

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

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt

H4-21

KW 3/18/13  
INITIAL/DATE

**COMMENTS:**

**SDG K4059**

**SAF-RC-233**

Rad only

Chem only

Rad & Chem

Complete

Partial

**Sample Location: 600-373**



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

12 March 2013

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

Subject: Analytical Data Package

Dear Ms. Kessner:

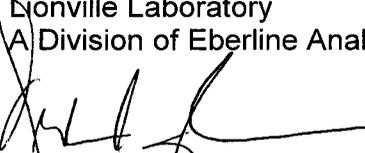
Enclosed are the hard copy analytical reports for the batch number/fraction indicated (marked X) in the following table:

LvLI Batch #	1302003
SDG #	K4059
SAF #	RC-233
Date Received	01/31/13
# Samples	1
Matrix	SOIL
Volatiles	
Semivolatiles	
Pest/PCB	
Glycols	
DRO/KRO/GRO	X
PAHs	X
Herbicides	
Metals	X
TCLP Metals	X
Inorganics	X

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

Sincerely,

Lionville Laboratory  
A Division of Eberline Analytical Corporation

  
Orlette S. Johnson  
Project Manager

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 61 pages.

R:\GROUP\PM\ORLETTE\Hanford\Data\B\_ltrs.DOC

000000001

# CHAIN OF CUSTODY





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

CLIENT: WC HANFORD  
Project ~~SAF/SOW~~/Release #: RC-233

Date: 1-31-13

LvL Batch #: 1301074

Sample Custodian: Victor Hernandez

NOTE: EXPLAIN ALL DISCREPANCIES

- |                                                                                                                                            |                                                                             |                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Samples Hand Delivered or <u>Shipped?</u>                                                                                               | Carrier <u>Fed. Ep</u>                                                      | Airbill # <u>79462606 7249</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 cooled or ambient?                                                                                                     | Temp <u>2°</u> °C                                                           | Cooler # <u>WCH-12-020</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 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? Short holds taken to wet lab?                                                                      | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Yes        | <input checked="" type="checkbox"/> No <u>ND3, ND2, OP04 rec'd out of hold time</u><br><input type="checkbox"/> No <input type="checkbox"/> N/A |
| 13. VOA, TOC, TOX, RSK-175, Sulfides, Non-Halogenated VOAs (Alcohol/Glycol) 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**

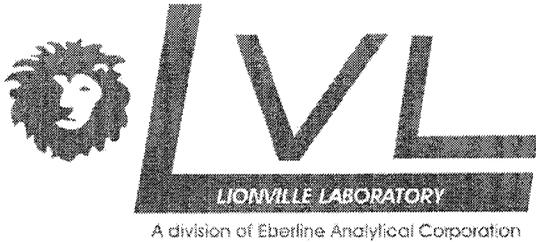


264 Welsh Pool Road  
Exton, PA 19341  
Phone: 610-280-3000  
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/14/2013 22:17
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
JIRD44	1302003-01	Soil	01/28/2013 12:20	01/31/2013 10:20



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## Case Narrative

**Client:** WC-HANFORD RC-233 K4059  
**LVL #:** 1302003

**W.O. #:** 60049-001-001-0001-00  
**Date Received:** 01-31-2013

### DIESEL RANGE ORGANICS

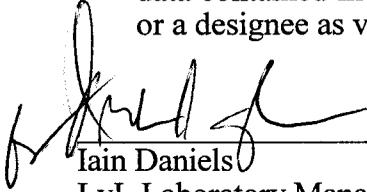
One (1) soil sample was collected on 01-28-2013.

The sample and associated QC samples were extracted 02-11-2013 and analyzed 02-12,14-2013 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. The sample and associated QC had an elevated final volume of 4 mLs due to sample matrix. Reporting limits have been adjusted to reflect the necessary dilutions.

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.
2. All required holding times for extraction and analysis have been met.
3. All 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. Two (2) of (2) matrix spike recoveries were outside QC acceptance criteria. Matrix spike recoveries were unobtainable due to high concentration of target analytes and dilution required for analysis. A copy of the Sample Discrepancy Report (SDR# 13GC025) has been enclosed.
7. The sample and associated QC required a 10-fold instrument dilution due to high concentration of target analytes. Reporting limits have been adjusted to reflect the necessary dilutions.
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. The samples were reported on a dry weight basis.

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 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

# Lionville Laboratory Sample Discrepancy Report (SDR)

SDR #: 136C025

Initiator: Catherine Carey Batch: 1302003 Parameter: DRO  
 Date: 02/14/13 Samples: ms1 msd1 Matrix: 001L  
 Client: WC Hanford Method: SW846/MCAWW/CLP1 Prep Batch: 1302095

**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)

*Spike recoveries high*

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

*high concentration of target analyte in sample*

**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  
IP.  
[Signature] 2/10/13*

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

- 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:

- 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 disposition.

Route

- Lab Manager: Daniels
- Project Mgr (circle): Johnson / Storie
- Sample Prep (circle): Ford
- Log-in: King

Route

- Metals: Welsh / \_\_\_\_\_
- Inorganic: Perrone / \_\_\_\_\_
- GC/LC: Carey / \_\_\_\_\_
- MS VOA: Rubino / \_\_\_\_\_
- MS BNA: Carden / \_\_\_\_\_
- Other: \_\_\_\_\_



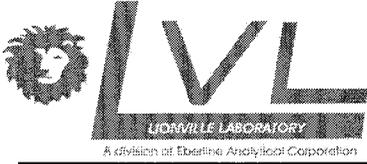
## GLOSSARY OF DATA

### 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-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/14/2013 22:17
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**J1RD44**  
**1302003-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
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**Lionville Laboratory**

**Extractable Petroleum Hydrocarbons by SW846 8015**

Diesel Range Organics	144000	U	144000	ug/kg dry	10	L302095	02/11/2013	02/14/2013	8015M
<b>Motor Oil</b>	<b>6600000</b>		431000	ug/kg dry	10	L302095	02/11/2013	02/14/2013	8015M
<i>Surrogate: p-Terphenyl</i>	86 %		39-129			L302095	02/11/2013	02/14/2013	8015M



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-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**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 L302095 - SW 3540C</b>									
<b>Blank (L302095-BLK1)</b>									
				Prepared: 02/11/2013 Analyzed: 02/12/2013					
Diesel Range Organics	3330 U	3330	ug/kg wet						
Motor Oil	10000 U	10000	ug/kg wet						
Surrogate: p-Terphenyl	5060		ug/kg wet	6666.7		76	39-129		
<b>LCS (L302095-BS1)</b>									
				Prepared: 02/11/2013 Analyzed: 02/12/2013					
Diesel Range Organics	51100	3330	ug/kg wet	66667		77	42-133		
Surrogate: p-Terphenyl	5580		ug/kg wet	6666.7		84	39-129		
<b>Matrix Spike (L302095-MS1)</b>									
				Source: 1302003-01		Prepared: 02/11/2013 Analyzed: 02/14/2013			
Diesel Range Organics	2420000	144000	ug/kg dry	71806	144000 U3370*		42-133		
Surrogate: p-Terphenyl	5340		ug/kg dry	7180.6		74	39-129		
<b>Matrix Spike Dup (L302095-MSD1)</b>									
				Source: 1302003-01		Prepared: 02/11/2013 Analyzed: 02/14/2013			
Diesel Range Organics	2820000	143000	ug/kg dry	71377	144000 U3950*		42-133	16	40
Surrogate: p-Terphenyl	6090		ug/kg dry	7137.7		85	39-129		

PREPARATION BENCH SHEET

L302095

Lionville Laboratory

Printed: 2/12/2013 2:04:08PM

Matrix: Solid

Prepared using: GC - SW 3540C

Surrogate used: 1300029

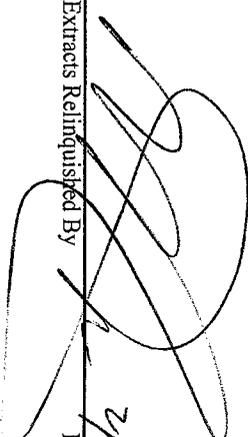
Lab Number	Analysis	Prepared	Initial (g)	Final (ml)	Spike ID	Source ID	Spike ul	Surrogate ul	Client	Extraction Comments
L302003-01	8015M DRO	02/11/2013 14:40	30.02	4				1000	WC-Hanford, Inc.	
L302004-01	8015M DRO	02/11/2013 14:40	30.03	1				1000	WC-Hanford, Inc.	
L302014-01	8015M DRO	02/11/2013 14:40	30.42	4				1000	WC-Hanford, Inc.	
L302015-01	8015M DRO	02/11/2013 14:40	30.63	1				1000	WC-Hanford, Inc.	
L302015-02	8015M DRO	02/11/2013 14:40	30	1				1000	WC-Hanford, Inc.	
L302095-BLK1	QC	02/11/2013 14:40	30	1				1000		
L302095-BS1	QC	02/11/2013 14:40	30	1	1201538		1000	1000		
L302095-MS1	QC	02/11/2013 14:40	30.01	4	1201538	1302003-01	1000	1000		
L302095-MS2	QC	02/11/2013 14:40	30.15	1	1201538	1302004-01	1000	1000		
L302095-MS3	QC	02/11/2013 14:40	30.2	4	1201538	1302014-01	1000	1000		
L302095-MS4	QC	02/11/2013 14:40	30	1	1201538	1302015-01	1000	1000		
L302095-MSD1	QC	02/11/2013 14:40	30.19	4	1201538	1302003-01	1000	1000		
L302095-MSD2	QC	02/11/2013 14:40	30.16	1	1201538	1302004-01	1000	1000		
L302095-MSD3	QC	02/11/2013 14:40	30.5	4	1201538	1302014-01	1000	1000		
L302095-MSD4	QC	02/11/2013 14:40	30	1	1201538	1302015-01	1000	1000		

