1R - 427-366

WORKPLANS

Date:

8-24-12

Rice Environmental Consulting & Safety
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

CERTIFIED MAIL
RETURN RECEIPT NO. 7007 2560 0003 0320 5419

August 24th, 2012

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

RE: **Investigation and Characterization Plan (ICP) Report and Corrective Action Plan (CAP)**
Rice Operating Company – EME SWD System
EME Jct. G-14 (1R427-366): UL/G Sec. 14 T20S R36E

Mr. Hansen:

RICE Operating Company (ROC) has retained Rice Environmental Consulting and Safety (RECS) to address potential environmental concerns at the above-referenced site in the EME Salt Water Disposal (SWD) system. ROC is the service provider (agent) for the EME SWD System and has no ownership of any portion of the pipeline, well, or facility. The system is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

Background and Previous Work

The site is located approximately 5 miles southwest of Monument, New Mexico at UL/G sec. 14 T20S R36E as shown on the Site Location Map (Figure 1). Soil bore installation at the site indicates that groundwater will be encountered at 38 ft bgs.

In 2011, ROC initiated work on the former EME G-14 junction box. The site was delineated using a backhoe to form a 30 ft x 30 ft x 12 ft deep excavation and soil samples were screened at regular intervals for both hydrocarbons and chlorides. From the excavation, the four-wall composite and the bottom composite were taken to a commercial laboratory for analysis. Laboratory tests of the four-wall composite showed a chloride reading of non-detect, a gasoline range organics (GRO) reading of non-detect and a diesel range organics (DRO) reading of 980 mg/kg. The sample was also analyzed for BTEX given the elevated field PID reading. Benzene and ethyl benzene returned results of non-detect, toluene returned a result of 0.218 mg/kg and total xylenes returned a result of 1.45 mg/kg. The bottom composite showed a chloride laboratory reading of non-detect, a GRO reading of 118 mg/kg and a DRO reading of 2,450 mg/kg. This sample was also analyzed for BTEX with a benzene reading of non-detect, a toluene reading of 0.488 mg/kg, an ethyl benzene reading of 0.391 mg/kg and a total xylenes reading of 2.32 mg/kg. The excavated soil was properly disposed of at a NMOCD

approved facility. Clean soil was imported to the site and used to backfill the excavation to 5 ft bgs where a 20-mil reinforced poly liner was installed and properly seated. The excavation was then backfilled with clean, imported soil to ground surface.

The area was contoured to the surrounding landscape and seeded. NMOCD was notified of potential groundwater impact on March 13th, 2012 and a junction box disclosure report was submitted to NMOCD with all the 2011 junction box closures and disclosures.

Investigation and Characterization Plan Report

As part of the Investigation and Characterization Plan (ICP) submitted to NMOCD on May 22nd, 2012 and approved on May 29th, 2012, six soil bores were installed at the site on June 13th and 14th, 2012 and August 8th, 2012 (Figure 2). As the bores were advanced, soil samples were taken at regular intervals and field tested for both chlorides and hydrocarbons. Representative samples from each bore were taken to a commercial laboratory for confirmation of field numbers (Appendix A). SB-1 returned laboratory chloride readings of 112 mg/kg at 15 ft bgs and 192 mg/kg at 33 ft bgs, and SB-2 through SB-4 and SB-6 returned laboratory chloride readings of non-detect at all depths. SB-5 returned laboratory chloride readings of non-detect at 12 ft bgs and 48 mg/kg at 18 ft bgs. GRO readings returned non-detect in SB-1 at 33 ft bgs, throughout SB-2, SB-3 and SB-4, in SB-5 at 18 ft bgs and throughout SB-6. Otherwise, SB-1 returned GRO results of 118 mg/kg at 15 ft bgs and SB-5 returned GRO results of 74 mg/kg at 12 ft bgs.

DRO readings in SB-1 returned results of 2,000 mg/kg at 15 ft bgs and 308 mg/kg at 33 ft bgs. DRO readings in SB-2 returned results of 2,280 mg/kg at 9 ft bgs and 654 mg/kg at 12 ft bgs. SB-3 returned DRO results of 794 mg/kg at 6 ft bgs and 2,320 mg/kg at 9 ft bgs. SB-4 returned DRO results of non-detect at all depths and SB-5 returned results of 1,920 mg/kg at 12 ft bgs and 69.6 mg/kg at 18 ft bgs. SB-6 returned DRO results of 367 mg/kg at the surface and non-detect at 18 ft bgs.

Two samples, SB-1 at 15 ft bgs and SB-5 at 12 ft bgs were also taken to a commercial laboratory for analysis of BTEX. SB-1 returned a benzene result of non-detect, a toluene result of 0.198 mg/kg, an ethyl benzene result of 0.319 mg/kg and a total xylene reading of 0.712 mg/kg. SB-5 returned benzene and toluene readings of non-detect, an ethyl benzene reading of 0.273 mg/kg and a xylene reading of 0.613 mg/kg.

Corrective Action Plan

It is evident from the soil bore installation data that the chlorides and GRO values in the vadose zone are quite low and will not affect groundwater beneath the site. DRO is relatively high in the upper parts of the some of the bores; however, the readings drop substantially as the bores are advanced. Since there is a 30 ft x 30 ft 20-mil poly liner installed at 5 ft bgs to inhibit the downward migration of soil constituents, RECS recommends that ROC prepare the surface of the site for seeding and then seed the site with a blend of native vegetation. Vegetation will act as an evapo-transpiration barrier that will also inhibit the downward migration of chlorides and hydrocarbons. Plants

capture water through their roots and so reduce the amount of water infiltrating below the root zone.

Once the CAP activities are completed, ROC will submit a written report detailing the CAP activities and a request for 'remediation termination' status of the regulatory file.

RECS appreciates the opportunity to work with you on this project. Please call Hack Conder at (575) 393-9174 or me if you have any questions or wish to discuss the site.

