

**SAF-RC-149**  
**300 Area D4 Waste Sites –**  
**Soil In-Process**  
**FINAL DATA PACKAGE**

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt H4-21

KW 1/16/13  
INITIAL/DATE

**COMMENTS:**

**SDG KP0153 SAF-RC-149**

Rad only

Chem only

Rad & Chem

Complete

Partial

**Sample Location/Waste Site: 300-15 Brown Stain**



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 #	1211082
SDG #	KP0153
SAF #	RC-149
Date Received	11/16/12
# Samples	1
Matrix	SOIL
Volatiles	
Semivolatiles	
Pest/PCB	
Glycols	
DRO/KRO/GRO	X
PAHs	
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 29 pages.

# CHAIN OF CUSTODY





**Lionville Laboratory**  
**SAMPLE RECEIPT CHECKLIST (SRC)**

CLIENT: W.C. Hamford  
Project/SAF/SOW/Release #: RC-149

Date: 11-16-12

LvL Batch #: 1211082

Sample Custodian: [Signature]

NOTE: EXPLAIN ALL DISCREPANCIES

- |  |   |   |
|--|---|---|
| 1. Samples Hand Delivered or <u>Shipped?</u>   | Carrier <u>FEDEX</u>  | Airbill # <u>7940 8631 2651</u>           |
| 2. Custody Seals on coolers or shipping containers intact, signed & dated?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         | <input type="checkbox"/> No Seals         |
| 3. Outside of coolers or shipping containers are free from damage?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         | Comments:                                 |
| 4. All expected paperwork received (coc & other client specific information) sealed in plastic bag and easily accessible?                  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 5. Samples received <u>cooled</u> or ambient?  | Temp <u>3.8</u> °C  | Cooler # <u>WCH-11-055</u>                |
| How was the temperature taken?   | <input checked="" type="checkbox"/> IR <input type="checkbox"/> Temp. Blank | <input type="checkbox"/> Other (Specify): |
| Is the Temp. Criteria met for these samples? (Hg in soils @ 4°C)   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 6. Custody seals on sample containers intact, signed and dated?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         | <input type="checkbox"/> No Seals         |
| 7. COC (Client & LvL) signed & dated?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 8. Sample containers are intact?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 9. All samples on COC received?  | <input checked="" type="checkbox"/> Yes                                     | <input type="checkbox"/> No               |
| All samples received on COC?   | <input checked="" type="checkbox"/> Yes                                     | <input type="checkbox"/> No               |
| 10. All sample label information matches COC?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 11. Samples properly preserved? (If #5 is no, then this is no.)  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 12. Samples received within hold times?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         | <input checked="" type="checkbox"/> N/A   |
| Short holds taken to wet lab?  | <input type="checkbox"/> Yes <input type="checkbox"/> No                    |   |
| 13. VOA, TOC, TOX free of headspace?   | <input type="checkbox"/> Yes <input type="checkbox"/> No                    | <input checked="" type="checkbox"/> N/A   |
| 14. QC stickers placed on bottles designated by client?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         | <input type="checkbox"/> 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.) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No         |   |
| 16. Project Manager contacted concerning any discrepancies?  | <input type="checkbox"/> Yes <input type="checkbox"/> No                    | <input checked="" type="checkbox"/> N/A   |
| Person Contacted _____   | Date _____  |   |

**DRO/MO**



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

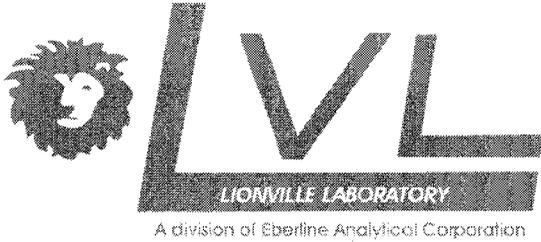
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-149  
Project Number: KP0153  
Project Manager: Joan Kessner

Reported:  
11/23/2012 13:14

**Analytical Report for Extractable Petroleum Hydrocarbons by SW846 8015**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
J1R5R6	1211082-01	Soil	11/14/2012 12:25	11/16/2012 15:50