Extracts Relinquished By

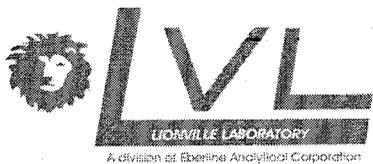
Date

Extracts Received By

Date

 2/12/13 1425

# PAHs



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

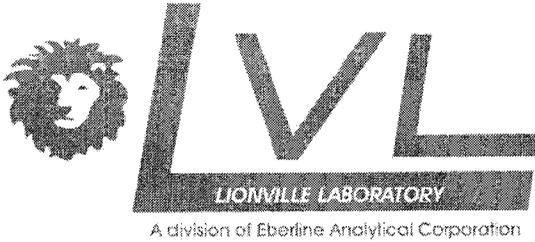
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-233  
Project Number: K4059  
Project Manager: Joan Kessner

Reported:  
02/15/2013 12:07

**Analytical Report for Polynuclear Aromatic Compounds by SW846 8310**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
J1RD44	1302003-01	Soil	01/28/2013 12:20	01/31/2013 10:20



264 Welsh Pool Road  
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Phone (610) 280-3000  
Fax (610) 280-3041

## Case Narrative

**Client:** WC-HANFORD RC-233 K4059  
**LVL #:** 1302003

**W.O. #:** 60049-001-001-0001-00  
**Date Received:** 01-31-2013

### POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)

One (1) soil sample was collected on 01-28-2013.

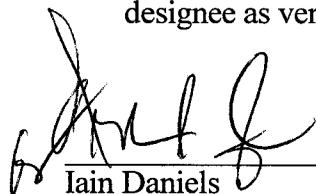
The sample and associated QC samples were extracted 02-11-2013 and analyzed 02-14,15-2013 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3540C and the analysis procedure was based on SW846 Method 8310. The sample and associated QC had an elevated final volume of 40mLs due to sample matrix. Reporting limits have been adjusted for the necessary dilutions.

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.
2. All required holding times for extraction and analysis have been met.
3. Three (3) of five (5) surrogate recoveries were outside QC acceptance criteria. A copy of the Sample Discrepancy Report (SDR# 13GC028) has been enclosed
4. The method blank was below the reporting limits for all target compounds.
5. All blank spike recoveries were within QC acceptance criteria.
6. Thirty-two (32) of thirty-two (32) matrix spike recoveries were outside QC acceptance criteria. Matrix spike recoveries were unobtainable due to dilution required for analysis due to high concentration of non-target and target analytes. A copy of the Sample Discrepancy Report (SDR# 13GC028) has been enclosed.
7. The sample and associated QC required a 100-fold instrument dilution due to high concentration of non-target and target analytes. 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 sample was reported on a dry weight basis.

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

  
\_\_\_\_\_  
Date

Lionville Laboratory Sample Discrepancy Report (SDR)

SDR #: 136C028

Initiator: Cathrenne Carey  
 Date: 02/17/13  
 Client: WC Hartford

Batch: 1302003  
 Samples: 01, ms1, msd1  
 Method: SW846/MCAWW/CLP/

Parameter: PAH  
 Matrix: SOIL  
 Prep Batch: L302092

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)

surrogate recoveries out in samples #01, ms1, msd1  
 multiple spike recoveries outside qc limits in ms1, msd1

2. Known or Probable Causes(s)

*Dilutions necessary for analysis, and interference from both target and non target compounds*

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:

*Nasty samples*

*Wald 2/19/13* *Narrate ID.*

4. Project Manager Instructions...signature/date:

- Concur with Proposed Action
- Disagree with Proposed Action; See Instruction
- Include in Case Narrative
- Client Contacted:
- Date/Person \_\_\_\_\_
- Add \_\_\_\_\_
- Cancel \_\_\_\_\_

*Wald 3/12/13*

5. Final Action...signature/date:

- 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 disposition.

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: \_\_\_\_\_

**8310 PAH**

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

Analyte	02.14.13 10:39:49 am CCV1	02.14.13 3:07:39 pm CCV2	2-14-13 7:17:30 pm CCV3	2-14-13 9:29:19 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	-17.5		-31.5	-31.9				
Dibenz[a,h]anthracene								
Benzo[g,h,i]perylene								
Mean %D or %Drift	1.2/2.3	2.7/0.2	0.2/-3.2	5.0/-3.3				

Sample results reported from affected CCV:

CCV1: L302092 - BIK1, BS1, 1301065-01, 1301066-01, L301202-MS3 MS, MSD3, MSD4

CCV2: \_\_\_\_\_

CCV3: 1302003-01, 1302005-02, 1302014

CCV4: \_\_\_\_\_

CCV5: \_\_\_\_\_

CCV6: \_\_\_\_\_

CCV7: \_\_\_\_\_

CCV8: \_\_\_\_\_



## 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.  
 2620 Fermi Avenue  
 Richland WA, 99354

Project: RC-233  
 Project Number: K4059  
 Project Manager: Joan Kessner

Reported:  
 02/15/2013 12:07

**JIRD44**  
**1302003-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
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**Lionville Laboratory**

**Polynuclear Aromatic Compounds by SW846 8310**

Naphthalene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Acenaphthylene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Acenaphthene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Fluorene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
<b>Phenanthrene</b>	<b>4430</b> D	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Anthracene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
<b>Fluoranthene</b>	<b>1130</b> J, D	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Indeno[1,2,3-cd]pyrene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Pyrene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Benz[a]anthracene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Chrysene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Benzo[b] fluoranthene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Benzo[k] fluoranthene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Benzo[a] pyrene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Dibenz[a,h]anthracene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Benzo[g,h,i] perylene	2790 U	2790	ug/kg dry	100	L302092	02/11/2013	02/14/2013	8310
Surrogate: Triphenylene	181 % *	68-129			L302092	02/11/2013	02/14/2013	8310



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Project: RC-233  
 Project Number: K4059  
 Project Manager: Joan Kessner

Reported:  
 02/15/2013 12:07

**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
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**Batch L302092 - SW 3540C**

<b>Blank (L302092-BLK1)</b>		Prepared: 02/11/2013 Analyzed: 02/14/2013							
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	3.33 U	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						
<i>Surrogate: Triphenylene</i>	143		ug/kg wet	166.67		86	68-129		

<b>LCS (L302092-BS1)</b>		Prepared: 02/11/2013 Analyzed: 02/14/2013							
Naphthalene	186	3.33	ug/kg wet	166.67		111	0-127		
Acenaphthylene	143	3.33	ug/kg wet	166.67		86	50-140		
Acenaphthene	145	3.33	ug/kg wet	166.67		87	17-139		
Fluorene	138	3.33	ug/kg wet	166.67		83	28-145		
Phenanthrene	140	3.33	ug/kg wet	166.67		84	30-152		
Anthracene	133	3.33	ug/kg wet	166.67		80	19-171		
Fluoranthene	144	3.33	ug/kg wet	166.67		86	34-159		
Indeno[1,2,3-cd]pyrene	145	3.33	ug/kg wet	166.67		87	31-156		
Pyrene	149	3.33	ug/kg wet	166.67		89	33-152		
Benz[a]anthracene	145	3.33	ug/kg wet	166.67		87	32-157		
Chrysene	146	3.33	ug/kg wet	166.67		88	31-159		
Benzo[b] fluoranthene	148	3.33	ug/kg wet	166.67		89	33-164		
Benzo[k] fluoranthene	148	3.33	ug/kg wet	166.67		89	28-161		
Benzo[a] pyrene	122	3.33	ug/kg wet	166.67		73	29-149		
Dibenz[a,h]anthracene	150	3.33	ug/kg wet	166.67		90	27-153		
Benzo[g,h,i] perylene	154	3.33	ug/kg wet	166.67		92	32-157		
<i>Surrogate: Triphenylene</i>	147		ug/kg wet	166.67		88	68-129		

000000023



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Project: RC-233  
 Project Number: K4059  
 Project Manager: Joan Kessner

