

COVER LETTER

Friday, July 15, 2011

Michael Schuhen  
Sandia National Lab  
4100 National Parks Hwy.  
MS1395  
Carlsbad, NM 88220

TEL: (505) 234-0006

FAX (505) 234-0061

RE: WIPP/H-9bR (C )

Order No.: 1106C12

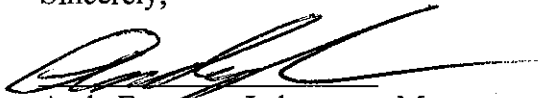
Dear Michael Schuhen:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 6/30/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,



Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901

AZ license # AZ0682



# Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-11

Analytical Report

**CLIENT:** Sandia National Lab  
**Lab Order:** 1106C12  
**Project:** WIPP/H-9bR (C)  
**Lab ID:** 1106C12-01

**Client Sample ID:** H-9bR(C)\_062811  
**Collection Date:** 6/28/2011 11:30:00 AM  
**Date Received:** 6/30/2011  
**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: LJB
Fluoride	3.2	0.10		mg/L	1	6/30/2011 5:04:02 PM
Chloride	170	50		mg/L	100	7/7/2011 5:38:24 PM
Bromide	0.26	0.10		mg/L	1	6/30/2011 5:04:02 PM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	7/6/2011 11:21:56 PM
Phosphorus, Orthophosphate (As P)	ND	2.5	H	mg/L	5	7/7/2011 5:20:59 PM
Sulfate	2000	50		mg/L	100	7/7/2011 5:38:24 PM
<b>EPA METHOD 6010B: DISSOLVED METALS</b>						Analyst: RAGS
Calcium	590	10		mg/L	10	7/12/2011 12:39:31 PM
Magnesium	150	10		mg/L	10	7/12/2011 12:39:31 PM
Potassium	6.9	1.0		mg/L	1	7/12/2011 12:37:43 PM
Sodium	140	10		mg/L	10	7/12/2011 12:39:31 PM
Strontium	7.2	0.60		mg/L	100	7/7/2011 7:48:43 AM
<b>SM 2320B: ALKALINITY</b>						Analyst: IC
Alkalinity, Total (As CaCO3)	100	20		mg/L CaCO3	1	6/30/2011 6:04:00 PM
Carbonate	ND	2.0		mg/L CaCO3	1	6/30/2011 6:04:00 PM
Bicarbonate	100	20		mg/L CaCO3	1	6/30/2011 6:04:00 PM
<b>EPA 120.1: SPECIFIC CONDUCTANCE</b>						Analyst: IC
Specific Conductance	3400	0.010		µmhos/cm	1	6/30/2011 6:04:00 PM
<b>SM4500-H+B: PH</b>						Analyst: IC
pH	7.98	0.100	H	pH units	1	6/30/2011 6:04:00 PM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: KS
Total Dissolved Solids	3330	20.0		mg/L	1	7/2/2011 4:38:00 PM

**Qualifiers:**

\* Value exceeds Maximum Contaminant Level  
 E Estimated value  
 J Analyte detected below quantitation limits  
 NC Non-Chlorinated  
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 MCL Maximum Contaminant Level  
 ND Not Detected at the Reporting Limit  
 S Spike recovery outside accepted recovery limits

# HALL ENVIRONMENTAL ANALYSIS LABORATORY

## CATION/ANION BALANCE SHEET FOR WATER ANALYSES

<b>HEAL LAB NUMBER</b>	H-9bR(C)_062811 1106C12-01									
<b>CATIONS</b>	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
Sodium	140	6.09								
Potassium	6.9	0.18								
Calcium	590	29.44								
Magnesium	150	12.35								
<b>Total Cations</b>		48.05								
<b>ANIONS</b>	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
Sulfate	2000	41.64								
Chloride	170	4.80								
Bicarbonate (CaCO <sub>3</sub> )	100	2.00								
Carbonate (CaCO <sub>3</sub> )										
Phosphate (P)										
Nitrite (N)										
Nitrate (N)										
Fluoride	3.2	0.17								
Bromide	0.26	0.00								
<b>Total Anions</b>		48.61								
Elect. Cond. (µMhos/cm)	3400									
<b>CATION/ANION RATIO</b>		0.99								
% Difference		1								
<b>TOTAL DISSOLVED SOLIDS RATIOS</b>										
TDS (measured)	3330									
TDS (calculated)	3120									
Ratio meas TDS:calc TDS		1.1								
Ratio Meas. TDS:EC		0.98								
Ratio Calc. TDS:EC		0.92								
Ratio of anion sum:EC		1.4								
Ratio of cation sum:EC		1.4								

\* Analyte not detected (below method detection limit).

