HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

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 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	**Client Sample ID:**	H-9bR(C)_062811
Lab Order:	1106C12	**Collection Date:**	6/28/2011 11:30:00 AM
Project:	WIPP/H-9bR (C)	**Date Received:**	6/30/2011
Lab ID:	1106C12-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						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
EPA METHOD 6010B: DISSOLVED METALS						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
SM 2320B: ALKALINITY						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
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: **IC**
Specific Conductance	3400	0.010		µmhos/cm	1	6/30/2011 6:04:00 PM
SM4500-H+B: PH						Analyst: **IC**
pH	7.98	0.100	H	pH units	1	6/30/2011 6:04:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	3330	20.0		mg/L	1	7/2/2011 4:38:00 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- B Analyte detected in the associated Method Blank
- E Estimated value
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- MCL Maximum Contaminant Level
- NC Non-Chlorinated
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitation Limit
- S Spike recovery outside accepted recovery limits

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CATION/ANION BALANCE SHEET FOR WATER ANALYSES

HEAL LAB NUMBER	H-9bR(C)_062811 1106C12-01										
CATIONS	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L
Sodium	140	6.09									
Potassium	6.9	0.18									
Calcium	590	29.44									
Magnesium	150	12.35									
Total Cations		48.05									
ANIONS	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L
Sulfate	2000	41.64									
Chloride	170	4.80									
Bicarbonate (CaCO3)	100	2.00									
Carbonate (CaCO3)											
Phosphate (P)											
Nitrite (N)											
Nitrate (N)											
Fluoride	3.2	0.17									
Bromide	0.26	0.00									
Total Anions		48.61									
Elect. Cond. (µMhos/cm)	3400										
CATION/ANION RATIO		0.99									
% Difference		1									
TOTAL DISSOLVED SOLIDS RATIOS											
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
Method: EPA Method 300.0: Anions											
Sample ID: MB		*MBLK*				Batch ID:	**R46355**	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								
Sample ID: MB		*MBLK*				Batch ID:	**R46368**	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								
Sample ID: MB		*MBLK*				Batch ID:	**R46406**	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								
Sample ID: LCS		*LCS*				Batch ID:	**R46355**	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			
Sample ID: LCS		*LCS*				Batch ID:	**R46368**	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			
Sample ID: LCS		*LCS*				Batch ID:	**R46406**	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
Method: SM 2320B: Alkalinity											
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			
Method: EPA Method 6010B: Dissolved Metals											
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			
Method: SM2540C MOD: Total Dissolved Solids											
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	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

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: _____ 06/30/11 | Sample ID labels checked by: AT

Signature | Date | Initials

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 ☐		Number of preserved bottles checked for pH:
Water - VOA vials have zero headspace? No VOA vials submitted	☑	Yes ☐	No ☐	
Water - Preservation labels on bottle and cap match?	Yes ☑	No ☐	N/A ☐	2
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐	(<2) >12 unless noted below.
Container/Temp Blank temperature?	**2.1°**	<6° C *Acceptable* If given sufficient time to cool.		

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

QA/QC Package:
X Standard ☐ Level 4 (Full Validation)
☐ Other _____
☐ EDD (Type) _____

Turn-Around Time:
☐ Standard ☐ Rush _____

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

Project #:
98806 / 1.4.2.3

Project Manager:
Mike Schuhen

Sampler: W. DeYonge, D. Bowman
On Ice: X Yes ☐ No
Sample Temperature: 2.1

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1106C12	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_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Cation / Anion Balance	pH, Cond, TDS, Alkalinity	NO_2 + NO_3	Metals / Strontium / Cations	Air Bubbles (Y or N)
6/28/11	11:30	H_20	H-9bR(C)_062811	#1: 500 mL	NONE	-1												X	X			
6/28/11	11:30	H_20	H-9bR(C)_062811	#2: 125 mL	H_2SO_4	-1														X		
6/28/11	11:30	H_20	H-9bR(C)_062811	#3: 125 mL	HNO_3	-1															X	
			END OF SAMPLE LIST																			

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Date	Time
6/29/11	11:30	Wesley F. DeYonge			
Date:	Time:	Relinquished by:	Received by:	Date	Time
				6/30/11	0730

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

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Appendix A

ACTIVITY/ PROJECT SPECIFIC PROCEDURE
Sandia National Laboratories

Chain of Custody

HEAL# 1106C12

Form Number: SP 13-1-1

Page 1 **of** 1
Attach more forms as needed

1. Initial Sample Custodian Wesley F. DeYonge (Printed Name) Organization: 6212 Date: 6/28/2011

2. Sample Collection or Creation Information
Scientific Notebook ID: WSWT-14
Test Plan ID: TP 03-01
Field Log ID: N/A
Sample Location: WIPP Monitoring Well H-9bR (i.e. borehole/core no./lab bldg. no./etc.)

Sample Team Members/Organization.
Wes DeYonge/ 6212
Dale Bowman/ 6212
enter n/a if none

3. Sample Identification Sample/Sub-Sample #	Date Collected	Container Type	Container 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	
	enter n/a if none					

4. Sample Requirements

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

5. Custody Transfer	Printed Name	Signature	Organization/Company	Date-Time	Sample Condition
a. Relinquished by:	Wesley F. DeYonge	Wesley F. DeYonge	6212 / RESPEC	6/29/11 - 1130	Containers intact & sealed
a. Received by:	Anne Thorne		HEAL	6/30/11 0730	yes 2-1"
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.