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

### Case Narrative

**Client:** WC-HANFORD RC-149 KP0153  
**LVL #:** 1211082

**W.O. #:** 60049-001-001-0001-00  
**Date Received:** 11-16-2012

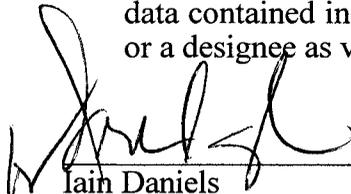
### DIESEL RANGE ORGANICS

One (1) soil sample was collected on 11-14-2012.

The sample and associated QC samples were extracted 11-19-2012 and analyzed 11-21-2012 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 8015B for Diesel Range Organics.

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 a sample that met LvL's sample acceptance policy with exceptions noted on the Sample Receipt Checklist.
2. All required holding times for extraction and analysis have been met.
3. All obtainable surrogate recoveries were within acceptance criteria.
4. The method blank was below the reporting limits for all target compounds.
5. All blank spike recoveries were within acceptance criteria.
6. All matrix spike recoveries were within acceptance criteria.
7. The samples were reported on a dry weight basis.
8. All 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.
10. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the laboratory manager or a designee as verified by the following signature.

  
Iain Daniels  
LvL Laboratory Manager

  
Date



## 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.



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/23/2012 13:14
---	--	-------------------------------

**J1R5R6**  
**1211082-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
---------	----------------------	-----------------	-------	----------	-------	----------	----------	--------

**Lionville Laboratory**

**Extractable Petroleum Hydrocarbons by SW846 8015**

Diesel Range Organics	3400 U	3400	ug/kg dry	1	L211153	11/19/2012	11/21/2012	8015M
Motor Oil	10200 U	10200	ug/kg dry	1	L211153	11/19/2012	11/21/2012	8015M
Surrogate: <i>p</i> -Terphenyl	75 %	39-129			L211153	11/19/2012	11/21/2012	8015M



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/23/2012 13:14
---	--	-------------------------------

**Extractable Petroleum Hydrocarbons by SW846 8015 - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch L211153 - SW 3540C</b>									
<b>Blank (L211153-BLK1)</b>					Prepared: 11/19/2012 Analyzed: 11/21/2012				
Diesel Range Organics	3330 U	3330	ug/kg wet						
Motor Oil	10000 U	10000	ug/kg wet						
<i>Surrogate: p-Terphenyl</i>	6530		ug/kg wet	6666.7		98	39-129		
<b>LCS (L211153-BS1)</b>					Prepared: 11/19/2012 Analyzed: 11/21/2012				
Diesel Range Organics	49200	3330	ug/kg wet	66667		74	42-133		
<i>Surrogate: p-Terphenyl</i>	5240		ug/kg wet	6666.7		79	39-129		
<b>Matrix Spike (L211153-MS2)</b>					Source: 1211082-01 Prepared: 11/19/2012 Analyzed: 11/21/2012				
Diesel Range Organics	50200	3500	ug/kg dry	70021	3400 U	72	42-133		
<i>Surrogate: p-Terphenyl</i>	5230		ug/kg dry	7002.1		75	39-129		
<b>Matrix Spike Dup (L211153-MSD2)</b>					Source: 1211082-01 Prepared: 11/19/2012 Analyzed: 11/21/2012				
Diesel Range Organics	52500	3440	ug/kg dry	68851	3400 U	76	42-133	6	40
<i>Surrogate: p-Terphenyl</i>	5430		ug/kg dry	6885.1		79	39-129		