Sincerely,

Lara Weinheimer
Project Scientist
RECS
(575) 441-0431

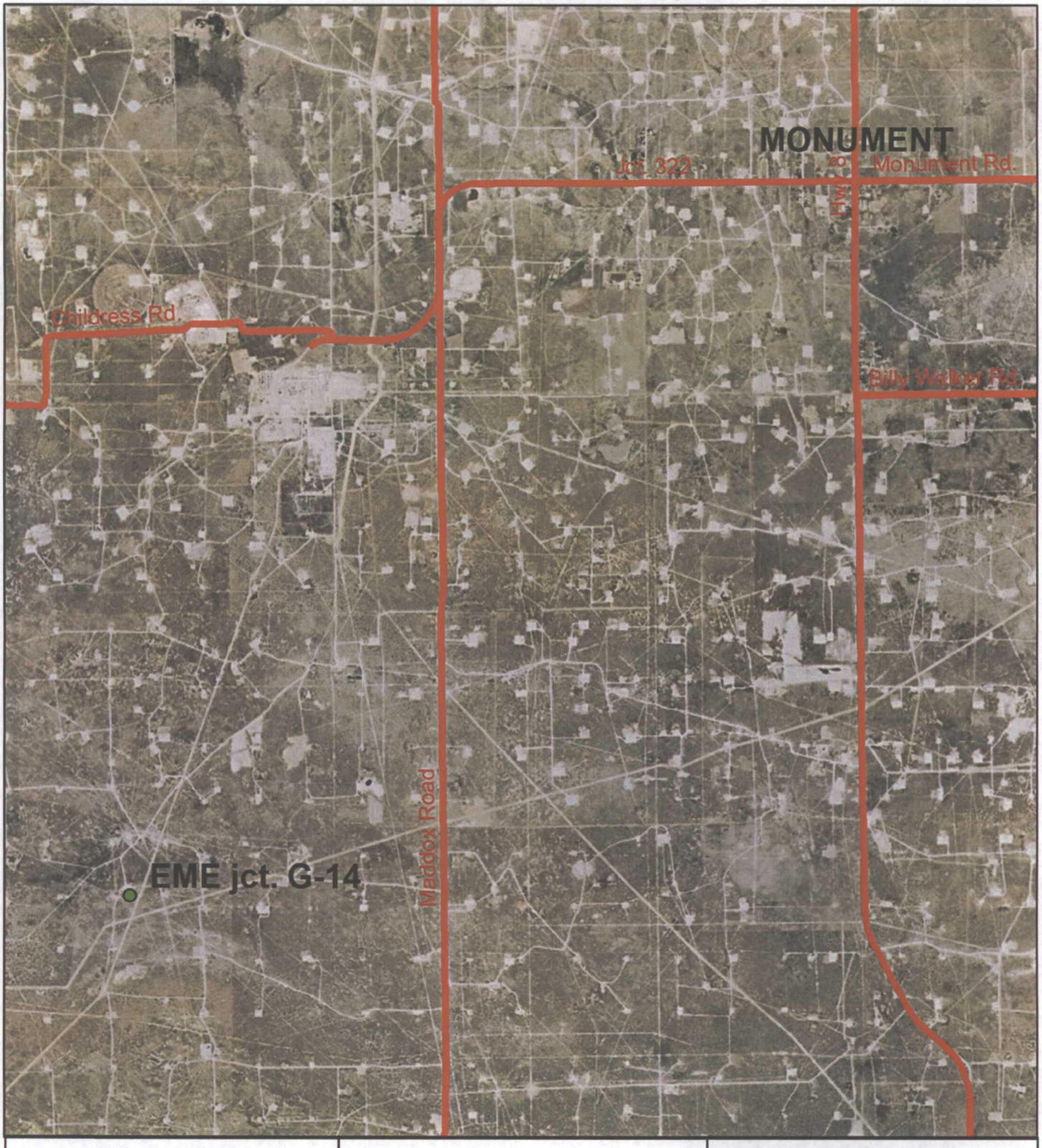
Attachments:

Figure 1 – Site Location Map
Figure 2 – Soil Bore Installation Map
Appendix A – Soil Bore Installation Documentation

Figures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

Site Location Map



RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC

RECS

EME jct. G-14

Legals: UL/G sec. 14
T-20-S R-36-E
LEA COUNTY, NM

Figure 1

N
W E
S

0 0.3 0.6 1.2 Miles

Drawing date: 5-3-12
Drafted by: L. Weinheimer

Soil Bore Installation

SB-1

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
13	120	147.6							
15	147	325.7	112	118	2000	<0.05	0.198	0.319	0.712
18	195	316.2							
21	112	114.5							
24	142	209.5							
27	143	122.8							
30	365	165.1							
33	220	52.8	192	<10	308				

SB-2

Depth	Cl-	PID	LAB Cl-	GRO	DRO
SS	114	0.4			
3	91	0.5			
6	119	6.3			
9	121	36.5	<16	<50	2280
12	122	8.2	<16	<50	654

SB-3

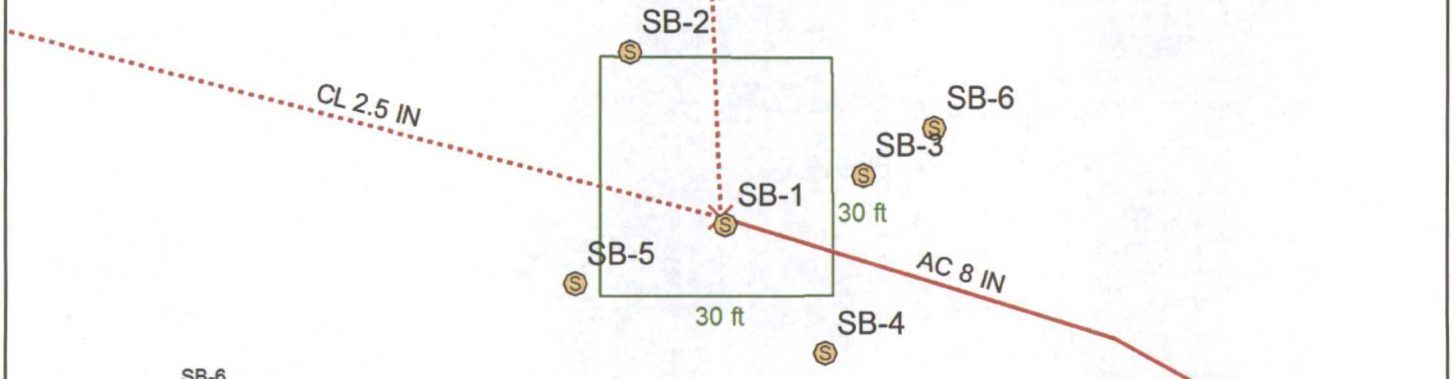
Depth	Cl-	PID	LAB Cl-	GRO	DRO
SS	116	1.2			
3	111	1.2			
6	115	0.8	<16	<100	794
9	90	5.8	<16	<50	2320