\*\* Values below 0.55 can be obtained in waters containing appreciable concentrations of free acid or alkalinity, or not within pH 6 to 9. Values much higher than 0.7 are possible in highly saline waters.

### GENERALLY ACCEPTED RANGES

Cation/Anion balance: 0-3 meq/L- 0.2 meq/L, 3-10 meq/L- 2%, >10 meq/L - 5%

Ratio measured TDS:calculated TDS -- 1.0-1.2. Ratio Calculated TDS:EC -- 0.55-0.7. Ratio Measured TDS:EC--0.55-0.7. Ratio of anion sum:EC -- 0.9-1.1.

Ratio of cation sum:EC -- 0.9-1.1

## QA/QC SUMMARY REPORT

Client: Sandia National Lab  
Project: WIPP/H-9bR (C)

Work Order: 1106C12

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
<b>Method: EPA Method 300.0: Anions</b>											
<b>Sample ID: MB</b>		<i>MBLK</i>			Batch ID: <b>R46355</b>		Analysis Date: 6/30/2011 3:36:59 PM				
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Bromide	ND	mg/L	0.10								
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
<b>Sample ID: MB</b>		<i>MBLK</i>			Batch ID: <b>R46368</b>		Analysis Date: 7/6/2011 12:55:07 PM				
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Bromide	ND	mg/L	0.10								
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
<b>Sample ID: MB</b>		<i>MBLK</i>			Batch ID: <b>R46406</b>		Analysis Date: 7/7/2011 3:36:32 PM				
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Bromide	ND	mg/L	0.10								
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
<b>Sample ID: LCS</b>		<i>LCS</i>			Batch ID: <b>R46355</b>		Analysis Date: 6/30/2011 3:54:23 PM				
Fluoride	0.4895	mg/L	0.10	0.5	0	97.9	90	110			
Chloride	4.644	mg/L	0.50	5	0	92.9	90	110			
Bromide	2.346	mg/L	0.10	2.5	0	93.8	90	110			
Nitrate (As N)+Nitrite (As N)	3.304	mg/L	0.20	3.5	0	94.4	90	110			
Phosphorus, Orthophosphate (As P)	4.478	mg/L	0.50	5	0	89.6	90	110			S
Sulfate	9.509	mg/L	0.50	10	0	95.1	90	110			
<b>Sample ID: LCS</b>		<i>LCS</i>			Batch ID: <b>R46368</b>		Analysis Date: 7/6/2011 1:12:31 PM				
Fluoride	0.4842	mg/L	0.10	0.5	0	96.8	90	110			
Chloride	4.780	mg/L	0.50	5	0	95.6	90	110			
Bromide	2.455	mg/L	0.10	2.5	0	98.2	90	110			
Nitrate (As N)+Nitrite (As N)	3.427	mg/L	0.20	3.5	0	97.9	90	110			
Phosphorus, Orthophosphate (As P)	5.030	mg/L	0.50	5	0	101	90	110			
Sulfate	9.690	mg/L	0.50	10	0	96.9	90	110			
<b>Sample ID: LCS</b>		<i>LCS</i>			Batch ID: <b>R46406</b>		Analysis Date: 7/7/2011 3:53:56 PM				
Fluoride	0.5134	mg/L	0.10	0.5	0	103	90	110			
Chloride	5.076	mg/L	0.50	5	0	102	90	110			
Bromide	2.590	mg/L	0.10	2.5	0	104	90	110			
Nitrate (As N)+Nitrite (As N)	3.636	mg/L	0.20	3.5	0	104	90	110			
Phosphorus, Orthophosphate (As P)	5.219	mg/L	0.50	5	0	104	90	110			
Sulfate	10.26	mg/L	0.50	10	0	103	90	110			

## Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

## QA/QC SUMMARY REPORT

Client: Sandia National Lab  
Project: WIPP/H-9bR (C)

