1R427-167

ICP/CAP Approval

Dated: 12.02.14

Approved December 2014

From: Lowe, Leonard, EMNRD
To: "Laura Flores"
Cc: "Hack Conder"; "Katie Jones"; Oberding, Tomas, EMNRD
Subject: APPROVED ROC - EME F-18 EOL (1R427-167) ICP Report and Corrective Action Plan (CAP)
Date: Thursday, December 11, 2014 2:06:00 PM
Importance: High

Laura Flores
Project Manager
RECS

OCD has reviewed the submitted ICP/CAP for **EME F – 18 EOL (1R427 - 167)**, dated December 2, 2014 and Approves the submitted Corrective Action Plan.

OCD shall await the written report in reference to the CAP. The written report shall be reviewed and termination shall be determined at that time.

Please be advised that OCD approval of this plan does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

Leonard Lowe
Environmental Engineer
[Environmental Bureau]
Oil **C**onservation **D**ivision
Energy **M**inerals and **N**atural **R**esources **D**epartment
1220 South St. Frances
Santa Fe, New Mexico 87004
Office: 505-476-3492
Fax: 505-476-3462
E-mail: leonard.lowe@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/

From: Laura Flores [mailto:lflores@rice-ecs.com]
Sent: Tuesday, December 02, 2014 3:34 PM
To: Lowe, Leonard, EMNRD
Cc: 'Hack Conder'; 'Katie Jones'
Subject: ROC - EME F-18 EOL (1R427-167) ICP Report and Corrective Action Plan (CAP)

Mr. Lowe,

Attached is the ICP Report and CAP for the EME F-18 EOL (1R427-167) site.

If you have any questions or require any additional information, please contact Hack Conder, Katie Jones or me.

Thank you,

Laura Flores
Project Manager
Rice Environmental Consulting & Safety (RECS)

RECS
RICE ENVIRONMENTAL
CONSULTING & SAFETY
PO Box 2948 | Hobbs, NM 88241 | Phone 575.393.2967

December 2, 2014

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

RE: **ICP Report & Corrective Action Plan (CAP)**
Rice Operating Company – EME SWD System
EME F-18 EOL (1R427-167): UL/F, Sec. 18, T20S, R37E
Formerly known as EME Britt EOL

Mr. Lowe:

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 3.7 miles southeast of Monument, New Mexico at UL/F, Sec. 18, T20S, R37E as shown on the Geographical Location Maps (Figure 1). NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 31 feet.

In 2004, ROC initiated work on the former EME F-18 EOL junction box, located adjacent to a non-ROC facility (Figure 2). The site was delineated using a backhoe to form a 10 ft x 10 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 213 mg/kg, a Gasoline Range Organics (GRO) reading of 133 mg/kg and a Diesel Range Organics (DRO) reading of 1,970 mg/kg. The bottom composite showed a chloride laboratory reading of 202 mg/kg, a GRO reading of 59.7 mg/kg and a DRO reading of 1,630 mg/kg (Figure 3A).

The excavated soil was blended on site and a sample was collected and taken to a commercial laboratory for analysis, resulting in a chloride concentration of 106 mg/kg, a GRO reading of 117 mg/kg and a DRO reading of 2,550 mg/kg. The excavation was backfilled with the blended backfill to ground surface and contoured to the surrounding area. NMOCD was notified of potential groundwater impact on August 27th, 2004 and a junction box disclosure report was submitted to NMOCD with all the 2004 junction box closures and disclosures.

As part of the Investigation and Characterization Plan (ICP) submitted to NMOCD on June 27th, 2014, five soil bores (SB-1 through SB-5) were installed at the site on July 14th, 2014, and one soil bore (SB-6) was installed on September 8, 2014. As the bores were advanced, soil samples were taken at regular intervals and field tested for hydrocarbons using a PID. Representative samples from each bore were taken to a commercial laboratory for analysis of TPH and BTEX, if the PID reading were over 100 ppm (Figure 3A and Appendix A). Chloride concentrations observed during the initial junction box investigation were low; therefore, chloride analysis was not necessary. Laboratory analysis of SB-1 returned GRO concentrations of non-detect at 21 ft bgs and 24 ft bgs, and 66.6 mg/kg at 27 ft bgs. DRO at SB-1 was 636 mg/kg at 21 ft bgs, 243 mg/kg at 24 ft bgs, and 828 mg/kg at 27 ft bgs. SB-2 returned GRO concentrations of 336 mg/kg at 18 ft bgs and 13.2 mg/kg at 27 ft bgs. DRO at SB-2 was 4,710 mg/kg at 18 ft bgs and 260 mg/kg at 27 ft bgs. SB-3 returned GRO concentrations of 423 mg/kg at 9 ft bgs and 427 mg/kg at 27 ft bgs. DRO at SB-3 was 5,760 mg/kg at 9 ft bgs and 4,830 mg/kg at 27 ft bgs. SB-4 returned GRO concentrations of 110 mg/kg at 18 ft bgs, 246 mg/kg at 24 ft bgs and 95.8 mg/kg at 27 ft bgs. DRO at SB-4 was 1,860 mg/kg at 18 ft bgs, 2,780 mg/kg at 24 ft bgs and 1,660 mg/kg at 27 ft bgs. SB-5 returned GRO and DRO concentrations of non-detect. SB-6 returned GRO and DRO readings of non detect at all depths except DRO at 3 ft bgs, which was 477 mg/kg.