Reported:  
 02/15/2013 12:07

**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
<b>Batch L302092 - SW 3540C</b>									
<b>Matrix Spike (L302092-MS1)</b>		<b>Source: 1302003-01</b>		<b>Prepared: 02/11/2013</b>		<b>Analyzed: 02/15/2013</b>			
Naphthalene	2860 U	2860	ug/kg dry	178.80	2790 U		0-127		
Acenaphthylene	2860 U	2860	ug/kg dry	178.80	2790 U	*	50-140		
Acenaphthene	2860 U	2860	ug/kg dry	178.80	2790 U	*	17-139		
Fluorene	2860 U	2860	ug/kg dry	178.80	2790 U	*	28-145		
Phenanthrene	2860 U	2860	ug/kg dry	178.80	4430	-2480*	30-152		
Anthracene	2860 U	2860	ug/kg dry	178.80	2790 U	*	19-171		
Fluoranthene	2860 U	2860	ug/kg dry	178.80	1130	-631*	34-159		
Indeno[1,2,3-cd]pyrene	2860 U	2860	ug/kg dry	178.80	2790 U	*	31-156		
Pyrene	2860 U	2860	ug/kg dry	178.80	2790 U	*	33-152		
Benz[a]anthracene	2860 U	2860	ug/kg dry	178.80	2790 U	*	32-157		
Chrysene	2860 U	2860	ug/kg dry	178.80	2790 U	*	31-159		
Benzo[b]fluoranthene	2860 U	2860	ug/kg dry	178.80	2790 U	*	33-164		
Benzo[k]fluoranthene	2860 U	2860	ug/kg dry	178.80	2790 U	*	28-161		
Benzo[a]pyrene	2860 U	2860	ug/kg dry	178.80	2790 U	*	29-149		
Dibenz[a,h]anthracene	2860 U	2860	ug/kg dry	178.80	2790 U	*	27-153		
Benzo[g,h,i]perylene	2860 U	2860	ug/kg dry	178.80	2790 U	*	32-157		
<i>Surrogate: Triphenylene</i>	281		ug/kg dry	178.80		157*	68-129		
<b>Matrix Spike Dup (L302092-MSD1)</b>		<b>Source: 1302003-01</b>		<b>Prepared: 02/11/2013</b>		<b>Analyzed: 02/15/2013</b>			
Naphthalene	2820 U	2820	ug/kg dry	176.40	2790 U		0-127		40
Acenaphthylene	2820 U	2820	ug/kg dry	176.40	2790 U	*	50-140		40
Acenaphthene	2820 U	2820	ug/kg dry	176.40	2790 U	*	17-139		40
Fluorene	2820 U	2820	ug/kg dry	176.40	2790 U	*	28-145		40
Phenanthrene	2820 U	2820	ug/kg dry	176.40	4430	-2510*	30-152	-1	40
Anthracene	2820 U	2820	ug/kg dry	176.40	2790 U	*	19-171		40
Fluoranthene	2820 U	2820	ug/kg dry	176.40	1130	-639*	34-159	-1	40
Indeno[1,2,3-cd]pyrene	2820 U	2820	ug/kg dry	176.40	2790 U	*	31-156		40
Pyrene	2820 U	2820	ug/kg dry	176.40	2790 U	*	33-152		40
Benz[a]anthracene	18900 D	2820	ug/kg dry	176.40	2790 U	10700*	32-157		40
Chrysene	2820 U	2820	ug/kg dry	176.40	2790 U	*	31-159		40
Benzo[b]fluoranthene	2820 U	2820	ug/kg dry	176.40	2790 U	*	33-164		40
Benzo[k]fluoranthene	2820 U	2820	ug/kg dry	176.40	2790 U	*	28-161		40
Benzo[a]pyrene	2820 U	2820	ug/kg dry	176.40	2790 U	*	29-149		40
Dibenz[a,h]anthracene	2820 U	2820	ug/kg dry	176.40	2790 U	*	27-153		40
Benzo[g,h,i]perylene	2820 U	2820	ug/kg dry	176.40	2790 U	*	32-157		40
<i>Surrogate: Triphenylene</i>	43.7		ug/kg dry	176.40		25*	68-129		

000000024

PREPARATION BENCH SHEET

L302092

Lionville Laboratory

Printed: 2/14/2013 10:15:04AM

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
L302003-01	8310 PAH	02/11/2013 13:31	30.81	40			50	50	WC-Hanford, Inc.	
L302004-01	8310 PAH	02/11/2013 13:31	30.51	20			50	50	WC-Hanford, Inc.	
L302005-01	8310 PAH	02/11/2013 13:31	30.15	20			50	50	WC-Hanford, Inc.	
L302005-02	8310 PAH	02/11/2013 13:31	30.4	40			50	50	WC-Hanford, Inc.	
L302014-01	8310 PAH	02/11/2013 13:31	30.58	40			50	50	WC-Hanford, Inc.	
L302092-BLK1	QC	02/11/2013 13:31	30	5			50	50		
L302092-BS1	QC	02/11/2013 13:31	30	5	1300078		50	50		
L302092-MS1	QC	02/11/2013 13:31	30.13	40	1300078	1302003-01	50	50		
L302092-MS2	QC	02/11/2013 13:31	30.04	20	1300078	1302004-01	50	50		
L302092-MS3	QC	02/11/2013 13:31	30.17	20	1300078	1302005-01	50	50		
L302092-MS4	QC	02/11/2013 13:31	30.35	40	1300078	1302014-01	50	50		
L302092-MSD1	QC	02/11/2013 13:31	30.54	40	1300078	1302003-01	50	50		
L302092-MSD2	QC	02/11/2013 13:31	30.62	20	1300078	1302004-01	50	50		
L302092-MSD3	QC	02/11/2013 13:31	30.07	20	1300078	1302005-01	50	50		
L302092-MSD4	QC	02/11/2013 13:31	30.15	40	1300078	1302014-01	50	50		

Extracts Relinquished By [Signature] Date 2/14/13 10:15

Extracts Received By [Signature] Date 02.14.13 10:15

# METALS

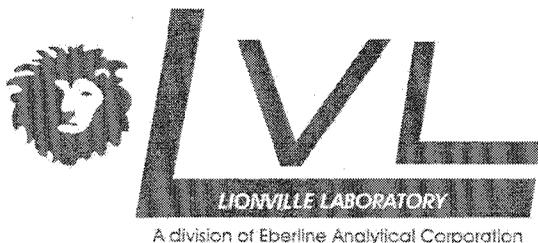


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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/20/2013 10:29
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
J1RD44	1302003-01	Soil	01/28/2013 12:20	01/31/2013 10:20



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## Case Narrative

**Client:** WC-HANFORD RC-233  
**LVL#:** 1302003  
**SDG/SAF#:** K4059/RC-233

**W.O.#:** 60049-001-001-0001-00  
**Date Received:** 01-31-13

### METALS

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

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

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

The sample was analyzed with a 3-fold dilution for ICP metals due to sample matrix. The sample was reanalyzed with a 12-fold dilution for Cadmium, Arsenic, and Lead due to the high concentrations of Arsenic and Lead, and reported with the suffix "...RE1". The sample was diluted to reduce the Arsenic interference on the Cadmium result. The corresponding QC samples DUP3, PS3 and MS3 were renamed as DUP6, PS6, and MS6, to facilitate reporting these analyses with the further dilution.

3. All analyses were performed within the required holding times.
4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvLI's sample acceptance policy.
5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within control limits.
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within method criteria.
7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation (3-10X the LOD or samples greater than 20X MB value)}.
8. All ICP Interference Check Standards were within control limits.
9. All Standard Reference Material (SRM) analytes were within the Prediction Interval control limits supplied by the manufacturer.

10. The matrix spike (MS) recovery for 7 analytes was outside the 75-125% control limits.
11. For analytes where the MS is out of control, a post-digestion MS (PDS) is performed. A serial dilution is performed for Mercury. A PDS was prepared at meaningful concentration levels for the following analytes: Aluminum, Antimony, Iron, Lead, Arsenic, Cadmium, and Mercury.

<u>Sample ID</u>	<u>PDS</u> <u>Element</u>	<u>PDS</u> <u>Concentration (ppb)</u>	<u>% Recovery</u>
J1RD44	Mercury	5.0	119.5%

12. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limit criteria. The  $\pm 20\%$  RPD control limit applies to sample results greater than ten times the MDL. The duplicate result for Antimony was less than ten times the MDL.
13. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.
14. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.
15. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.



