L211273-BLK1 | QC | 11/30/2012 15:25 | 30 | 1 | | | | 500 | | |
| L211273-BS1 | QC | 11/30/2012 15:25 | 30 | 1 | 1201082 | | 600 | 500 | | |
| L211273-MS1 | QC | 11/30/2012 15:25 | 30.17 | 2 | 1201082 | 1211101-01 | 600 | 500 | | |
| L211273-MS2 | QC | 11/30/2012 15:25 | 30.52 | 2 | 1201082 | 1211102-04 | 600 | 500 | | |
| L211273-MS3 | QC | 11/30/2012 15:25 | 30.4 | 10 | 1201082 | 1211103-02 | 600 | 500 | | |
| L211273-MSD1 | QC | 11/30/2012 15:25 | 30.67 | 2 | 1201082 | 1211101-01 | 600 | 500 | | |
| L211273-MSD2 | QC | 11/30/2012 15:25 | 30.01 | 2 | 1201082 | 1211102-04 | 600 | 500 | | |
| L211273-MSD3 | QC | 11/30/2012 15:25 | 30.08 | 10 | 1201082 | 1211103-02 | 600 | 500 | | |

Extracts Relinquished By — Date 12/4/12 1525

Extracts Received By — Date 12/4/12 1530

# PAHs

264 Welsh Pool Road
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Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 07:06 |

## Analytical Report for Polynuclear Aromatic Compounds by SW846 8310

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1R5X9 | 1211103-01 | Soil | 11/20/2012 09:49 | 11/27/2012 10:00 |
| J1R600 | 1211103-02 | Soil | 11/20/2012 09:52 | 11/27/2012 10:00 |

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Phone (610) 280-3000
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**Case Narrative**

**Client:** WC-HANFORD RC-190 KP0159
**LVL #:** 1211103

**W.O. #:** 60049-001-001-0001-00
**Date Received:** 11-27-2012

**POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)**

Two (2) soil samples were collected on 11-20-2012.

The samples and associated QC samples were extracted 11-29-2012 and analyzed 12-05-2012 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3540C and the analysis procedure was based on SW846 Method 8310.

Lionville Laboratory (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. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements:

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

2. All required holding times for extraction and analysis have been met.

3. All obtainable surrogate recoveries were within QC acceptance criteria.

4. The method blank was below the reporting limits for all target compounds.

5. All blank spike recoveries were within QC acceptance criteria.

6. Twenty-two (22) out of thirty-two (32) matrix spike recoveries were outside QC acceptance criteria. A copy of the Sample Discrepancy Report (SDR # 12GC208) has been enclosed.

7. The sample and associated QC required a 25-fold instrument dilution due to the nature of the matrix. Reporting limits have been adjusted to reflect the necessary dilutions.

8. The initial calibrations associated with this data set were within acceptance criteria.

9. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria. Per SW846 Method 8000B, the attached table lists compounds where the %difference or drift was greater than 15%, and the mean across all compounds was used for evaluation of the continuing calibration. Results associated with these compounds are considered to have greater uncertainty.

10. The samples were reported on a dry weight basis.


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. 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
LvL Laboratory Manager

12/21/12
Date

**8310 PAH**

Analytes with %Difference or %Drift >15%, Where Mean is Used for Continuing Calibration

| Analyte | 12/5/12 0942 CCV1 | 12/5/12 1636 CCV2 | 12/5/12 2219 CCV3 | CCV4 | CCV5 | CCV6 | CCV7 | CCV8 |
|---|---|---|---|---|---|---|---|---|
| Triphenylene (surrogate) | | | | | | | | |
| Naphthalene | | | | | | | | |
| Acenaphthylene | | | | | | | | |
| Acenaphthene | | | | | | | | |
| Fluorene | | | | | | | | |
| Phenanthrene | | | | | | | | |
| Anthracene | | | | | | | | |
| Fluoranthene | | | | | | | | |
| Indeno[1,2,3-cd]pyrene | | | | | | | | |
| Pyrene | | | | | | | | |
| Benz[a]anthracene | | | | | | | | |
| Chrysene | | | | | | | | |
| Benzo[b]fluoranthene | | | | | | | | |
| Benzo[k]fluoranthene | | | | | | | | |
| Benzo[a]pyrene | | | -54.5 | | | | | |
| Dibenz[a,h]anthracene | | | | | | | | |
| Benzo[g,h,i]perylene | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Mean %D or %Drift | 1.4/8.2 | 1.4/3.9 | -0.1/-7.2 | | | | | |

Sample results reported from affected CCV:

CCV1: _____

CCV2: _____

CCV3: 1211102-02,03,04 1211103-01,02 L211261- MS3, MSD3, MS4, MSD4

CCV4: _____

CCV5: _____

CCV6: _____

CCV7: _____

CCV8: _____

# Lionville Laboratory Sample Discrepancy Report (SDR)

SDR #: 12GC208

Initiator: Catherine Carey
Date: 12/08/12
Client: WC Hanford

Batch: 1211103
Samples: MS4 | MSD4
Method: SW846/MCAWW/CLP/

Parameter: PAH
Matrix: SOIL
Prep Batch: L211261

**1. Reason for SDR**

**a. COC Discrepancy**
__ Tech Profile Error
__ Transcription Error
__ Client Request
__ Wrong Test Code
__ Sampler Error on C-O-C
__ Other _____

**b. General Discrepancy**
__ Missing Sample/Extract*
__ Hold Time Exceeded
__ Improper Bottle Type
__ Container Broken*
__ Insufficient Sample*
__ Not Amenable to Analysis
__ Wrong Sample Pulled
__ Preservation Wrong
__ Label ID's Illegible
__ Received Past Hold

Note*: Verified by [Log-In] or [Prep Group] (circle)...signature/date: _____

**c. Problem** (Include all relevant specific results; attach data if necessary)

Several spike recoveries outside QC limits

**2. Known or Probable Causes(s)**

Dilution required for analysis, and interference from target/Non target analyte peaks.

**3. Discussion and Proposed Action**

__ Re-log
__ Entire Batch
__ Following Samples: _____
__ Re-leach
__ Re-extract
__ Re-digest
__ Revise EDD
__ Change Test Code to _____
__ Place On/Take Off Hold (circle)

Other Description:
Samples extracts ID. are not normal in appearance.
Narrate

12/21/12

**4. Project Manager Instructions**...signature/date: 12/21/12
__ Concur with Proposed Action
__ Disagree with Proposed Action; See Instruction
✓ Include in Case Narrative
__ Client Contacted:
__ Date/Person _____
__ Add
__ Cancel

**5. Final Action**...signature/date: 12/21/12
__ Verified re-[log][leach][extract][digest][analysis] (circle)
__ Included in Case Narrative
__ Hard Copy COC Revised
__ Electronic COC Revised
__ EDD Corrections Completed

Other Explanation:

**When Final Action has been recorded, forward original to QA for diposition.**

Route
__ Lab Manager: Daniels
X Project Mgr (circle): Johnson / Stone
__ Sample Prep (circle): Ford
__ Log-in: King

Route
__ Metals: Welsh / _____
__ Inorganic: Perrone / _____
X GC/LC: Carey / _____
__ MS VOA: Rubino / _____
__ MS BNA: Carden / _____
__ Other: _____

QA-139-A-0208

# GLOSSARY OF DATA

## DATA QUALIFIERS

| | | |
|---|---|---|
| U | = | Indicates that the compound was analyzed for but not detected. The minimum detection limit for the sample (not the method detection limit) is reported with the U (e.g., 10U). |
| J | = | Indicates an estimated value. This flag is used in cases where a target analyte is detected at a level less than the lower quantification level. If the limit of quantification is 10 ug/L and a concentration of 3 ug/L is calculated, it is reported as 3J. |
| B | = | This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination. |
| E | = | Indicates that the compound was detected beyond the calibration range and was subsequently analyzed at a dilution. |
| I | = | Interference. |
| .I | = | Indicates an interference on one analytical column only. Result is reported from remaining analytical column. |
| P | = | This flag is used for a dual column analysis (i.e. pesticides/PCB/herbicides) when there is greater than 40% difference for detected concentrations between the two GC columns; the lower of the two values is reported on Form 1 and flagged with a "P". |
| D | = | This flag identifies all compounds identified in an analysis at a secondary dilution factor. |
| C | = | This flag applies to a compound that has been confirmed by GC/MS. |

## ABBREVIATIONS

| | | |
|---|---|---|
| BS | = | Indicates blank spike in which reagent grade water is spiked with the CLP matrix spiking solutions and carried through all the steps in the method. Spike recoveries are reported. |
| BSD | = | Indicates blank spike duplicate. |
| MS | = | Indicates matrix spike. |
| MSD | = | Indicates matrix spike duplicate. |
| DL | = | Indicates that recoveries were not obtained because the extract had to be diluted for analysis. |
| NA | = | Not Applicable. |
| DF | = | Dilution Factor. |
| NR | = | Not Required. |
| NS | = | Not Spiked. |
| SP | = | Indicates Spiked Compound. |
| NPM | = | No pattern match for multi-component target analytes. |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 07:06 |