SB-4

Depth	Cl-	PID	LAB Cl-	GRO	DRO
SS	113	1.6			
3	121	2.3	<16	<10	<10
6	86	2.4			
9	120	1.4	<16	<10	<10

SB-5

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
SS	85	1.2							
3	121	1.8							
6	121	1.7							
9	92	32.7							
12	118	139.1	<16	74	1920	<0.05	<0.05	0.273	0.613
15	117	82.5							
18	147	19.7	48	<10	69.6				



SB-6

Depth	Cl-	PID	LAB Cl-	GRO	DRO
SS	111	4.2	<16	<50	367
3	54	10.7			
6	55	8.5			
9	118	6.6			
12	88	7.3			
15	82	10.3			
18	87	7.2	<16	<10	<10

Legend

- EME SOIL BORES
- ROC REMOVED BOXES
- 20-mil REINFORCED LINER @ 5'

DGW = 38 ft

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

EME Jct. G-14

UL/G SECTION 14
T-20-S R-36-E
LEA COUNTY, NM
NMOCD Case #: 1R427-366

Figure 2

N W E S

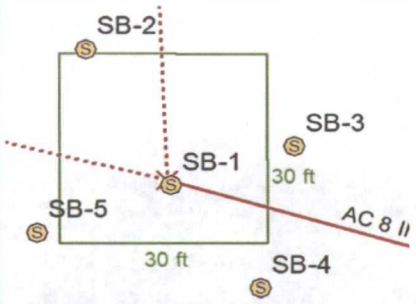
0 20 40 Feet

GPS date: 5/4/12 by TG
Drawing date: 8/14/12
Drafted by: L. Weinheimer

Appendix A

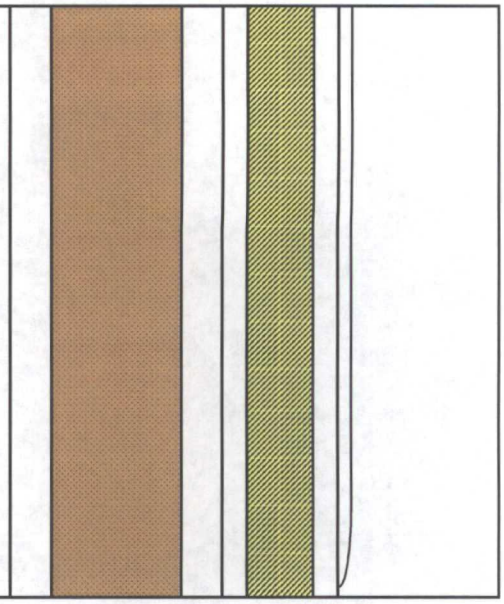
Soil Bore Installation Documentation

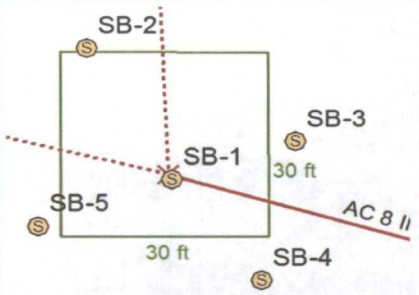
RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

Logger:	Kyle Norman		**Project Name:** EME Jct. G-14 **Well ID:** SB-1
Driller:	Harrison & Cooper, Inc.		**Project Consultant:** RECS
Drilling Method:	Air Rotary		**Location:** UL/G sec. 14 T-20-S R-36-E
Start Date:	6/13/2012		**Lat:** 32°34'33.696"N **Long:** 103°19'28.917"W **County**: Lea **State**: NM
End Date:	6/13/2012		

Comments: Located at the former junction box site.
All samples were from cuttings.
DRAFTED BY: A.C. Ruth
TD = 33 ft GW = 38 ft

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				Regolith		
SS						
5 ft						
10 ft						
				Brown Sand		
13 ft	120		147.6			
				Tan/Grey Sand		
15 ft	147	Cl- 112	325.7			
B: <0.05	E: 0.319	GRO 118				
T: 0.198	X: 0.712	DRO 2000				bentonite seal
18 ft	195		316.2			
				Tan Sand		
21 ft	112		114.5			
24 ft	142		209.5			

				Tan Sand	
27 ft	143		122.8		
30 ft	365		165.1		
33 ft	220	Cl- 192	52.8		
		GRO <10			
		DRO 308			

Logger:	Kyle Norman		**Project Name:** EME Jct. G-14 **Well ID:** SB-2
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air Rotary		**Project Consultant:** RECS
Start Date:	6/14/2012		
End Date:	6/14/2012		

Comments: Located 25 ft northwest of the former junction box site. All samples were from cuttings.