SB-2, SB-3 and SB-4 were also analyzed for BTEX. In SB-2, at 18 ft bgs, Benzene was non-detect, Toluene was 0.362 mg/kg, Ethylbenzene was 1.48 mg/kg and Xylene 2.55 mg/kg. At 27 ft bgs, in SB-2, Benzene was non-detect, Toluene was 0.113 mg/kg, Ethylbenzene was 0.317 mg/kg and Xylene was 0.58 mg/kg. In SB-3, at 9 ft bgs, Benzene was non-detect, Toluene was 0.326 mg/kg, Ethylbenzene was 2.11 mg/kg and Xylene was 3.74 mg/kg. At 27 ft bgs, in SB-3, Benzene was non-detect, Toluene was 0.22 mg/kg, Ethylbenzene was 1.98 mg/kg and Xylene was 3.67 mg/kg. In SB-4, at 18 ft bgs, Benzene and Toluene were non-detect, while Ethylbenzene was 0.454 mg/kg and Xylene was 0.833 mg/kg. At 24 ft bgs, in SB-4, Benzene was non-detect, Toulene was 0.213 mg/kg, Ethylbenzene was 1.25 mg/kg and Xylene was 2.27 mg/kg. At 27 ft bgs, at SB-4, Benzene and Toluene were non-detect, Ethylbenzene was 0.45 mg/kg and Xylene was 0.844 mg/kg. The bore holes were plugged in total with bentonite to the ground surface.

The former junction box was located immediately adjacent to an active tank battery (Figure 2). Chloride concentrations were low through the initial investigation of the junction box, suggesting the former junction box had minimal impact to the vadose zone. Hydrocarbon concentrations decreased laterally to the east and the south, away from the

facility (i.e., nearer to the former junction box). However, hydrocarbon concentrations increased to the north, with the highest concentrations of TPH and BTEX being observed in SB-3, approximately 24 ft north of the former junction box (i.e., nearer to the tanks).

To determine if the residual hydrocarbon in the vadose zone pose a threat to groundwater quality, RECS ran the U.S. Environmental Protection Agency Exposure Assessment Multimedia Model (MULTIMED Version 1.5, 2005). Model outputs and the graph are included in Appendix B. The model output concludes that the peak concentration of xylene in groundwater contributed by the vadose zone soils would be approximately 0.573 mg/L in 24years. Since the estimated increase in xylene concentrations in groundwater from residual hydrocarbon migration is below the WQCC standard of 0.62 mg/L, no action is warranted for the groundwater at this site.

Corrective Action Plan

Based on the multimed analysis, RECS recommends that ROC install a 20-mil reinforced poly liner at the site with dimensions of 34 ft x 41 ft at a depth of 5 ft bgs (Figures 3A and 3B). The liner will inhibit the downward migration of constituents through the vadose zone. The soils placed above the liner will have a laboratory chloride reading no greater than 500 mg/kg and a field PID measurement below 100 ppm. Excavated soils will be evaluated for use as backfill and any soils that do not meet requirements will be properly disposed of at a NMOCD approved facility. The excavation will be backfilled to ground surface and contoured to the surrounding location. The soils over and surrounding the site will then be prepared with soil amendments as necessary and seeded with a native vegetative mix. Vegetation above the liner will also provide a natural infiltration barrier for the site since plants capture water through their roots thereby reducing the volume of water moving through the vadose zone.

Once the CAP work is completed by installing the 20-mil reinforced poly liner and seeding the site, ROC will submit a written report that will include a request for 'remediation termination' and site closure.

RECS appreciates the opportunity to work with you on this project. Please call Hack Conder at (575) 393-2967 or me if you have any questions or wish to discuss the site.

Sincerely,

L Flores

Laura Flores
Rice Environmental Consulting & Safety (RECS)
Project Manager

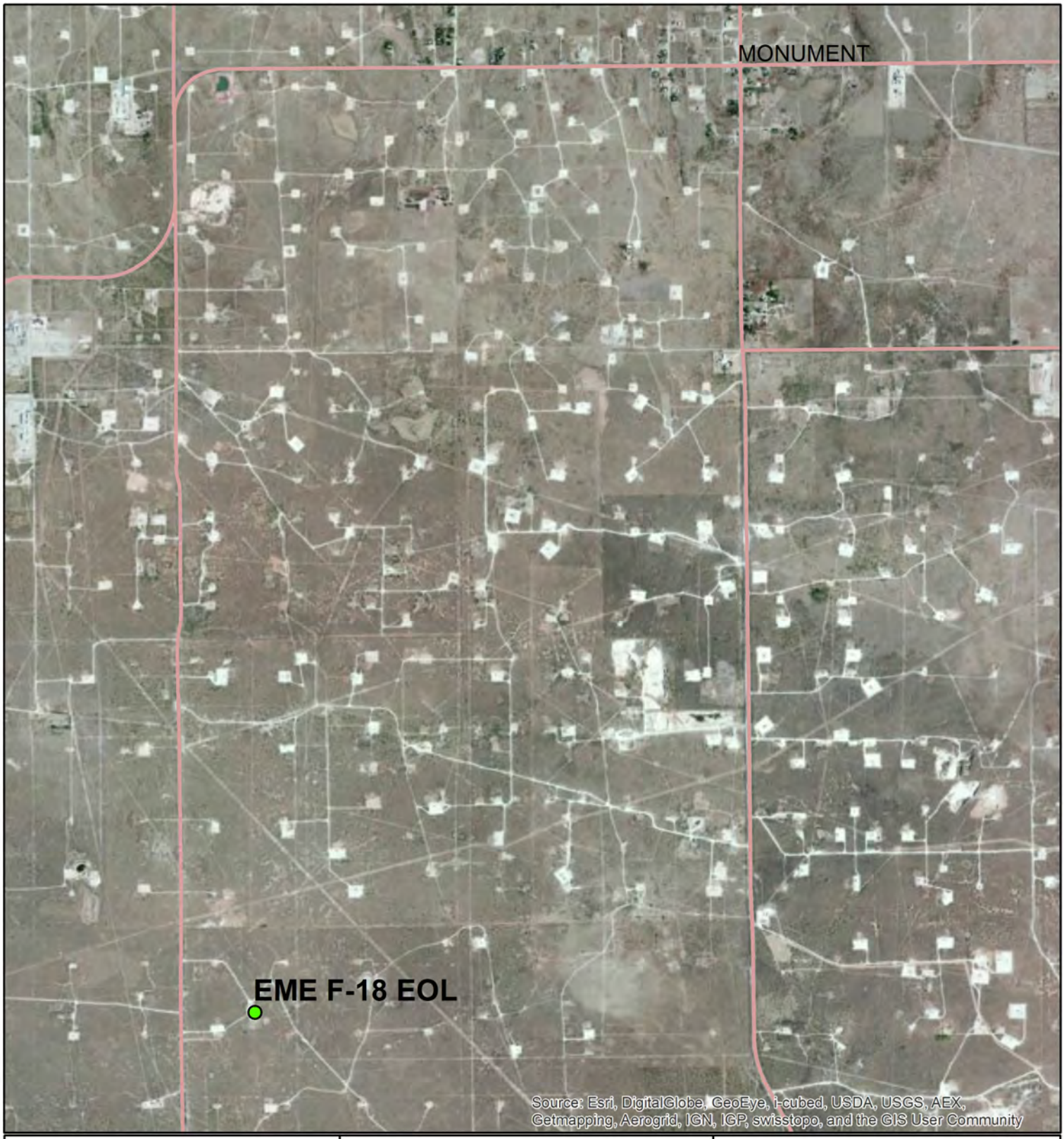
Attachments:

