

**SAF-RC-236**  
**100N Groundwater Sample**  
**Collection Supporting UPR-100-N-17**  
**FINAL DATA PACKAGE**

**COMPLETE COPY OF DATA PACKAGE TO:**

Kathy Wendt

H4-21

KW 12/18/12  
INITIAL/DATE

**COMMENTS:**

**SDG K4027**

**SAF-RC-236**

Rad only

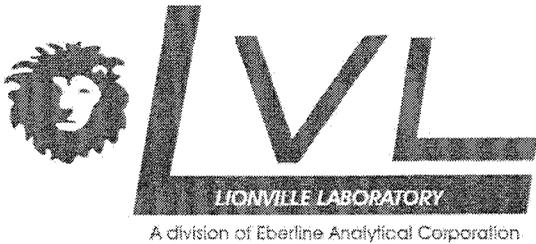
Chem only

Rad & Chem

Complete

Partial

**Sample Location: 100-N Groundwater Samples,  
Well 199-N-167**



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

16 December 2012

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

Subject: Analytical Data Package

Dear Ms. Kessner:

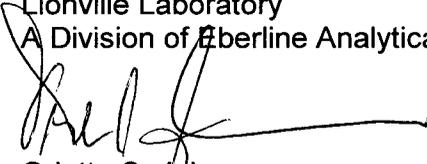
Enclosed are the hard copy analytical reports for the batch number/fraction indicated (marked X) in the following table:

LvLI Batch #	1211048
SDG #	K4027
SAF #	RC-236
Date Received	11/15/12
# Samples	1
Matrix	WATER
Volatiles	
Semivolatiles	
Pest/PCB	
Glycols	
DRO/KRO/GRO	X
PAHs	X
Herbicides	
Metals	X
Inorganics	X

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

Sincerely,

Lionville Laboratory  
A Division of Eberline Analytical Corporation

  
Orlette S. Johnson  
Project Manager

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 52 pages.

# **CHAIN OF CUSTODY**



CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. #

RC-236-002

Page 1 of 1

Collector	F. M. Hall	Contact/Requester	THOMPSON, WS	Telephone No.	372-9597
SAF No.	RC-236	Sampling Origin	Hanford Site	Purchase Order/Charge Code	303123ES20
Project Title	100-N Groundwater Sample Collection S	Logbook No.	HNF-N-506 5147	Ice Chest No.	GLWS-092
Shipped To (Lab)	Lionville Laboratory Incorporated	Method of Shipment	Commercial Carrier	Bill of Lading/Air Bill No.	7940 7699 9979
Protocol	CHARACTERIZATION	Priority:	15 Days	Offsite Property No.	

POSSIBLE SAMPLE HAZARDS/REMARKS

\*\*Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/171A Dangerous Goods Regulations but are not releasable per DOE Order 458.1\*\*

SPECIAL INSTRUCTIONS

\*\* The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. The are to record their observations, along with any odors observed on the Field Sampling Report provided.

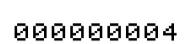
Total Activity Exemption: Yes  No

\*\* The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 9056 will not be met.

Bottle ID	Matrix	Volume	Container	Analysis	Hold Time	Exemption	
B2MB39	N	W	11412 1147	2x1000-mL aG	TPH-Diesel/Kerosene Range - WTPH-D (100 Area RIFS)	14/40 Days	HCl to pH <2/Cool~4C
B2MB39	N	W		4x40-mL aGs*	TPH-Gasoline Range - WTPH-G (100 Area RIFS)	14 Days	HCl to pH <2/Cool~4C
B2MB39	N	W		2x1-L G	Oil & Grease - 1664A	28 Days	HCl to pH <2/Cool~4C
B2MB39	N	W		2x1-L aG	PAHs - 8310 (100 Area RIFS)	7/40 Days	Cool~4C
B2MB39	N	W		1x500-mL G/P	ICP Metals - 6010 (Suprtrace); ICP Metals - 6010 (Suprtrace Add-On)	6 Months	HNO3 to pH <2
B2MB39	N	W		1x500-mL P	IC Anions - 300.0 (100 Area RIFS)	48 Hours	Cool~4C
B2MB39	N	W		1x250-mL G/P	2320_ALKALINITY	14 Days	Cool~4C
B2MB39	N	W	11412 1147	1x20-mL P	Activity Scan	6 Months	None

Relinquished By	F. M. Hall	Print	Sign	Date/Time	1400	NOV 14 2012	Received By	FEDEX	Print	Sign	Date/Time	
Relinquished By	<i>[Signature]</i>			Date/Time			Received By	<i>[Signature]</i>			Date/Time	
Relinquished By	<i>[Signature]</i>			Date/Time	1005	11-15-12	Received By	<i>[Signature]</i>			Date/Time	1005
Relinquished By				Date/Time			Received By				Date/Time	

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



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

CLIENT: WC Hanford  
Project/SAP/SOW/Release #: RC-236

Date: 11/15/12

LvL Batch #: 1211048

Sample Custodian: T. Newman

NOTE: EXPLAIN ALL DISCREPANCIES

- |  |  |   |
|--|--|---|
| 1. Samples Hand Delivered or <u>Shipped?</u>   | Carrier <u>FEDEX</u>   | Airbill # <u>7940 7699 9968</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>2.1</u> °C   | Cooler # <u>GWS-092</u>   |
| How was the temperature taken?   | <input checked="" type="checkbox"/> IR <input type="checkbox"/> Temp. Blank  | <input type="checkbox"/> Other (Specify):   |
| Is the Temp. Criteria met for these samples? (Hg in soils @ 4°C)   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |   |
| 6. Custody seals on sample containers intact, signed and dated?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> No Seals   |
| 7. COC (Client & LvL) signed & dated?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |   |
| 8. Sample containers are intact?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |   |
| 9. All samples on COC received?<br>All samples received on COC?  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br><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  | <u>05/11/12</u>   |
| 11. Samples properly preserved? (If #5 is no, then this is no.)  | <input checked="" type="checkbox"/> Yes<br><u>Metal pH &lt; 2</u>  | <input type="checkbox"/> No<br><u>WTPH-D pH Naated held out @ coc<br/>analytical preserved w/ HCL</u> |
| 12. Samples received within hold times?<br>Short holds taken to wet lab?   | <input type="checkbox"/> Yes <input type="checkbox"/> No<br><input type="checkbox"/> Yes <input type="checkbox"/> No                       | <input type="checkbox"/> N/A  |
| 13. VOA, TOC, TOX free of headspace? <u>ALK</u>  | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  | <input type="checkbox"/> N/A <u>ALKALINITY</u>  |
| 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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No  |   |
| 16. Project Manager contacted concerning any discrepancies?<br>Person Contacted <u>O. Johnson</u>  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> N/A<br>Date <u>11-15-12</u>  |

**DRO/MO**



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

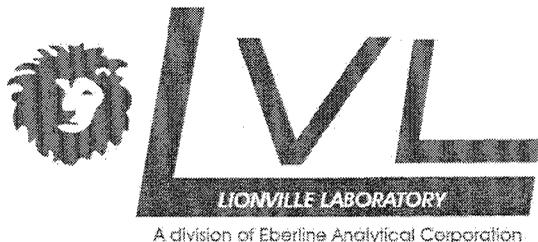
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-236  
Project Number: K4027  
Project Manager: Joan Kessner

Reported:  
12/03/2012 21:41

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B2MB39	1211048-01	Water	11/14/2012 11:47	11/15/2012 10:05



264 Welsh Pool Road  
Exton, Pennsylvania 19341  
Phone (610) 280-3000  
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## Case Narrative

**Client:** WC-HANFORD RC-236 K4027  
**LVL #:** 1211048

**Date Received:** 11-15-2012

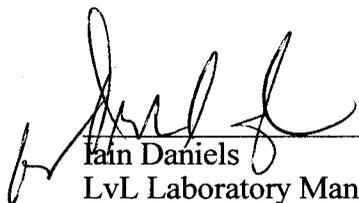
### DIESEL RANGE ORGANICS

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

The samples and associated QC samples were extracted 11-21-2012 and analyzed 11-28-2012 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3520C and the analysis procedure was based on SW846 Method 8015B for Diesel Range Organics.