DRAFTED BY: A.C. Ruth

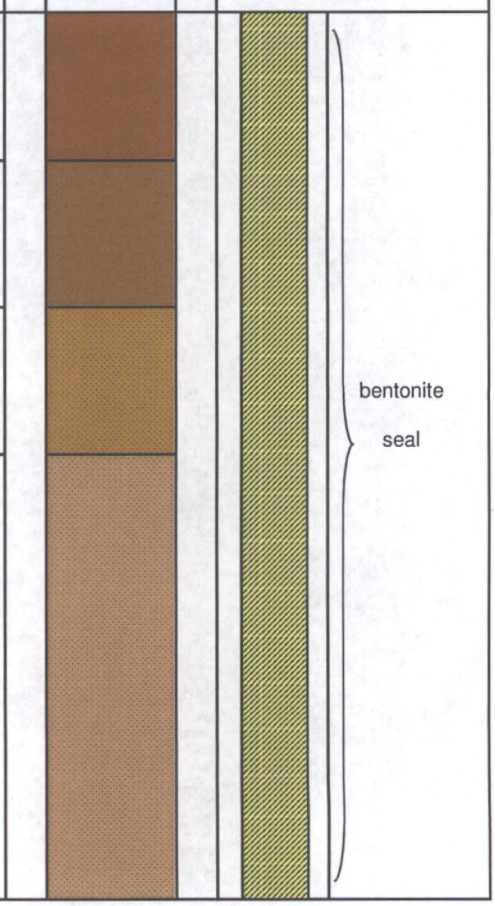
TD = 12 ft GW = 38 ft

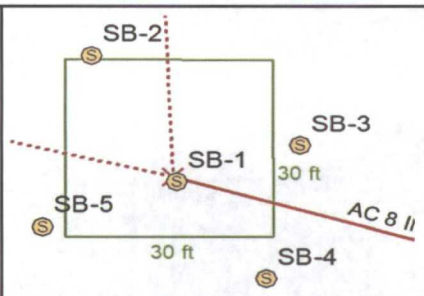
Location: UL/G sec. 14 T-20-S R-36-E

Lat: 32°34'33.922"N **County**: Lea

Long: 103°19'29.064"W **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description
				Brown Sand
SS	114		0.4	
				Tan/Brown Sand
3 ft	91		0.5	
				Yellow/Brown Sand
6 ft	119		6.3	
				Tan Sand
9 ft	121	Cl- <16	36.5	
		GRO <50		
		DRO 2280		
12 ft	122	Cl- <16	8.2	
		GRO <50		
		DRO 654		



Logger:	Kyle Norman		RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air Rotary		**Project Name:** EME Jct. G-14 **Well ID:** SB-3
Start Date:	6/14/2012		**Project Consultant:** RECS
End Date:	6/14/2012		

Comments: Located 20 ft east-northeast of the former junction box site. All samples were from cuttings.

DRAFTED BY: A.C. Ruth

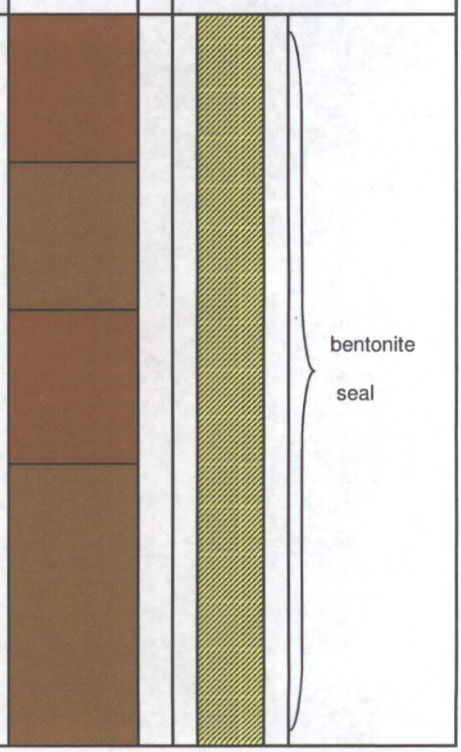
TD = 9 ft GW = 38 ft

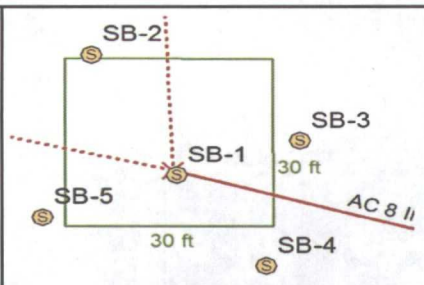
Location: UL/G sec. 14 T-20-S R-36-E

Lat: 32°34'33.757"N **County**: Lea

Long: 103°19'28.703"W **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description
				Brown Sand
SS	116		1.2	
				Tan/Brown Sand
3 ft	111		1.2	
				Brown Sand
6 ft	115	Cl- <16	0.8	
		GRO <100		Tan/Brown Sand
		DRO 794		
9 ft	90	Cl- <16	5.8	
		GRO <50		
		DRO 2320		



Logger:	Kyle Norman		**Project Name:** EME Jct. G-14 **Well ID:** SB-4
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air Rotary		**Project Consultant:** RECS
Start Date:	6/14/2012		
End Date:	6/14/2012		

Comments: Located 22 ft southeast of the former junction box site. All samples were from cuttings.