Work Order: 1106C12

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
<b>Method: SM 2320B: Alkalinity</b>											
Sample ID: MB-R46271		MBLK					Batch ID: R46271	Analysis Date: 6/30/2011 5:47:00 PM			
Alkalinity, Total (As CaCO3)	ND	mg/L Ca	20								
Carbonate	ND	mg/L Ca	2.0								
Bicarbonate	ND	mg/L Ca	20								
Sample ID: LCS-R46271		LCS					Batch ID: R46271	Analysis Date: 6/30/2011 5:53:00 PM			
Alkalinity, Total (As CaCO3)	80.76	mg/L Ca	20	80	0	101	98.7	102			
<b>Method: EPA Method 6010B: Dissolved Metals</b>											
Sample ID: MB		MBLK					Batch ID: R46361	Analysis Date: 7/7/2011 7:26:30 AM			
Calcium	ND	mg/L	1.0								
Magnesium	ND	mg/L	1.0								
Potassium	ND	mg/L	1.0								
Sodium	ND	mg/L	1.0								
Strontium	ND	mg/L	0.0060								
Sample ID: MB		MBLK					Batch ID: R46464	Analysis Date: 7/12/2011 12:33:46 PM			
Calcium	ND	mg/L	1.0								
Magnesium	ND	mg/L	1.0								
Potassium	ND	mg/L	1.0								
Sodium	ND	mg/L	1.0								
Sample ID: LCS		LCS					Batch ID: R46361	Analysis Date: 7/7/2011 7:29:08 AM			
Calcium	48.64	mg/L	1.0	50	0	97.3	80	120			
Magnesium	50.13	mg/L	1.0	50	0	100	80	120			
Potassium	49.19	mg/L	1.0	50	0	98.4	80	120			
Sodium	49.83	mg/L	1.0	50	0	99.7	80	120			
Strontium	0.09007	mg/L	0.0060	0.1	0	90.1	80	120			
Sample ID: LCS		LCS					Batch ID: R46464	Analysis Date: 7/12/2011 12:35:55 PM			
Calcium	51.23	mg/L	1.0	50	0.0699	102	80	120			
Magnesium	51.64	mg/L	1.0	50	0.0739	103	80	120			
Potassium	50.21	mg/L	1.0	50	0	100	80	120			
Sodium	51.49	mg/L	1.0	50	0	103	80	120			
<b>Method: SM2540C MOD: Total Dissolved Solids</b>											
Sample ID: MB-27457		MBLK					Batch ID: 27457	Analysis Date: 7/2/2011 4:38:00 PM			
Total Dissolved Solids	ND	mg/L	20.0								
Sample ID: LCS-27457		LCS					Batch ID: 27457	Analysis Date: 7/2/2011 4:38:00 PM			
Total Dissolved Solids	1021	mg/L	20.0	1000	0	102	80	120			

## Qualifiers:

E Estimated value  
J Analyte detected below quantitation limits  
ND Not Detected at the Reporting Limit  
H Holding times for preparation or analysis exceeded  
NC Non-Chlorinated  
R RPD outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name SANDIA CARLSBAD

Date Received:

6/30/2011

Work Order Number 1106C12

Received by: AT

Checklist completed by:

*[Handwritten Signature]*

Sample ID labels checked by:

*[Handwritten Initials]*

Signature

Date

06/30/11

Matrix:

Carrier name: FedEx

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present  Not Shipped
- Custody seals intact on sample bottles? Yes  No  N/A
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Water - VOA vials have zero headspace? No VOA vials submitted  Yes  No
- Water - Preservation labels on bottle and cap match? Yes  No  N/A
- Water - pH acceptable upon receipt? Yes  No  N/A
- Container/Temp Blank temperature? 2.1° <6° C Acceptable  
If given sufficient time to cool.

Number of preserved bottles checked for pH: 2  
<2> 12 unless noted below.

COMMENTS:

Client contacted \_\_\_\_\_ Date contacted: \_\_\_\_\_ Person contacted \_\_\_\_\_

Contacted by: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments: \_\_\_\_\_

Corrective Action \_\_\_\_\_

# Chain-of-Custody Record

Client: Sandia National Laboratories

Mailing Address: 4100 National Parks Highway  
Carlsbad, NM 88220

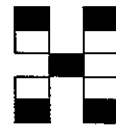
Phone #: (575) 234-0107

email or Fax#: (575) 234-0061

Turn-Around Time:  
 Standard  Rush

Project Name:  
WIPP / H-9bR (C)

Project #:  
98806 / 1.4.2.3



## HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

QA/QC Package:  
 Standard  Level 4 (Full Validation)  
 Other \_\_\_\_\_  
 EDD (Type) \_\_\_\_\_