## J1R5X9
### 1211103-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Polynuclear Aromatic Compounds by SW846 8310** | | | | | | | | | |
| **Naphthalene** | **95.3** | J, D | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Acenaphthylene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Acenaphthene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Fluorene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Phenanthrene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Anthracene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Fluoranthene** | **265** | D | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Indeno[1,2,3-cd]pyrene** | **111** | D | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Pyrene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Benz[a]anthracene** | **90.6** | J, D | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Chrysene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Benzo[b] fluoranthene** | **225** | D | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[k] fluoranthene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[a] pyrene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Dibenz[a,h]anthracene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[g,h,i] perylene | 96.5 | U | 96.5 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| *Surrogate: Triphenylene* | *93 %* | | *68-129* | | | *L211261* | *11/29/2012* | *12/05/2012* | *8310* |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 07:06 |

## J1R600

### 1211103-02 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Polynuclear Aromatic Compounds by SW846 8310** | | | | | | | | | |
| **Naphthalene** | **135** | D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Acenaphthylene** | **608** | D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Acenaphthene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Fluorene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Phenanthrene** | **25.4** | J, D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Anthracene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Fluoranthene** | **271** | D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Indeno[1,2,3-cd]pyrene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Pyrene** | **24.3** | J, D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Benz[a]anthracene** | **151** | D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Chrysene** | **36.2** | J, D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| **Benzo[b] fluoranthene** | **23.7** | J, D | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[k] fluoranthene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[a] pyrene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Dibenz[a,h]anthracene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| Benzo[g,h,i] perylene | 88.6 | U | 88.6 | ug/kg dry | 25 | L211261 | 11/29/2012 | 12/05/2012 | 8310 |
| *Surrogate: Triphenylene* | *95 %* | | *68-129* | | | *L211261* | *11/29/2012* | *12/05/2012* | *8310* |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 07:06 |

# Polynuclear Aromatic Compounds by SW846 8310 - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211261 - SW 3540C** | | | | | | | | | | |
| **Blank (L211261-BLK1)** | | | | Prepared: 11/29/2012 Analyzed: 12/05/2012 | | | | | | |
| Naphthalene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Acenaphthylene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Acenaphthene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Fluorene | 0.833 | J | 3.33 | ug/kg wet | | | | | | |
| Phenanthrene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Anthracene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Fluoranthene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Indeno[1,2,3-cd]pyrene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Pyrene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Benz[a]anthracene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Chrysene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Benzo[b] fluoranthene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Benzo[k] fluoranthene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Benzo[a] pyrene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Dibenz[a,h]anthracene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| Benzo[g,h,i] perylene | 3.33 | U | 3.33 | ug/kg wet | | | | | | |
| *Surrogate: Triphenylene* | *151* | | | *ug/kg wet* | *166.67* | | *91* | *68-129* | | |
| **LCS (L211261-BS1)** | | | | Prepared: 11/29/2012 Analyzed: 12/05/2012 | | | | | | |
| Naphthalene | 127 | | 3.33 | ug/kg wet | 166.67 | | 76 | 0-127 | | |
| Acenaphthylene | 134 | | 3.33 | ug/kg wet | 166.67 | | 80 | 50-140 | | |
| Acenaphthene | 134 | | 3.33 | ug/kg wet | 166.67 | | 81 | 17-139 | | |
| Fluorene | 132 | | 3.33 | ug/kg wet | 166.67 | | 79 | 28-145 | | |
| Phenanthrene | 134 | | 3.33 | ug/kg wet | 166.67 | | 80 | 30-152 | | |
| Anthracene | 137 | | 3.33 | ug/kg wet | 166.67 | | 82 | 19-171 | | |
| Fluoranthene | 147 | | 3.33 | ug/kg wet | 166.67 | | 88 | 34-159 | | |
| Indeno[1,2,3-cd]pyrene | 152 | | 3.33 | ug/kg wet | 166.67 | | 91 | 31-156 | | |
| Pyrene | 146 | | 3.33 | ug/kg wet | 166.67 | | 87 | 33-152 | | |
| Benz[a]anthracene | 161 | | 3.33 | ug/kg wet | 166.67 | | 97 | 32-157 | | |
| Chrysene | 150 | | 3.33 | ug/kg wet | 166.67 | | 90 | 31-159 | | |
| Benzo[b] fluoranthene | 161 | | 3.33 | ug/kg wet | 166.67 | | 96 | 33-164 | | |
| Benzo[k] fluoranthene | 158 | | 3.33 | ug/kg wet | 166.67 | | 95 | 28-161 | | |
| Benzo[a] pyrene | 165 | | 3.33 | ug/kg wet | 166.67 | | 99 | 29-149 | | |
| Dibenz[a,h]anthracene | 160 | | 3.33 | ug/kg wet | 166.67 | | 96 | 27-153 | | |
| Benzo[g,h,i] perylene | 163 | | 3.33 | ug/kg wet | 166.67 | | 98 | 32-157 | | |
| *Surrogate: Triphenylene* | *148* | | | *ug/kg wet* | *166.67* | | *88* | *68-129* | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/07/2012 07:06 |

## Polynuclear Aromatic Compounds by SW846 8310 - Quality Control

## Lionville Laboratory

| Analyte | Result and Qualifiers | | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch L211261 - SW 3540C** | | | | | | | | | | |
| **Matrix Spike (L211261-MS4)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/05/2012 | | | | | | |
| Naphthalene | 75.3 | J, D | 96.5 | ug/kg dry | 193.12 | 95.3 | -10* | 0-127 | | |
| Acenaphthylene | 257 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 133 | 50-140 | | |
| Acenaphthene | 309 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 160* | 17-139 | | |
| Fluorene | 35.7 | J, D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 18* | 28-145 | | |
| Phenanthrene | 39.4 | J, D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 20* | 30-152 | | |
| Anthracene | 96.5 | U | 96.5 | ug/kg dry | 193.12 | 96.5 U | * | 19-171 | | |
| Fluoranthene | 183 | D | 96.5 | ug/kg dry | 193.12 | 265 | -42* | 34-159 | | |
| Indeno[1,2,3-cd]pyrene | 75.8 | J, D | 96.5 | ug/kg dry | 193.12 | 111 | -18* | 31-156 | | |
| Pyrene | 143 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 74 | 33-152 | | |
| Benz[a]anthracene | 50.9 | J, D | 96.5 | ug/kg dry | 193.12 | 90.6 | -21* | 32-157 | | |
| Chrysene | 232 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 120 | 31-159 | | |
| Benzo[b] fluoranthene | 148 | D | 96.5 | ug/kg dry | 193.12 | 225 | -40* | 33-164 | | |
| Benzo[k] fluoranthene | 173 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 90 | 28-161 | | |
| Benzo[a] pyrene | 39.9 | J, D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 21* | 29-149 | | |
| Dibenz[a,h]anthracene | 28.3 | J, D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 15* | 27-153 | | |
| Benzo[g,h,i] perylene | 891 | D | 96.5 | ug/kg dry | 193.12 | 96.5 U | 461* | 32-157 | | |
| *Surrogate: Triphenylene* | *180* | | | *ug/kg dry* | *193.12* | | *93* | *68-129* | | |
| **Matrix Spike Dup (L211261-MSD4)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/05/2012 | | | | | | |
| Naphthalene | 112 | D | 95.7 | ug/kg dry | 191.59 | 95.3 | 9 | 0-127 | -2290 | 40 |
| Acenaphthylene | 296 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 154* | 50-140 | 15 | 40 |
| Acenaphthene | 345 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 180* | 17-139 | 12 | 40 |
| Fluorene | 95.7 | U | 95.7 | ug/kg dry | 191.59 | 96.5 U | * | 28-145 | | 40 |
| Phenanthrene | 57.9 | J, D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 30 | 30-152 | 39 | 40 |
| Anthracene | 95.7 | U | 95.7 | ug/kg dry | 191.59 | 96.5 U | * | 19-171 | | 40 |
| Fluoranthene | 225 | D | 95.7 | ug/kg dry | 191.59 | 265 | -21* | 34-159 | -66 | 40 |
| Indeno[1,2,3-cd]pyrene | 116 | D | 95.7 | ug/kg dry | 191.59 | 111 | 2* | 31-156 | -262 | 40 |
| Pyrene | 187 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 98 | 33-152 | 28 | 40 |
| Benz[a]anthracene | 115 | D | 95.7 | ug/kg dry | 191.59 | 90.6 | 13* | 32-157 | -841 | 40 |
| Chrysene | 334 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 174* | 31-159 | 37 | 40 |
| Benzo[b] fluoranthene | 186 | D | 95.7 | ug/kg dry | 191.59 | 225 | -20* | 33-164 | -65 | 40 |
| Benzo[k] fluoranthene | 224 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 117 | 28-161 | 26 | 40 |
| Benzo[a] pyrene | 59.6 | J, D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 31 | 29-149 | 40 | 40 |
| Dibenz[a,h]anthracene | 68.5 | J, D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 36 | 27-153 | 84* | 40 |
| Benzo[g,h,i] perylene | 1140 | D | 95.7 | ug/kg dry | 191.59 | 96.5 U | 594* | 32-157 | 25 | 40 |
| *Surrogate: Triphenylene* | *166* | | | *ug/kg dry* | *191.59* | | *86* | *68-129* | | |