DRAFTED BY: A.C. Ruth

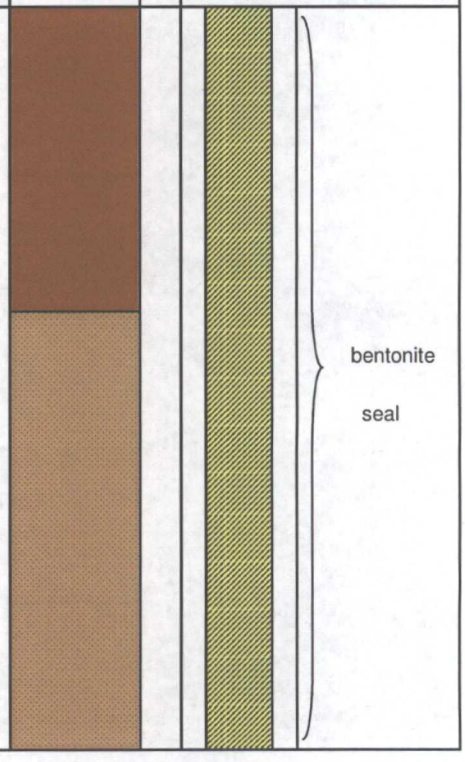
TD = 9 ft GW = 38 ft

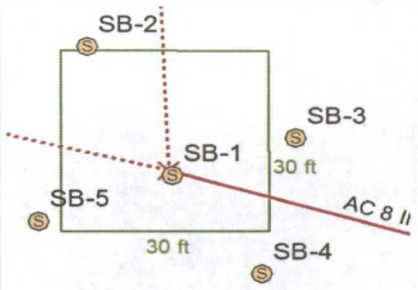
Location: UL/G sec. 14 T-20-S R-36-E

Lat: 32°34'33.525"N **County**: Lea

Long: 103°19'28.757"W **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description
				Brown Sand
SS	113		1.6	
3 ft	121	Cl- <16	2.3	
		GRO <10		Tan Sand
		DRO <10		
6 ft	86		2.4	
9 ft	120	Cl- <16	1.4	
		GRO <10		
		DRO <10		



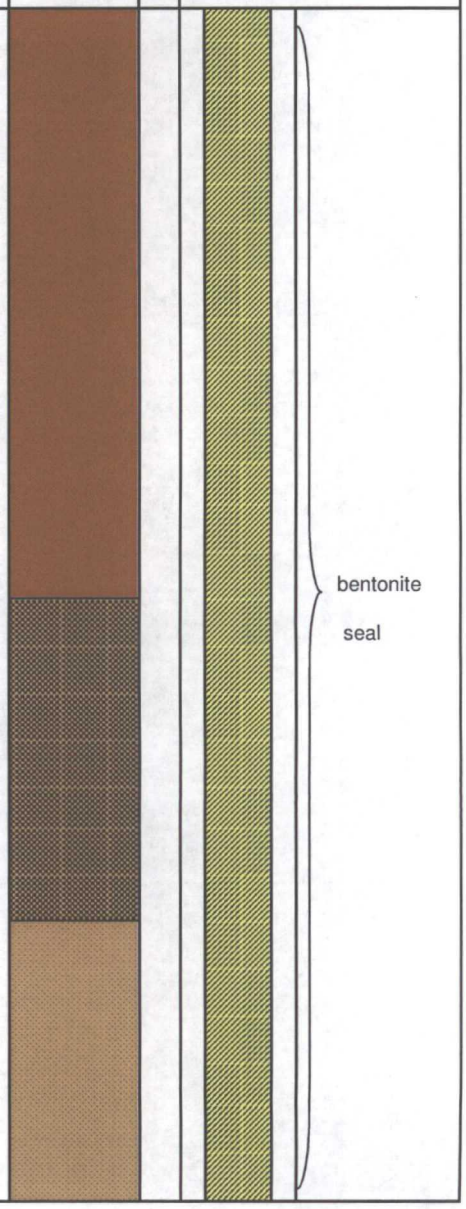
Logger:	Kyle Norman		**Project Name:** EME Jct. G-14 **Well ID:** SB-5
Driller:	Harrison & Cooper, Inc.		**Project Consultant:** RECS
Drilling Method:	Air Rotary		**Location:** UL/G sec. 14 T-20-S R-36-E
Start Date:	6/14/2012		**Lat:** 32°34'33.624"N **County**: Lea
End Date:	6/14/2012		**Long:** 103°19'29.147"W **State**: NM

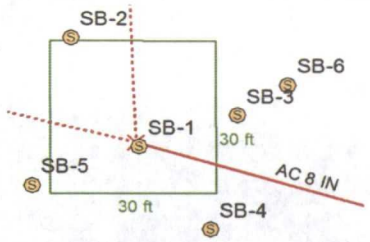
Comments: Located 21 ft southwest of the former junction box site. All samples were from cuttings.

DRAFTED BY: A.C. Ruth

TD = 18 ft GW = 38 ft

Depth (feet)	Chloride field tests	LAB	PID	Description
				Brown Sand
SS	85		1.2	
3 ft	121		1.8	
6 ft	121		1.7	
9 ft	92		32.7	
				Black/Tan Sand
12 ft	118	Cl- <16	139	
B: <0.05	E: 0.273	GRO 74		
T: <0.05	X: 0.613	DRO 1920		
15 ft	117		82.5	
				Tan Sand
18 ft	147	Cl- 48	19.7	
		GRO <10		
		DRO 69.6		



Logger:	Kyle Norman		**Project Name:** EME Jct. G-14 **Well ID:** SB-6
Driller:	Harrison & Cooper, Inc.		**Project Consultant:** RECS
Drilling Method:	Air rotary		**Location:** UL/G sec. 14 T20S R36E
Start Date:	8/8/2012		**Lat:** 32°34'33.818"N **Long:** 103°19'28.589"W **County:** Lea **State:** NM
End Date:	8/8/2012		

Comments: SB-6 is located 30 ft northeast of the former junction box site. All samples were from cuttings.