PREPARATION BENCH SHEET

L211153

Lionville Laboratory

Printed: 11/23/2012 1:22:56PM

Matrix: Solid

Prepared using: GC - SW 3540C

Surrogate used: 1201463

Lab Number	Analysis	Prepared	Initial (g)	Final (mL)	Spike ID	Source ID	ul Spike	ul Surrogate	Client	Extraction Comments
L211068-01	8015M DRO	11/19/2012 16:40	30.87	1			1000	1000	WC-Hanford, Inc.	
L211082-01	8015M DRO	11/19/2012 16:40	31.52	1			1000	1000	WC-Hanford, Inc.	
L211083-01	8015M DRO	11/19/2012 16:40	30.7	4			1000	1000	WC-Hanford, Inc.	
L211083-02	8015M DRO	11/19/2012 16:40	30.12	1			1000	1000	WC-Hanford, Inc.	
L211083-03	8015M DRO	11/19/2012 16:40	30.01	1			1000	1000	WC-Hanford, Inc.	
L211153-BLKI	QC	11/19/2012 16:40	30	1			1000	1000		
L211153-BSI	QC	11/19/2012 16:40	30	1	1200846		1000	1000		
L211153-MSI	QC	11/19/2012 16:40	30.72	1	1200846	1211068-01	1000	1000		
L211153-MSS2	QC	11/19/2012 16:40	30.61	1	1200846	1211082-01	1000	1000		
L211153-MSS3	QC	11/19/2012 16:40	30.61	4	1200846	1211083-01	1000	1000		
L211153-MSD1	QC	11/19/2012 16:40	30.57	1	1200846	1211068-01	1000	1000		
L211153-MSD2	QC	11/19/2012 16:40	31.13	1	1200846	1211082-01	1000	1000		
L211153-MSD3	QC	11/19/2012 16:40	30.32	4	1200846	1211083-01	1000	1000		

REVISION for SURR. AMT. CRC 11/23/12  
 Extracts Relinquished By \_\_\_\_\_ Date \_\_\_\_\_

Extracts Received By \_\_\_\_\_ Date \_\_\_\_\_

PREPARATION BENCH SHEET

L211153

Lionville Laboratory

Prepared using: GC - SW 3540C

Printed: 11/20/2012 1:59:20PM

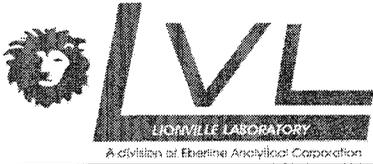
Surrogate used: 1201463

Lab Number	Analysis	Prepared	Initial (g)	Final (mL)	Spike ID	Source ID	uL Spike	uL Surrogate	Client	Extraction Comments
L211068-01	8015M DRO	11/19/2012 16:40	30.87	1			1000	1000	WC-Hanford, Inc.	
L211082-01	8015M DRO	11/19/2012 16:40	31.52	1			1000	1000	WC-Hanford, Inc.	
L211083-01	8015M DRO	11/19/2012 16:40	30.7	4			1000	1000	WC-Hanford, Inc.	
L211083-02	8015M DRO	11/19/2012 16:40	30	1			30.12	1000	WC-Hanford, Inc.	
L211083-03	8015M DRO	11/19/2012 16:40	30.01	1			1000	1000	WC-Hanford, Inc.	
L211153-BLK1	QC	11/19/2012 16:40	30	1			1000	1000		
L211153-BS1	QC	11/19/2012 16:40	30	1	1200846		1000	1000		
L211153-MS1	QC	11/19/2012 16:40	30.72	1	1200846	1211068-01	1000	1000		
L211153-MS2	QC	11/19/2012 16:40	30.61	1	1200846	1211082-01	1000	1000		
L211153-MS3	QC	11/19/2012 16:40	30.61	4	1200846	1211083-01	1000	1000		
L211153-MSD1	QC	11/19/2012 16:40	30.57	1	1200846	1211068-01	1000	1000		
L211153-MSD2	QC	11/19/2012 16:40	31.13	1	1200846	1211082-01	1000	1000		
L211153-MSD3	QC	11/19/2012 16:40	30.32	4	1200846	1211083-01	1000	1000		