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

1. The results presented in this report are derived from samples that met LvL's sample acceptance policy with exceptions noted on the Sample Receipt Checklist.
2. All required holding times for extraction and analysis have been met.
3. All obtainable surrogate recoveries were within acceptance criteria.
4. The method blank was below the reporting limits for all target compounds.
5. All blank spike recoveries were within acceptance criteria.
6. The matrix spike analyses are associated with LvL lot 1211065. Please refer to the associated data package.
7. All initial calibrations associated with this data set were within acceptance criteria.
8. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
9. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the laboratory manager or a designee as verified by the following signature.

  
Iain Daniels  
LvL Laboratory Manager

  
Date



## GLOSSARY OF DATA

### DATA QUALIFIERS

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

### ABBREVIATIONS

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



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 12/03/2012 21:41
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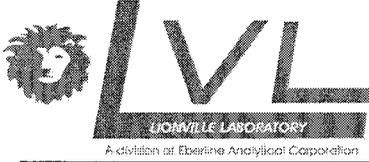
**B2MB39**  
**1211048-01 (Water)**

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

**Extractable Petroleum Hydrocarbons by SW846 8015**

<b>Diesel Range Organics</b>	<b>3700</b>		100	ug/L	1	L211190	11/21/2012	11/28/2012	SW846 8015C
<i>Surrogate: p-Terphenyl</i>	74 %		35-130			L211190	11/21/2012	11/28/2012	SW846 8015C
Kerosene	300	U	300	ug/L	1	L211190	11/21/2012	11/28/2012	SW846 8015C
Motor Oil	300	U	300	ug/L	1	L211190	11/21/2012	11/28/2012	SW846 8015C



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 12/03/2012 21:41
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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 L211190 - SW 3520C</b>									
<b>Blank (L211190-BLK1)</b>									
				Prepared: 11/21/2012 Analyzed: 11/28/2012					
Diesel Range Organics	100 U	100	ug/L						
Motor Oil	300 U	300	ug/L						
Surrogate: p-Terphenyl	194		ug/L	200.00		97	35-130		
<b>Blank (L211190-BLK2)</b>									
				Prepared: 11/21/2012 Analyzed: 11/28/2012					
Kerosene	300 U	300	ug/L						
Surrogate: p-Terphenyl	194		ug/L	200.00		97	35-130		
<b>LCS (L211190-BS1)</b>									
				Prepared: 11/21/2012 Analyzed: 11/28/2012					
Diesel Range Organics	1600	100	ug/L	2000.0		80	30-130		
Surrogate: p-Terphenyl	210		ug/L	200.00		105	35-130		
<b>LCS (L211190-BS2)</b>									
				Prepared: 11/21/2012 Analyzed: 11/28/2012					
Kerosene	505	300	ug/L	1200.0		42	35-110		
Surrogate: p-Terphenyl	184		ug/L	200.00		92	35-130		

PREPARATION BENCH SHEET

L211190

Lionville Laboratory

Printed: 12/3/2012 9:01:22AM

Prepared using: Extraction - SW3540/3520/625 <sup>2</sup> *Round 1/12/12*

(No Surrogate)

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	Spike <sup>uL</sup>	Surrogate <sup>uL</sup>	Client	Extraction Comments
L211048-01	8015C DRO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211048-01	8015C KRO/MO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211065-01	8015C DRO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211065-01	8015C KRO/MO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211065-02	8015C DRO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211065-02	8015C KRO/MO	11/21/2012 15:27	1000	1			1000	1000	WC-Hanford, Inc.	
L211190-BLK1	QC	11/21/2012 15:27	1000	1			1000	1000		odro
L211190-BLK2	QC	11/21/2012 15:27	1000	1			1000	1000		
L211190-BS1	QC	11/21/2012 15:27	1000	1	1201538		1000	1000		odro
L211190-BS2	QC	11/21/2012 15:27	1000	1	1201097		300	1000		
L211190-MS1	QC	11/21/2012 15:27	500	1	1201538	1211065-01	1000	1000		odro
L211190-MS2	QC	11/21/2012 15:27	1000	1	1201097	1211065-02	300	1000		
L211190-MSD1	QC	11/21/2012 15:27	500	1	1201538	1211065-01	1000	1000		odro
L211190-MSD2	QC	11/21/2012 15:27	1000	1	1201097	1211065-02	300	1000		

REVISION *CHC* 12/03/12  
 Extracts Relinquished By \_\_\_\_\_ Date \_\_\_\_\_

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

PREPARATION BENCH SHEET

L211190

Lionville Laboratory

Printed: 11/29/2012 7:42:54PM

Prepared using: GC - SW3540/3520/655 ~~Re 10/1/12~~

Surrogate used: 1201102

1

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	Spike ul	Surrogate ul	Client	Extraction Comments
L211048-01	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211048-01	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-01	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-01	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-02	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-02	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211190-BLK1	QC	11/21/2012 15:27	1000	1				1000		odro
L211190-BLK2	QC	11/21/2012 15:27	1000	1				1000		
L211190-BS1	QC	11/21/2012 15:27	1000	1	1201538		1000	1000		odro
L211190-BS2	QC	11/21/2012 15:27	1000	1	1201097		300	1000		
L211190-MS1	QC	11/21/2012 15:27	500	1	1201538	1211065-01	1000	1000		odro
L211190-MS2	QC	11/21/2012 15:27	1000	1	1201097	1211065-02	300	1000		
L211190-MSD1	QC	11/21/2012 15:27	500	1	1201538	1211065-01	1000	1000		odro
L211190-MSD2	QC	11/21/2012 15:27	1000	1	1201097	1211065-02	300	1000		

50 K. 10 + AMT CAE 11/29/12

Extracts Relinquished By

Date

Extracts Received By

Date

PREPARATION BENCH SHEET

L211190

Lionville Laboratory

log book # 1122

Printed: 11/27/2012 4:30:04PM

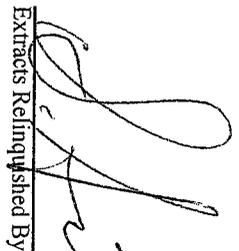
Prepared using: GC - SW3544/3520/425

Surrogate used: 1201463

Matrix: Water

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	Spike $\mu$ l	Surrogate $\mu$ l	Client	Extraction Comments
L211048-01	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211048-01	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-01	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-01	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-02	8015C DRO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211065-02	8015C KROMO	11/21/2012 15:27	1000	1				1000	WC-Hanford, Inc.	
L211190-BLK1	QC	11/21/2012 15:27	1000	1				1000		odro
L211190-BLK2	QC	11/21/2012 15:27	1000	1				1000		
L211190-BS1	QC	11/21/2012 15:27	1000	1	1200846			1000		odro
L211190-BS2	QC	11/21/2012 15:27	1000	1	1201097			1000		
L211190-MS1	QC	11/21/2012 15:27	500	1	1200846	1211065-01		1000		odro
L211190-MS2	QC	11/21/2012 15:27	500	1	1201097	1211065-02		1000		
L211190-MSD1	QC	11/21/2012 15:27	500	1	1200846	1211065-01		1000		odro
L211190-MSD2	QC	11/21/2012 15:27	500	1	1201097	1211065-02		1000		