# PREPARATION BENCH SHEET

L211261

**Lionville Laboratory**

**Printed: 12/5/2012 1:46:20PM**

**Matrix: Solid** **Prepared using: HPLC - SW 3540C** **Surrogate used: 1200612**

| Lab Number | Analysis | Prepared | Initial (g) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211094-01 | 8310 PAH | 11/29/2012 16:25 | 30.27 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211101-01 | 8310 PAH | 11/29/2012 16:25 | 30.75 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-01 | 8310 PAH | 11/29/2012 16:25 | 30.19 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-02 | 8310 PAH | 11/29/2012 16:25 | 30.12 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-03 | 8310 PAH | 11/29/2012 16:25 | 30.92 | 25 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-04 | 8310 PAH | 11/29/2012 16:25 | 30.48 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211103-01 | 8310 PAH | 11/29/2012 16:25 | 30.02 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211103-02 | 8310 PAH | 11/29/2012 16:25 | 30.28 | 5 | | | | 50 | WC-Hanford, Inc. | |
| L211261-BLK1 | QC | 11/29/2012 16:25 | 30 | 5 | | | | 50 | | |
| L211261-BS1 | QC | 11/29/2012 16:25 | 30 | 5 | 1200436 | | 50 | 50 | | |
| L211261-MS1 | QC | 11/29/2012 16:25 | 30.18 | 5 | 1200436 | 1211094-01 | 50 | 50 | | |
| L211261-MS2 | QC | 11/29/2012 16:25 | 30.89 | 5 | 1200436 | 1211101-01 | 50 | 50 | | |
| L211261-MS3 | QC | 11/29/2012 16:25 | 30.26 | 25 | 1200436 | 1211102-03 | 50 | 50 | | |
| L211261-MS4 | QC | 11/29/2012 16:25 | 30.04 | 5 | 1200436 | 1211103-01 | 50 | 50 | | |
| L211261-MSD1 | QC | 11/29/2012 16:25 | 30.51 | 5 | 1200436 | 1211094-01 | 50 | 50 | | |
| L211261-MSD2 | QC | 11/29/2012 16:25 | 30.51 | 5 | 1200436 | 1211101-01 | 50 | 50 | | |
| L211261-MSD3 | QC | 11/29/2012 16:25 | 30.81 | 25 | 1200436 | 1211102-03 | 50 | 50 | | |
| L211261-MSD4 | QC | 11/29/2012 16:25 | 30.28 | 5 | 1200436 | 1211103-01 | 50 | 50 | | |

12/5/12 0846 Revision

Extracts Relinquished By Date Extracts Received By Date

# PREPARATION BENCH SHEET

L211261

**Lionville Laboratory**

**Printed: 12/4/2012 6:31:42PM**

**Matrix: Solid** **Prepared using: GC - SW 3540C** **Surrogate used: 1200612**

| Lab Number | Analysis | Prepared | Initial (g) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211094-01 | 8310 PAH | 11/29/2012 16:25 | 30.27 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211101-01 | 8310 PAH | 11/29/2012 16:25 | 30.75 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-01 | 8310 PAH | 11/29/2012 16:25 | 30.19 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-02 | 8310 PAH | 11/29/2012 16:25 | 30.12 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-03 | 8310 PAH | 11/29/2012 16:25 | 30.92 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211102-04 | 8310 PAH | 11/29/2012 16:25 | 30.48 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211103-01 | 8310 PAH | 11/29/2012 16:25 | 30.02 | 5 | | | | 50 | WC-Hanford, Inc. | |
| 1211103-02 | 8310 PAH | 11/29/2012 16:25 | 30.28 | 5 | | | | 50 | WC-Hanford, Inc. | |
| L211261-BLK1 | QC | 11/29/2012 16:25 | 30 | 5 | | | | 50 | | |
| L211261-BS1 | QC | 11/29/2012 16:25 | 30 | 5 | 1200436 | | 50 | 50 | | |
| L211261-MS1 | QC | 11/29/2012 16:25 | 30.18 | 5 | 1200436 | 1211094-01 | 50 | 50 | | |
| L211261-MS2 | QC | 11/29/2012 16:25 | 30.89 | 5 | 1200436 | 1211101-01 | 50 | 50 | | |
| L211261-MS3 | QC | 11/29/2012 16:25 | 30.26 | 5 | 1200436 | 1211102-03 | 50 | 50 | | |
| L211261-MS4 | QC | 11/29/2012 16:25 | 30.04 | 5 | 1200436 | 1211103-01 | 50 | 50 | | |
| L211261-MSD1 | QC | 11/29/2012 16:25 | 30.51 | 5 | 1200436 | 1211094-01 | 50 | 50 | | |
| L211261-MSD2 | QC | 11/29/2012 16:25 | 30.51 | 5 | 1200436 | 1211101-01 | 50 | 50 | | |
| L211261-MSD3 | QC | 11/29/2012 16:25 | 30.81 | 5 | 1200436 | 1211102-03 | 50 | 50 | | |
| L211261-MSD4 | QC | 11/29/2012 16:25 | 30.28 | 5 | 1200436 | 1211103-01 | 50 | 50 | | |

Extracts Relinquished By 12/4/12 8:3 Date

Extracts Received By 12/05/12 8:40 Date

# METALS

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

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

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| J1R5X9 | 1211103-01 | Soil | 11/20/2012 09:49 | 11/27/2012 10:00 |
| J1R600 | 1211103-02 | Soil | 11/20/2012 09:52 | 11/27/2012 10:00 |

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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# Case Narrative

**Client:** WC-HANFORD RC-190
**LVL#:** 1211103
**SDG/SAF#:** KP0159/RC-190

**W.O.#:** 60049-001-001-0001-00
**Date Received:** 11-27-12

## 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 analyses of 2 soil samples and 2 leachate samples.

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

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

   Soil samples J1R5X9, L211251-DUP3, and L211251-MS3 were reanalyzed and reported with 12-fold dilutions for Zinc due to high concentration of Zinc in the sample

   The TCLP leachate samples were analyzed and reported with 5-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. 2120019-CCB2 and 2120019-CCB4 results for Barium (TCLP) were above the MRL, however less than 5% of the RCRA limit.

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


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.

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

10. The matrix spike (MS) recoveries for 7 analytes were outside the 75-125% control limits.

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, Iron, Magnesium, Manganese, Silicon, and Zinc.

12. The duplicate analysis for 1 analyte was outside the 20% Relative Percent Difference (RPD) control limits. The ± 20% RPD control limit applies to sample results greater than ten times the MDL.

13. The TCLP extract from sample J1R5X9 was selected for the matrix spike (MS) for this analytical batch. All MS recoveries were greater than 50% as per method criteria.

    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.

14. 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.

15. 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.

16. 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

12/6/12
Date

alm/11-103TChg%

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

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

## 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-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

## J1R5X9
### 1211103-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **Metals by SW846 6000/7000 series** | | | | | | | | | |
| **Aluminum** | **9870** | | 15.3 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Antimony** | **1.54** | B | 1.83 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Arsenic** | **3.83** | | 3.05 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Barium** | **103** | | 1.53 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Beryllium** | **0.338** | B | 0.611 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Boron** | **2.06** | B | 6.11 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Cadmium** | **0.831** | | 0.611 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Calcium** | **24500** | | 305 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Chromium** | **19.2** | | 0.611 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Cobalt** | **10.9** | | 6.11 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Copper** | **66.4** | | 3.05 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Iron** | **23200** | | 61.1 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Lead** | **487** | | 1.53 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Magnesium** | **4200** | | 229 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Manganese** | **344** | | 15.3 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Molybdenum | 6.11 | U | 6.11 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Nickel** | **25.4** | | 12.2 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Potassium** | **1840** | | 1220 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Selenium | 0.916 | U | 0.916 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Silicon** | **462** | | 6.11 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Silver | 0.611 | U | 0.611 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Sodium** | **504** | | 153 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Vanadium** | **76.9** | | 7.63 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Zinc** | **3450** | | 122 | mg/kg dry | 12 | L211251 | 11/29/2012 | 12/04/2012 | 6010B |
| Mercury | 0.0268 | U | 0.0268 | mg/kg dry | 1 | L211252 | 11/29/2012 | 12/03/2012 | 7471A |

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Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

## J1R5X9

### 1211103-01 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **TCLP Metals by SW846 1311 6000/7000 series** | | | | | | | | | |
| **Arsenic** | **0.0284** | B | 0.0750 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Barium** | **0.411** | | 0.00500 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Cadmium** | **0.00894** | B | 0.0150 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Chromium** | **0.00542** | B | 0.0250 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Lead** | **0.293** | | 0.0500 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L211272 | 11/30/2012 | 12/03/2012 | 7470 |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