Figure 1 − Geographical Location Map
Figure 2 – Site Map

Figures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Geographical Location Map



RECS
RICE ENVIRONMENTAL
CONSULTING & SAFETY

EME F-18 EOL

LEGALS: UL/F sec. 18
T-20S R-37-E
LEA COUNTY, NM
NMOCD CASE #: 1R427-167

Figure 1

N
W E
S

0 0.3 0.6
Miles

Drawing date: 6/20/14
Drafted by: J. Shorter

Site Map

RECS
RICE ENVIRONMENTAL
CONSULTING & SAFETY

EME F-18 EOL

Unit Letter F, Section 18
T-20-S R-37-E

NMOCD CASE # 1R427-167

Figure 2

N
W E
S

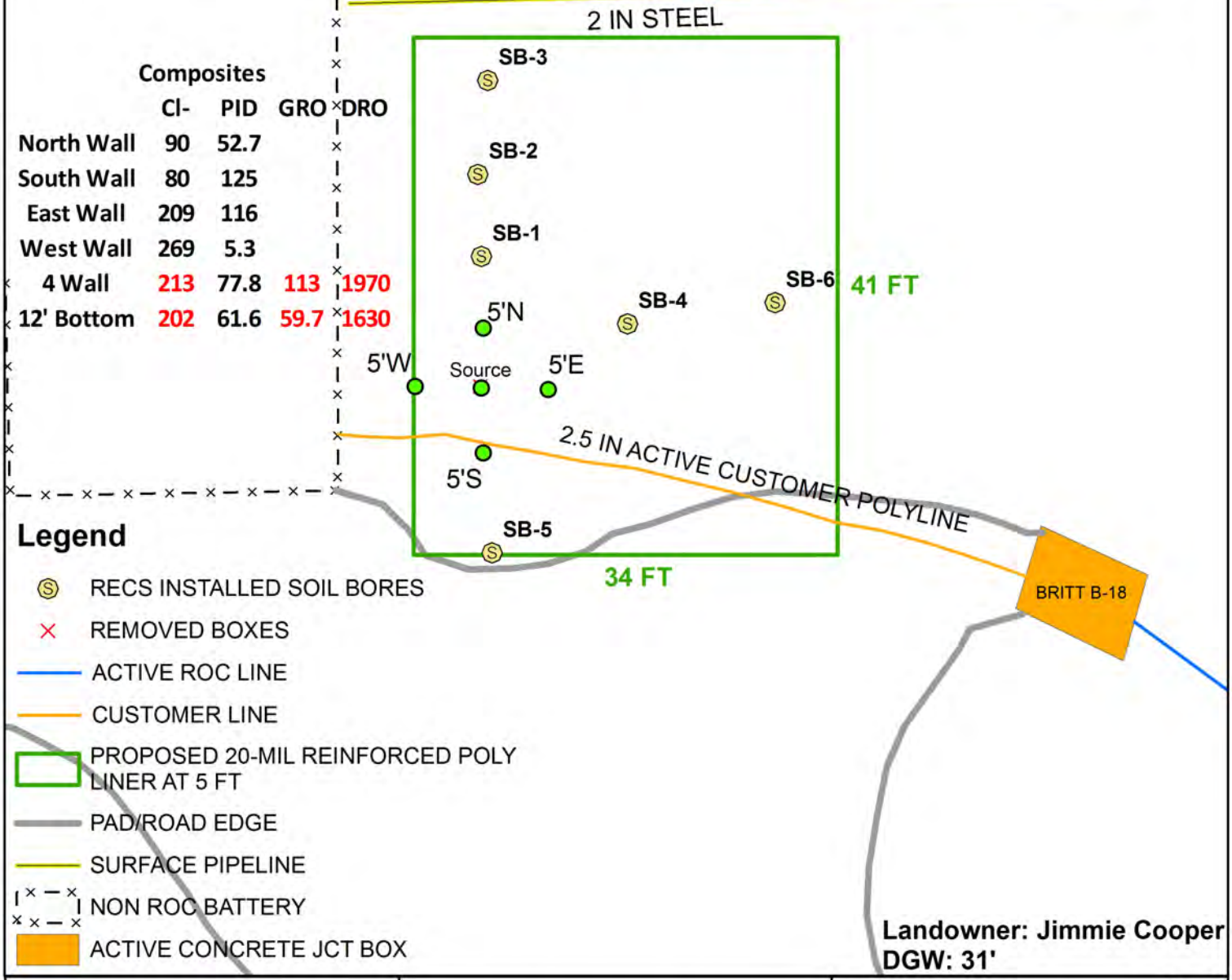
0 20 40
Feet

GPS Date: 9/8/14 AG
Drawing date: 11/7/14
Drafted by: L. Weinheimer

Initial Sampling

Source			5'North			5'East			5'South			5'West		
	Cl-	PID		Cl-	PID		Cl-	PID		Cl-	PID		Cl-	PID
6'	360	29.8	6'	180	93.6	6'	300	1.6	6'	179	30.6	6'	330	0
7'	270	20.8	7'	209	119	7'	419	1.9	7'	210	0	7'	419	0
8'	209	23.1	8'	179	41.3	8'	270	0	8'	149	3.1	8'	240	0
9'	240	14.7	9'	150	32	9'	239	0	9'	149	0	9'	239	0
10'	210	41.6	10'	120	109	10'	180	0	10'	120	25.9	10'	210	0
11'	239	39.1	11'	90	15.3	11'	389	0	11'	119	10.4	11'	180	0
12'	179	11	12'	89	127	12'	330	0	12'	240	19.7	12'	179	0

Composites	Cl-	PID	GRO	DRO
North Wall	90	52.7		
South Wall	80	125		
East Wall	209	116		
West Wall	269	5.3		
4 Wall	213	77.8	113	1970
12' Bottom	202	61.6	59.7	1630