QURR 1201102  
 Dec Spk 1201538  
 Ver Spk 1201097

Extracts Relinquished By  Date 11/27/12 16:30

Extracts Received By  Date 11.27.12 16:30

**GASOLINE RANGE ORGANICS (GRO)**

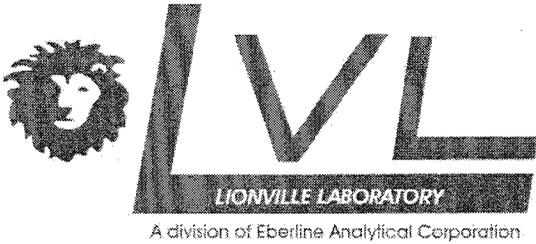


264 Welsh Pool Road  
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Phone: 610-280-3000  
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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 10:44
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**Analytical Report for GRO by SW846 8015**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B2MB39	1211048-01	Water	11/14/2012 11:47	11/15/2012 10:05



264 Welsh Pool Road  
Exton, Pennsylvania 19341  
Phone (610) 280-3000  
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## Case Narrative

**Client:** WC-HANFORD RC-236 K4027  
**LVL #:** 1211048

**W.O. #:** 60049-001-001-0001-00  
**Date Received:** 11-15-2012

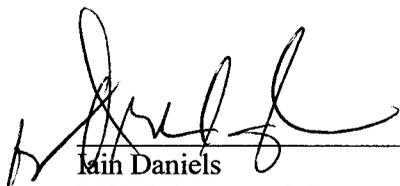
### GASOLINE RANGE ORGANICS

Two (2) water samples were collected on 11-14-2012.

The samples and their associated QC samples were extracted and analyzed according to criteria set forth in Lionville Laboratory SOPs based on method 8015B for Gasoline Range Organics on 11-21-2012.

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

1. The results presented in this report are derived from samples that met LvL's sample acceptance policy with exceptions noted on the Sample Receipt Checklist.
2. All required holding times for analysis have been met.
3. The method blank was below the reporting limits for all target compounds.
4. All obtainable surrogate recoveries were within acceptance criteria.
5. All blank spike recoveries were within acceptance criteria.
6. All matrix spike recoveries were within acceptance criteria.
7. All initial calibrations associated with this data set were within acceptance criteria.
8. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
9. 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.

  
Kevin Daniels  
LVL Laboratory Manager

12/13/12  
Date



## GLOSSARY OF DATA

### DATA QUALIFIERS

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

### ABBREVIATIONS

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



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

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 10:44
---	---	-------------------------------

**B2MB39**  
**1211048-01 (Water)**

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

**GRO by SW846 8015**

<b>Gasoline Range Organics</b>	<b>6.29</b>	<b>J</b>	<b>30.0</b>	<b>ug/L</b>	<b>1</b>	<b>L211187</b>	<b>11/21/2012</b>	<b>11/21/2012</b>	<b>SW846 8015</b>
<i>Surrogate: Fluorobenzene</i>	<i>103 %</i>		<i>50-150</i>			<i>L211187</i>	<i>11/21/2012</i>	<i>11/21/2012</i>	<i>SW846 8015</i>



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 10:44
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**GRO 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 L211187 - 8015</b>									
<b>Blank (L211187-BLK1)</b>									
Prepared & Analyzed: 11/21/2012									
Gasoline Range Organics	30.0 U	30.0	ug/L						
Surrogate: Fluorobenzene	45.4		ug/L	45.000		101	50-150		
<b>LCS (L211187-BS1)</b>									
Prepared & Analyzed: 11/21/2012									
Gasoline Range Organics	449	30.0	ug/L	450.00		99.8	50-150		
Surrogate: Fluorobenzene	49.0		ug/L	45.000		109	50-150		
<b>Matrix Spike (L211187-MS1)</b>									
Source: 1211048-01 Prepared & Analyzed: 11/21/2012									
Gasoline Range Organics	438	30.0	ug/L	450.00	6.29	95.9	50-150		
Surrogate: Fluorobenzene	50.0		ug/L	45.000		111	50-150		
<b>Matrix Spike Dup (L211187-MSD1)</b>									
Source: 1211048-01 Prepared & Analyzed: 11/21/2012									
Gasoline Range Organics	444	30.0	ug/L	450.00	6.29	97.4	50-150	1.50	20
Surrogate: Fluorobenzene	49.4		ug/L	45.000		110	50-150		

PREPARATION BENCH SHEET

L211187

Lionville Laboratory

Printed: 11/21/2012 12:39:51PM

Matrix: Water

Prepared using: GCVOA - 8015

Surrogate used: 1200984

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	Spike ul	Surrogate ul	Client	Extraction Comments
L211048-01	8015M GRO	11/21/2012 12:38	5	5			15	15	WC-Hanford, Inc.	
L211065-01	8015M GRO	11/21/2012 12:38	5	5			15	15	WC-Hanford, Inc.	
L211065-02	8015M GRO	11/21/2012 12:38	5	5			15	15	WC-Hanford, Inc.	
L211187-BLK1	QC	11/21/2012 12:38	5	5			15	15		
L211187-BS1	QC	11/21/2012 12:38	5	5	1200983		15	15		
L211187-MS1	QC	11/21/2012 12:38	5	5	1200983	1211048-01	15	15		
L211187-MS2	QC	11/21/2012 12:38	5	5	1200983	1211065-01	15	15		
L211187-MSD1	QC	11/21/2012 12:38	5	5	1200983	1211048-01	15	15		
L211187-MSD2	QC	11/21/2012 12:38	5	5	1200983	1211065-01	15	15		

1200984

Extracts Relinquished By

LC

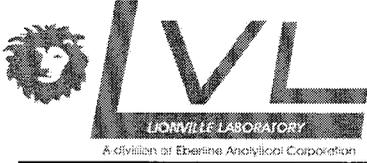
Date

11-21-12

Extracts Received By

Date

# PAHs

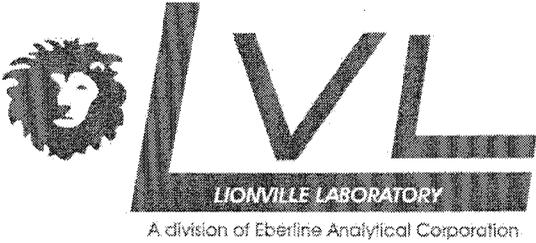


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Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 20:16
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**Analytical Report for Polynuclear Aromatic Compounds by SW846 8310**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B2MB39	1211048-01	Water	11/14/2012 11:47	11/15/2012 10:05



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

**Case Narrative**

**Client:** WC-HANFORD RC-236 K4027  
**LVL #:** 1211048

**W.O. #:** 60049-001-001-0001-00  
**Date Received:** 11-15-2012

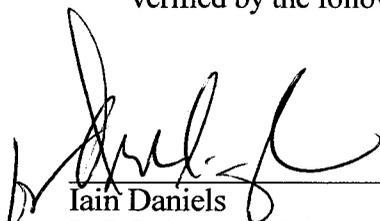
**POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)**

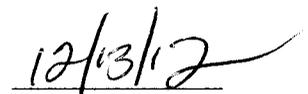
One (1) water sample was collected on 11-14-2012.