## J1R600
### 1211103-02 (Soil)

### Lionville Laboratory

**Metals by SW846 6000/7000 series**

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum** | **9800** | | 14.9 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Antimony | 1.79 | U | 1.79 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Arsenic** | **3.03** | | 2.99 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Barium** | **113** | | 1.49 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Beryllium** | **0.324** | B | 0.597 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Boron | 5.97 | U | 5.97 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Cadmium** | **0.219** | B | 0.597 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Calcium** | **3260** | | 299 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Chromium** | **12.8** | | 0.597 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Cobalt** | **5.93** | B | 5.97 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Copper** | **22.0** | | 2.99 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Iron** | **21500** | | 59.7 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Lead** | **30.8** | | 1.49 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Magnesium** | **3650** | | 224 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Manganese** | **258** | | 14.9 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Molybdenum | 5.97 | U | 5.97 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Nickel** | **10.7** | B | 11.9 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Potassium** | **1740** | | 1190 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Selenium | 0.896 | U | 0.896 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Silicon** | **778** | | 5.97 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Silver | 0.597 | U | 0.597 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Sodium** | **264** | | 149 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Vanadium** | **52.2** | | 7.46 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| **Zinc** | **159** | | 29.9 | mg/kg dry | 3 | L211251 | 11/29/2012 | 12/03/2012 | 6010B |
| Mercury | 0.0293 | U | 0.0293 | mg/kg dry | 1 | L211252 | 11/29/2012 | 12/03/2012 | 7471A |

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Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | **Reported:** |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

## J1R600
### 1211103-02 (Soil)

| Analyte | Result and Qualifier | | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|
| **Lionville Laboratory** | | | | | | | | | |
| **TCLP Metals by SW846 1311 6000/7000 series** | | | | | | | | | |
| Arsenic | 0.0750 | U | 0.0750 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Barium** | **0.194** | | 0.00500 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Cadmium** | **0.00191** | B | 0.0150 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Chromium** | **0.00349** | B | 0.0250 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| **Lead** | **0.0308** | B | 0.0500 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Selenium | 0.100 | U | 0.100 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Silver | 0.0300 | U | 0.0300 | mg/L | 5 | L211264 | 11/30/2012 | 12/04/2012 | 6010 |
| Mercury | 0.000200 | U | 0.000200 | mg/L | 1 | L211272 | 11/30/2012 | 12/03/2012 | 7470 |

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Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

# 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 L211251 - SW 3050B** | | | | | | | | | | |
| **Blank (L211251-BLK1)** | | | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Aluminum | 4.63 | U | 4.63 | mg/kg wet | | | | | | |
| Antimony | 0.556 | U | 0.556 | mg/kg wet | | | | | | |
| Arsenic | 0.926 | U | 0.926 | mg/kg wet | | | | | | |
| Barium | 0.463 | U | 0.463 | mg/kg wet | | | | | | |
| Beryllium | 0.185 | U | 0.185 | mg/kg wet | | | | | | |
| Boron | 1.85 | U | 1.85 | mg/kg wet | | | | | | |
| Cadmium | 0.185 | U | 0.185 | mg/kg wet | | | | | | |
| Calcium | 5.74 | B | 92.6 | mg/kg wet | | | | | | |
| Chromium | 0.185 | U | 0.185 | mg/kg wet | | | | | | |
| Cobalt | 1.85 | U | 1.85 | mg/kg wet | | | | | | |
| Copper | 0.926 | U | 0.926 | mg/kg wet | | | | | | |
| Iron | 18.5 | U | 18.5 | mg/kg wet | | | | | | |
| Lead | 0.463 | U | 0.463 | mg/kg wet | | | | | | |
| Magnesium | 69.4 | U | 69.4 | mg/kg wet | | | | | | |
| Manganese | 4.63 | U | 4.63 | mg/kg wet | | | | | | |
| Molybdenum | 1.85 | U | 1.85 | mg/kg wet | | | | | | |
| Nickel | 3.70 | U | 3.70 | mg/kg wet | | | | | | |
| Potassium | 370 | U | 370 | mg/kg wet | | | | | | |
| Selenium | 0.278 | U | 0.278 | mg/kg wet | | | | | | |
| Silicon | 1.85 | U | 1.85 | mg/kg wet | | | | | | |
| Silver | 0.185 | U | 0.185 | mg/kg wet | | | | | | |
| Sodium | 46.3 | U | 46.3 | mg/kg wet | | | | | | |
| Vanadium | 2.31 | U | 2.31 | mg/kg wet | | | | | | |
| Zinc | 9.26 | U | 9.26 | mg/kg wet | | | | | | |
| **Duplicate (L211251-DUP3)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Aluminum | 9470 | | 15.8 | mg/kg dry | | 9870 | | | 4.17 | 20 |
| Antimony | 1.60 | B | 1.90 | mg/kg dry | | 1.54 | | | 3.63 | 20 |
| Arsenic | 3.37 | | 3.16 | mg/kg dry | | 3.83 | | | 12.8 | 20 |
| Barium | 98.6 | | 1.58 | mg/kg dry | | 103 | | | 4.59 | 20 |
| Beryllium | 0.311 | B | 0.633 | mg/kg dry | | 0.338 | | | 8.19 | 20 |
| Boron | 2.07 | B | 6.33 | mg/kg dry | | 2.06 | | | 0.0796 | 20 |
| Cadmium | 0.878 | | 0.633 | mg/kg dry | | 0.831 | | | 5.50 | 20 |
| Calcium | 21800 | | 316 | mg/kg dry | | 24500 | | | 11.9 | 20 |
| Chromium | 17.9 | | 0.633 | mg/kg dry | | 19.2 | | | 7.22 | 20 |
| Cobalt | 13.3 | | 6.33 | mg/kg dry | | 10.9 | | | 19.7 | 20 |
| Copper | 70.6 | | 3.16 | mg/kg dry | | 66.4 | | | 6.07 | 20 |

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| | | |
|---|---|---|
| WC-Hanford, Inc. | Project: RC-190 | |
| 2620 Fermi Avenue | Project Number: KP0159 | Reported: |
| Richland WA, 99354 | Project Manager: Joan Kessner | 12/06/2012 10:49 |

# 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 L211251 - SW 3050B** | | | | | | | | | | |
| **Duplicate (L211251-DUP3)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Iron | 22700 | | 63.3 | mg/kg dry | | 23200 | | | 2.26 | 20 |
| Lead | 492 | | 1.58 | mg/kg dry | | 487 | | | 1.03 | 20 |
| Magnesium | 4270 | | 237 | mg/kg dry | | 4200 | | | 1.52 | 20 |
| Manganese | 373 | | 15.8 | mg/kg dry | | 344 | | | 7.99 | 20 |
| Molybdenum | 6.33 | U | 6.33 | mg/kg dry | | 6.11 U | | | | 20 |
| Nickel | 23.7 | | 12.7 | mg/kg dry | | 25.4 | | | 6.87 | 20 |
| Potassium | 1740 | | 1270 | mg/kg dry | | 1840 | | | 5.34 | 20 |
| Selenium | 0.949 | U | 0.949 | mg/kg dry | | 0.916 U | | | | 20 |
| Silicon | 595 | | 6.33 | mg/kg dry | | 462 | | | 25.2* | 20 |
| Silver | 0.633 | U | 0.633 | mg/kg dry | | 0.611 U | | | | 20 |
| Sodium | 519 | | 158 | mg/kg dry | | 504 | | | 2.90 | 20 |
| Vanadium | 82.1 | | 7.91 | mg/kg dry | | 76.9 | | | 6.54 | 20 |
| Zinc | 3350 | | 127 | mg/kg dry | | 3450 | | | 2.91 | 20 |
| **Matrix Spike (L211251-MS3)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Aluminum | 9670 | | 13.4 | mg/kg dry | 178.50 | 9870 | -115* | 75-125 | | |
| Antimony | 14.3 | | 1.61 | mg/kg dry | 44.625 | 1.54 | 28.5* | 75-125 | | |
| Arsenic | 162 | | 2.68 | mg/kg dry | 178.50 | 3.83 | 88.8 | 75-125 | | |
| Barium | 254 | | 1.34 | mg/kg dry | 178.50 | 103 | 84.4 | 75-125 | | |
| Beryllium | 4.37 | | 0.535 | mg/kg dry | 4.4625 | 0.338 | 90.4 | 75-125 | | |
| Boron | 81.8 | | 5.35 | mg/kg dry | 89.249 | 2.06 | 89.3 | 75-125 | | |
| Cadmium | 4.66 | | 0.535 | mg/kg dry | 4.4625 | 0.831 | 85.8 | 75-125 | | |
| Calcium | 27100 | | 268 | mg/kg dry | 2231.2 | 24500 | 116 | 75-125 | | |
| Chromium | 33.6 | | 0.535 | mg/kg dry | 17.850 | 19.2 | 80.3 | 75-125 | | |
| Cobalt | 49.2 | | 5.35 | mg/kg dry | 44.625 | 10.9 | 85.9 | 75-125 | | |
| Copper | 93.2 | | 2.68 | mg/kg dry | 22.312 | 66.4 | 120 | 75-125 | | |
| Iron | 19700 | | 53.5 | mg/kg dry | 89.249 | 23200 | -3940* | 75-125 | | |
| Lead | 521 | | 1.34 | mg/kg dry | 44.625 | 487 | 75.8 | 75-125 | | |
| Magnesium | 5670 | | 201 | mg/kg dry | 2231.2 | 4200 | 65.9* | 75-125 | | |
| Manganese | 354 | | 13.4 | mg/kg dry | 44.625 | 344 | 21.5* | 75-125 | | |
| Molybdenum | 79.8 | | 5.35 | mg/kg dry | 89.249 | 6.11 U | 89.4 | 75-125 | | |
| Nickel | 63.1 | | 10.7 | mg/kg dry | 44.625 | 25.4 | 84.5 | 75-125 | | |
| Potassium | 3670 | | 1070 | mg/kg dry | 2231.2 | 1840 | 81.9 | 75-125 | | |
| Selenium | 160 | | 0.803 | mg/kg dry | 178.50 | 0.916 U | 89.8 | 75-125 | | |
| Silicon | 579 | | 5.35 | mg/kg dry | 89.249 | 462 | 132* | 75-125 | | |
| Silver | 4.31 | | 0.535 | mg/kg dry | 4.4625 | 0.611 U | 96.7 | 75-125 | | |
| Sodium | 2760 | | 134 | mg/kg dry | 2231.2 | 504 | 101 | 75-125 | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-190<br>Project Number: KP0159<br>Project Manager: Joan Kessner | **Reported:**<br>12/06/2012 10:49 |