Iam Daniels  
Laboratory Manager  
Lionville Laboratory

m130203hg%argc.doc

3/12/13

Date



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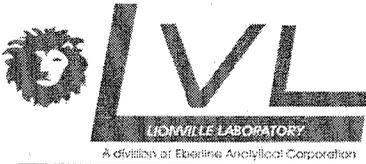
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-233  
Project Number: K4059  
Project Manager: Joan Kessner

Reported:  
02/20/2013 10:29

### 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. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/20/2013 10:29
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**J1RD44**  
**1302003-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
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**Lionville Laboratory**

**Metals by SW846 6000/7000 series**

Aluminum	8750		15.2	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Antimony	5.78		1.83	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Barium	98.7		1.52	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Beryllium	0.283	B	0.610	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Boron	6.10	U	6.10	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Calcium	3500		305	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Chromium	12.1		0.610	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Cobalt	5.56	B	6.10	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Copper	25.2		3.05	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Iron	19600		61.0	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Magnesium	3670		229	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Manganese	223		15.2	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Molybdenum	6.10	U	6.10	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Nickel	9.87	B	12.2	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Potassium	1710		1220	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Selenium	0.915	U	0.915	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Silicon	253		6.10	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Silver	0.610	U	0.610	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Sodium	208		152	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Vanadium	46.1		7.62	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Zinc	118		30.5	mg/kg dry	3	L302089	02/11/2013	02/13/2013	6010B
Mercury	0.301		0.0313	mg/kg dry	1	L302090	02/12/2013	02/13/2013	7471A



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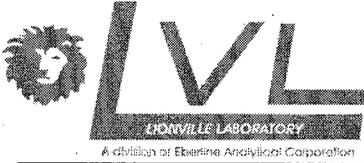
**JIRD44**  
**1302003-01RE1 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
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**Lionville Laboratory**

**Metals by SW846 6000/7000 series**

Arsenic	4210	12.2	mg/kg dry	12	L302089	02/11/2013	02/14/2013	6010B
Cadmium	1.63 B	2.44	mg/kg dry	12	L302089	02/11/2013	02/14/2013	6010B
Lead	15600	6.10	mg/kg dry	12	L302089	02/11/2013	02/14/2013	6010B



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/20/2013 10:29
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

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

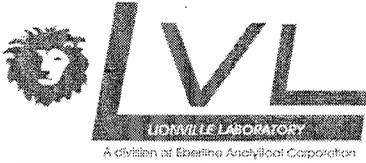
Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch L302089 - SW 3050B**

Blank (L302089-BLK1)			Prepared: 02/11/2013 Analyzed: 02/13/2013						
Aluminum	4.55 U	4.55	mg/kg wet						
Antimony	0.545 U	0.545	mg/kg wet						
Arsenic	0.909 U	0.909	mg/kg wet						
Barium	0.455 U	0.455	mg/kg wet						
Beryllium	0.182 U	0.182	mg/kg wet						
Boron	1.82 U	1.82	mg/kg wet						
Cadmium	0.182 U	0.182	mg/kg wet						
Calcium	6.60 B	90.9	mg/kg wet						
Chromium	0.182 U	0.182	mg/kg wet						
Cobalt	1.82 U	1.82	mg/kg wet						
Copper	0.909 U	0.909	mg/kg wet						
Iron	18.2 U	18.2	mg/kg wet						
Lead	0.455 U	0.455	mg/kg wet						
Magnesium	1.65 B	68.2	mg/kg wet						
Manganese	0.187 B	4.55	mg/kg wet						
Molybdenum	1.82 U	1.82	mg/kg wet						
Nickel	3.64 U	3.64	mg/kg wet						
Potassium	364 U	364	mg/kg wet						
Selenium	0.273 U	0.273	mg/kg wet						
Silicon	1.82 U	1.82	mg/kg wet						
Silver	0.182 U	0.182	mg/kg wet						
Sodium	45.5 U	45.5	mg/kg wet						
Vanadium	2.27 U	2.27	mg/kg wet						
Zinc	9.09 U	9.09	mg/kg wet						

Duplicate (L302089-DUP3)			Source: 1302003-01		Prepared: 02/11/2013 Analyzed: 02/13/2013				
Aluminum	8700		15.0	mg/kg dry	8750		0.623	20	
Antimony	7.57		1.80	mg/kg dry	5.78		26.8*	20	
Barium	90.4		1.50	mg/kg dry	98.7		8.80	20	
Beryllium	0.294	B	0.599	mg/kg dry	0.283		3.94	20	
Boron	2.22	B	5.99	mg/kg dry	6.10 U			20	
Calcium	3530		299	mg/kg dry	3500		0.798	20	
Chromium	12.8		0.599	mg/kg dry	12.1		6.17	20	
Cobalt	5.94	B	5.99	mg/kg dry	5.56		6.64	20	
Copper	27.4		2.99	mg/kg dry	25.2		8.15	20	
Iron	19400		59.9	mg/kg dry	19600		0.799	20	
Magnesium	3700		224	mg/kg dry	3670		0.837	20	

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/20/2013 10:29
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**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
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**Batch L302089 - SW 3050B**

<b>Duplicate (L302089-DUP3)</b>		<b>Source: 1302003-01</b>		<b>Prepared: 02/11/2013 Analyzed: 02/13/2013</b>					
Manganese	229		15.0	mg/kg dry	223			2.68	20
Molybdenum	5.99	U	5.99	mg/kg dry	6.10	U			20
Nickel	11.3	B	12.0	mg/kg dry	9.87			13.5	20
Potassium	1730		1200	mg/kg dry	1710			0.924	20
Selenium	0.898	U	0.898	mg/kg dry	0.915	U			20
Silicon	244		5.99	mg/kg dry	253			3.90	20
Silver	0.599	U	0.599	mg/kg dry	0.610	U			20
Sodium	189		150	mg/kg dry	208			9.80	20
Vanadium	46.2		7.48	mg/kg dry	46.1			0.226	20
Zinc	113		29.9	mg/kg dry	118			4.12	20

<b>Duplicate (L302089-DUP6)</b>		<b>Source: 1302003-01RE1</b>		<b>Prepared: 02/11/2013 Analyzed: 02/14/2013</b>					
Arsenic	3810		11.8	mg/kg dry	4210			9.86	20
Cadmium	2.35	U	2.35	mg/kg dry	1.63				20
Lead	14000		5.88	mg/kg dry	15600			10.8	20

<b>Matrix Spike (L302089-MS3)</b>		<b>Source: 1302003-01</b>		<b>Prepared: 02/11/2013 Analyzed: 02/13/2013</b>					
Aluminum	10200		15.2	mg/kg dry	203.29	8750	699*	75-125	
Antimony	22.9		1.83	mg/kg dry	50.823	5.78	33.7*	75-125	
Barium	273		1.52	mg/kg dry	203.29	98.7	85.6	75-125	
Beryllium	4.83		0.610	mg/kg dry	5.0823	0.283	89.4	75-125	
Boron	87.2		6.10	mg/kg dry	101.65	6.10	U 85.8	75-125	
Calcium	6360		305	mg/kg dry	2541.1	3500	113	75-125	
Chromium	30.3		0.610	mg/kg dry	20.329	12.1	89.7	75-125	
Cobalt	50.1		6.10	mg/kg dry	50.823	5.56	87.7	75-125	
Copper	49.2		3.05	mg/kg dry	25.411	25.2	94.4	75-125	
Iron	19300		61.0	mg/kg dry	101.65	19600	-267*	75-125	
Magnesium	6030		229	mg/kg dry	2541.1	3670	92.9	75-125	
Manganese	284		15.2	mg/kg dry	50.823	223	119	75-125	
Molybdenum	87.4		6.10	mg/kg dry	101.65	6.10	U 86.0	75-125	
Nickel	54.3		12.2	mg/kg dry	50.823	9.87	87.4	75-125	
Potassium	4090		1220	mg/kg dry	2541.1	1710	93.6	75-125	
Selenium	179		0.915	mg/kg dry	203.29	0.915	U 88.2	75-125	
Silicon	342		6.10	mg/kg dry	101.65	253	87.8	75-125	
Silver	4.50		0.610	mg/kg dry	5.0823	0.610	U 88.6	75-125	
Sodium	2650		152	mg/kg dry	2541.1	208	96.1	75-125	
Vanadium	92.0		7.62	mg/kg dry	50.823	46.1	90.4	75-125	
Zinc	161		30.5	mg/kg dry	50.823	118	85.1	75-125	

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 2620 Fermi Avenue  
 Richland WA, 99354

Project: RC-233  
 Project Number: K4059  
 Project Manager: Joan Kessner

Reported:  
 02/20/2013 10:29

**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
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**Batch L302089 - SW 3050B**

**Matrix Spike (L302089-MS6)** Source: 1302003-01RE1 Prepared: 02/11/2013 Analyzed: 02/14/2013

Arsenic	3940	12.2	mg/kg dry	203.29	4210	-133*	75-125		
Cadmium	4.14	2.44	mg/kg dry	5.0823	1.63	49.4*	75-125		
Lead	13700	6.10	mg/kg dry	50.823	15600	-3700*	75-125		

**Post Spike (L302089-PS3)** Source: 1302003-01 Prepared: 02/11/2013 Analyzed: 02/13/2013

Aluminum	149000		ug/L	66000	86100	95.5	75-125		
Antimony	374		ug/L	300.00	56.9	106	75-125		
Iron	305000		ug/L	126000	192000	89.5	75-125		

**Post Spike (L302089-PS6)** Source: 1302003-01RE1 Prepared: 02/11/2013 Analyzed: 02/14/2013

Arsenic	54400		ug/L	13200	41400	98.6	75-125		
Cadmium	1360		ug/L	1200.0	16.0	112	75-125		
Lead	278000		ug/L	121200	154000	103	75-125		