Extracts Relinquished By [Signature] Date 11/19/12 1400

Extracts Received By [Signature] Date 11/20/12

# METALS

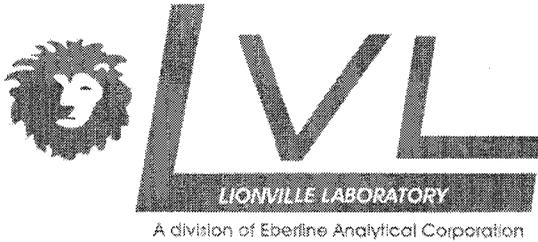


264 Welsh Pool Road  
Exton, PA 19341  
Phone: 610-280-3000  
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
J1R5R6	1211082-01	Soil	11/14/2012 12:25	11/16/2012 15:50



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

---

### Case Narrative

**Client:** WC-HANFORD RC-149  
**LVL#:** 1211082  
**SDG/SAF#:** KP0153/RC-149

**W.O.#:** 60049-001-001-0001-00  
**Date Received:** 11-16-12

### 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.

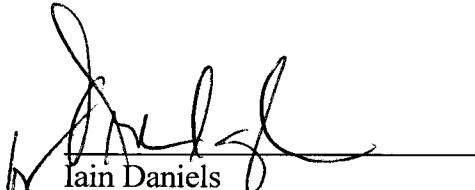
All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analyses of 1 soil sample.
2. The sample was prepared and analyzed in accordance with methods listed on the data report forms.

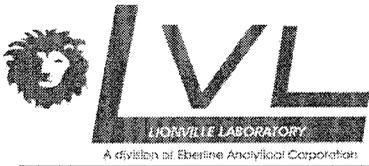
The soil sample was analyzed and reported with a 3-fold dilution for ICP metals due to sample matrix.

3. All analyses were performed within the required holding times.
4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvL's sample acceptance policy.
5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits.
7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, samples greater than 20X MB value}.
8. All ICP Interference Check Standards were within control limits.
9. All Standard Reference Material (SRM) analytes were within the Prediction Interval control limits supplied by the manufacturer.
10. The matrix spike (MS) recoveries for 5 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, Calcium, Iron, and Silicon.
12. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. The  $\pm 20\%$  RPD control limit applies to sample results greater than ten times the MDL.
13. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.
14. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.
15. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

  
Iain Daniels  
Laboratory Manager  
Lionville Laboratory  
alm/11-082hg%

1/7/13  
Date

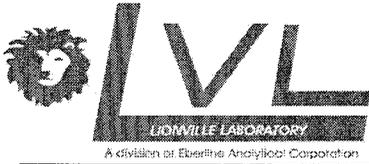


264 Welsh Pool Road  
Exton, PA 19341  
Phone: 610-280-3000  
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

### Notes and Definitions

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



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**J1R5R6**  
**1211082-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
---------	----------------------	-----------------	-------	----------	-------	----------	----------	--------

**Lionville Laboratory**

**Metals by SW846 6000/7000 series**

<b>Aluminum</b>	<b>7280</b>		14.1	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Antimony	1.69	U	1.69	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Arsenic</b>	<b>3.34</b>		2.82	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Barium</b>	<b>91.9</b>		1.41	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Beryllium</b>	<b>0.188</b>	B	0.564	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Boron</b>	<b>1.85</b>	B	5.64	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Cadmium	0.564	U	0.564	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Calcium</b>	<b>4740</b>		282	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Chromium</b>	<b>12.0</b>		0.564	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Cobalt</b>	<b>7.23</b>		5.64	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Copper</b>	<b>26.4</b>		2.82	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Iron</b>	<b>35800</b>		56.4	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Lead</b>	<b>5.19</b>		1.41	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Lithium</b>	<b>5.99</b>	B	7.05	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Magnesium</b>	<b>3690</b>		212	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Manganese</b>	<b>340</b>		14.1	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Molybdenum	5.64	U	5.64	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Nickel</b>	<b>6.85</b>	B	11.3	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Potassium</b>	<b>1430</b>		1130	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Selenium	0.846	U	0.846	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Silicon</b>	<b>539</b>		5.64	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Silver	0.564	U	0.564	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Sodium</b>	<b>605</b>		141	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Uranium	56.4	U	56.4	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Vanadium</b>	<b>116</b>		7.05	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Zinc</b>	<b>62.3</b>		28.2	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
<b>Zirconium</b>	<b>36.0</b>		7.05	mg/kg dry	3	L211167	11/20/2012	11/28/2012	6010B
Mercury	0.0276	U	0.0276	mg/kg dry	1	L211168	11/20/2012	11/21/2012	7471A