## 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 L211251 - SW 3050B** | | | | | | | | | |
| **Matrix Spike (L211251-MS3)** | | **Source: 1211103-01** | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Vanadium | 123 | 6.69 | mg/kg dry | 44.625 | 76.9 | 104 | 75-125 | | |
| Zinc | 2970 | 107 | mg/kg dry | 44.625 | 3450 | -1060* | 75-125 | | |
| **Post Spike (L211251-PS3)** | | **Source: 1211103-01** | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Aluminum | 155000 | | ug/L | 66000 | 97000 | 87.2 | 75-125 | | |
| Antimony | 310 | | ug/L | 300.00 | 15.2 | 98.1 | 75-125 | | |
| Iron | 331000 | | ug/L | 126000 | 228000 | 81.6 | 75-125 | | |
| Magnesium | 94600 | | ug/L | 64800 | 41300 | 82.2 | 75-125 | | |
| Manganese | 6040 | | ug/L | 3000.0 | 3380 | 88.6 | 75-125 | | |
| Silicon | 10900 | | ug/L | 6300.0 | 4540 | 101 | 75-125 | | |
| Zinc | 56700 | | ug/L | 24000 | 33900 | 95.2 | 75-125 | | |
| **Reference (L211251-SRM1)** | | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Aluminum | 9780 | 14.7 | mg/kg wet | 6670.0 | | 147 | 0-200.89 | | |
| Antimony | 46.6 | 1.76 | mg/kg wet | 53.000 | | 87.9 | 0-235.8 | | |
| Arsenic | 116 | 2.94 | mg/kg wet | 114.00 | | 102 | 82.8-117.54 | | |
| Barium | 309 | 1.47 | mg/kg wet | 307.00 | | 101 | 79.8-120.2 | | |
| Beryllium | 108 | 0.588 | mg/kg wet | 108.00 | | 100 | 82.8-117.6 | | |
| Boron | 81.4 | 5.88 | mg/kg wet | 85.100 | | 95.6 | 67.5-132.8 | | |
| Cadmium | 229 | 0.588 | mg/kg wet | 225.00 | | 102 | 83.6-116.4 | | |
| Calcium | 3330 | 294 | mg/kg wet | 3360.0 | | 99.0 | 83.3-116.9 | | |
| Chromium | 82.2 | 0.588 | mg/kg wet | 77.200 | | 107 | 73.3-126.4 | | |
| Cobalt | 166 | 5.88 | mg/kg wet | 166.00 | | 100 | 80.7-118.7 | | |
| Copper | 266 | 2.94 | mg/kg wet | 271.00 | | 98.1 | 80.8-119.2 | | |
| Iron | 8620 | 58.8 | mg/kg wet | 8420.0 | | 102 | 78.6-121.1 | | |
| Lead | 187 | 1.47 | mg/kg wet | 190.00 | | 98.3 | 81.6-118.4 | | |
| Magnesium | 8140 | 221 | mg/kg wet | 8570.0 | | 95.0 | 83.2-116.7 | | |
| Manganese | 1020 | 14.7 | mg/kg wet | 965.00 | | 105 | 69.3-130.5 | | |
| Molybdenum | 244 | 5.88 | mg/kg wet | 235.00 | | 104 | 76.2-123.8 | | |
| Nickel | 226 | 11.8 | mg/kg wet | 221.00 | | 102 | 79.6-120.8 | | |
| Potassium | 14900 | 1180 | mg/kg wet | 14400 | | 103 | 81.9-118.1 | | |
| Selenium | 193 | 0.882 | mg/kg wet | 187.00 | | 103 | 75.9-124.6 | | |
| Silicon | 803 | 5.88 | mg/kg wet | 807.00 | | 99.5 | 0-219.3 | | |
| Silver | 81.9 | 0.588 | mg/kg wet | 83.500 | | 98.1 | 82.7-117.1 | | |
| Sodium | 9560 | 147 | mg/kg wet | 9730.0 | | 98.3 | 82.5-117.2 | | |
| Vanadium | 110 | 7.35 | mg/kg wet | 98.700 | | 111 | 75.9-123.6 | | |
| Zinc | 220 | 29.4 | mg/kg wet | 199.00 | | 110 | 78.4-121.6 | | |

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|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-190<br>Project Number: KP0159<br>Project Manager: Joan Kessner | **Reported:**<br>12/06/2012 10:49 |

## 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 L211252 - SW 7471A Prep** | | | | | | | | | | |
| **Blank (L211252-BLK1)** | | | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.0290 | U | 0.0290 | mg/kg wet | | | | | | |
| **Duplicate (L211252-DUP3)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.0298 | U | 0.0298 | mg/kg dry | | 0.0268 U | | | | 20 |
| **Matrix Spike (L211252-MS3)** | | **Source: 1211103-01** | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.206 | | 0.0298 | mg/kg dry | 0.16575 | 0.0268 U | 124 | 75-125 | | 20 |
| **Reference (L211252-SRM1)** | | | | Prepared: 11/29/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 1.38 | | 0.0290 | mg/kg wet | 1.2900 | | 107 | 62.6-138 | | |

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| | | |
|---|---|---|
| WC-Hanford, Inc.<br>2620 Fermi Avenue<br>Richland WA, 99354 | Project: RC-190<br>Project Number: KP0159<br>Project Manager: Joan Kessner | **Reported:**<br>12/06/2012 10:49 |

# 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 L211264 - SW 3010A** | | | | | | | | | | |
| **Blank (L211264-BLK1)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| 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 (L211264-BLK3)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| 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 (L211264-BS1)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Arsenic | 9.75 | | 0.0150 | mg/L | 10.000 | | 97.5 | 80-120 | | |
| Barium | 4.99 | | 0.00100 | mg/L | 5.0000 | | 99.7 | 80-120 | | |
| Cadmium | 0.228 | | 0.00300 | mg/L | 0.25000 | | 91.4 | 80-120 | | |
| Chromium | 0.503 | | 0.00500 | mg/L | 0.50000 | | 101 | 80-120 | | |
| Lead | 2.41 | | 0.0100 | mg/L | 2.5000 | | 96.6 | 80-120 | | |
| Selenium | 9.44 | | 0.0200 | mg/L | 10.000 | | 94.4 | 80-120 | | |
| Silver | 0.493 | | 0.00600 | mg/L | 0.50000 | | 98.6 | 80-120 | | |
| **Duplicate (L211264-DUP4)** | | **Source: 1211103-01** | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| Arsenic | 0.0247 | B | 0.0750 | mg/L | | 0.0284 | | | 13.7 | 20 |
| Barium | 0.407 | | 0.00500 | mg/L | | 0.411 | | | 0.942 | 20 |
| Cadmium | 0.00858 | B | 0.0150 | mg/L | | 0.00894 | | | 4.11 | 20 |
| Chromium | 0.00602 | B | 0.0250 | mg/L | | 0.00542 | | | 10.3 | 20 |
| Lead | 0.291 | | 0.0500 | mg/L | | 0.293 | | | 0.445 | 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-190<br>Project Number: KP0159<br>Project Manager: Joan Kessner | **Reported:**<br>12/06/2012 10:49 |

