HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Tuesday, May 03, 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-9c (M)

Order No.: 1104715

Dear Michael Schuhen:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 4/20/2011 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.

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
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

Hall Environmental Analysis Laboratory, Inc.

Date: *03-May-11*

CLIENT:	Sandia National Lab	**Client Sample ID:**	H-9c(M)_041811
Lab Order:	1104715	**Collection Date:**	4/18/2011 7:07:00 PM
Project:	WIPP/H-9c (M)	**Date Received:**	4/20/2011
Lab ID:	1104715-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: **SRM**
Fluoride	1.8	0.50		mg/L	5	4/23/2011 4:58:55 AM
Chloride	1000	50		mg/L	100	4/27/2011 1:28:03 AM
Nitrogen, Nitrite (As N)	ND	2.0		mg/L	20	4/20/2011 2:07:45 PM
Bromide	3.1	0.10		mg/L	1	4/20/2011 1:55:20 PM
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	4/20/2011 1:55:20 PM
Phosphorus, Orthophosphate (As P)	ND	10		mg/L	20	4/20/2011 2:07:45 PM
Sulfate	2800	50		mg/L	100	4/23/2011 5:11:19 AM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **RAGS**
Calcium	590	100		mg/L	100	4/28/2011 8:15:03 PM
Magnesium	130	100		mg/L	100	4/28/2011 8:15:03 PM
Potassium	28	10		mg/L	10	5/2/2011 12:36:18 PM
Sodium	890	100		mg/L	100	4/28/2011 8:15:03 PM
Strontium	11	0.60		mg/L	100	4/28/2011 8:15:03 PM
SM 2320B: ALKALINITY						Analyst: **LJB**
Alkalinity, Total (As CaCO3)	21	20		mg/L CaCO3	1	4/20/2011 4:52:00 PM
Carbonate	5.1	2.0		mg/L CaCO3	1	4/20/2011 4:52:00 PM
Bicarbonate	ND	20		mg/L CaCO3	1	4/20/2011 4:52:00 PM
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: **LJB**
Specific Conductance	6200	0.010		µmhos/cm	1	4/20/2011 4:52:00 PM
SM4500-H+B: PH						Analyst: **LJB**
pH	8.64	0.100		pH units	1	4/20/2011 4:52:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	5080	100		mg/L	1	4/23/2011 10:29:00 AM

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

HEAL LAB NUMBER	H-9c (M)_041811 1104715-1											
CATIONS	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
Sodium	890	38.71										
Potassium	28	0.72										
Calcium	590	29.44										
Magnesium	130	10.70										
Total Cations		79.57										
ANIONS	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
Sulfate	2800	58.30										
Chloride	1000	28.21										
Bicarbonate (CaCO3)	21	0.42										
Carbonate (CaCO3)	5.1	0.10										
Phosphate (P)	ND	*										
Nitrite (N)	ND	*										
Nitrate (N)	ND	*										
Fluoride	1.8	0.09										
Bromide	3.1	0.04										
Total Anions		87.16										
Elect. Cond. (µMhos/cm)	6200											
CATION/ANION RATIO		0.91										
% Difference		5										
TOTAL DISSOLVED SOLIDS RATIOS												
TDS (measured)	5080											
TDS (calculated)	5459											
Ratio meas TDS:calc TDS		0.9										
Ratio Meas. TDS:EC		0.82										
Ratio Calc. TDS:EC		0.88										
Ratio of anion sum:EC		1.4										
Ratio of cation sum:EC		1.3										

* 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-9c (M)
Work Order: 1104715