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**Metals by SW846 6000/7000 series - Quality Control**  
**Lionville Laboratory**

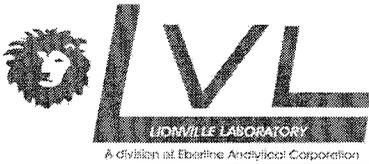
Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	-----------------------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------

**Batch L211167 - SW 3050B**

**Blank (L211167-BLK1)**

Prepared: 11/20/2012 Analyzed: 11/28/2012

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	92.6	U	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					
Lithium	2.31	U	2.31	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					
Uranium	18.5	U	18.5	mg/kg wet					
Vanadium	2.31	U	2.31	mg/kg wet					
Zinc	9.26	U	9.26	mg/kg wet					
Zirconium	2.31	U	2.31	mg/kg wet					



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**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
<b>Batch L211167 - SW 3050B</b>									
<b>Duplicate (L211167-DUP1)</b>		<b>Source: 1211082-01</b>			<b>Prepared: 11/20/2012 Analyzed: 11/28/2012</b>				
Aluminum	7230	14.9	mg/kg dry		7280			0.699	20
Antimony	1.79 U	1.79	mg/kg dry		1.69 U				20
Arsenic	3.34	2.98	mg/kg dry		3.34			0.0611	20
Barium	90.1	1.49	mg/kg dry		91.9			2.04	20
Beryllium	0.177 B	0.595	mg/kg dry		0.188			5.97	20
Boron	1.76 B	5.95	mg/kg dry		1.85			5.01	20
Cadmium	0.595 U	0.595	mg/kg dry		0.564 U				20
Calcium	5610	298	mg/kg dry		4740			16.7	20
Chromium	11.2	0.595	mg/kg dry		12.0			6.77	20
Cobalt	7.02	5.95	mg/kg dry		7.23			2.97	20
Copper	25.6	2.98	mg/kg dry		26.4			2.83	20
Iron	35900	59.5	mg/kg dry		35800			0.236	20
Lead	4.76	1.49	mg/kg dry		5.19			8.68	20
Lithium	5.51 B	7.44	mg/kg dry		5.99			8.39	20
Magnesium	3580	223	mg/kg dry		3690			3.13	20
Manganese	306	14.9	mg/kg dry		340			10.5	20
Molybdenum	5.95 U	5.95	mg/kg dry		5.64 U				20
Nickel	6.84 B	11.9	mg/kg dry		6.85			0.140	20
Potassium	1300	1190	mg/kg dry		1430			9.10	20
Selenium	0.893 U	0.893	mg/kg dry		0.846 U				20
Silicon	546	5.95	mg/kg dry		539			1.24	20
Silver	0.595 U	0.595	mg/kg dry		0.564 U				20
Sodium	663	149	mg/kg dry		605			9.20	20
Uranium	59.5 U	59.5	mg/kg dry		56.4 U				20
Vanadium	126	7.44	mg/kg dry		116			8.18	20
Zinc	61.1	29.8	mg/kg dry		62.3			1.82	20
Zirconium	37.1	7.44	mg/kg dry		36.0			3.11	20