**Reference (L302089-SRM1)** Prepared: 02/11/2013 Analyzed: 02/13/2013

Aluminum	10300	14.7	mg/kg wet	6670.0		154	0-200.89		
Antimony	43.1	1.76	mg/kg wet	53.000		81.4	0-235.8		
Arsenic	115	2.94	mg/kg wet	114.00		101	82.8-117.54		
Barium	318	1.47	mg/kg wet	307.00		104	79.8-120.2		
Beryllium	107	0.588	mg/kg wet	108.00		99.1	82.8-117.6		
Boron	78.3	5.88	mg/kg wet	85.100		92.0	67.5-132.8		
Cadmium	224	0.588	mg/kg wet	225.00		99.7	83.6-116.4		
Calcium	3380	294	mg/kg wet	3360.0		100	83.3-116.9		
Chromium	84.0	0.588	mg/kg wet	77.200		109	73.3-126.4		
Cobalt	165	5.88	mg/kg wet	166.00		99.1	80.7-118.7		
Copper	263	2.94	mg/kg wet	271.00		97.1	80.8-119.2		
Iron	8580	58.8	mg/kg wet	8420.0		102	78.6-121.1		
Lead	195	1.47	mg/kg wet	190.00		103	81.6-118.4		
Magnesium	8400	221	mg/kg wet	8570.0		98.1	83.2-116.7		
Manganese	1010	14.7	mg/kg wet	965.00		104	69.3-130.5		
Molybdenum	237	5.88	mg/kg wet	235.00		101	76.2-123.8		
Nickel	226	11.8	mg/kg wet	221.00		102	79.6-120.8		
Potassium	14700	1180	mg/kg wet	14400		102	81.9-118.1		
Selenium	188	0.882	mg/kg wet	187.00		100	75.9-124.6		
Silicon	339	5.88	mg/kg wet	807.00		42.0	0-219.3		
Silver	84.2	0.588	mg/kg wet	83.500		101	82.7-117.1		
Sodium	9440	147	mg/kg wet	9730.0		97.0	82.5-117.2		
Vanadium	110	7.35	mg/kg wet	98.700		112	75.9-123.6		

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-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**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 L302089 - SW 3050B</b>									
<b>Reference (L302089-SRM1)</b>				Prepared: 02/11/2013 Analyzed: 02/13/2013					
Zinc	199	29.4	mg/kg wet	199.00		100	78.4-121.6		
<b>Batch L302090 - SW 7471A Prep</b>									
<b>Blank (L302090-BLK1)</b>				Prepared: 02/12/2013 Analyzed: 02/13/2013					
Mercury	0.0273 U	0.0273	mg/kg wet						
<b>Duplicate (L302090-DUP3)</b>				Source: 1302003-01		Prepared: 02/12/2013 Analyzed: 02/13/2013			
Mercury	0.304	0.0262	mg/kg dry		0.301			1.21	20
<b>Matrix Spike (L302090-MS3)</b>				Source: 1302003-01		Prepared: 02/12/2013 Analyzed: 02/13/2013			
Mercury	0.540	0.0303	mg/kg dry	0.16835	0.301	142*	75-125		20
<b>Reference (L302090-SRM1)</b>				Prepared: 02/12/2013 Analyzed: 02/13/2013					
Mercury	1.37	0.0281	mg/kg wet	1.2900		106	62.6-138		

SAMPLE DIGESTION RECORD

Digestion Batch #: L302089  
 Date/Time Initiated: 2/11/13 1735  
 Date/Time Completed: 2/12/13 1300  
 Analyst: AMJ

Digested / Undigested (circle one)  
 Balance #: 1514  
 Balance Cal Verification:  NA  
 Temp: 95°  
 BLOCK 1 2 (circle one)

Matrix (circle one):  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

Work Order #	Spike Vol (mL)	Initial Wt/Vol (g/mL)	Final Vol (mL)	pH	Type: To/Sol/TC	Texture	Color / Appearance	Artifact	Turb
1301049-01		0.61	50		TO	fine	light brown mud	H <sub>2</sub> O, rocks	PAN
L302089-DUP1		0.69	50						
MS1	0.5	0.63	50						
1301060-01		0.56	50			not fine	black, tan flecks granular rocks		
L302089-DUP2		0.55	50						
MS2	0.5	0.57	50						
1301060-02		0.54	50			not fine	dark brown, tan sandy	rocks	
03		0.53	50			not fine	dark brown, tan sandy	rocks	
04		0.60	50			coarse	ottawa sand	N/A	
1302003-01		0.53	50			fine	brown soil	rocks	
L302089-DUP3		0.54	50						
MS3	0.5	0.53	50						
1302004-01		0.53	50			fine	brown soil	rocks, vegetation	
L302089-DUP4		0.53	50						
MS4	0.5	0.59	50						
1302005-01		0.52	50			coarse	brown soil	rocks	
L302089-DUP5		0.52	50						
MS5	0.5	0.54	50						
1302005-02		0.64	50			fine	brown soil	rocks	
L302089-BU4		0.55	50			coarse	biting chips		
SPM1	0.5	0.51	50			fine	pink sandy		

prod 2/11/13

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

Reagent IDs:  
 HNO<sub>3</sub> 000003390  
 HCl 0000018301  
 H<sub>2</sub>O<sub>2</sub> L11A03  
 1:1 HNO<sub>3</sub> 637-076-07  
 1:1 HCl \_\_\_\_\_

File ID#: \_\_\_\_\_  
 Data Review By/Date: Rev 2/27/13

R:\group\QAISOP  
 Signed\SPIMetals Digestion log.doc

\*also 0.25 ml 1201380 (0-)  
 0.25 ml 1201382 (2-)

Rev 2/11/13 RE

Page #:

Lionville Laboratory

MERCURY PREPARATION

Logbook # 1198

Analyst: M. M. M.  
 Date: 2/11/13 - 2/12/13  
 Start Time/Temp: 1825/95  
 End Time/Temp: 1900/97

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

Prep Batch: L302090  
 Worksheet: HG021301  
 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				10ml	50	
0.2 µg/L		0.100		10ml	50	
1.0 µg/L		0.500		10ml	50	
2.0 µg/L		1.000		10ml	50	
5.0 µg/L		2.500		10ml	50	
10.0 µg/L		5.000		10ml	50	
TEN		0.125	2.5	10ml	50	
CEV		0.250	5.0	10ml	50	
TEB/CEB				10ml	50	
L302090-BUC1				0.33	50	
SPM1				0.32	50	
1301049-01				0.33	50	PAT1
L302090-DUP1				0.39	50	↓
MS1		0.500	1.0	0.38	50	
1301060-01				0.35	50	
L302090-DUP2				0.33	50	
MS2		0.500	1.0	0.36	50	
1301060-02				0.33	50	
03				0.38	50	
04				0.33	50	Ottawa sand
1302003-01				0.31	50	
L302090-DUP3				0.37	50	
.MS3		0.500	1.0	0.32	50	
1302004-01				0.37	50	
L302090-DUP4				0.39	50	
MS4		0.500	1.0	0.38	50	
1302005-01				0.32	50	

Standard:	ID	Prep Date/Time
ICAL/MS	RI 1201235	2/12/13 1310
ICV/CCV/LCS	(T.V. 1201411)	N/A

Reviewed By/Date: R. M. M. / 1/3

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

se book # 1198 for std traceability information  
 Water Matrix Spiking Solution Concentration = 0.1 µg/ml  
 after LCS Spiking Concentration: 1.0 µg/ml





# **TCLP METALS**

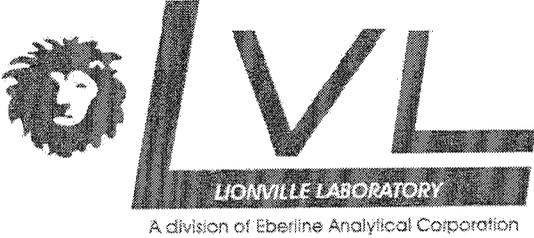


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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/28/2013 11:42
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
JIRD44	1302003-01	Soil	01/28/2013 12:20	01/31/2013 10:20



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### Case Narrative

**Client:** WC-HANFORD RC-233  
**LVL#:** 1302003  
**SDG/SAF#:** K4059/RC-233

**W.O.#:** 60049-001-001-0001-00  
**Date Received:** 01-31-13

### METALS

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

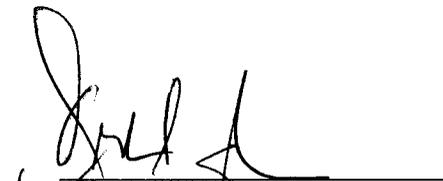
All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

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

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

3. All analyses were performed within the required holding times.
4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvL's sample acceptance policy.
5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the LOQ).
7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, MB value less than 5% of the RCRA limit, or samples were greater than 20X MB value}.
8. All ICP Interference Check Standards were within control limits.
9. All laboratory control samples (LCS) were within the 80-120% control limits.