## 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 L211264 - SW 3010A** | | | | | | | | | | |
| **Matrix Spike (L211264-MS4)** | | **Source: 1211103-01** | | Prepared: 11/30/2012 Analyzed: 12/04/2012 | | | | | | |
| Arsenic | 5.14 | | 0.0750 | mg/L | 5.0000 | 0.0284 | 102 | 50-1000 | | |
| Barium | 95.4 | | 0.00500 | mg/L | 100.00 | 0.411 | 94.9 | 50-1000 | | |
| Cadmium | 1.01 | | 0.0150 | mg/L | 1.0000 | 0.00894 | 99.9 | 50-1000 | | |
| Chromium | 4.88 | | 0.0250 | mg/L | 5.0000 | 0.00542 | 97.5 | 50-1000 | | |
| Lead | 4.96 | | 0.0500 | mg/L | 5.0000 | 0.293 | 93.3 | 50-1000 | | |
| Selenium | 0.995 | | 0.100 | mg/L | 1.0000 | 0.100 U | 99.5 | 50-1000 | | |
| Silver | 2.56 | | 0.0300 | mg/L | 5.0000 | 0.0300 U | 51.2 | 50-1000 | | |
| **Batch L211272 - SW 7470A Prep** | | | | | | | | | | |
| **Blank (L211272-BLK1)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | | | | | |
| **Blank (L211272-BLK3)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | | | | | |
| **LCS (L211272-BS1)** | | | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.00523 | | 0.000200 | mg/L | 0.0050000 | | 105 | 80-120 | | |
| **Duplicate (L211272-DUP4)** | | **Source: 1211103-01** | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.000200 | U | 0.000200 | mg/L | | 0.000200 U | | | | 20 |
| **Matrix Spike (L211272-MS4)** | | **Source: 1211103-01** | | Prepared: 11/30/2012 Analyzed: 12/03/2012 | | | | | | |
| Mercury | 0.182 | | 0.0100 | mg/L | 0.20000 | 0.000200 U | 91.2 | 50-1000 | | |

**Lionville Laboratory** Logbook #: 1154

# SAMPLE DIGESTION RECORD

Digestion Batch #: L211251
Date/Time Initiated: 11/29/12 1705
Date/Time Completed: 11/30/12 1400
Analyst: MW
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)

| Work Order # | Spike Vol (mL) | Initial Wt/Vol (g/mL) | Final Vol (mL) | pH <2 | Type: To/Sol/ TC | Texture | Color / Appearance | Artifact | Turb |
|---|---|---|---|---|---|---|---|---|---|
| 1211101-01 | | 0.64 | 50 | | TO | fine | brown soil | rocks | |
| L211251-DUP1 | | 0.57 | 50 | | | | | | |
| MS1 | 0.5 | 0.59 | 50 | | | | | | |
| 1211102-01 | | 0.53 | 50 | | | coarse | dark brown compost | bars/veg. | |
| L211251-DUP2 | | 0.55 | 50 | | | | | | |
| MS2 | 0.5 | 0.58 | 50 | | | | | | |
| 1211102-02 | | 0.64 | 50 | | | coarse | dark gray soil, white | lumps rocks | |
| 03 | | 0.62 | 50 | | | fine | dark brown soil | rocks, nail | |
| 04 | | 0.53 | 50 | | | coarse | dark brown soil | rocks, veg. | |
| 1211103-01 | | 0.57 | 50 | | | coarse | brown soil w/ white | rocks, nail, unknown | flat solid |
| L211251-DUP3 | | 0.55 | 50 | | | | | | |
| MS3 | 0.5 | 0.65 | 50 | | | | | | |
| 1211103-02 | | 0.54 | 50 | | | fine | brown soil | N/A | |
| 1211104-01 | | 0.57 | 50 | | | fine | dark brown soil | unknown debris, veg. | |
| L211251-DUP4 | | 0.55 | 50 | | | | | | |
| +1 MS4 | 0.5 | 0.54 | 50 | | | | | | |
| 1211205-01 | | 0.60 | 50 | | | not fine | brown sandy | N/A | |
| L211251-DUP5 | | 0.64 | 50 | | | | | | |
| MS5 | 0.5 | 0.70 | 50 | | | | | | |
| BLK1 | | 0.54 | 50 | | | | | | |
| SRM1 | ⊛ | 0.51 | 50 | | | | | | |

MW 11/30/12

Spiking IDs / Expiration Date:
MS#: 1201377

LCS#: 1201014 ⊛

Reagent IDs:
$HNO_3$ 0000003190
HCl L13029
$H_2O_2$ L11A03
1:1 $HNO_3$ 637-076-07
1:1 HCl

File ID#:

Data Review By/Date: aem 12/4/12

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Signed\SPI\Metals Digestion log.doc

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Page #:

# PREPARATION BENCH SHEET

L211251

**Lionville Laboratory**

**Printed: 12/4/2012 11:57:48AM**

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211101-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.64 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.53 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-02 | 6010B HSL Metals | 11/29/2012 17:05 | 0.64 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-03 | 6010B HSL Metals | 11/29/2012 17:05 | 0.62 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-04 | 6010B HSL Metals | 11/29/2012 17:05 | 0.53 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211103-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.57 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211103-02 | 6010B HSL Metals | 11/29/2012 17:05 | 0.54 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211104-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.57 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211105-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.6 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| L211251-BLK1 | QC | 11/29/2012 17:05 | 0.54 | 50 | | | | | | |
| L211251-DUP1 | QC | 11/29/2012 17:05 | 0.57 | 50 | | 1211101-01 | | | | |
| L211251-DUP2 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211102-01 | | | | |
| L211251-DUP3 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211103-01 | | | | |
| L211251-DUP4 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211104-01 | | | | |
| L211251-DUP5 | QC | 11/29/2012 17:05 | 0.64 | 50 | | 1211105-01 | | | | |
| L211251-MS1 | QC | 11/29/2012 17:05 | 0.59 | 50 | 1201377 | 1211101-01 | 500 | | | |
| L211251-MS2 | QC | 11/29/2012 17:05 | 0.58 | 50 | 1201377 | 1211102-01 | 500 | | | |
| L211251-MS3 | QC | 11/29/2012 17:05 | 0.65 | 50 | 1201377 | 1211103-01 | 500 | | | |
| L211251-MS4 | QC | 11/29/2012 17:05 | 0.54 | 50 | 1201377 | 1211104-01 | 500 | | | |
| L211251-MS5 | QC | 11/29/2012 17:05 | 0.7 | 50 | 1201377 | 1211105-01 | 500 | | | |

Revision addition of Post spike AJM 12/4/12

Extracts Relinquished By Date Extracts Received By Date

# PREPARATION BENCH SHEET

L211251

**Lionville Laboratory**

**Printed: 12/4/2012 11:57:48AM**

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| L211251-PS1 | QC | 11/29/2012 17:05 | 0.64 | 50 | 1001493 | 1211101-01 | 100 | | | |
| L211251-PS2 | QC | 11/29/2012 17:05 | 0.53 | 50 | 1001493 | 1211102-01 | 100 | | | |
| L211251-PS3 | QC | 11/29/2012 17:05 | 0.57 | 50 | 1001493 | 1211103-01 | 100 | | | |
| L211251-PS4 | QC | 11/29/2012 17:05 | 0.57 | 50 | 1001902 | 1211104-01 | 100 | | | |
| L211251-PS5 | QC | 11/29/2012 17:05 | 0.6 | 50 | 1001902 | 1211105-01 | 100 | | | |
| L211251-SRM1 | QC | 11/29/2012 17:05 | 0.51 | 50 | 1201014 | | 510 | | | |

Revision addition of Post Spike AJM

12/4/12

Extracts Relinquished By Date

Extracts Received By Date

# PREPARATION BENCH SHEET

L211251

**Lionville Laboratory**

**Printed: 12/3/2012 12:27:41PM**

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211101-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.64 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.53 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-02 | 6010B HSL Metals | 11/29/2012 17:05 | 0.64 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-03 | 6010B HSL Metals | 11/29/2012 17:05 | 0.62 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211102-04 | 6010B HSL Metals | 11/29/2012 17:05 | 0.53 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211103-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.57 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211103-02 | 6010B HSL Metals | 11/29/2012 17:05 | 0.54 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211104-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.57 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| 1211105-01 | 6010B HSL Metals | 11/29/2012 17:05 | 0.6 | 50 | | | | | WC-Hanford, Inc. | HSL + B, Mo, Si (No TL) |
| L211251-BLK1 | QC | 11/29/2012 17:05 | 0.54 | 50 | | | | | | |
| L211251-DUP1 | QC | 11/29/2012 17:05 | 0.57 | 50 | | 1211101-01 | | | | |
| L211251-DUP2 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211102-01 | | | | |
| L211251-DUP3 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211103-01 | | | | |
| L211251-DUP4 | QC | 11/29/2012 17:05 | 0.55 | 50 | | 1211104-01 | | | | |
| L211251-DUP5 | QC | 11/29/2012 17:05 | 0.64 | 50 | | 1211105-01 | | | | |
| L211251-MS1 | QC | 11/29/2012 17:05 | 0.59 | 50 | 1201377 | 1211101-01 | 500 | | | |
| L211251-MS2 | QC | 11/29/2012 17:05 | 0.58 | 50 | 1201377 | 1211102-01 | 500 | | | |
| L211251-MS3 | QC | 11/29/2012 17:05 | 0.65 | 50 | 1201377 | 1211103-01 | 500 | | | |
| L211251-MS4 | QC | 11/29/2012 17:05 | 0.54 | 50 | 1201377 | 1211104-01 | 500 | | | |
| L211251-MS5 | QC | 11/29/2012 17:05 | 0.7 | 50 | 1201377 | 1211105-01 | 500 | | | |