The sample and associated QC samples were extracted 11-19-2012 and analyzed 11-28-2012 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3520C and the analysis procedure was based on SW846 Method 8310.

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

1. The results presented in this report are derived from a sample that met LvL's sample acceptance policy.
2. All required holding times for extraction and analysis have been met.
3. All obtainable surrogate recoveries were within acceptance criteria.
4. The method blank contained Fluorene at a level above the reporting limit. Fluorene was detected in the sample processed with this blank at levels at or above the reporting limit. A copy of the Sample Discrepancy Report (SDR # 12GC198) was enclosed.
5. All blank spike recoveries were within acceptance criteria.
6. Two (2) of thirty-two (32) matrix spike recoveries were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR# 12GC198) has been enclosed.
7. The initial calibrations associated with this data set were within acceptance criteria.
8. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
9. 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





## GLOSSARY OF DATA

### DATA QUALIFIERS

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 20:16
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**B2MB39**  
**1211048-01 (Water)**

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

**Polynuclear Aromatic Compounds by SW846 8310**

<b>Naphthalene</b>	<b>1.56</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Acenaphthylene</b>	<b>4.32</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Acenaphthene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Fluorene</b>	<b>0.908</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Phenanthrene</b>	<b>3.46</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Anthracene</b>	<b>0.434</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Fluoranthene</b>	<b>3.18</b>		0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Indeno[1,2,3-cd]pyrene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<b>Pyrene</b>	<b>0.0800</b>	J	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Benz[a]anthracene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Chrysene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Benzo[b] fluoranthene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Benzo[k] fluoranthene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Benzo[a] pyrene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Dibenz[a,h]anthracene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
Benzo[g,h,i] perylene	0.100	U	0.100	ug/L	1	L211159	11/19/2012	11/28/2012	8310
<i>Surrogate: Triphenylene</i>	<i>107 %</i>		<i>68-129</i>			<i>L211159</i>	<i>11/19/2012</i>	<i>11/28/2012</i>	<i>8310</i>



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 20:16
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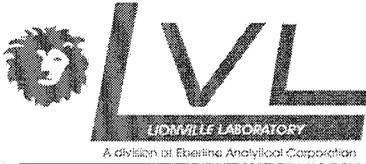
**Polynuclear Aromatic Compounds by SW846 8310 - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch L211159 - SW 3520C**

<b>Blank (L211159-BLK1)</b>		Prepared: 11/19/2012 Analyzed: 11/28/2012							
Naphthalene	0.100 U	0.100	ug/L						
Acenaphthylene	0.100 U	0.100	ug/L						
Acenaphthene	0.100 U	0.100	ug/L						
Fluorene	0.166	0.100	ug/L						
Phenanthrene	0.100 U	0.100	ug/L						
Anthracene	0.100 U	0.100	ug/L						
Fluoranthene	0.100 U	0.100	ug/L						
Indeno[1,2,3-cd]pyrene	0.100 U	0.100	ug/L						
Pyrene	0.100 U	0.100	ug/L						
Benz[a]anthracene	0.100 U	0.100	ug/L						
Chrysene	0.100 U	0.100	ug/L						
Benzo[b] fluoranthene	0.100 U	0.100	ug/L						
Benzo[k] fluoranthene	0.100 U	0.100	ug/L						
Benzo[a] pyrene	0.100 U	0.100	ug/L						
Dibenz[a,h]anthracene	0.100 U	0.100	ug/L						
Benzo[g,h,i] perylene	0.100 U	0.100	ug/L						
<i>Surrogate: Triphenylene</i>	4.27		ug/L	5.0000		85	68-129		

<b>LCS (L211159-BS1)</b>		Prepared: 11/19/2012 Analyzed: 11/28/2012							
Naphthalene	4.22	0.100	ug/L	5.0000		84	0-127		
Acenaphthylene	4.01	0.100	ug/L	5.0000		80	50-140		
Acenaphthene	3.82	0.100	ug/L	5.0000		76	17-139		
Fluorene	4.23	0.100	ug/L	5.0000		85	28-145		
Phenanthrene	4.20	0.100	ug/L	5.0000		84	30-152		
Anthracene	4.11	0.100	ug/L	5.0000		82	19-171		
Fluoranthene	4.29	0.100	ug/L	5.0000		86	34-159		
Indeno[1,2,3-cd]pyrene	4.53	0.100	ug/L	5.0000		91	31-156		
Pyrene	4.58	0.100	ug/L	5.0000		92	33-152		
Benz[a]anthracene	4.72	0.100	ug/L	5.0000		94	32-157		
Chrysene	4.58	0.100	ug/L	5.0000		92	31-159		
Benzo[b] fluoranthene	5.12	0.100	ug/L	5.0000		102	33-164		
Benzo[k] fluoranthene	4.82	0.100	ug/L	5.0000		96	28-161		
Benzo[a] pyrene	4.70	0.100	ug/L	5.0000		94	29-149		
Dibenz[a,h]anthracene	4.92	0.100	ug/L	5.0000		98	27-153		
Benzo[g,h,i] perylene	5.00	0.100	ug/L	5.0000		100	32-157		
<i>Surrogate: Triphenylene</i>	4.50		ug/L	5.0000		90	68-129		



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/29/2012 20:16
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**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 L211159 - SW 3520C**

Matrix Spike (L211159-MS1)	Source: 1211048-01	Prepared: 11/19/2012	Analyzed: 11/28/2012
Naphthalene	8.92	0.200	ug/L 10.000 1.56 74 0-127
Acenaphthylene	8.68	0.200	ug/L 10.000 4.32 44* 50-140
Acenaphthene	6.85	0.200	ug/L 10.000 0.100 U 69 17-139
Fluorene	8.93	0.200	ug/L 10.000 0.908 80 28-145
Phenanthrene	11.0	0.200	ug/L 10.000 3.46 75 30-152
Anthracene	8.97	0.200	ug/L 10.000 0.434 85 19-171
Fluoranthene	13.0	0.200	ug/L 10.000 3.18 99 34-159
Indeno[1,2,3-cd]pyrene	7.94	0.200	ug/L 10.000 0.100 U 79 31-156
Pyrene	9.35	0.200	ug/L 10.000 0.0800 93 33-152
Benz[a]anthracene	10.0	0.200	ug/L 10.000 0.100 U 100 32-157
Chrysene	8.66	0.200	ug/L 10.000 0.100 U 87 31-159
Benzo[b] fluoranthene	9.08	0.200	ug/L 10.000 0.100 U 91 33-164
Benzo[k] fluoranthene	8.35	0.200	ug/L 10.000 0.100 U 84 28-161
Benzo[a] pyrene	8.26	0.200	ug/L 10.000 0.100 U 83 29-149
Dibenz[a,h]anthracene	8.39	0.200	ug/L 10.000 0.100 U 84 27-153
Benzo[g,h,i] perylene	8.63	0.200	ug/L 10.000 0.100 U 86 32-157
Surrogate: Triphenylene	9.13		ug/L 10.000 91 68-129