10. The TCLP leachate duplicate analyses were within the 20% Relative Percent Difference (RPD) control limit criteria. The  $\pm 20\%$  RPD control limit applies to sample results greater than ten times the MDL.
11. The TCLP extract from sample J1RD44 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.
12. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.
13. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.
14. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

  
\_\_\_\_\_  
Jamin Daniels  
Laboratory Manager  
Lionville Laboratory  
jjw/m02-003tc2013

  
\_\_\_\_\_  
Date



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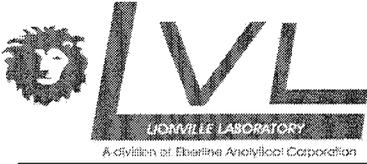
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-233  
Project Number: K4059  
Project Manager: Joan Kessner

Reported:  
02/28/2013 11:42

### Notes and Definitions

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



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/28/2013 11:42
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**J1RD44**  
**1302003-01 (Soil)**

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
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**Lionville Laboratory**

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

<b>Arsenic</b>	<b>2.31</b>		0.0750	mg/L	5	L302146	02/26/2013	02/27/2013	6010
<b>Barium</b>	<b>0.248</b>		0.00500	mg/L	5	L302146	02/26/2013	02/27/2013	6010
Cadmium	0.0150	U	0.0150	mg/L	5	L302146	02/26/2013	02/27/2013	6010
Chromium	0.0250	U	0.0250	mg/L	5	L302146	02/26/2013	02/27/2013	6010
<b>Lead</b>	<b>2.07</b>		0.0500	mg/L	5	L302146	02/26/2013	02/27/2013	6010
Selenium	0.100	U	0.100	mg/L	5	L302146	02/26/2013	02/27/2013	6010
Silver	0.0300	U	0.0300	mg/L	5	L302146	02/26/2013	02/27/2013	6010
Mercury	0.000200	U	0.000200	mg/L	1	L302147	02/26/2013	02/27/2013	7470



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-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/28/2013 11:42
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**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
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**Batch L302146 - SW 3010A**

<b>Blank (L302146-BLK1)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Arsenic	0.0150 U	0.0150	mg/L						
Barium	0.00100 U	0.00100	mg/L						
Cadmium	0.00300 U	0.00300	mg/L						
Chromium	0.00500 U	0.00500	mg/L						
Lead	0.0100 U	0.0100	mg/L						
Selenium	0.0200 U	0.0200	mg/L						
Silver	0.00600 U	0.00600	mg/L						

<b>Blank (L302146-BLK2)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Arsenic	0.0750 U	0.0750	mg/L						
Barium	0.00500 U	0.00500	mg/L						
Cadmium	0.0150 U	0.0150	mg/L						
Chromium	0.0250 U	0.0250	mg/L						
Lead	0.0500 U	0.0500	mg/L						
Selenium	0.100 U	0.100	mg/L						
Silver	0.0300 U	0.0300	mg/L						

<b>LCS (L302146-BS1)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Arsenic	9.81	0.0150	mg/L	10.000		98.1	80-120		
Barium	4.83	0.00100	mg/L	5.0000		96.6	80-120		
Cadmium	0.229	0.00300	mg/L	0.25000		91.6	80-120		
Chromium	0.506	0.00500	mg/L	0.50000		101	80-120		
Lead	2.42	0.0100	mg/L	2.5000		96.8	80-120		
Selenium	9.47	0.0200	mg/L	10.000		94.7	80-120		
Silver	0.498	0.00600	mg/L	0.50000		99.5	80-120		

<b>Duplicate (L302146-DUP2)</b>		<b>Source: 1302003-01</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013					
Arsenic	2.33		0.0750	mg/L	2.31			0.841	20
Barium	0.250		0.00500	mg/L	0.248			0.902	20
Cadmium	0.0150	U	0.0150	mg/L	0.0150 U				20
Chromium	0.0250	U	0.0250	mg/L	0.0250 U				20
Lead	2.10		0.0500	mg/L	2.07			1.13	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. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/28/2013 11:42
-------------------------------------------------------------	---------------------------------------------------------------------------	-------------------------------

**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
<b>Batch L302146 - SW 3010A</b>									
<b>Matrix Spike (L302146-MS2)</b>		<b>Source: 1302003-01</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013					
Arsenic	7.48	0.0750	mg/L	5.0000	2.31	104	50-1000		
Barium	92.8	0.00500	mg/L	100.00	0.248	92.5	50-1000		
Cadmium	0.998	0.0150	mg/L	1.0000	0.0150 U	99.8	50-1000		
Chromium	5.27	0.0250	mg/L	5.0000	0.0250 U	105	50-1000		
Lead	6.94	0.0500	mg/L	5.0000	2.07	97.4	50-1000		
Selenium	1.00	0.100	mg/L	1.0000	0.100 U	100	50-1000		
Silver	4.95	0.0300	mg/L	5.0000	0.0300 U	98.9	50-1000		
<b>Batch L302147 - SW 7470A Prep</b>									
<b>Blank (L302147-BLK1)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Mercury	0.000200 U	0.000200	mg/L						
<b>Blank (L302147-BLK2)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Mercury	0.000200 U	0.000200	mg/L						
<b>Blank (L302147-BLK3)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Mercury	0.000200 U	0.000200	mg/L						
<b>LCS (L302147-BS1)</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013							
Mercury	0.00527	0.000200	mg/L	0.0050000		105	80-120		
<b>Duplicate (L302147-DUP5)</b>		<b>Source: 1302003-01</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013					
Mercury	0.000200 U	0.000200	mg/L		0.000200 U				20
<b>Matrix Spike (L302147-MS5)</b>		<b>Source: 1302003-01</b>		Prepared: 02/26/2013 Analyzed: 02/27/2013					
Mercury	0.193	0.0100	mg/L	0.20000	0.000200 U	96.5	50-1000		

Start Date: <u>2-5-13</u> Start Time: <u>RH 13:12</u> Analyst: <u>RH</u> SOP: <u>SPI-1311.1</u>	End Date: <u>2-6-13</u> End Time: <u>7:00</u> Analyst: <u>RH</u> Method: <u>1311J</u>	Tumbler Speed: <u>31</u> RPM Leachate Batch #: <u>1302031</u> Leachate Page: <u>1</u> of <u>3</u> Room Temp. (°C): Start <u>21</u> / Finish <u>21</u> Room Temp. Acceptance Criteria: <p style="text-align: center;"><b>23°C ± 2°</b></p>
----------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Lvl #: <u>1302003-01</u> Client ID#: <u>JIRD44</u> pH After 5 Min: <u>5.84</u> pH After Acid/Heat: <u>2.05</u> Extraction Fluid/pH: <u>#1 4.92</u> Sample Wt.(g): <u>25</u> Extract Fluid Vol.(mL): <u>500</u> pH After Extraction: <u>4.94</u>	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
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Lvl #: <u>1302004-01</u> Client ID#: <u>JIRD74</u> pH After 5 Min: <u>5.57</u> pH After Acid/Heat: <u>2.35</u> Extraction Fluid/pH: <u>#1 4.92</u> Sample Wt.(g): <u>25</u> Extract Fluid Vol.(mL): <u>500</u> pH After Extraction: <u>4.95</u>	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
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Lvl #: <u>1302005-01</u> Client ID#: <u>JIRD77</u> pH After 5 Min: <u>4.52</u> pH After Acid/Heat: <u>N/A</u> Extraction Fluid/pH: <u>#1 4.92</u> Sample Wt.(g): <u>25</u> Extract Fluid Vol.(mL): <u>500</u> pH After Extraction: <u>4.90</u>	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
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Lvl #: <u>1302005-02</u> Client ID#: <u>JIRD78</u> pH After 5 Min: <u>6.35</u> pH After Acid/Heat: <u>2.15</u> Extraction Fluid/pH: <u>#1 4.92</u> Sample Wt.(g): <u>25</u> Extract Fluid Vol.(mL): <u>500</u> pH After Extraction: <u>4.92</u>	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
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Standard	ID	Prep Date	Expir Date	pH Acceptance Criteria
Fluid #1	<u>1300077</u>	<u>1/28/13</u>	<u>7/28/13</u>	<u>4.93 ± 0.05</u>
Fluid #2	_____	_____	_____	<u>2.88 ± 0.05</u>

Start Date: <u>2-5-13</u> Start Time: <u>13:12</u> Analyst: <u>RH</u> SOP: <u>SPI-1311.1</u>	End Date: <u>2-6-13</u> End Time: <u>7:00</u> Analyst: <u>RH</u> Method: <u>1311.1</u>	Tumbler Speed: <u>31 RPM</u> Leachate Batch #: <u>L302031</u> Leachate Page: <u>2</u> of <u>3</u> Room Temp. (°C): Start <u>21</u> / Finish <u>21</u> Room Temp. Acceptance Criteria: <u>23°C ± 2°</u>
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LvL #: 1302013-01  
 Client ID#: JIRD82  
 pH After 5 Min: 6.02  
 pH After Acid/Heat: 2.35  
 Extraction Fluid/pH: #1 4.92  
 Sample Wt.(g): 25  
 Extract Fluid Vol.(mL): 500  
 pH After Extraction: 4.91

Initial Filtration Data and Comments:  
 Solids: \_\_\_\_\_ % / NA  
  
 Initial Filtrate Added: \_\_\_\_\_

LvL #: 1302013-02  
 Client ID#: JIRD83  
 pH After 5 Min: 5.81  
 pH After Acid/Heat: 2.41  
 Extraction Fluid/pH: #1 4.92  
 Sample Wt.(g): 25  
 Extract Fluid Vol.(mL): 500  
 pH After Extraction: 4.89