DRAFTED BY: L. Weinheimer

TD = 18 ft GW = 38 ft

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				Tan Sand		bentonite seal
SS	111	Cl- <16	4.2			
		GRO <50				
		DRO 367				
3 ft	54		10.7			
6 ft	55		8.5			
9 ft	118		6.6			
12 ft	88		7.3			
15 ft	82		10.3			
18 ft	87	Cl- <16	7.2			
		GRO <10				
		DRO <10				

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

June 19, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME G-14 JCT. 20S/36E

Enclosed are the results of analyses for samples received by the laboratory on 06/13/12 16:45.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/13/2012	Sampling Date:	06/13/2012
Reported:	06/19/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 1 @ 15' (H201336-01)

BTEX 8021B mg/kg **Analyzed By: ZZZ** **S-04**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/18/2012	ND	1.93	96.5	2.00	7.45	
Toluene*	**0.198**	0.050	06/18/2012	ND	1.94	97.1	2.00	6.42	
Ethylbenzene*	**0.319**	0.050	06/18/2012	ND	1.96	98.2	2.00	6.95	
Total Xylenes*	**0.712**	0.150	06/18/2012	ND	5.91	98.6	6.00	6.73	

Surrogate: 4-Bromofluorobenzene (PID *154 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**112**	16.0	06/15/2012	ND	416	104	400	3.77	

TPH 8015M mg/kg **Analyzed By: MS** **S-06**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	**118**	50.0	06/15/2012	ND	185	92.4	200	1.98	
DRO >C10-C28	**2000**	50.0	06/15/2012	ND	194	97.2	200	3.12	

Surrogate: 1-Chlorooctane *114 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *163 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/13/2012	Sampling Date:	06/13/2012
Reported:	06/19/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 1 @ 33' (H201336-02)

Chloride, SM4500Cl-B **mg/kg** **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**192**	16.0	06/15/2012	ND	416	104	400	3.77	

TPH 8015M **mg/kg** **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/15/2012	ND	185	92.4	200	1.98	
DRO >C10-C28	**308**	10.0	06/15/2012	ND	194	97.2	200	3.12	

Surrogate: 1-Chlorooctane	*99.5 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*130 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: Rice		**BILL TO**
Project Manager: Hack Conder		P.O. #:
Address:		Company:
City: Hobbs	State: NM Zip: 88240	Attn:
Phone #:	Fax #:	Address:
Project #:	Project Owner:	City:
Project Name:		State: Zip:
Project Location: EME G-14 Jct, 20S-36E		Phone #:
Sampler Name: Kyle Norman		Fax #:

ANALYSIS REQUEST

Lab I.D. (FOR LAB USE ONLY) H201336	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS						
-1	SB1 @ 15'	G	1			✓					✓		6-13-12	4:00	✓	✓	✓									
2	SB1 @ 33'	G	1			✓					✓		6-13-12	4:15	✓	✓										

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: Kyle N	Date: 6-13-12 Time: 4:45	Received By: Jodi Henson	Phone Result: ☐ Yes ☑ No Add'l Phone #:
			Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	Date: Time:	Received By:	REMARKS: email results: zconder@rice-ecs.com Knorman@rice-ecs.com; lpena@riceswd.com Kjones@riceswd.com; Bbaker@rice-ecs.com; hconder@rice-ecs.com; Lweinheimer@rice-ecs.com
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No	CHECKED BY: (Initials) JH	

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#26

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

June 21, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME G-14 JCT. 20S/36E

Enclosed are the results of analyses for samples received by the laboratory on 06/14/12 16:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/14/2012	Sampling Date:	06/14/2012
Reported:	06/21/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 2 @ 9' (H201359-01)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-06**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<50.0	50.0	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	**2280**	50.0	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*90.5 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*185 %*	*63.6-154*

Sample ID: SB 2 @ 12' (H201359-02)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<50.0	50.0	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	**654**	50.0	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*85.2 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*131 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/14/2012	Sampling Date:	06/14/2012
Reported:	06/21/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 3 @ 6' (H201359-03)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-06**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<100	100	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	**794**	100	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*78.6 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*167 %*	*63.6-154*

Sample ID: SB 3 @ 9' (H201359-04)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-06**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<50.0	50.0	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	**2320**	50.0	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*85.3 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*194 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/14/2012	Sampling Date:	06/14/2012
Reported:	06/21/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 4 @ 3' (H201359-05)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	<10.0	10.0	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*91.4 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*105 %*	*63.6-154*

Sample ID: SB 4 @ 9' (H201359-06)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/18/2012	ND	180	89.9	200	3.86	
DRO >C10-C28	<10.0	10.0	06/18/2012	ND	183	91.3	200	7.90	

Surrogate: 1-Chlorooctane	*90.0 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*105 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/14/2012	Sampling Date:	06/14/2012
Reported:	06/21/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 5 @ 12' (H201359-07)

BTEX 8021B mg/kg **Analyzed By: ZZZ** **S-04**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/21/2012	ND	2.01	100	2.00	5.58	
Toluene*	<0.050	0.050	06/21/2012	ND	2.01	100	2.00	5.58	
Ethylbenzene*	**0.273**	0.050	06/21/2012	ND	2.04	102	2.00	5.76	
Total Xylenes*	**0.613**	0.150	06/21/2012	ND	6.14	102	6.00	5.84	

Surrogate: 4-Bromofluorobenzene (PID *228 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-06**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	**74.0**	50.0	06/18/2012	ND	182	91.2	200	5.14	
DRO >C10-C28	**1920**	50.0	06/18/2012	ND	189	94.5	200	1.59	

Surrogate: 1-Chlorooctane *113 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *165 %* *63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	06/14/2012	Sampling Date:	06/14/2012
Reported:	06/21/2012	Sampling Type:	Soil
Project Name:	EME G-14 JCT. 20S/36E	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 5 @ 18' (H201359-08)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**48.0**	16.0	06/19/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/18/2012	ND	182	91.2	200	5.14	
DRO >C10-C28	**69.6**	10.0	06/18/2012	ND	189	94.5	200	1.59	

Surrogate: 1-Chlorooctane	*89.9 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*112 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: Rice	**BILL TO**
Project Manager: Hack Conder	P.O. #:
Address:	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name:	State: Zip:
Project Location: EME 6-14 Jct. 205-36E	Phone #:
Sampler Name: Kyle Norman	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST										
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS					
H201359																									
1	SB2 @ 9'	G	1			✓					✓		6-14-12	8:30	✓	✓									
2	SB2 @ 12'	G	1			✓					✓			9:00	✓	✓									
3	SB3 @ 6'	G	1			✓					✓			9:30	✓	✓									
4	SB3 @ 9'	G	1			✓					✓			10:00	✓	✓									
5	SB4 @ 3'	G	1			✓					✓			10:30	✓	✓									
6	SB4 @ 9'	G	1			✓					✓			11:00	✓	✓									
7	SB5 @ 12'	G	1			✓					✓			11:30	✓	✓	✓								
8	SB5 @ 18'	G	1			✓					✓		6-14-12	11:45	✓	✓									