Matrix Spike Dup (L211159-MSD1)	Source: 1211048-01	Prepared: 11/19/2012	Analyzed: 11/28/2012
Naphthalene	10.6	0.200	ug/L 10.000 1.56 90 0-127 20 30
Acenaphthylene	9.02	0.200	ug/L 10.000 4.32 47* 50-140 8 30
Acenaphthene	8.20	0.200	ug/L 10.000 0.100 U 82 17-139 18 30
Fluorene	9.88	0.200	ug/L 10.000 0.908 90 28-145 11 30
Phenanthrene	12.4	0.200	ug/L 10.000 3.46 89 30-152 17 30
Anthracene	10.1	0.200	ug/L 10.000 0.434 97 19-171 13 30
Fluoranthene	14.1	0.200	ug/L 10.000 3.18 109 34-159 10 30
Indeno[1,2,3-cd]pyrene	9.03	0.200	ug/L 10.000 0.100 U 90 31-156 13 30
Pyrene	10.1	0.200	ug/L 10.000 0.0800 100 33-152 8 30
Benz[a]anthracene	10.4	0.200	ug/L 10.000 0.100 U 104 32-157 4 30
Chrysene	9.24	0.200	ug/L 10.000 0.100 U 92 31-159 6 30
Benzo[b] fluoranthene	9.64	0.200	ug/L 10.000 0.100 U 96 33-164 6 30
Benzo[k] fluoranthene	9.38	0.200	ug/L 10.000 0.100 U 94 28-161 12 30
Benzo[a] pyrene	9.23	0.200	ug/L 10.000 0.100 U 92 29-149 11 30
Dibenz[a,h]anthracene	9.52	0.200	ug/L 10.000 0.100 U 95 27-153 13 30
Benzo[g,h,i] perylene	9.80	0.200	ug/L 10.000 0.100 U 98 32-157 13 30
Surrogate: Triphenylene	10.6		ug/L 10.000 106 68-129

PREPARATION BENCH SHEET

L211159

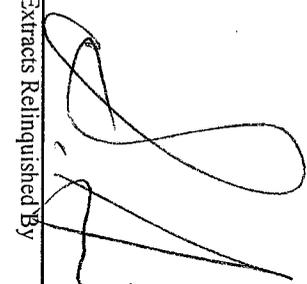
Lionville Laboratory

Printed: 11/27/2012 4:29:56PM

Prepared using: HPLC - SW 3520C

Surrogate used: 1200612

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	Spike ul	Surrogate ul	Client	Extraction Comments
1211048-01	8310 PAH	11/19/2012 21:46	1000	5				50	WC-Hanford, Inc.	
1211065-01	8310 PAH	11/19/2012 21:46	1000	5				50	WC-Hanford, Inc.	
1211065-02	8310 PAH	11/19/2012 21:46	1000	5				50	WC-Hanford, Inc.	
1211159-BLK1	QC	11/19/2012 21:46	1000	5				50		
1211159-BS1	QC	11/19/2012 21:46	1000	5	1200963			50		
1211159-MS1	QC	11/19/2012 21:46	500	5	1200963	1211048-01		50		
1211159-MSD1	QC	11/19/2012 21:46	500	5	1200963	1211048-01		50		

Extracts Relinquished By  Date 11/27/12 16:29

Extracts Received By  Date 11.27.12 16:30

# METALS



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

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

Project: RC-236  
Project Number: K4027  
Project Manager: Joan Kessner

Reported:  
11/30/2012 11:34

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

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B2MB39	1211048-01	Water	11/14/2012 11:47	11/15/2012 10:05



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

## Case Narrative

**Client:** WC-HANFORD RC-236  
**LVL#:** 1211048  
**SDG/SAF#:** K4027/RC-236

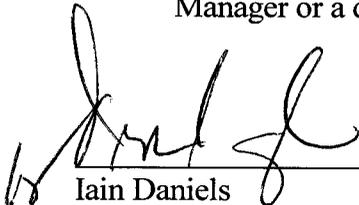
**W.O.#:** 60049-001-001-0001-00  
**Date Received:** 11-15-12

### METALS

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

1. This narrative covers the analysis of 1 water sample.
2. The sample was prepared and analyzed in accordance with methods listed on the data report forms.
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.
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the LOQ) with the exception of CCB3 for Iron (65.8µg/L, RDL=50µg/L). The method blank L211194-MB1 was below the 50µg/L RDL and the sample results for Iron were surrounded by CCBs within control.
7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, 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 matrix spike (MS) recoveries for 2 analytes were outside the 75-125% control limits.
11. For analytes where the MS is out of control, a post-digestion MS (PDS) is performed. A PDS was prepared at meaningful concentration levels for the following analytes: Calcium and Silicon.

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.
13. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.
14. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.
15. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

  
\_\_\_\_\_  
Iain Daniels  
Laboratory Manager  
Lionville Laboratory

11/30/12  
Date

alm/11-048



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-236  
Project Number: K4027  
Project Manager: Joan Kessner

Reported:  
11/30/2012 11:34

### 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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 Richland WA, 99354

Project: RC-236  
 Project Number: K4027  
 Project Manager: Joan Kessner

Reported:  
 11/30/2012 11:34

**B2MB39**  
**1211048-01 (Water)**

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	95.0		50.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Antimony	6.00	U	6.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Arsenic	3.06	B	10.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Barium	216		5.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Beryllium	2.00	U	2.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Bismuth	100	U	100	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Boron	18.5	B	20.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Cadmium	0.214	B	2.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Calcium	207000		1000	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Chromium	1.28	B	2.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Cobalt	2.64	B	20.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Copper	6.87	B	10.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Iron	1200		50.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Lead	5.00	U	5.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Lithium	12.2	B	25.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Magnesium	36300		750	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Manganese	3090		5.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Molybdenum	1.94	B	20.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Nickel	3.57	B	40.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Phosphorus	104		50.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Potassium	6630		4000	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Selenium	10.0	U	10.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Silicon	15900		25.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Silver	2.00	U	2.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Sodium	46900		500	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Strontium	880		10.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Thallium	5.00	U	5.00	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Tin	100	U	100	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Uranium	200	U	200	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Vanadium	19.2	B	25.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B
Zinc	12.0		10.0	ug/L	1	L211194	11/26/2012	11/29/2012	6010B

000000036



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/30/2012 11:34
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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
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**Batch L211194 - SW 3005A**

<b>Blank (L211194-BLK1)</b>				Prepared: 11/26/2012 Analyzed: 11/29/2012					
Aluminum	50.0	U	50.0	ug/L					
Antimony	6.00	U	6.00	ug/L					
Arsenic	10.0	U	10.0	ug/L					
Barium	5.00	U	5.00	ug/L					
Beryllium	2.00	U	2.00	ug/L					
Bismuth	100	U	100	ug/L					
Boron	20.0	U	20.0	ug/L					
Cadmium	2.00	U	2.00	ug/L					
Calcium	1000	U	1000	ug/L					
Chromium	2.00	U	2.00	ug/L					
Cobalt	20.0	U	20.0	ug/L					
Copper	10.0	U	10.0	ug/L					
Iron	50.0	U	50.0	ug/L					
Lead	5.00	U	5.00	ug/L					
Lithium	25.0	U	25.0	ug/L					
Magnesium	750	U	750	ug/L					
Manganese	5.00	U	5.00	ug/L					
Molybdenum	20.0	U	20.0	ug/L					
Nickel	40.0	U	40.0	ug/L					
Phosphorus	50.0	U	50.0	ug/L					
Potassium	4000	U	4000	ug/L					
Selenium	10.0	U	10.0	ug/L					
Silicon	25.0	U	25.0	ug/L					
Silver	2.00	U	2.00	ug/L					
Sodium	500	U	500	ug/L					
Strontium	10.0	U	10.0	ug/L					
Thallium	5.00	U	5.00	ug/L					
Tin	100	U	100	ug/L					
Uranium	200	U	200	ug/L					
Vanadium	25.0	U	25.0	ug/L					
Zinc	10.0	U	10.0	ug/L					