Initial Filtration Data and Comments:  
 Solids: \_\_\_\_\_ % / NA  
  
 Initial Filtrate Added: \_\_\_\_\_

LvL #: 1302013-03  
 Client ID#: JIRD84  
 pH After 5 Min: 4.31  
 pH After Acid/Heat: N/A  
 Extraction Fluid/pH: #1 4.92  
 Sample Wt.(g): 25  
 Extract Fluid Vol.(mL): 500  
 pH After Extraction: 4.87

Initial Filtration Data and Comments:  
 Solids: \_\_\_\_\_ % / NA  
  
 Initial Filtrate Added: \_\_\_\_\_

LvL #: 1302013-04  
 Client ID#: JIRD85  
 pH After 5 Min: 5.45  
 pH After Acid/Heat: 2.35  
 Extraction Fluid/pH: #1 4.92  
 Sample Wt.(g): 25  
 Extract Fluid Vol.(mL): 500  
 pH After Extraction: 4.93

Initial Filtration Data and Comments:  
 Solids: \_\_\_\_\_ % / NA  
  
 Initial Filtrate Added: \_\_\_\_\_

Standard	ID	Prep Date	Expir Date	pH Acceptance Criteria
Fluid #1	<u>1300077</u>	<u>1/28/13</u>	<u>7/28/13</u>	<u>4.93 ± 0.05</u>
Fluid #2	_____	_____	_____	<u>2.88 ± 0.05</u>

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

Lvl #: <u>130204-01</u> Client ID#: <u>JR081</u> pH After 5 Min: <u>5.93</u> pH After Acid/Heat: <u>2.26</u> Extraction Fluid/pH: <u>#1 4.92</u> Sample Wt.(g): <u>25.00g</u> Extract Fluid Vol.(mL): <u>500</u> pH After Extraction: <u>6.15</u>	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
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Lvl #: <u>L302031</u> Client ID#: <u>NA</u> pH After 5 Min: <u>NA</u> pH After Acid/Heat: <u>NA</u> Extraction Fluid/pH: <u>NA</u> Sample Wt.(g): <u>NA</u> Extract Fluid Vol.(mL): _____ pH After Extraction: _____	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: <u>Blank</u>
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Lvl # _____ Client ID#: _____ pH After 5 Min: _____ pH After Acid/Heat: _____ Extraction Fluid/pH: _____ Sample Wt.(g): _____ Extract Fluid Vol.(mL): _____ pH After Extraction: _____	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: <u>2-6-13</u>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------

Lvl #: _____ Client ID#: _____ pH After 5 Min: _____ pH After Acid/Heat: _____ Extraction Fluid/pH: _____ Sample Wt.(g): _____ Extract Fluid Vol.(mL): _____ pH After Extraction: _____	Initial Filtration Data and Comments: Solids: _____ % / NA  Initial Filtrate Added: _____
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------

Standard	ID	Prep Date	Expir Date	pH Acceptance Criteria
Fluid #1	<u>1300077</u>	<u>1/28/13</u>	<u>7/28/13</u>	<u>4.93 ± 0.05</u>
Fluid # 2				<u>2.88 ± 0.05</u>

SAMPLE DIGESTION RECORD

Digestion Batch #: L302146  
 Date/Time Initiated: 2/26/13 1150  
 Date/Time Completed: 2/27/13 1145  
 Analyst: MW  
 Matrix (circle): Soil Water Other TCR  
 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: 95  
 BLOCK 1 3 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 <	Type: To/Sol/TC	Texture	Color / Appearance	Artifact	Turb
1301060-01		50	50	<	TC		clear, colorless		
02		50	50	<			clear, colorless		
03		50	50	<			clear, colorless		
L302146-DUP1		50	50	<					
MS1	0.5	50	50				↓ ↓		
1302003-01		50	50	<			clear, light yellow		
L302146-DUP2		50	50	<					
MS2	0.5	50	50				↓ ↓		
1302004-01		50	50	<			clear, yellow		
L302146-DUP3		50	50	<					
MS3	0.5	50	50				↓ ↓		
1302005-01		50	50	<			clear, barely yellow		
L302146-DUP4		50	50	<					
MS4	0.5	50	50				↓ ↓		
1302005-02		50	50	<			clear, barely yellow		
1302013-01		50	50	<			clear, yellow		
L302146-DUP5		50	50	<					
MS5	0.5	50	50				↓ ↓		
1302013-02		50	50	<			clear, yellow		
03		50	50	<			clear, colorless		
04		50	50	<			clear, barely yellow		
1302014-01		50	50	<			clear, barely yellow		
L302146-DUP6		50	50	<					
MS6	0.5	50	50				↓ ↓		
BLK1		50	50				clear, colorless		
BS1	0.5	50	50				↓ ↓		
BLK2		50	50	<			↓ ↓		

Spiking IDs / Expiration Date:

MS#: 1201195  
 1250388

LCS#: 1201583

Reagent IDs:

HNO<sub>3</sub> 0000003390  
 HCl \_\_\_\_\_  
 H<sub>2</sub>O<sub>2</sub> \_\_\_\_\_  
 1:1 HNO<sub>3</sub> \_\_\_\_\_  
 1:1 HCl 637-069-01

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

Data Review By/Date:

ROMP, 02/28/13

R:\group\QA\SOP\

Signed\SPINMetals Digestion log.doc

J.E. MW 2/27/13  
 (X) L302051-BLK1

Page #:

Lionville Laboratory

MERCURY PREPARATION

Analyst: M. Miller  
 Date: 2/26/13  
 Start Time/Temp: 1730/95°  
 End Time/Temp: 1940/97°

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

Logbook # 1198  
 Prep Batch: L302147  
 Worksheet: HG-022701  
 SOP No. ME-HgCVAA  
 BLOCK 1 2 (circle one)

NOTE: All temperatures are recorded as corrected temperatures.

Lvl Work Order#	pH < 2 (Liq)	Spike Vol (mL)	Spike Conc. (µg/L)	Initial Wt. or Vol. (g or mL)	Final Sample Vol (mL)	Comments, % Solids, etc.
Blank				35	35	
0.2 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		0.0675	2.5	35	35	
CCV		0.1175	5.0	35	35	
Ice/ice				35	35	
L302147-BLK1				35	35	
BS1		0.1175	5.0	35	35	
BLK2	<			35	35	
BLK3	<			35	35	
1301060-01	<			35	35	
02	<			35	35	
03	<			35	35	
L302147-DUP1	<			35	35	
MS1		0.700	200*	35	35	
1301062-01	<			35	35	
L302147-DUP2	<			35	35	
MS2		0.700	200*	35	35	
1301065-01	<			35	35	
L302147-DUP3	<			35	35	
MS3		0.700	200*	35	35	
1301066-01	<			35	35	
L302147-DUP4	<			35	35	
MS4		0.700	200*	35	35	

Standard:	ID	Prep Date/Time	Reviewed By/Date: <u>PMR, 02/28/13</u>
ICAL/MS	<u>RE 1201235</u>	<u>2/26/13 1125</u>	
ICV/CCV/LCS	<u>(I.V. 120111)</u>	<u>N/A</u>	se book # <u>1198</u> 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

\* MSD 1201234 (10 µg/ml)

Lionville Laboratory

MERCURY PREPARATION

Logbook # 1198

Analyst: mmh  
 Date: 2/26/13  
 Start Time/Temp: see pg 051  
 End Time/Temp: see pg 051

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

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

NOTE: All temperatures are recorded as corrected temperatures.

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

mmh 2/26/13

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

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

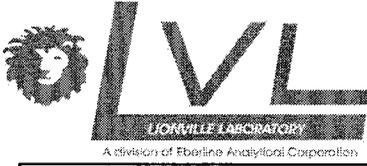
Soil LCS True Value = see pg 051 mg/Kg  
 Standard # \_\_\_\_\_

see book # 1198 for std traceability information

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

see pg 051

# WET CHEMISTRY

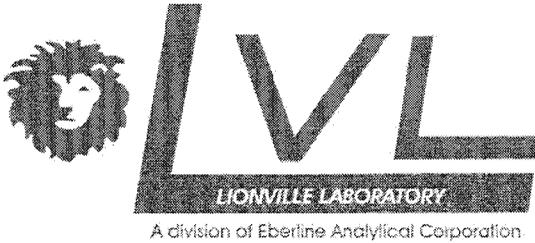


Lionville Laboratory, PADEP Lab ID# 15-00009  
264 Welsh Pool Road  
Exton, PA 19341  
Phone: 610-280-3000  
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/11/2013 16:05
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**Analytical Report for Wet Chemistry**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
J1RD44	1302003-01	Soil	01/28/2013 12:20	01/31/2013 10:20



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

## Case Narrative

**Client:** WC-HANFORD RC-233 K4059

**LVL#:** 1302003

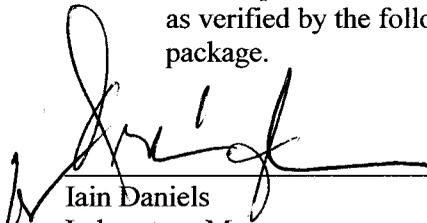
**Date Received:** 01-31-13

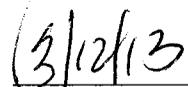
### INORGANIC NARRATIVE

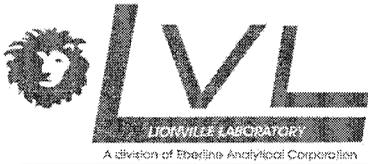
1. This narrative covers the analyses of 1 soil sample.
2. The sample was prepared and analyzed in accordance with the methods indicated on the data summary report. Results for soil or solid pH are measured in water at 25°C unless otherwise specified.