Relinquished By: Kyle Norman	Date: 6-14-12 Time: 9:30	Received By: Jodi Henson	Phone Result: ☐ Yes ☑ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☑ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool ☐ Yes ☐ No Intact ☑ Yes ☐ No	CHECKED BY: (Initials)	REMARKS: email results: zconder@rice-ecs.com Knorman@rice-ecs.com; lpena@riceswd.com Kjones@riceswd.com; Bbaker@rice-ecs.com; hconder@rice-ecs.com; Lweinheimer@rice-ecs.com

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#26

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

August 13, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME JCT G-14

Enclosed are the results of analyses for samples received by the laboratory on 08/08/12 16:40.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	08/08/2012	Sampling Date:	08/08/2012
Reported:	08/13/2012	Sampling Type:	Soil
Project Name:	EME JCT G-14	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 6 @ SURFACE (H201844-01)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	08/13/2012	ND	400	100	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-04**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<50.0	50.0	08/10/2012	ND	174	86.8	200	1.44	
DRO >C10-C28	**367**	50.0	08/10/2012	ND	176	88.2	200	0.126	

Surrogate: 1-Chlorooctane	*102 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*176 %*	*63.6-154*

Sample ID: SB 6 @ 18' (H201844-02)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	08/13/2012	ND	400	100	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	08/10/2012	ND	174	86.8	200	1.44	
DRO >C10-C28	<10.0	10.0	08/10/2012	ND	176	88.2	200	0.126	

Surrogate: 1-Chlorooctane	*113 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*117 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Celey D. Keene, Lab Director/Quality Manager

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: Rice	**BILL TO** P.O. #:
Project Manager: Hack Conder	Company:
Address:	Attn:
City: Hobbs State: NM Zip: 88240	Address:
Phone #: Fax #:	City:
Project #: Project Owner:	State: Zip:
Project Name:	Phone #:
Project Location: EME Jct 8-14	Fax #:
Sampler Name: Kyle Norman	

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST										
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS					
H201844																									
1	SP 6 @ Surface	G	1			✓					✓		8-8-12	3:00	✓	✓									
2	SP 6 @ 18'	G	1			✓					✓		8-8-12	3:30	✓	✓									

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	Date: 8-8-12	Received By: Jodi Henson	Phone Result: ☐ Yes ☑ No Add'l Phone #:
	Time: 4:40		Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: email results: zconder@rice-ecs.com Knorman@rice-ecs.com; lpena@riceswd.com Kjones@riceswd.com; Bbaker@rice-ecs.com; hconder@rice-ecs.com; Lweinheimer@rice-ecs.com
	Time:		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#26

Hansen, Edward J., EMNRD

From: Laura Pena <lpena@riceswd.com>
Sent: Friday, September 14, 2012 2:06 PM
To: Hansen, Edward J., EMNRD
Cc: Hack Conder; Katie Jones
Subject: ROC - EME Jct. G-14 (1R427-366) Multimed
Attachments: EME Jct. G-14 MultiMed Notes.xlsx; EME Jct. G-14 (1R427-366) Multimed.inp; EME Jct. G-14 Chloride Graph.pdf; ROC - EME Jct. G-14 (1R427-366) Multimed Output.pdf

Mr. Hansen,

The following details the attached Multimed file for the EME Jct. G-14 (1R427-366), as requested during the conference call between ROC and NMOCD on September 11th, 2012.

This file uses the parameters submitted to NMOCD in the Multimed Study report. Site specific parameters are as follows:

- An estimated area of 30 ft by 30 ft (900 ft^2 or 83.61m^2).
- A source infiltration rate of 0.6" (clay/poor liner, 0.1524 m).
- An initial concentration of the highest xylene result, 0.712 mg/kg.
- For the layer thickness calculation, an average of soil bore depths were BTEX was sampled and PID readings reached levels below 100 subtracted from the depth to groundwater (38 ft – 26 ft) to yield 14 ft or 4 meters.
- An aquifer thickness of 20 ft (6.10 m).

The result of this model indicates that the maximum xylene concentration is approximately 0.09274 mg/kg at 78 years, falling below the WQCC standard of 0.62 mg/kg.

Let Hack Conder, Katie Jones or me know if you have any questions or require any additional information.

Thank you,

Laura Peña
Environmental Project Scientist
RICE Operating Company

EME Jct. G-14 (1R427-366)

Unit G, Section 14, T20S, R36E

Depth to GW: 38 ft

	SB-1								
	Cl-	PID	Lab Cl-	GRO	DRO	B	T	E	X
13	120	147.6							
15	147	325.7	112	118	2000	0.05	0.198	0.319	0.712
18	195	316.2							
21	112	114.5							
24	142	209.5							
27	143	122.8							
30	365	165.1							
33	220	52.8	192	10	308				

	SB-2				
	Cl-	PID	Lab Cl-	GRO	DRO
SS	114	0.4			
3	91	0.5			
6	119	6.3			
9	121	36.5	16	50	2280
12	122	8.2	16	50	654

	SB-3									
	Cl-	PID	Lab Cl-	GRO	DRO		Cl-	PID	Lab Cl-	GRO	DRO
SS	116	1.2				SS	113	1.6			
3	111	1.2				3	121	2.3	16	10	10
6	115	0.8	16	100	794	6	86	2.4			
9	90	5.8	16	50	2320	9	120	1.4	16	10	10

	SB-5								
	Cl-	PID	Lab Cl-	GRO	DRO	B	T	E	X
SS	85	1.2							
3	121	1.8							
6	121	1.7							
9	92	32.7							
12	118	139.1	16	74	1920	0.05	0.05	0.273	0.613
13									
15	117	82.5							
18	147	19.7	48	10	69.6				