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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
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**Batch L211194 - SW 3005A**

LCS (L211194-BS1)		Prepared: 11/26/2012 Analyzed: 11/29/2012							
Aluminum	4870	50.0	ug/L	5000.0		97	80-120		20
Antimony	3060	6.00	ug/L	3000.0		102	80-120		20
Arsenic	10000	10.0	ug/L	10000		100	80-120		20
Barium	5090	5.00	ug/L	5000.0		102	80-120		20
Beryllium	247	2.00	ug/L	250.00		99	80-120		20
Bismuth	5150	100	ug/L	5000.0		103	80-120		20
Boron	5120	20.0	ug/L	5000.0		102	80-120		20
Cadmium	252	2.00	ug/L	250.00		101	80-120		20
Calcium	24700	1000	ug/L	25000		99	80-120		20
Chromium	487	2.00	ug/L	500.00		97	80-120		20
Cobalt	2490	20.0	ug/L	2500.0		100	80-120		20
Copper	1280	10.0	ug/L	1250.0		102	80-120		20
Iron	4950	50.0	ug/L	5000.0		99	80-120		20
Lead	2430	5.00	ug/L	2500.0		97	80-120		20
Lithium	5120	25.0	ug/L	5000.0		102	80-120		20
Magnesium	24400	750	ug/L	25000		98	80-120		20
Manganese	742	5.00	ug/L	750.00		99	80-120		20
Molybdenum	4990	20.0	ug/L	5000.0		100	80-120		20
Nickel	1980	40.0	ug/L	2000.0		99	80-120		20
Phosphorus	5070	50.0	ug/L	5000.0		101	80-120		20
Potassium	24500	4000	ug/L	25000		98	80-120		20
Selenium	10000	10.0	ug/L	10000		100	80-120		20
Silicon	4780	25.0	ug/L	5000.0		96	80-120		20
Silver	500	2.00	ug/L	500.00		100	80-120		20
Sodium	24800	500	ug/L	25000		99	80-120		20
Strontium	5020	10.0	ug/L	5000.0		100	80-120		20
Thallium	9790	5.00	ug/L	10000		98	80-120		20
Tin	5030	100	ug/L	5000.0		101	80-120		20
Uranium	4800	200	ug/L	5000.0		96	80-120		20
Vanadium	2490	25.0	ug/L	2500.0		100	80-120		20
Zinc	1040	10.0	ug/L	1000.0		104	80-120		20



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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 L211194 - SW 3005A</b>										
<b>Duplicate (L211194-DUP1)</b>			<b>Source: 1211048-01</b>			<b>Prepared: 11/26/2012</b>		<b>Analyzed: 11/29/2012</b>		
Aluminum	102		50.0	ug/L		95.0			7	20
Antimony	6.00	U	6.00	ug/L		6.00 U				20
Arsenic	10.0	U	10.0	ug/L		3.06				20
Barium	217		5.00	ug/L		216			0.5	20
Beryllium	2.00	U	2.00	ug/L		2.00 U				20
Bismuth	100	U	100	ug/L		100 U				20
Boron	17.8	B	20.0	ug/L		18.5			4	20
Cadmium	2.00	U	2.00	ug/L		0.214				20
Calcium	205000		1000	ug/L		207000			0.8	20
Chromium	1.46	B	2.00	ug/L		1.28			14	20
Cobalt	2.56	B	20.0	ug/L		2.64			3	20
Copper	7.52	B	10.0	ug/L		6.87			9	20
Iron	1190		50.0	ug/L		1200			0.6	20
Lead	5.00	U	5.00	ug/L		5.00 U				20
Lithium	11.5	B	25.0	ug/L		12.2			6	20
Magnesium	36000		750	ug/L		36300			0.9	20
Manganese	3050		5.00	ug/L		3090			1	20
Molybdenum	1.62	B	20.0	ug/L		1.94			18	20
Nickel	3.38	B	40.0	ug/L		3.57			5	20
Phosphorus	103		50.0	ug/L		104			0.9	20
Potassium	6640		4000	ug/L		6630			0.09	20
Selenium	10.0	U	10.0	ug/L		10.0 U				20
Silicon	15800		25.0	ug/L		15900			0.8	20
Silver	2.00	U	2.00	ug/L		2.00 U				20
Sodium	47400		500	ug/L		46900			1	20
Strontium	888		10.0	ug/L		880			0.9	20
Thallium	5.00	U	5.00	ug/L		5.00 U				20
Tin	100	U	100	ug/L		100 U				20
Uranium	200	U	200	ug/L		200 U				20
Vanadium	18.9	B	25.0	ug/L		19.2			2	20
Zinc	11.1		10.0	ug/L		12.0			8	20

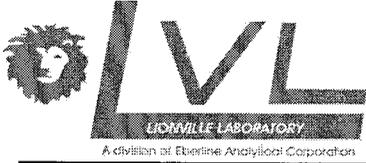


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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/30/2012 11:34
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**Metals by SW846 6000/7000 series - Quality Control**  
**Lionville Laboratory**

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch L211194 - SW 3005A</b>									
<b>Matrix Spike (L211194-MS1)</b>		<b>Source: 1211048-01</b>		<b>Prepared: 11/26/2012 Analyzed: 11/29/2012</b>					
Aluminum	2060	50.0	ug/L	2000.0	95.0	98	75-125		20
Antimony	519	6.00	ug/L	500.00	6.00 U	104	75-125		20
Arsenic	2040	10.0	ug/L	2000.0	3.06	102	75-125		20
Barium	2250	5.00	ug/L	2000.0	216	102	75-125		20
Beryllium	49.7	2.00	ug/L	50.000	2.00 U	99	75-125		20
Bismuth	5130	100	ug/L	5000.0	100 U	103	75-125		20
Boron	1020	20.0	ug/L	1000.0	18.5	100	75-125		20
Cadmium	50.5	2.00	ug/L	50.000	0.214	101	75-125		20
Calcium	225000	1000	ug/L	25000	207000	72*	75-125		20
Chromium	194	2.00	ug/L	200.00	1.28	97	75-125		20
Cobalt	480	20.0	ug/L	500.00	2.64	96	75-125		20
Copper	250	10.0	ug/L	250.00	6.87	97	75-125		20
Iron	2160	50.0	ug/L	1000.0	1200	96	75-125		20
Lead	468	5.00	ug/L	500.00	5.00 U	94	75-125		20
Lithium	1040	25.0	ug/L	1000.0	12.2	103	75-125		20
Magnesium	59900	750	ug/L	25000	36300	94	75-125		20
Manganese	3490	5.00	ug/L	500.00	3090	80	75-125		20
Molybdenum	984	20.0	ug/L	1000.0	1.94	98	75-125		20
Nickel	476	40.0	ug/L	500.00	3.57	95	75-125		20
Phosphorus	5370	50.0	ug/L	5000.0	104	105	75-125		20
Potassium	31800	4000	ug/L	25000	6630	101	75-125		20
Selenium	2020	10.0	ug/L	2000.0	10.0 U	101	75-125		20
Silicon	16400	25.0	ug/L	1000.0	15900	53*	75-125		20
Silver	49.6	2.00	ug/L	50.000	2.00 U	99	75-125		20
Sodium	71800	500	ug/L	25000	46900	100	75-125		20
Strontium	1870	10.0	ug/L	1000.0	880	99	75-125		20
Thallium	1820	5.00	ug/L	2000.0	5.00 U	91	75-125		20
Tin	955	100	ug/L	1000.0	100 U	96	75-125		20
Uranium	4780	200	ug/L	5000.0	200 U	96	75-125		20
Vanadium	514	25.0	ug/L	500.00	19.2	99	75-125		20
Zinc	522	10.0	ug/L	500.00	12.0	102	75-125		20