RECS
RICE ENVIRONMENTAL
CONSULTING & SAFETY

EME F-18 EOL

Unit Letter F, Section 18
T-20-S R-37-E

NMOCD CASE # 1R427-167

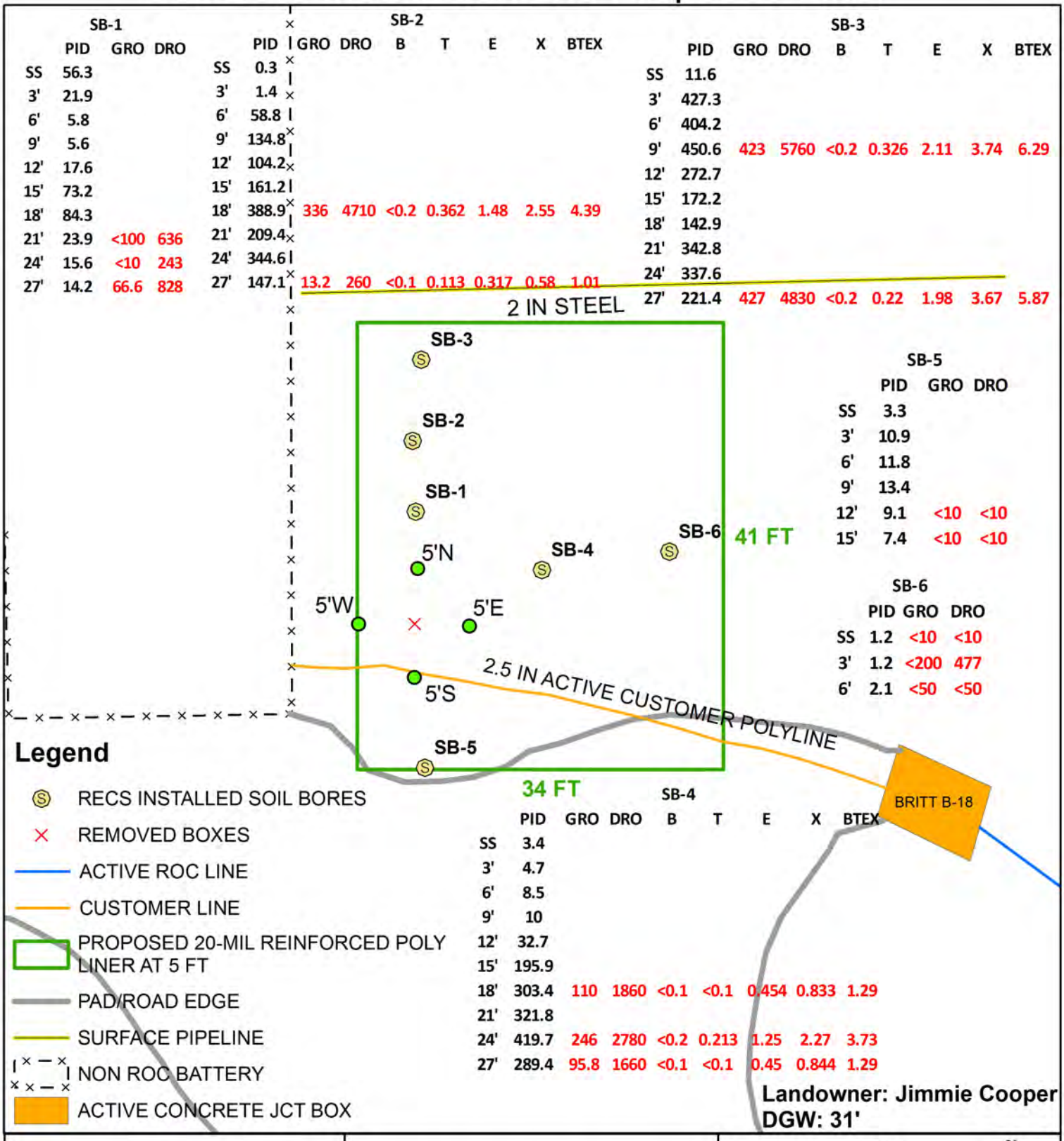
Figure 3A

N W E S

0 8 16
Feet

GPS Date: 9/8/14 AG
Drawing date: 11/7/14
Drafted by: L. Weinheimer

Soil Bore Installation and Proposed Liner



RECS
RICE ENVIRONMENTAL
CONSULTING & SAFETY

EME F-18 EOL

Unit Letter F, Section 18
T-20-S R-37-E

NMOCD CASE # 1R427-167

Figure 3B

N W E S

0 8 16
Feet

GPS Date: 9/8/14 AG
Drawing date: 11/7/14
Drafted by: L. Weinheimer

Appendix A

Soil Bore Installation Documentation