	SB-6				
	Cl-	PID	Lab Cl-	GRO	DRO
SS	111	4.2	16	50	367
3	54	10.7			
6	55	8.5			
9	118	6.6			
12	88	7.3			
13					
15	82	10.3			
18	87	7.2	16	10	10

Maximum BTEX Concentration: 0.712

Average Soil Bore Depth: 24

Subtracted from Depth to Groundwater: 14

MULTIMED V1.01 DATE OF CALCULATIONS: 13-SEP-2012 TIME: 8:20:30

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED (Version 1.50, 2005)

1
Run options
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EME Jct. G-14

Xylenes Model Run
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration Specified By User: 1.524E-02 m/yr
Run was transient
Well Times: Entered Explicitly
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1
UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
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Van Genuchten functional coefficients
User defined coordinate system
1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY
1	4.00	1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	3.60	-999.	-999.	-999.
Unsaturated zone porosity	--	CONSTANT	0.250	-999.	-999.	-999.
Air entry pressure head	m	CONSTANT	0.700	-999.	-999.	-999.
Depth of the unsaturated zone	m	CONSTANT	4.00	0.000	0.000	0.000

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.116	-999.	-999.	-999.
Brook and Corey exponent,EN	--	CONSTANT	-999.	-999.	-999.	-999.
ALFA coefficient	1/cm	CONSTANT	0.500E-02	-999.	-999.	-999.
Van Genuchten exponent, ENN	--	CONSTANT	1.09	-999.	-999.	-999.

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		40
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		2
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Convolution integral approach
Exponentially decaying continuous source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	4.00	-999.	-999.	-999.
Longitudinal dispersivity of layer	m	DERIVED	-999.	-999.	-999.	-999.
Percent organic matter	--	CONSTANT	0.000	-999.	-999.	-999.
Bulk density of soil for layer	g/cc	CONSTANT	1.99	-999.	-999.	-999.
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.	-999.

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	-999.	-999.
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	-999.	-999.
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	-999.	-999.
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	-999.	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	-999.	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	-999.	-999.
Reference temperature	C	CONSTANT	25.0	-999.	-999.	-999.
Normalized distribution coefficient	ml/g	CONSTANT	0.000	-999.	-999.	-999.
Distribution coefficient	--	DERIVED	-999.	-999.	-999.	-999.
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	-999.	-999.
Air diffusion coefficient	cm2/s	CONSTANT	-999.	-999.	-999.	-999.
Reference temperature for air diffusion	C	CONSTANT	-999.	-999.	-999.	-999.
Molecular weight	g/M	CONSTANT	-999.	-999.	-999.	-999.
Mole fraction of solute	--	CONSTANT	-999.	-999.	-999.	-999.
Vapor pressure of solute	mm Hg	CONSTANT	-999.	-999.	-999.	-999.
Henry`s law constant	atm-m^3/M	CONSTANT	-999.	-999.	-999.	-999.
Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Not currently used		CONSTANT	0.000	0.000	0.000	0.000
Not currently used		CONSTANT	0.000	0.000	0.000	0.000

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.152E-01	-999.	-999.	-999.
Area of waste disposal unit	m^2	CONSTANT	83.6	-999.	-999.	-999.
Duration of pulse	yr	DERIVED	50.0	-999.	-999.	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	-999.	-999.
Recharge rate	m/yr	CONSTANT	0.000	-999.	-999.	-999.
Source decay constant	1/yr	CONSTANT	0.250E-01	0.000	0.000	0.000
Initial concentration at landfill	mg/l	CONSTANT	0.712	-999.	-999.	-999.
Length scale of facility	m	DERIVED	-999.	-999.	-999.	-999.
Width scale of facility	m	DERIVED	-999.	-999.	-999.	-999.
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	-999.	-999.	-999.	-999.
Aquifer porosity	--	CONSTANT	0.300	-999.	-999.	-999.
Bulk density	g/cc	CONSTANT	1.86	-999.	-999.	-999.
Aquifer thickness	m	CONSTANT	6.10	-999.	-999.	-999.
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	-999.	-999.
Conductivity (hydraulic)	m/yr	CONSTANT	315.	-999.	-999.	-999.
Gradient (hydraulic)		CONSTANT	0.400E-02	-999.	-999.	-999.
Groundwater seepage velocity	m/yr	DERIVED	-999.	-999.	-999.	-999.
Retardation coefficient	--	DERIVED	-999.	-999.	-999.	-999.
Longitudinal dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Transverse dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Vertical dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Temperature of aquifer	C	CONSTANT	20.0	-999.	-999.	-999.
pH	--	CONSTANT	7.00	-999.	-999.	-999.
Organic carbon content (fraction)		CONSTANT	0.000	-999.	-999.	-999.
Well distance from site	m	CONSTANT	1.00	-999.	-999.	-999.
Angle off center	degree	CONSTANT	0.000	-999.	-999.	-999.
Well vertical distance	m	CONSTANT	0.000	-999.	-999.	-999.

1

TIME	CONCENTRATION
0.100E+01	0.00000E+00
0.130E+02	0.00000E+00
0.250E+02	0.76132E-05
0.370E+02	0.21327E-02
0.490E+02	0.23157E-01
0.610E+02	0.64030E-01
0.730E+02	0.90271E-01
0.850E+02	0.89440E-01
0.970E+02	0.75510E-01
0.109E+03	0.58583E-01
0.121E+03	0.44284E-01
0.133E+03	0.32997E-01
0.145E+03	0.24491E-01
0.157E+03	0.18164E-01
0.169E+03	0.13443E-01
0.181E+03	0.99744E-02
0.193E+03	0.73749E-02
0.205E+03	0.54756E-02
0.217E+03	0.40492E-02
0.229E+03	0.30055E-02
0.241E+03	0.22287E-02
0.253E+03	0.16495E-02
0.265E+03	0.12156E-02

Xylenes Concentration At The Receptor Well

EME Jct. G-14