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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
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**Batch L211194 - SW 3005A**

<b>Post Spike (L211194-PS1)</b>		<b>Source: 1211048-01</b>	<b>Prepared: 11/26/2012 Analyzed: 11/29/2012</b>						
Calcium	240000		ug/L	40800	207000	81	75-125		
Silicon	20100		ug/L	4000.0	15900	105	75-125		

SAMPLE DIGESTION RECORD

Digestion Batch #: L211194  
 Date/Time Initiated: 11/26/12 1100  
 Date/Time Completed: 11/26/12 2010  
 Analyst: MM  
 Matrix (circle): Soil Water Other  
 Method (circle one): 3005A 3010A 3050 200.7 (1994)  
 pH/Turbidity: N/A for Solids.

Digested / Undigested (circle one)  
 Balance #: \_\_\_\_\_  
 Balance Cal Verification: Y NA  
 Temp: 97  
 BLOCK 1 2 (circle one)  
3

NOTE: All temperatures are recorded as corrected temperatures

Work Order #	Spike Vol (mL)	Initial Wt/Vol (g/mL)	Final Vol (mL)	pH <	Type: To/Sol/TC	Texture	Color / Appearance	Artifact	Turb
1211048-01		50	50	<	TD		slightly cloudy / colorless		
L211194-DWP1		50	50	<					
MS1	0.5*	50	50	<					
1211065-01		50	50	<			cloudy / colorless		
L211194-DWP2		50	50	<					
MS2	0.5*	50	50	<					
1211065-02		50	50	<			brown red / colorless		
L211194-BLX1		50	50				clear / colorless		
BS1	0.5*	50	50						

MM 11/26/12

Spiking IDs / Expiration Date:

MS#: 1201377

LCS#: 1201373

Reagent IDs:

HNO<sub>3</sub> 0000003390

HCl 113029

H<sub>2</sub>O<sub>2</sub> \_\_\_\_\_

1:1 HNO<sub>3</sub> \_\_\_\_\_

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

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

Data Review By/Date:

MM 11/29/12

\* also 0.25 ml 1201292 (B)  
 0.25 ml 1200382 (P-)  
 0.25 ml 1200380 (U-)

PREPARATION BENCH SHEET

L211194

Lionville Laboratory

Printed: 11/30/2012 9:27:12AM

Matrix: Water

Prepared using: METALS - SW 3005A

(No Surrogate)

Lab Number	Analysis	Prepared	Initial (ml)	Final (ml)	Spike ID	Source ID	ul Spike	ul Surrogate	Client	Extraction Comments
1211048-01	6010B HSL Metals	11/26/2012 11:00	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
1211065-01	6010B HSL Metals	11/26/2012 11:00	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
1211065-02	6010B HSL Metals	11/26/2012 11:00	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
1211194-BLKI	QC	11/26/2012 11:00	50	50						
1211194-BS1	QC	11/26/2012 11:00	50	50	1201373		500			
1211194-DUP1	QC	11/26/2012 11:00	50	50		1211048-01				
1211194-DUP2	QC	11/26/2012 11:00	50	50		1211065-01				
1211194-MS1	QC	11/26/2012 11:00	50	50	1201377	1211048-01	500			
1211194-MS2	QC	11/26/2012 11:00	50	50	1201377	1211065-01	500			
1211194-PS1	QC	11/26/2012 11:00	50	50	1001493	1211048-01	100			

*Reinson correction for time and added post spike open 11/30/12*

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

PREPARATION BENCH SHEET

L211194

Lionville Laboratory

Printed: 11/26/2012 8:45:26PM

Matrix: Water

Prepared using: METALS - SW 3005A

(No Surrogate)

Lab Number	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	ul Spike	ul Surrogate	Client	Extraction Comments
L211048-01	6010B HSL Metals	11/26/2012 10:58	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
L211065-01	6010B HSL Metals	11/26/2012 10:58	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
L211065-02	6010B HSL Metals	11/26/2012 10:58	50	50					WC-Hanford, Inc.	HSL + B, Bi, Li, Mo, P, Si, Sn, Sr, U
L211194-BLK1	QC	11/26/2012 10:58	50	50						
L211194-BS1	QC	11/26/2012 10:58	50	50	1201373		500			
L211194-DUP1	QC	11/26/2012 10:58	50	50		1211048-01				
L211194-DUP2	QC	11/26/2012 10:58	50	50		1211065-01				
L211194-MS1	QC	11/26/2012 10:58	50	50	1201377	1211048-01	500			
L211194-MS2	QC	11/26/2012 10:58	50	50	1201377	1211065-01	500			

Extracts Relinquished By

Date

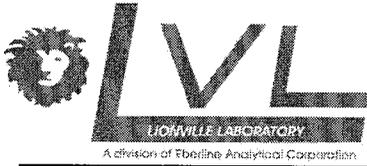
Extracts Received By

Date

*[Signature]* 11/26/12

*[Signature]* 11/28/12

# WET CHEMISTRY



Lionville Laboratory, PADEP Lab ID# 15-00009  
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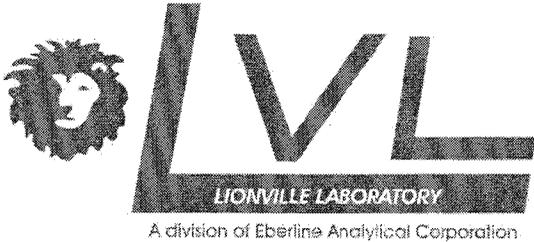
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-236  
Project Number: K4027  
Project Manager: Joan Kessner

Reported:  
11/30/2012 15:39

### Analytical Report for Wet Chemistry

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B2MB39	1211048-01	Water	11/14/2012 11:47	11/15/2012 10:05



264 Welsh Pool Road  
Exton, Pennsylvania 19341  
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## Case Narrative

**Client:** WC-HANFORD RC-236 K4027

**LVL#:** 1211048

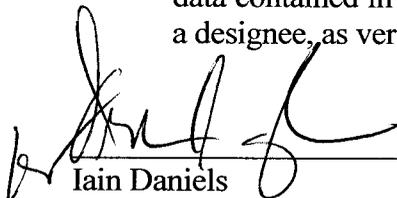
**Date Received:** 11-15-12

### INORGANIC NARRATIVE

1. This narrative covers the analyses of 1 water sample.
2. The sample was prepared and analyzed in accordance with the methods indicated on the data summary report.

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.