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

3. Sample holding times as required by the method and/or contract were met with the exceptions of Nitrate, Nitrite and Orthophosphate that were received past hold.
4. The results presented in this report are derived from samples that met LvL's sample acceptance policy with the exceptions noted on the Sample Receipt Checklist.
5. The method blanks were within the method criteria.
6. The Laboratory Control Samples (LCS) were within the laboratory control limits and method criteria.
7. The matrix spike recoveries were within the 75-125% control limits.
8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.
9. Results for soil samples are reported on a dry weight basis.
10. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. The Laboratory Manager or a designee, as verified by the following signature, has authorized release of the data contained in this hard copy package.

  
Iain Daniels  
Laboratory Manager  
Lionville Laboratory  
njp\02-003

  
Date



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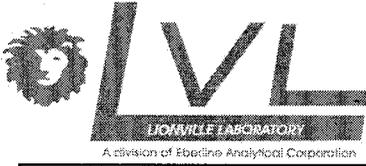
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-233  
Project Number: K4059  
Project Manager: Joan Kessner

Reported:  
02/11/2013 16:05

### Notes and Definitions

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

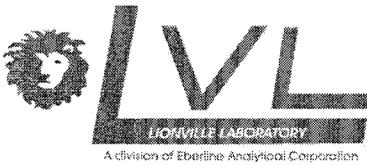


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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-233 Project Number: K4059 Project Manager: Joan Kessner	Reported: 02/11/2013 16:05
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**Wet Chemistry**  
**Lionville Laboratory**

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
<b>JIRD44 (1302003-01) Soil</b>									
<b>%Solids</b>	<b>92.8</b>		0.1	% by Weight	1	L302030	02/04/2013 15:33	02/04/2013 15:33	SM2540G
Bromide	1.1 U	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
Chloride	1.1 U	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
Fluoride	1.1 U	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
Nitrate	6.4	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
Nitrite	1.1 U	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
<b>Orthophosphate</b>	<b>7.7 B</b>	2.1	10.7	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
<b>Sulfate</b>	<b>7.8</b>	1.1	5.3	mg/kg dry	1	L302081	02/06/2013 14:30	02/07/2013 17:18	EPA 300.0 (1993)
Nitrate/Nitrite as N	1.51	0.11	0.53	mg/kg dry	1	L302075	02/06/2013 14:31	02/08/2013 14:15	EPA 353.2
<b>pH</b>	<b>6.26</b>		0.10	pH Units	1	L302047	02/05/2013 12:47	02/05/2013 12:47	SW846 9045D

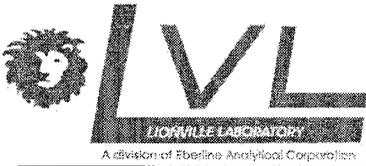


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**Wet Chemistry - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch L302030 - % Solids</b>										
<b>Duplicate (L302030-DUP3)</b>		<b>Source: 1302003-01</b>		<b>Prepared &amp; Analyzed: 02/04/2013 15:33</b>						
%Solids	92.7		0.1	% by Weight		92.8			0.1	20
<b>Batch L302047 - Default Prep GenChem</b>										
<b>Duplicate (L302047-DUP2)</b>		<b>Source: 1302003-01</b>		<b>Prepared &amp; Analyzed: 02/05/2013 12:50</b>						
pH	6.07		0.10	pH Units		6.26			3.08	20
<b>Reference (L302047-SRM1)</b>		<b>Prepared &amp; Analyzed: 02/05/2013 12:23</b>								
pH	9.99		0.10	pH Units	10.000		99.9	99-101		
<b>Reference (L302047-SRM2)</b>		<b>Prepared &amp; Analyzed: 02/05/2013 13:00</b>								
pH	3.97		0.10	pH Units	4.0000		99.2	99-101		
<b>Reference (L302047-SRM3)</b>		<b>Prepared &amp; Analyzed: 02/05/2013 13:23</b>								
pH	10.0		0.10	pH Units	10.000		100	99-101		
<b>Batch L302075 - Default Prep GenChem</b>										
<b>Blank (L302075-BLK1)</b>		<b>Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 13:55</b>								
Nitrate/Nitrite as N	0.10 U		0.10	0.50	mg/kg wet					
<b>LCS (L302075-BS1)</b>		<b>Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 13:54</b>								
Nitrate/Nitrite as N	5.27		0.10	0.50	mg/kg wet	5.0000		105	90-110	
<b>Duplicate (L302075-DUP2)</b>		<b>Source: 1302003-01</b>		<b>Prepared: 02/06/2013 14:30 Analyzed: 02/08/2013 14:16</b>						
Nitrate/Nitrite as N	1.63		0.11	0.54	mg/kg dry		1.51		7.85	20



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**Wet Chemistry - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch L302075 - Default Prep GenChem**

<b>Matrix Spike (L302075-MS2)</b>	<b>Source: 1302003-01</b>	Prepared: 02/06/2013 14:30		Analyzed: 02/08/2013 14:17						
Nitrate/Nitrite as N	7.12	0.10	0.52	mg/kg dry	5.1850	1.51	108	75-125		

**Batch L302081 - Default Prep GenChem**

<b>Blank (L302081-BLK1)</b>	Prepared: 02/06/2013 14:30		Analyzed: 02/07/2013 14:16							
Fluoride	1.0 U	1.0	5.0	mg/kg wet						
Chloride	1.0 U	1.0	5.0	mg/kg wet						
Bromide	1.0 U	1.0	5.0	mg/kg wet						
Orthophosphate	2.0 U	2.0	10.0	mg/kg wet						
Sulfate	1.0 U	1.0	5.0	mg/kg wet						
Nitrate	1.0 U	1.0	5.0	mg/kg wet						
Nitrite	1.0 U	1.0	5.0	mg/kg wet						

<b>LCS (L302081-BS1)</b>	Prepared: 02/06/2013 14:30		Analyzed: 02/07/2013 14:16							
Fluoride	51.2	1.0	5.0	mg/kg wet	50.000		102	80-120		
Chloride	47.5	1.0	5.0	mg/kg wet	50.000		95.0	80-120		
Bromide	48.5	1.0	5.0	mg/kg wet	50.000		97.0	80-120		
Orthophosphate	48.0	2.0	10.0	mg/kg wet	50.000		96.0	80-120		
Sulfate	49.2	1.0	5.0	mg/kg wet	50.000		98.4	80-120		
Nitrate	48.5	1.0	5.0	mg/kg wet	50.000		97.0	80-120		
Nitrite	48.6	1.0	5.0	mg/kg wet	50.000		97.2	80-120		

<b>Duplicate (L302081-DUP2)</b>	<b>Source: 1302003-01</b>	Prepared: 02/06/2013 14:30		Analyzed: 02/07/2013 17:18						
Fluoride	1.1 U	1.1	5.4	mg/kg dry		1.1 U				20
Chloride	1.1 U	1.1	5.4	mg/kg dry		1.1 U				20
Bromide	1.1 U	1.1	5.4	mg/kg dry		1.1 U				20
Orthophosphate	7.8 B	2.2	10.9	mg/kg dry		7.7			1.67	20
Sulfate	7.5	1.1	5.4	mg/kg dry		7.8			3.97	20
Nitrate	7.8	1.1	5.4	mg/kg dry		6.4			19.8	20
Nitrite	1.1 U	1.1	5.4	mg/kg dry		1.1 U				20



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**Wet Chemistry - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch L302081 - Default Prep GenChem**

Matrix Spike (L302081-MS2)	Source: 1302003-01	Prepared: 02/06/2013 14:30 Analyzed: 02/07/2013 17:18								
Fluoride	56.2	1.0	5.2	mg/kg dry	51.850	1.1 U	108	75-125		
Chloride	53.0	1.0	5.2	mg/kg dry	51.850	1.1 U	102	75-125		
Bromide	51.6	1.0	5.2	mg/kg dry	51.850	1.1 U	99.6	75-125		
Orthophosphate	60.0	2.1	10.4	mg/kg dry	51.850	7.7	101	75-125		
Sulfate	59.6	1.0	5.2	mg/kg dry	51.850	7.8	100	75-125		
Nitrate	58.8	1.0	5.2	mg/kg dry	51.850	6.4	101	75-125		
Nitrite	52.2	1.0	5.2	mg/kg dry	51.850	1.1 U	101	75-125		