Project Manager:  
Mike Schuhen

Sampler: W. DeYonge, D. Bowman

On Ice:  Yes  No

Sample Temperature: 21

### Analysis Request

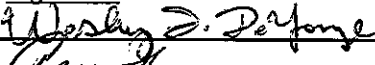
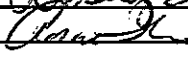
Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Cation / Anion Balance	pH, Cond, TDS, Alkalinity	NO <sub>2</sub> + NO <sub>3</sub>	Metals / Strontium / Cations	Air Bubbles (Y or N)	
6/28/11	11:30	H <sub>2</sub> O	H-9bR(C)_062811	#1: 500 mL	NONE	1106612	-												X	X			
6/28/11	11:30	H <sub>2</sub> O	H-9bR(C)_062811	#2: 125 mL	H <sub>2</sub> SO <sub>4</sub>		-														X		
6/28/11	11:30	H <sub>2</sub> O	H-9bR(C)_062811	#3: 125 mL	HNO <sub>3</sub>		-															X	
<b>END OF SAMPLE LIST</b>																							

Date: 6/29/11 Time: 11:30 Relinquished by: Wesley F. DeYonge  
*Wesley F. DeYonge*

Date: 6/30/11 Time: 0730 Received by: *[Signature]*

Remarks:  
Container #3 was filtered.  
Samples may contain high levels of salts.

## Appendix A

<b>ACTIVITY/ PROJECT SPECIFIC PROCEDURE</b>  Sandia National Laboratories	<h1 style="margin:0;">Chain of Custody</h1>	<b>Form Number:</b> <b>SP 13-1-1</b>  Page <u>1</u> of <u>1</u> Attach more forms as needed			
<b>1. Initial Sample Custodian</b> <u>Wesley F. DeYonge</u> Organization: <u>6212</u> Date: <u>6/28/2011</u> <small>Printed Name</small>					
<b>2. Sample Collection or Creation Information</b>		<b>HEAL# 1106C12</b>			
Test Plan ID: <u>TP 03-01</u>	Scientific Notebook ID: <u>WSWT-14</u>	Sample Team Members/Organization: <u>Wes DeYonge/ 6212</u> <u>Dale Bowman/ 6212</u> <small>enter n/a if none</small>			
Sample Location: <u>WIPP Monitoring Well H-9bR</u> <small>i.e. borehole/core no./lab bldg. no./etc.</small>					
<b>3. Sample Identification</b>					
Sample/Sub-Sample #	Date Collected	Container Type Volume	Preser- Vative	Analysis Request	Sample Description
H-9bR(C) 062811	06/28/11	PE Bottle 500 ml	None	Anions, pH, TDS, Cond., Alk.	H-9bR Culebra water unpreserved
H-9bR(C) 062811	06/28/11	PE Bottle 125 ml	H2SO4	NO2+NO3	H-9bR Culebra water preserved w/ sulfuric acid
H-9bR(C) 062811	06/28/11	PE Bottle 125 ml	HNO3	Cations, Metals	H-9bR Culebra water filtered & preserved w/ nitric acid
--End of Sample List--				Strontium	
<small>enter n/a if none</small>					
<b>4. Sample Requirements</b>					
Handling: Keep sealed until use					
Storage & Preservation: Keep chilled/refrigerated					
Shipping: Hand carry/Fed Ex					
Archive: N/A					
Disposition: Discard samples upon completion of testing					
Expiration Date: 07/28/11					
<b>5. Custody Transfer</b>					
a. Relinquished by:	Printed Name <u>Wesley F. DeYonge</u>	Signature 	Organization/Company <u>6212 / RESPEC</u>	Date-Time <u>6/29/11 - 1130</u>	Sample Condition <u>Containers intact &amp; sealed</u>
a. Received by:	<u>Anne Thorne</u>		<u>HEAL</u>	<u>10/30/11 0730</u>	<u>ups 2-1"</u>
b. Relinquished by:					
b. Received by:					
c. Relinquished by:					
c. Received by:					
Upon sample receipt, note condition. This form (copy for your records) shall follow samples through its life, until final disposition, then send original to WIPP Records Center. For samples that are potentially hazardous & require packaging and shipping, contact Center 6700 ES&H Coordinator or see SNL ES&H Manual, Chpt. 12.					