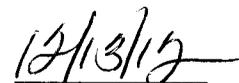
3. Sample holding times as required by the method and/or contract were met with the exceptions of Nitrate, Nitrite and Orthophosphate that were analyzed past hold.
4. The results presented in this report are derived from samples that met LvL's sample acceptance policy with the exceptions noted on the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



---

Iain Daniels  
Laboratory Manager  
Lionville Laboratory

njvl11-048

  
Date



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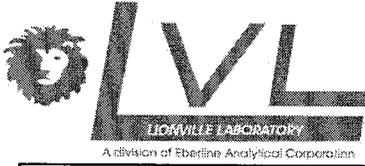
WC-Hanford, Inc.  
2620 Fermi Avenue  
Richland WA, 99354

Project: RC-236  
Project Number: K4027  
Project Manager: Joan Kessner

Reported:  
11/30/2012 15:39

### Notes and Definitions

- U Analyte included in the analysis, but not detected
- D Results reported from a dilution; related reporting limits are elevated due to the presence of an interference or a high target value.
- \* 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

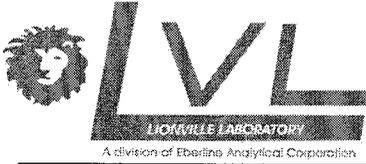


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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/30/2012 15:39
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**Wet Chemistry**  
**Lionville Laboratory**

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
<b>B2MB39 (1211048-01) Water</b>									
Oil and Grease (HEM)	2.1 U	2.1	10.5	mg/L	1	L211207	11/25/2012 10:30	11/25/2012 10:30	EPA 1664A
<b>Total Alkalinity</b>	<b>626</b>	1.2	2.5	mg/L	1	L211160	11/19/2012 16:45	11/19/2012 18:20	SM 2320B
<b>Bromide</b>	<b>0.38</b>	0.10	0.50	mg/L	1	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
<b>Chloride</b>	<b>37.5 D</b>	0.50	2.50	mg/L	5	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
<b>Fluoride</b>	<b>0.10</b>	0.10	0.50	mg/L	1	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
Nitrate	0.10 U	0.10	0.50	mg/L	1	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
Nitrite	0.50 U	0.50	2.50	mg/L	5	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
Orthophosphate	0.20 U	0.20	1.00	mg/L	1	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)
<b>Sulfate</b>	<b>111 D</b>	2.00	10.0	mg/L	20	L211181	11/16/2012 14:00	11/16/2012 19:38	EPA 300.0 (1993)



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/30/2012 15:39
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**Wet Chemistry - Quality Control**  
**Lionville Laboratory**

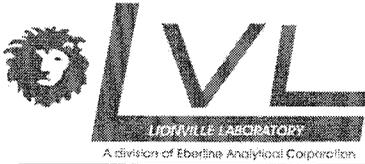
Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch L211160 - Default Prep GenChem**

<b>Blank (L211160-BLK1)</b>		Prepared: 11/19/2012 16:45 Analyzed: 11/19/2012 18:20								
Total Alkalinity	0.1 U	0.1	0.2	mg/L						
<b>LCS (L211160-BS1)</b>		Prepared: 11/19/2012 16:45 Analyzed: 11/19/2012 18:20								
Total Alkalinity	105	0.2	0.5	mg/L	100.00		105	90-110		
<b>Duplicate (L211160-DUP1)</b>		Source: 1211048-01		Prepared: 11/19/2012 16:45 Analyzed: 11/19/2012 18:20						
Total Alkalinity	608	1.2	2.5	mg/L		626			2.92	20

**Batch L211181 - Default Prep GenChem**

<b>Blank (L211181-BLK1)</b>		Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38								
Fluoride	0.10 U	0.10	0.50	mg/L						
Chloride	0.10 U	0.10	0.50	mg/L						
Nitrite	0.10 U	0.10	0.50	mg/L						
Bromide	0.10 U	0.10	0.50	mg/L						
Nitrate	0.10 U	0.10	0.50	mg/L						
Orthophosphate	0.20 U	0.20	1.00	mg/L						
Sulfate	0.10 U	0.10	0.50	mg/L						
<b>LCS (L211181-BS1)</b>		Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38								
Fluoride	5.06	0.10	0.50	mg/L	5.0000		101	90-110		
Chloride	4.80	0.10	0.50	mg/L	5.0000		96.0	90-110		
Nitrite	4.85	0.10	0.50	mg/L	5.0000		97.0	90-110		
Bromide	4.99	0.10	0.50	mg/L	5.0000		99.8	90-110		
Nitrate	5.04	0.10	0.50	mg/L	5.0000		101	90-110		
Orthophosphate	4.75	0.20	1.00	mg/L	5.0000		95.0	90-110		
Sulfate	4.99	0.10	0.50	mg/L	5.0000		99.8	90-110		



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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-236 Project Number: K4027 Project Manager: Joan Kessner	Reported: 11/30/2012 15:39
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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 L211181 - Default Prep GenChem**

<b>Duplicate (L211181-DUP1)</b>		<b>Source: 1211048-01</b>		<b>Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38</b>						
Fluoride	0.10	0.10	0.50	mg/L		0.10			0.00	20
Chloride	37.0 D	0.50	2.50	mg/L		37.5			1.45	20
Nitrite	0.50 U	0.50	2.50	mg/L		0.50 U				20
Bromide	0.36	0.10	0.50	mg/L		0.38			5.41	20
Nitrate	0.10 U	0.10	0.50	mg/L		0.10 U				20
Orthophosphate	0.40	0.20	1.00	mg/L		0.20 U				20
Sulfate	112 D	2.00	10.0	mg/L		111			0.701	20

<b>Matrix Spike (L211181-MS1)</b>		<b>Source: 1211048-01</b>		<b>Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38</b>						
Fluoride	5.16	0.10	0.50	mg/L	5.0000	0.10	101	80-120		
Bromide	5.40	0.10	0.50	mg/L	5.0000	0.38	100	80-120		
Nitrate	4.83	0.10	0.50	mg/L	5.0000	0.10 U	96.6	80-120		
Orthophosphate	4.11	0.20	1.00	mg/L	5.0000	0.20 U	82.2	80-120		

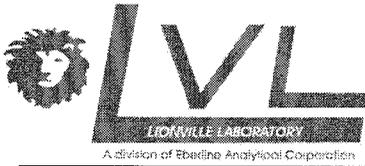
<b>Matrix Spike (L211181-MS2)</b>		<b>Source: 1211048-01</b>		<b>Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38</b>						
Chloride	89.0 D	1.00	5.00	mg/L	50.000	37.5	103	80-120		
Nitrite	50.3 D	1.00	5.00	mg/L	50.000	0.50 U	101	80-120		

<b>Matrix Spike (L211181-MS3)</b>		<b>Source: 1211048-01</b>		<b>Prepared: 11/16/2012 14:00 Analyzed: 11/16/2012 19:38</b>						
Sulfate	371 D	5.00	25.0	mg/L	250.00	111	104	80-120		

**Batch L211207 - Default Prep GenChem**

<b>Blank (L211207-BLK1)</b>		<b>Prepared &amp; Analyzed: 11/25/2012 10:30</b>								
Oil and Grease (HEM)	2.0 U	2.0	10.0	mg/L						

<b>LCS (L211207-BS1)</b>		<b>Prepared &amp; Analyzed: 11/25/2012 10:30</b>								
Oil and Grease (HEM)	39.0	2.0	10.0	mg/L	39.700		98.2	80-120		



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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 L211207 - Default Prep GenChem</b>										
<b>LCS (L211207-BS2)</b>					Prepared & Analyzed: 11/25/2012 10:30					
Oil and Grease (HEM)	37.7	2.0	10.0	mg/L	39.700		95.0	80-120		
<b>Duplicate (L211207-DUP1)</b>					Source: 1211048-01 Prepared & Analyzed: 11/25/2012 10:30					
Oil and Grease (HEM)	2.1	2.1	10.5	mg/L		2.1 U				20