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**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
<b>Batch L211167 - SW 3050B</b>									
<b>Matrix Spike (L211167-MS1)</b>		<b>Source: 1211082-01</b>		<b>Prepared: 11/20/2012 Analyzed: 11/28/2012</b>					
Aluminum	10400	14.1	mg/kg dry	188.01	7280	1630*	75-125		
Antimony	14.8	1.69	mg/kg dry	47.003	1.69 U	31.5*	75-125		
Arsenic	164	2.82	mg/kg dry	188.01	3.34	85.6	75-125		
Barium	267	1.41	mg/kg dry	188.01	91.9	93.1	75-125		
Beryllium	4.28	0.564	mg/kg dry	4.7003	0.188	87.1	75-125		
Boron	82.1	5.64	mg/kg dry	94.006	1.85	85.4	75-125		
Cadmium	4.04	0.564	mg/kg dry	4.7003	0.564 U	85.9	75-125		
Calcium	9240	282	mg/kg dry	2350.2	4740	191*	75-125		
Chromium	29.8	0.564	mg/kg dry	18.801	12.0	94.6	75-125		
Cobalt	47.4	5.64	mg/kg dry	47.003	7.23	85.5	75-125		
Copper	47.0	2.82	mg/kg dry	23.502	26.4	87.7	75-125		
Iron	36900	56.4	mg/kg dry	94.006	35800	1170*	75-125		
Lead	45.0	1.41	mg/kg dry	47.003	5.19	84.6	75-125		
Lithium	91.8	7.05	mg/kg dry	94.006	5.99	91.3	75-125		
Magnesium	6110	212	mg/kg dry	2350.2	3690	103	75-125		
Manganese	392	14.1	mg/kg dry	47.003	340	110	75-125		
Molybdenum	82.5	5.64	mg/kg dry	94.006	5.64 U	87.7	75-125		
Nickel	47.4	11.3	mg/kg dry	47.003	6.85	86.2	75-125		
Potassium	3590	1130	mg/kg dry	2350.2	1430	92.0	75-125		
Selenium	161	0.846	mg/kg dry	188.01	0.846 U	85.8	75-125		
Silicon	757	5.64	mg/kg dry	94.006	539	231*	75-125		
Silver	4.30	0.564	mg/kg dry	4.7003	0.564 U	91.6	75-125		
Sodium	3380	141	mg/kg dry	2350.2	605	118	75-125		
Uranium	395	56.4	mg/kg dry	470.03	56.4 U	84.1	75-125		
Vanadium	172	7.05	mg/kg dry	47.003	116	118	75-125		
Zinc	105	28.2	mg/kg dry	47.003	62.3	90.0	75-125		
Zirconium	444	7.05	mg/kg dry	470.03	36.0	86.7	75-125		



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**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
<b>Batch L211167 - SW 3050B</b>									
<b>Post Spike (L211167-PS1)</b>		<b>Source: 1211082-01</b>		<b>Prepared: 11/20/2012</b>		<b>Analyzed: 11/28/2012</b>			
Aluminum	136000		ug/L	66000	77500	88.2	75-125		
Antimony	301		ug/L	300.00	-2.10	101	75-125		
Calcium	104000		ug/L	62400	50500	86.3	75-125		
Iron	481000		ug/L	126000	381000	79.0	75-125		
Silicon	12100		ug/L	6300.0	5740	100	75-125		
<b>Reference (L211167-SRM1)</b>				<b>Prepared: 11/20/2012</b>		<b>Analyzed: 11/28/2012</b>			
Aluminum	11200	14.4	mg/kg wet	6670.0		168	0-200.89		
Antimony	40.8	1.73	mg/kg wet	53.000		77.1	0-235.8		
Arsenic	115	2.88	mg/kg wet	114.00		101	82.8-117.54		
Barium	299	1.44	mg/kg wet	307.00		97.5	79.8-120.2		
Beryllium	106	0.577	mg/kg wet	108.00		98.3	82.8-117.6		
Boron	81.2	5.77	mg/kg wet	85.100		95.5	67.5-132.8		
Cadmium	231	0.577	mg/kg wet	225.00		103	83.6-116.4		
Calcium	3280	288	mg/kg wet	3360.0		97.7	83.3-116.9		
Chromium	80.5	0.577	mg/kg wet	77.200		104	73.3-126.4		
Cobalt	165	5.77	mg/kg wet	166.00		99.3	80.7-118.7		
Copper	279	2.88	mg/kg wet	271.00		103	80.8-119.2		
Iron	8520	57.7	mg/kg wet	8420.0		101	78.6-121.1		
Lead	186	1.44	mg/kg wet	190.00		97.7	81.6-118.4		
Lithium	128	7.21	mg/kg wet	114.00		112	50.9-148.2		
Magnesium	8320	216	mg/kg wet	8570.0		97.1	83.2-116.7		
Manganese	1010	14.4	mg/kg wet	965.00		105	69.3-130.5		
Molybdenum	231	5.77	mg/kg wet	235.00		98.2	76.2-123.8		
Nickel	222	11.5	mg/kg wet	221.00		100	79.6-120.8		
Potassium	14400	1150	mg/kg wet	14400		100	81.9-118.1		
Selenium	195	0.865	mg/kg wet	187.00		105	75.9-124.6		
Silicon	1010	5.77	mg/kg wet	807.00		125	0-219.3		
Silver	81.3	0.577	mg/kg wet	83.500		97.4	82.7-117.1		
Sodium	9680	144	mg/kg wet	9730.0		99.5	82.5-117.2		
Vanadium	107	7.21	mg/kg wet	98.700		109	75.9-123.6		
Zinc	206	28.8	mg/kg wet	199.00		103	78.4-121.6		