Extracts Relinquished By — Date: 12/3/12

Extracts Received By — Date: 12/03/12

# PREPARATION BENCH SHEET

L211251

**Lionville Laboratory**

**Printed: 12/3/2012 12:27:41PM**

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| L211251-PS1 | QC | 11/29/2012 17:05 | 0.5 | 50 | | | | | | |
| L211251-SRM1 | QC | 11/29/2012 17:05 | 0.51 | 50 | 1201014 | | 510 | | | |

Extracts Relinquished By 12/3/12 Date

Extracts Received By 12/03/12 Date

Lionville Laboratory Logbook #: 1154

# SAMPLE DIGESTION RECORD

Digestion Batch #: L211264
Date/Time Initiated: 11/30/12 1030
Date/Time Completed: 11/30/12 1725
Analyst: PM
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: 96
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 |
|---|---|---|---|---|---|---|---|---|---|
| 1211037-01 | ~~50.0 mL~~ | 50 | 50 | < | TC | | colorless/clear | ~~limited volume~~ | |
| L211264-DUP1 | | 50 | 50 | < | | | | | |
| MS1 | 0.5 | 50 | 50 | | | | | | |
| 1211037-02 | | 50 | 50 | < | | | colorless/clear | | |
| 03 | | 50 | 50 | < | | | colorless/clear | | |
| 1211101-01 | | 50 | 50 | < | | | colorless/clear | | |
| L211264-DUP2 | | 50 | 50 | < | | | | | |
| MS2 | 0.5 | 50 | 50 | | | | | | |
| 1211102-01 | | 50 | 50 | < | | | amber/clear | | |
| 02 | | 50 | 50 | < | | | colorless/clear | | |
| L211264-DUP3 | | 50 | 50 | < | | | | | |
| MS3 | 0.5 | 50 | 50 | | | | | | |
| 1211102-03 | | 50 | 50 | < | | | slightly yellow/clear | | |
| 04 | | 50 | 50 | < | | | colorless/clear | | |
| 1211103-01 | | 50 | 50 | < | | | slightly yellow/clear | | |
| L211264-DUP4 | | 50 | 50 | < | | | | | |
| MS4 | 0.5 | 50 | 50 | | | | | | |
| 1211103-02 | | 50 | 50 | < | | | slightly yellow/clear | | |
| 1211104-01 | | 50 | 50 | < | | | slightly yellow/clear | | |
| L211264-DUP5 | | 50 | 50 | < | | | | | |
| MS5 | 0.5 | 50 | 50 | | | | | | |
| 1211105-01 | | 50 | 50 | < | | | colorless/clear | | |
| L211264-DUP6 | | 50 | 50 | < | | | | | |
| MS6 | 0.5 | 50 | 50 | | | | | | |
| BLK1 | | 50 | 50 | | | | colorless/clear | | |
| BS1 | 0.5 | 50 | 50 | | | | | | |
| BLK2 | | 50 | 50 | < | | | | | |

Spiking IDs / Expiration Date:
MS#: 1201195
1201388
LCS#: 1201373

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: PM 12/4/12

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Signed\SPI\Metals Digestion log.doc

See next page

Page #:

Lionville Laboratory

Logbook #: 1154

# SAMPLE DIGESTION RECORD

Digestion Batch #: L211264
Date/Time Initiated: 11/30/12 1030
Date/Time Completed:
Analyst: MW
Matrix (circle): Soil Water Other TCP
Method (circle one): 3005A 3010A 3050 200.7 (1994)
pH/Turbidity: N/A for Solids.

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

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

| Work Order # | Spike Vol (mL) | Initial Wt/Vol (g/mL) | Final Vol (mL) | pH <2 | Type: To/Sol/ TC | Texture | Color / Appearance | Artifact | Turb |
|---|---|---|---|---|---|---|---|---|---|
| L211264-BLK3 | | 50 | 50 | < | TC | | clear/colorless | | |

MW 11/30/12

Spiking IDs / Expiration Date:
MS# : Lot 094
LCS#: Lot 094

Reagent IDs:
$HNO_3$ Lot 094
HCl
$H_2O_2$
1:1 $HNO_3$
1:1 HCl

File ID#:

Data Review By/Date:
CLM 12/4/12

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Signed\SPI\Metals Digestion log.doc

Page #:

# PREPARATION BENCH SHEET

L211264

**Lionville Laboratory**

**Printed: 12/3/2012 12:33:04PM**

**Matrix: Solid** **Prepared using: METALS - SW 3010A** **(No Surrogate**

| Lab Number | Analysis | Prepared | Initial (mL) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1211037-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | Alliance Environmental Systems | |
| 1211037-02 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | Alliance Environmental Systems | |
| 1211037-03 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | Alliance Environmental Systems | |
| 1211101-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211102-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211102-02 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211102-03 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211102-04 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211103-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211103-02 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211104-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| 1211105-01 | 1311/6010B TCLP RCRA ICP MET | 11/30/2012 10:30 | 50 | 50 | | | | | WC-Hanford, Inc. | |
| L211264-BLK1 | QC | 11/30/2012 10:30 | 50 | 50 | | | | | | |
| L211264-BLK2 | QC | 11/30/2012 10:30 | 50 | 50 | | | | | | 1211037 |
| L211264-BLK3 | QC | 11/30/2012 10:30 | 50 | 50 | | | | | | 1211101-1211105 |
| L211264-BS1 | QC | 11/30/2012 10:30 | 50 | 50 | 1201373 | | 500 | | | |
| L211264-DUP1 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211037-01 | | | | |
| L211264-DUP2 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211101-01 | | | | |
| L211264-DUP3 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211102-02 | | | | |
| L211264-DUP4 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211103-01 | | | | |

Extracts Relinquished By — Date: 12/5/12

Extracts Received By — Date: 12/03/12

# PREPARATION BENCH SHEET

L211264

**Lionville Laboratory**

**Printed: 12/3/2012 12:33:04PM**

**Matrix: Solid** **Prepared using: METALS - SW 3010A** **(No Surrogate)**

| Lab Number | Analysis | Prepared | Initial (mL) | Final (mL) | Spike ID | Source ID | ul Spike | ul Surrogate | Client | Extraction Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| L211264-DUP5 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211104-01 | | | | |
| L211264-DUP6 | QC | 11/30/2012 10:30 | 50 | 50 | | 1211105-01 | | | | |
| L211264-MS1 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211037-01 | 500 | | | |
| L211264-MS2 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211101-01 | 500 | | | |
| L211264-MS3 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211102-02 | 500 | | | |
| L211264-MS4 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211103-01 | 500 | | | |
| L211264-MS5 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211104-01 | 500 | | | |
| L211264-MS6 | QC | 11/30/2012 10:30 | 50 | 50 | 1201195 | 1211105-01 | 500 | | | |

Extracts Relinquished By — Date: 12/3/12

Extracts Received By — Date: 12/03/12

Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1153

Analyst: [illegible]
Date 11/29/12 - 11/30/12
Start Time/Temp: 1845/95
End Time/Temp: 1920/97

Instrument ID: HG3.3
Balance # 614 /NA
Pipette Calibration (Daily) (Y)

Prep Batch: L211252
Worksheet: HG120303
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 ug/l | | 0.100 | | 10 ml | 50 | |
| 1.0 ug/l | | 0.500 | | 10 ml | 50 | |
| 2.0 ug/l | | 1.000 | | 10 ml | 50 | |
| 5.0 ug/l | | 2.500 | | 10 ml | 50 | |
| 10.0 ug/l | | 5.000 | | 10 ml | 50 | |
| ICV | | 0.125 | 2.5 | 10 ml | 50 | |
| CCV | | 0.250 | 5.0 | 10 ml | 50 | |
| ICB/CCB | | | | 10 ml | 50 | |
| L211252-BLK1 | | | | 0.31 | 50 | |
| SRM1 | | (A) | (A) | 0.31 | 50 | |
| 1211101-01 | | | | 0.34 | 50 | |
| L211252-DUP1 | | | | 0.36 | 50 | |
| MS1 | | 0.500 | 1.0 | 0.39 | 50 | |
| 1211102-01 | | | | 0.34 | 50 | |
| L211252-DUP2 | | | | 0.34 | 50 | |
| MS2 | | 0.500 | 1.0 | 0.36 | 50 | |
| 1211102-02 | | | | 0.36 | 50 | |
| 03 | | | | 0.39 | 50 | |
| 04 | | | | 0.37 | 50 | |
| 1211103-01 | | | | 0.39 | 50 | |
| L211252-DUP3 | | | | 0.35 | 50 | |
| MS3 | | 0.500 | 1.0 | 0.35 | 50 | |
| 1211103-02 | | | | 0.33 | 50 | |
| 1211104-01 | | | | 0.39 | 50 | |
| L211252-DUP4 | | | | 0.35 | 50 | |
| MS4 | | 0.500 | 1.0 | 0.35 | 50 | |