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: **R44866**		Analysis Date:	4/20/2011 12:40:53 PM		
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Nitrogen, Nitrite (As N)	ND	mg/L	0.10								
Bromide	ND	mg/L	0.10								
Nitrogen, Nitrate (As N)	ND	mg/L	0.10								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
Sample ID: MB		*MBLK*				Batch ID: **R44934**		Analysis Date:	4/22/2011 5:48:50 PM		
Fluoride	ND	mg/L	0.10								
Nitrogen, Nitrite (As N)	ND	mg/L	0.10								
Bromide	ND	mg/L	0.10								
Nitrogen, Nitrate (As N)	ND	mg/L	0.10								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
Sample ID: MB		*MBLK*				Batch ID: **R44945**		Analysis Date:	4/25/2011 1:03:11 PM		
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Nitrogen, Nitrite (As N)	ND	mg/L	0.10								
Bromide	ND	mg/L	0.10								
Nitrogen, Nitrate (As N)	ND	mg/L	0.10								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
Sample ID: MB		*MBLK*				Batch ID: **R44982**		Analysis Date:	4/26/2011 11:32:17 AM		
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Nitrogen, Nitrite (As N)	ND	mg/L	0.10								
Bromide	ND	mg/L	0.10								
Nitrogen, Nitrate (As N)	ND	mg/L	0.10								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
Sample ID: LCS		*LCS*				Batch ID: **R44866**		Analysis Date:	4/20/2011 12:53:17 PM		
Fluoride	0.5123	mg/L	0.10	0.5	0	102	90	110			
Chloride	4.946	mg/L	0.50	5	0.1158	96.6	90	110			
Nitrogen, Nitrite (As N)	1.003	mg/L	0.10	1	0	100	90	110			
Bromide	2.498	mg/L	0.10	2.5	0	99.9	90	110			
Nitrogen, Nitrate (As N)	2.482	mg/L	0.10	2.5	0	99.3	90	110			
Phosphorus, Orthophosphate (As P)	5.033	mg/L	0.50	5	0	101	90	110			
Sulfate	9.960	mg/L	0.50	10	0	99.6	90	110			
Sample ID: LCS		*LCS*				Batch ID: **R44934**		Analysis Date:	4/22/2011 6:01:15 PM		
Fluoride	0.4856	mg/L	0.10	0.5	0	97.1	90	110			
Nitrogen, Nitrite (As N)	0.9276	mg/L	0.10	1	0	92.8	90	110			
Bromide	2.397	mg/L	0.10	2.5	0	95.9	90	110			
Nitrogen, Nitrate (As N)	2.349	mg/L	0.10	2.5	0	93.9	90	110			

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

QA/QC SUMMARY REPORT

Client: Sandia National Lab
Project: WIPP/H-9c (M) **Work Order:** 1104715

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions											
Sample ID: LCS		*LCS*				Batch ID: **R44934**		Analysis Date:		4/22/2011 6:01:15 PM	
Phosphorus, Orthophosphate (As P)	4.678	mg/L	0.50	5	0	93.6	90	110			
Sulfate	9.460	mg/L	0.50	10	0	94.6	90	110			
Sample ID: LCS		*LCS*				Batch ID: **R44945**		Analysis Date:		4/25/2011 1:15:36 PM	
Fluoride	0.5023	mg/L	0.10	0.5	0	100	90	110			
Chloride	4.827	mg/L	0.50	5	0.1979	92.6	90	110			
Nitrogen, Nitrite (As N)	0.9766	mg/L	0.10	1	0	97.7	90	110			
Bromide	2.475	mg/L	0.10	2.5	0	99.0	90	110			
Nitrogen, Nitrate (As N)	2.475	mg/L	0.10	2.5	0	99.0	90	110			
Phosphorus, Orthophosphate (As P)	4.862	mg/L	0.50	5	0	97.2	90	110			
Sulfate	9.960	mg/L	0.50	10	0	99.6	90	110			
Sample ID: LCS		*LCS*				Batch ID: **R44982**		Analysis Date:		4/26/2011 11:49:42 AM	
Fluoride	0.5120	mg/L	0.10	0.5	0	102	90	110			
Chloride	5.148	mg/L	0.50	5	0	103	90	110			
Nitrogen, Nitrite (As N)	0.9854	mg/L	0.10	1	0	98.5	90	110			
Bromide	2.526	mg/L	0.10	2.5	0	101	90	110			
Nitrogen, Nitrate (As N)	2.611	mg/L	0.10	2.5	0	104	90	110			
Phosphorus, Orthophosphate (As P)	5.014	mg/L	0.50	5	0	100	90	110			
Sulfate	10.31	mg/L	0.50	10	0	103	90	110			
Method: SM 2320B: Alkalinity											
Sample ID: 1104715-01AMSD		*MSD*				Batch ID: **R44873**		Analysis Date:		4/20/2011 5:24:00 PM	
Alkalinity, Total (As CaCO3)	92.12	mg/L Ca	20	80	21.08	88.8	37.1	121	1.98	7.21	
Sample ID: MB-1		*MBLK*				Batch ID: **R44873**		Analysis Date:		4/20/2011 4:36:00 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-1		*LCS*				Batch ID: **R44873**		Analysis Date:		4/20/2011 4:42:00 PM	
Alkalinity, Total (As CaCO3)	79.88	mg/L Ca	20	80	0	99.8	98.7	102			
Sample ID: 1104715-01AMS		*MS*				Batch ID: **R44873**		Analysis Date:		4/20/2011 5:09:00 PM	
Alkalinity, Total (As CaCO3)	93.96	mg/L Ca	20	80	21.08	91.1	37.1	121			