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-149 Project Number: KP0153 Project Manager: Joan Kessner	Reported: 11/29/2012 12:42
---	--	-------------------------------

**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
<b>Batch L211168 - SW 7471A Prep</b>									
<b>Blank (L211168-BLK1)</b>									
				Prepared: 11/20/2012	Analyzed: 11/21/2012				
Mercury	0.0281 U	0.0281	mg/kg wet						
<b>Duplicate (L211168-DUP4)</b>									
		Source: 1211082-01		Prepared: 11/20/2012	Analyzed: 11/21/2012				
Mercury	0.0268 U	0.0268	mg/kg dry		0.0276 U				20
<b>Matrix Spike (L211168-MS4)</b>									
		Source: 1211082-01		Prepared: 11/20/2012	Analyzed: 11/21/2012				
Mercury	0.162	0.0284	mg/kg dry	0.15760	0.0276 U	103	75-125		20
<b>Reference (L211168-SRM1)</b>									
				Prepared: 11/20/2012	Analyzed: 11/21/2012				
Mercury	1.24	0.0281	mg/kg wet	1.2900		95.9	62.6-138		

SAMPLE DIGESTION RECORD

Digestion Batch #: L211167  
 Date/Time Initiated: 11/20/12 1100  
 Date/Time Completed: 11/21/12 1345  
 Analyst: YVW  
 Matrix (circle): Soil Water Other  
 Method (circle one): 3005A 3010A 3050 200.7 (1994)  
 pH/Turbidity: N/A for Solids.

Digested/ Undigested (circle one)  
 Balance #: B14  
 Balance Cal Verification: Y NA  
 Temp: \_\_\_\_\_  
 BLOCK 1 2 (circle one)

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
1211082-01		0.57	50		TC	not fine	brown/tau, sandy	lots of rocks	
L211167-NVPI		0.54	50						
MS1	0.15	0.57	50						
BUL1		0.54	50			coarse	boiling chips	N/A	
SRM1		0.52	50			fine	pink Brandy		

~~YVW 11/20/12~~

Spiking IDs / Expiration Date:

MS#: 1201377

LCS#: 1201014

Reagent IDs:

HNO<sub>3</sub> 0000003390

HCl L13029

H<sub>2</sub>O<sub>2</sub> L11A03

1:1 HNO<sub>3</sub> 657-076-07

1:1 HCl \_\_\_\_\_

File ID#: \_\_\_\_\_

Data Review By/Date:

Qem 11/20/12

Lionville Laboratory

MERCURY PREPARATION

Analyst: M. L. L.  
 Date: 11/20/12  
 Start Time/Temp: 1755/94°  
 End Time/Temp: 1830/96°

Instrument ID: HG3.2/HG3.3  
 Balance #: B14 /NA  
 Pipette Calibration (Daily) (Y)

Logbook # 1153  
 Prep Batch: L211168  
 Worksheet: HG112102/HG112103  
 SOP No. ME-HgCVAA  
 BLOCK 1 (3) 2 (circle one)

NOTE: All temperatures are recorded as corrected temperatures.