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948 Hobbs, NM 88241
Phone 575.393.2967

Logger:	Amber Groves		RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison&Cooper, Inc.		
Drilling Method:	Air Rotary		**Project Name:** EME F-18 EOL **Well ID:** SB-1
Start Date:	7/14/2014		
End Date:	7/14/2014		**Project Consultant:** RECS

Comments: PID readings taken from cuttings. SB-1 was installed 10' north of the former junction box.

DRAFTED BY: C. Uršanić

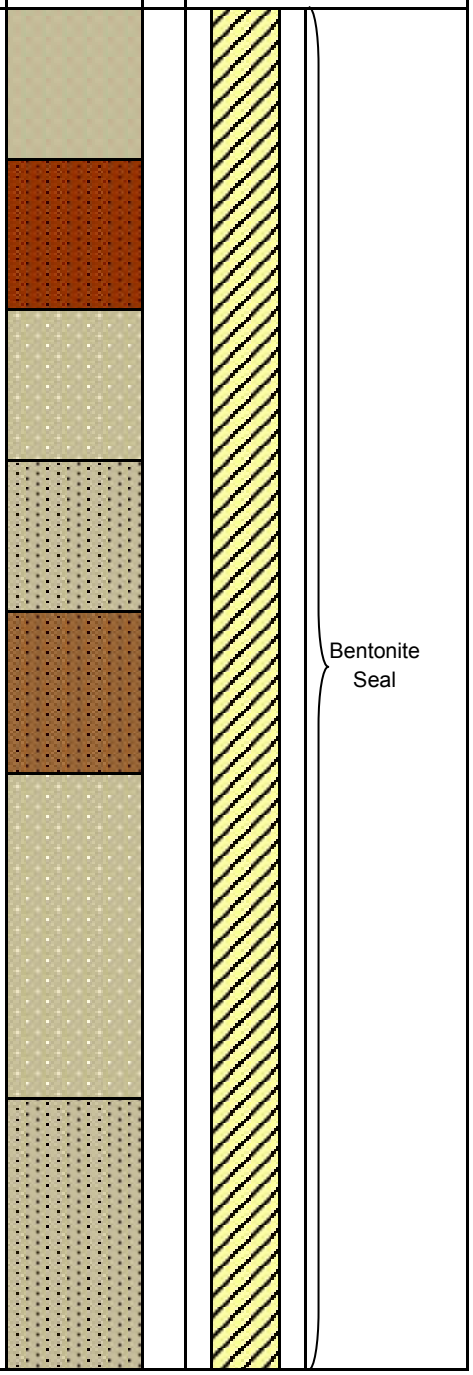
TD = 27' GW = 31'

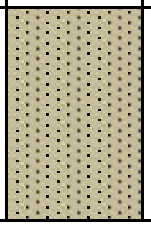
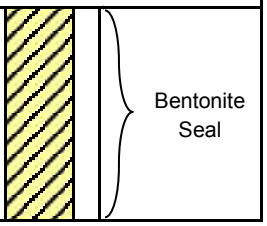
Location: U/L F Sec. 18 T20S R37E