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-9c (M) **Work Order:** 1104715

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 6010B: Dissolved Metals											
Sample ID: MB		*MBLK*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 3:36:31 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: MB		*MBLK*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 3:42:33 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: CCB		*MBLK*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 4:51:19 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								
Strontium	ND	mg/L	0.0060								
Sample ID: MB		*MBLK*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 4:54:44 PM		
Strontium	ND	mg/L	0.0060								
Sample ID: MB		*MBLK*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 4:59:17 PM		
Strontium	ND	mg/L	0.0060								
Sample ID: LCS		*LCS*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 3:39:39 PM		
Calcium	50.07	mg/L	1.0	50.5	0	99.1	80	120			
Magnesium	52.66	mg/L	1.0	50.5	0	104	80	120			
Potassium	55.22	mg/L	1.0	55	0	100	80	120			
Sodium	52.60	mg/L	1.0	50.5	0	104	80	120			
Sample ID: LCS		*LCS*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 3:45:39 PM		
Calcium	51.06	mg/L	1.0	50.5	0	101	80	120			
Magnesium	53.93	mg/L	1.0	50.5	0	107	80	120			
Potassium	56.63	mg/L	1.0	55	0	103	80	120			
Sodium	54.02	mg/L	1.0	50.5	0	107	80	120			
Sample ID: LCS		*LCS*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 4:56:58 PM		
Strontium	0.09918	mg/L	0.0060	0.1	0	99.2	80	120			
Sample ID: LCS		*LCS*				Batch ID:	**R45023**	Analysis Date:	4/28/2011 5:01:32 PM		
Strontium	0.1001	mg/L	0.0060	0.1	0	100	80	120			
Method: SM2540C MOD: Total Dissolved Solids											
Sample ID: MB-26501		*MBLK*				Batch ID:	**26501**	Analysis Date:	4/23/2011 10:29:00 AM		
Total Dissolved Solids	ND	mg/L	20.0								
Sample ID: LCS-26501		*LCS*				Batch ID:	**26501**	Analysis Date:	4/23/2011 10:29:00 AM		
Total Dissolved Solids	1029	mg/L	20.0	1000	13	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: 4/20/2011

Work Order Number 1104715 | Received by: AT

Checklist completed by: _____ 04/20/11 | Sample ID labels checked by: _____

Signature | Date | Initials

Matrix: | Carrier name: Client drop-off

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?	**2.0°**	*<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

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

Turn-Around Time:
☐ Standard ☐ Rush

Project Name:
WIPP / H-9c (M)

Project #:
98806 / 1.4.2.3

Project Manager:
Mike Schuhen

Sampler: Wesley DeYonge
On Ice: X Yes ☐ No
Sample Temperature: 2.0°

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. 1104715	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)
4/18/11	19:07	H_20	H-9c(M)_041811	#1: 500 mL	NONE	-1												X	X			
4/18/11	19:07	H_20	H-9c(M)_041811	#2: 125 mL	H_2SO_4	-1														X		
4/18/11	19:07	H_20	H-9c(M)_041811	#3: 125 mL	HNO_3	-1															X	
			END OF SAMPLE LIST																			

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Date	Time
4/18/11	23:50	Wesley D. DeYonge		04/24/11	0843
Date:	Time:	Relinquished by:	Received by:	Date	Time

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

Appendix A

ACTIVITY/ PROJECT SPECIFIC PROCEDURE
Sandia National Laboratories

Chain of Custody

HEAL # 1104715

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: 4/18/2011

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-9c
i.e. borehole/core no./lab bldg. no./etc.

Sample Team Members/Organization.
Wes DeYonge/ 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-9c(M) 041811	04/18/11	PE Bottle	500 ml	None	Anions, pH, TDS, Cond., Alk.	H-9c Magenta water unpreserved
H-9c(M) 041811	04/18/11	PE Bottle	125 ml	H2SO4	NO2+NO3	H-9c Magenta water preserved w/ sulfuric acid
H-9c(M) 041811	04/18/11	PE Bottle	125 ml	HNO3	Cations, Metals	H-9c Magenta 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:	05/18/11

5. Custody Transfer	Printed Name	Signature	Organization/Company	Date-Time	Sample Condition
a. Relinquished by:	Wesley F. DeYonge	Wesley F. DeYonge	6212 / RESPEC	4/18/11-2350	Containers intact & sealed
a. Received by:	Anne Thorne	Anne Thorne	HEAL	4/20/11 0843	
b. Relinquished by:					2.0 A 4/20/11
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.