LVL Work Order#	pH < 2 (Liq)	Spike Vol (mL)	Spike Conc. (µg/L)	Initial Wt. or Vol (g or mL)	Final Sample Vol (mL)	Comments, % Solids, etc.
Blank				10 ml	50	
0.2 µg/L		0.100		10 ml	50	
1.0 µg/L		0.500		10 ml	50	
2.0 µg/L		1.000		10 ml	50	
5.0 µg/L		2.500		10 ml	50	
10.0 µg/L		5.000		10 ml	50	
ICV		0.125	2.5	10 ml	50	
CV		0.250	5.0	10 ml	50	
ICB/CCB				10 ml	50	
L211168-BLK1				0.32	50	
SRM1				0.32	50	
1211067-01				0.36	50	
L211168-DUP1				0.39	50	
MS1		0.500	1.0	0.37	50	
1211069-01				0.36	50	
L211168-DUP2				0.39	50	
MS2		0.500	1.0	0.33	50	
1211073-01				0.34	50	
L211168-DUP3				0.36	50	
MS3		0.500	1.0	0.38	50	
1211073-02				0.35	50	
1211082-01				0.35	50	RAD (?)
L211168-DUP4				0.36	50	
MS4		0.500	1.0	0.34	50	
1211083-01				0.34	50	
L211168-DUP5				0.39	50	
MS5		0.500	1.0	0.39	50	

Standard:	ID	Prep Date/Time
ICAL/MS	RI 1201235	11/20/12 1130
ICV/CCV/LCS	(I.V. 1201411)	N/A

Reviewed By/Date: ALM 11/20/12

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

se book # 1153 for std traceability information  
 Water Matrix Spiking Solution Concentration = 0.1 µg/ml  
 after LCS Spiking Concentration: 1.0 µg/ml



PREPARATION BENCH SHEET

L211167

Lionville Laboratory

Printed: 11/29/2012 11:48:42AM

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
L211082-01	6010B HSL Metals	11/20/2012 11:00	0.57	50					WC-Hanford, Inc.	HSL + B, Li, Mo, Si, U, Zr (No TL)
L211167-BLKI	QC	11/20/2012 11:00	0.54	50						
L211167-DUP1	QC	11/20/2012 11:00	0.54	50		1211082-01				
L211167-MSI	QC	11/20/2012 11:00	0.57	50	1201377	1211082-01	500			
L211167-PSI	QC	11/20/2012 11:00	0.57 <sup>†</sup>	50						added to accommodate lims
L211167-SRM1	QC	11/20/2012 11:00	0.52	50	1201014		520			

*revision prepared date/time/comments*

*† IE run 11/29/12*

*run 11/29/12*

Extracts Relinquished By

Date

Extracts Received By

Date

PREPARATION BENCH SHEET

L211167

Lionville Laboratory

Matrix: Solid

Prepared using: METALS - SW 3050B

(No Surrogate)

Printed: 11/21/2012 2:24:46PM

Lab Number	Analysis	Prepared	Initial (g)	Final (mL)	Spike ID	Source ID	Spike ul	Surrogate ul	Client	Extraction Comments
L211082-01	6010B HSL Metals	11/20/2012 10:54	0.57	50					WC-Hanford, Inc.	HSL + B, Li, Mo, Si, U, Zr (No TL)
L211167-BLK1	QC	11/20/2012 10:54	0.54	50						
L211167-DUP1	QC	11/20/2012 10:54	0.54	50		1211082-01				
L211167-MS1	QC	11/20/2012 10:54	0.57	50	1201377	1211082-01	500			
L211167-PS1	QC	11/20/2012 10:54	0.5	50						
L211167-SRM1	QC	11/20/2012 10:54	0.52	50	1201014		520			

Extracts Relinquished By M. Bell Date 11/21/12

Extracts Received By Spaxel Date 11/28/12