Lat: 32°34'34.421"N **Long:**103°17'41.692"W

County:Lea **State**:NM

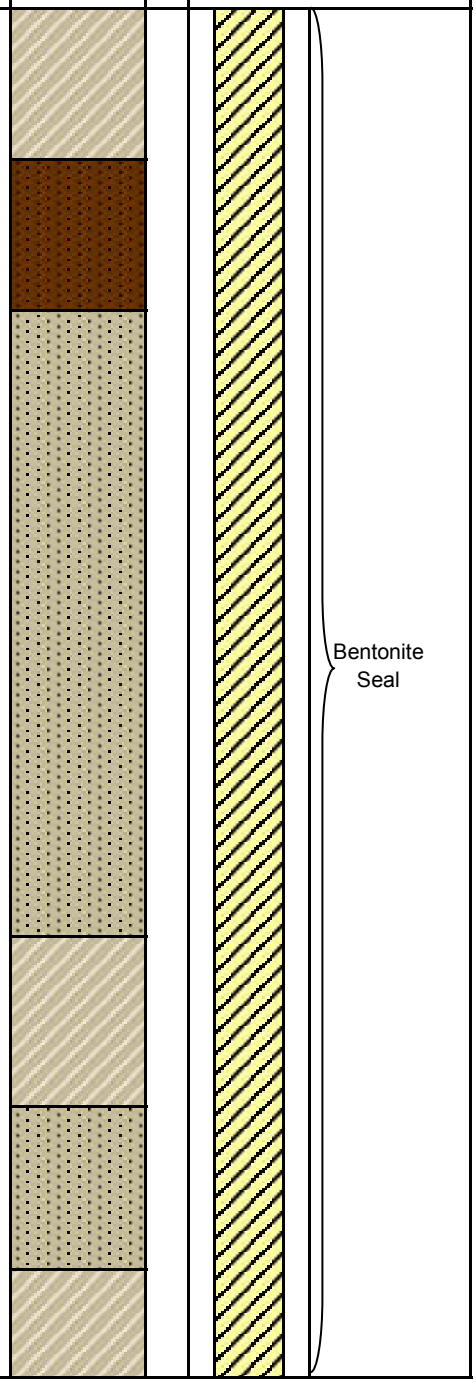
Depth (feet)	Chloride field tests	LAB	PID	Description
SS			56.3	Tan Sand/Caliche Rock
3 ft			21.9	Reddish Brown Sand/No Odor
6 ft			5.8	Tan Sand/Caliche Rock
9 ft			5.6	Tan Sand
12 ft			17.6	Brown sand
15 ft			73.2	Tan Sand/Caliche Rock
18 ft			84.3	
21 ft		GRO <100	23.9	Tan Sand
		DRO 636		
24 ft		GRO <10	15.6	
		DRO 243		

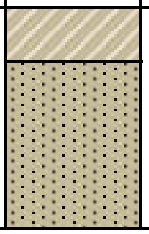
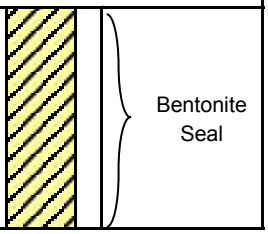


Depth (feet)	Chloride field tests	LAB	PID	Description		Lithology		Well Construction
				Tan Sand				
27 ft		GRO 66.6	14.2					
		DRO 828						

Logger:	Amber Groves		RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison&Cooper, Inc.		**Project Name:** EME F-18 EOL **Well ID:** SB-2
Drilling Method:	Air Rotary		**Project Consultant:** RECS
Start Date:	7/14/2014		
End Date:	7/14/2014		
Comments: PID readings taken only. SB-2 was installed 17' north of the former junction box. **DRAFTED BY:** C. Uršanić TD = 27' GW = 31'			**Location:** UL/ F Sec. 18 T-20-S R-37-E **Lat:** 32°34'34.489"N **County**:Lea **Long:**103°17'41.696"W **State**:NM

Depth (feet)	Chloride field tests	LAB	PID	Description
SS			0.3	Tan Sand/Caliche Rock/Sandstone
3 ft			1.4	Brown Loamy Sand
6 ft			58.8	Tan Sand
9 ft			134.8	
12 ft			104.2	
15 ft			161.2	
18 ft	B <0.2 T 0.362	GRO 336	388.9	Tan Sand/Sandstone
	E 1.48 X 2.55	DRO 4710		
21 ft			209.4	Tan Sand
24 ft			344.6	Tan Sand/Sandstone



Depth (feet)	Chloride field tests		LAB	PID	Description		Lithology		Well Construction
					Tan Sand/Sandstone				
27 ft	B <0.1	T 0.113	GRO 13.2	147.1	Tan Sand				
	E 0.317	X 0.58	DRO 260						

Logger:	Amber Groves	SB3	RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison&Cooper Inc.	SB2	
Drilling Method:	Air Rotary	SB1	**Project Name:** EME F-18 EOL **Well ID:** SB-3
Start Date:	7/14/2014		**Project Consultant:** RECS
End Date:	7/14/2014		

Comments:PID readings were taken from cuttings. SB-3 was installed 24' north of the former junction box.

DRAFTED BY:C. Uršanić

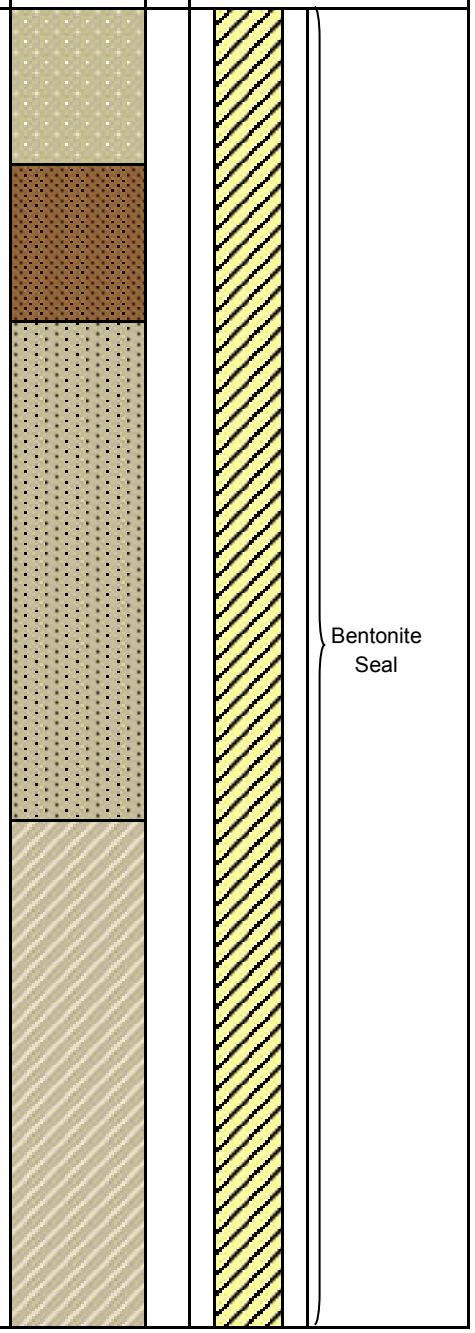
TD = 27' GW = 31'