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | RI 1201235 | 11/30/12 1145 |
| ICV/CCV/LCS | (I.V. 1201411) | N/A |

Reviewed By/Date: CEJM 12/4/12

se book # 1153 for std traceability information

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

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

ME-HgCVAA-Prep0910

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Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1153

Analyst: [illegible]
Date 11/29/12 – 11/30/12
Start Time/Temp: See pg 082
End Time/Temp: See pg 082

Instrument ID: HG3.3
Balance # 614 ~~B24~~ /NA w.e. 11/30/12
Pipette Calibration (Daily) (Y)

Prep Batch: L211252
Worksheet: HG120303
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. |
|---|---|---|---|---|---|---|
| 1211105-01 w.e. 11/30/12 | | | | 0.37 | 50 | |
| L211252-DUP5 | | | | 0.37 | 50 | |
| MS5 | | 0.500 | 1.0 | 0.39 | 50 | |

[illegible] 11/30/12

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

Reviewed By/Date: [illegible] 12/4/12

se book # 1153 for std traceability information

Soil LCS True Value = See pg 082 mg/Kg
Standard # _____

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

ME-HgCVAA-Prep0910

Page #:

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Lionville Laboratory

# MERCURY PREPARATION

Logbook # 1153

Analyst: [illegible]
Date 11/30/12
Start Time/Temp: 2000/94°
End Time/Temp: 2200/96°

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

Prep Batch: L211272
Worksheet: HG120301
SOP No. ME-HgCVAA
BLOCK 1 (2) 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 µg/l | | 0.070 | | 35 | 35 | |
| 1.0 µg/l | | 0.350 | | 35 | 35 | |
| 2.0 µg/l | | 0.700 | | 35 | 35 | |
| 5.0 µg/l | | 1.750 | | 35 | 35 | |
| 10.0 µg/l | | 3.500 | | 35 | 35 | |
| ICV | | 0.0875 | 2.5 | 35 | 35 | |
| CCV | | 0.175 | 5.0 | 35 | 35 | |
| ICB/CCB | | | | 35 | 35 | |
| L211272-BLK1 | | | | 35 | 35 | |
| BS1 | | 0.175 | 5.0 | 35 | 35 | |
| BLK2 | < | | | 35 | 35 | L211165 |
| BLK3 | < | | | 35 | 35 | L211223 |
| 1211037-01 | < | | | 35 | 35 | |
| L211272-DUP1 | < | | | 35 | 35 | |
| MS1 | | 0.700 | 200 * | 35 | 35 | |
| 1211037-02 | < | | | 35 | 35 | |
| 03 | < | | | 35 | 35 | |
| 1211101-01 | < | | | 7 | 35 | limited volume |
| L211272-DUP2 | < | | | 7 | 35 | |
| MS2 | | 0.140 | 40(200)* | 7 | 35 | |
| 1211102-01 | < | | | 35 | 35 | |
| 02 | < | | | 35 | 35 | |
| L211272-DUP3 | < | | | 35 | 35 | |
| MS3 | | 0.700 | 200 * | 35 | 35 | |
| 1211102-03 | < | | | 35 | 35 | |
| 04 | < | | | 35 | 35 | |

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | BI 1201235 | 11/30/12 1145 |
| ICV/CCV/LCS | (I.V. 1201411 | N/A |

Reviewed By/Date: [illegible] 12/4/12

se book # 1153 for std traceability information

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

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

* based 1201204 (10 µg/ml)

ME-HgCVAA-Prep0910

Page #:

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Lionville Laboratory

# MERCURY PREPARATION

Analyst: [illegible]
Date 11/30/12
Start Time/Temp: 1188
End Time/Temp: see 78

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

Logbook # 1153
Prep Batch: L211272
Worksheet: HG120301
SOP No. ME-HgCVAA
BLOCK 1 2 (circle one) 3

**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. |
|---|---|---|---|---|---|---|
| 1211103-01 | < | | | 35 | 35 | |
| L211272-DUP4 | < | | | 35 | 35 | |
| MS4 | | 0.700 | 200* | 35 | 35 | |
| 1211103-02 | < | | | 35 | 35 | |
| 1211104-01 | < | | | 35 | 35 | |
| L211272-DUP5 | < | | | 35 | 35 | |
| MS5 | | 0.700 | 200* | 35 | 35 | |
| 1211105-01 | < | | | 35 | 35 | |
| L211272-DUP6 | < | | | 35 | 35 | |
| MS6 | | 0.700 | 200* | 35 | 35 | |

11/30/12 [illegible]

| Standard: | ID | Prep Date/Time |
|---|---|---|
| ICAL/MS | | |
| ICV/CCV/LCS | see page 085 | |

Reviewed By/Date: [illegible] 12/4/12

see book # 1153 for std traceability information

Soil LCS True Value = see page 085 mg/Kg
Standard # see page 085

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

* used 1201234 (10ug/ml)

ME-HgCVAA-Prep0910

Page #:

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Lionville Laboratory

# TCLP EXTRACTION RECORD
## (NON-VOLATILES)

LOGBOOK # 1168

| | | |
|---|---|---|
| Start Date: 11-28-12<br>Start Time: 12:51<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 11-29-12<br>End Time: 7:00<br>Analyst: RH<br>Method: B11.1 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L211233<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 #: 1211101-01<br>Client ID#: J1R5X8<br>pH After 5 Min: 9.15<br>pH After Acid/Heat: 2.05<br>Extraction Fluid/pH: #1 4.94<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 #: 1211102-01<br>Client ID#: J1R5X4<br>pH After 5 Min: 7.05<br>pH After Acid/Heat: 1.92<br>Extraction Fluid/pH: #1 4.94<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: _____ |
| LvL # 1211102-02<br>Client ID#: J1R5X5<br>pH After 5 Min: 8.61<br>pH After Acid/Heat: 2.06<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 7.49 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |
| LvL #: 1211102-03<br>Client ID#: J1R5X6<br>pH After 5 Min: 8.09<br>pH After Acid/Heat: 1.91<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 5.56 | Initial Filtration Data and Comments:<br>Solids: _____% / NA<br><br>Initial Filtrate Added: _____ |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1201456 | 11-14-12 | 5-14-13 | 4.93 ± 0.05 |
| **Fluid # 2** | — | | — | 2.88 ± 0.05 |

SPI-1311.1-A-0310 Reviewed By/Date [signature] 12/4/12 Page #

Lionville Laboratory

# TCLP EXTRACTION RECORD
## (NON-VOLATILES)

LOGBOOK # 1168

| | | |
|---|---|---|
| Start Date: 11-28-12<br>Start Time: 12:51<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 11-29-12<br>End Time: 7:00<br>Analyst: RH<br>Method: 1311 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L211223<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 #: 1211102-04<br>Client ID#: J1R5X7<br>pH After 5 Min: 8.56<br>pH After Acid/Heat: 1.86<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 5.11 | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |
| LvL #: 1211103-01<br>Client ID#: J1R5X9<br>pH After 5 Min: 8.43<br>pH After Acid/Heat: 1.89<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 5.71 | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |
| LvL # 1211103-02<br>Client ID#: J1R600<br>pH After 5 Min: 8.64<br>pH After Acid/Heat: 2.15<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 4.83 | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |
| LvL #: 1211104-01<br>Client ID#: J1R5X3<br>pH After 5 Min: 8.12<br>pH After Acid/Heat: 2.91<br>Extraction Fluid/pH: #1 4.94<br>Sample Wt.(g): 25<br>Extract Fluid Vol.(mL): 500<br>pH After Extraction: 5.76 | Initial Filtration Data and Comments:<br>Solids: ____% / NA<br><br>Initial Filtrate Added: |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1201456 | 11-14-12 | 5-14-13 | 4.93 ± 0.05 |
| **Fluid # 2** | | | | 2.88 ± 0.05 |

SPI-1311.1-A-0310

Reviewed By/Date [illegible] 12/4/12

Page #

Lionville Laboratory

# TCLP EXTRACTION RECORD
## (NON-VOLATILES)

LOGBOOK # 1168

| | | |
|---|---|---|
| Start Date: 11-28-12<br>Start Time: 12:51<br>Analyst: RH<br>SOP: SPI-1311.1 | End Date: 11-29-12<br>End Time: 7:00<br>Analyst: RH<br>Method: 1311.1 | Tumbler Speed: 31 RPM<br>Leachate Batch #: L211228<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 #: 1211105-01<br>Client ID#: J1R5X2<br>pH After 5 Min: 7.63<br>pH After Acid/Heat: 2.31<br>Extraction Fluid/pH: #1 4.94<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 #: L211223<br>Client ID#: N/A<br>pH After 5 Min: N/A<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: |
| 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: 11-29-12 RH<br>Solids: _____% / NA<br><br>Initial Filtrate Added: |

| Standard | ID | Prep Date | Expir Date | pH Acceptance Criteria |
|---|---|---|---|---|
| **Fluid #1** | 1201456 | 11-14-12 | 5-14-13 | 4.93 ± 0.05 |
| **Fluid # 2** | — | | | 2.88 ± 0.05 |

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