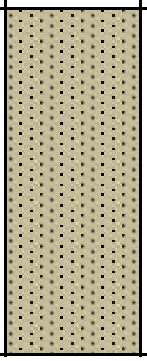
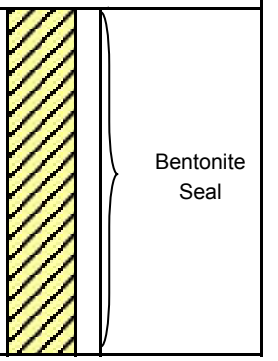
Location: UL/F Sec. 18 T-20-S R-37-E

Lat: 32°34'34.563"N **Long:**103°17'41.68"W

County:Lea **State**:NM

Depth (feet)	Chloride field tests	LAB	PID	Description
SS			11.6	Tan Sand/Caliche Rock
3 ft			427.3	Brown Loamy Sand
6 ft			404.2	Tan Sand
9 ft	B <0.2 T 0.326	GRO 423	450.6	
	E 2.11 X 3.74	DRO 5760		
12 ft			272.7	
15 ft			172.2	Tan Sand/Sandstone
18 ft			142.9	
21 ft			342.8	

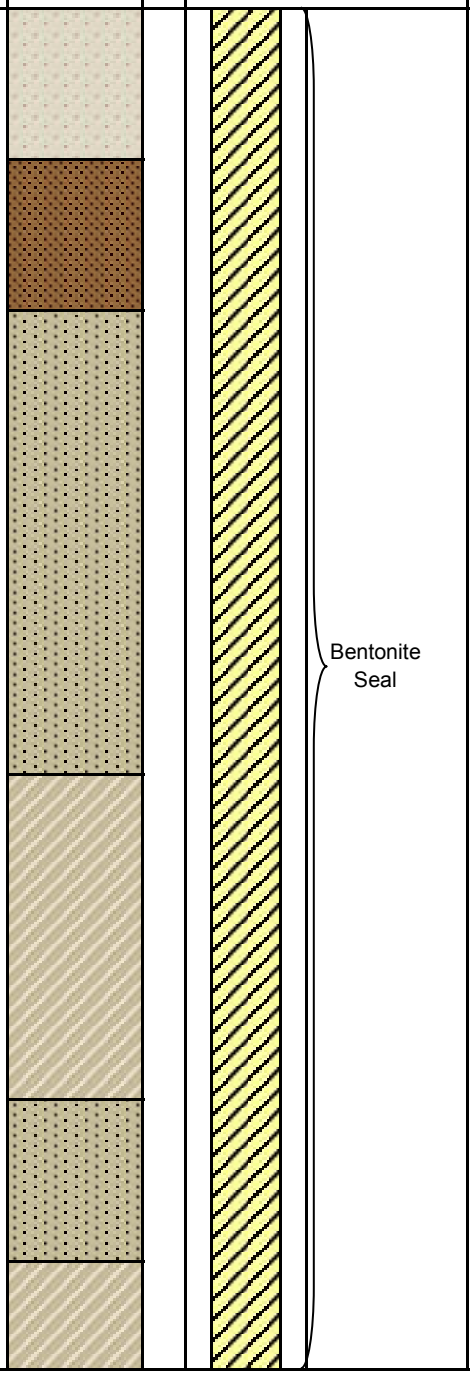


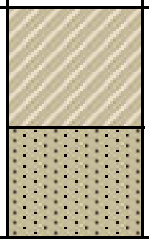
Depth (feet)	Chloride field tests		LAB	PID	Description		Lithology		Well Construction
24 ft				337.6	Tan Sand				
27 ft	B <0.2	T 0.22	GRO 427	221.4					
	E 1.98	X 3.67	DRO 4830						

Logger:	Amber Groves		RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison&Cooper Inc.		
Drilling Method:	Air Rotary		**Project Name:** EME F-18 EOL **Well ID:** SB-4
Start Date:	7/14/2014		
End Date:	7/14/2014		**Project Consultant:** RECS
Comments: PID readings taken from cuttings. SB-4 was installed 14' northeast of the former junction box. **DRAFTED BY:** C. Uršanić TD = 27' GW = 31'			**Location:** UL/ F Sec. 18 T-20-S R-37-E **Lat:** 32°34'34.371"N **Long:**103°17'41.557"W **County**:Lea **State**:NM

Depth (feet)	Chloride field tests	LAB	PID	Description
SS			3.4	Tan Sand/Caliche Rock
3 ft			4.7	Brown Loamy Sand
6 ft			8.5	Tan Sand
9 ft			10	
12 ft			32.7	
15 ft			195.9	Tan Sand/Sandstone
18 ft	B <0.1 T <0.1	GRO 110	303.4	
	E 0.454 X 0.833	DRO 1860		
21 ft			321.8	Tan Sand
24 ft	B <0.2 T 0.213	GRO 246	419.7	Tan Sand/Sandstone
	E 1.25 X 2.27	DRO 2780		

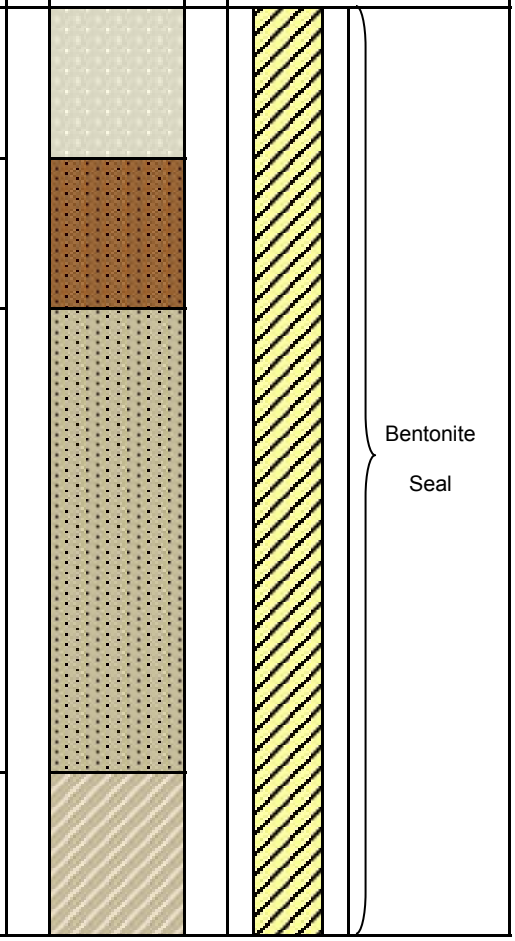
Lithology / Well Construction

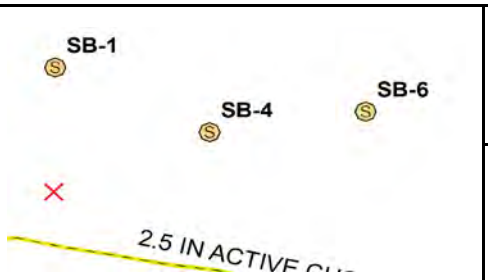


Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				Tan Sand/Sandstone		 Bentonite Seal
27 ft	B <0.1 T <0.1	GRO 95.8	289.4	Tan Sand		
	E 0.45 X 0.844	DRO 1660				

Logger:	Amber Groves		RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison&Cooper		
Drilling Method:	Air Rotary		**Project Name:** EME F-18 EOL **Well ID:** SB-5
Start Date:	7/14/2014		
End Date:	7/14/2014		**Project Consultant:** RECS
Comments: PID readings taken from cuttings. SB-5 installed 13' south of the former junction box. **DRAFTED BY:** C. Uršanić TD = 15' GW = 31'			**Location:** UL/F Sec. 18 T-20-S R-37-E **Lat:** 32°34'34.189"N **County**:Lea **Long:**103°17'41.684"W **State**:NM

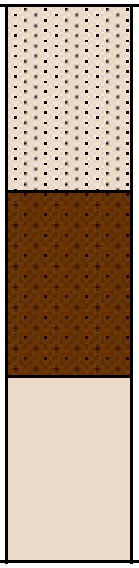
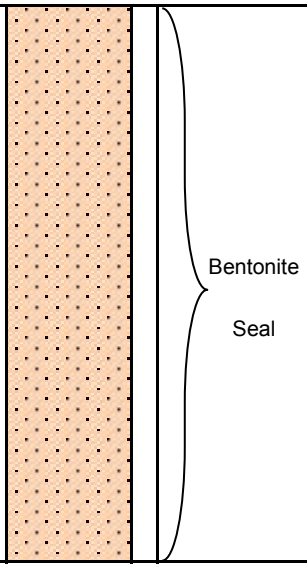
Depth (feet)	Chloride field tests	LAB	PID	Description
SS			3.3	Tan Sand/Caliche Rock
3 ft			10.9	Brown Sand
6 ft			11.8	Tan Sand
9 ft			13.4	
12 ft		GRO <10	9.1	
		DRO <10		
15 ft		GRO <10	7.4	Tan Sand/Sandstone
		DRO <10		



Logger:	Amber Groves		RECS RICE ENVIRONMENTAL CONSULTING & SAFETY
Driller:	Harrison & Cooper, Inc.		**Company:** ROC
Drilling Method:	Air rotary		**Project Name:** EME F-18 EOL **Well ID:** SB-6
Start Date:	9/8/2014		**Project Consultant:** RECS
End Date:	9/8/2014		

Comments: All samples taken from cuttings.SB-6 is located 24 FT NE of former junction box.
DRAFTED BY: Brian Cooper
TD = 6 FT GW = 31 FT

Location: UL/F, sec. 18, T-20-S, R-37-E
Lat: 32.576217 **County**: Lea
Long: -103.294839 **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
SS		GRO <10	1.2	Tan sand with caliche rock		
		DRO <10				
3 ft		GRO <200	1.2	Brown loamy sand		
		DRO 477				
6 ft		GRO <50	2.1	Tan sand		
		DRO <50				

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.			
		MODEL: PGM 7300	SERIAL NO: 590-000508
	X	MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM ____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : GAM-248-1004	EXPIRATION DATE: 6-7-16
METER READING ACCURACY: 100ppm	

COMPANY
Rice

SITE	UNIT	SECTION	TOWN SHIP	RANGE
EME F-18 EOL	F	18	20	37

SAMPLE ID	PID	SAMPLE ID	PID
SB1 @ Surface	56.3	SB2 @ Surface	0.3
SB1 @ 3'	21.9	SB2 @ 3'	1.4
SB1 @ 6'	5.8	SB2 @ 6'	58.8
SB1 @ 9'	5.6	SB2 @ 9'	134.8
SB1 @ 12'	17.6	SB2 @ 12'	104.2
SB1 @ 15'	73.2	SB2 @ 15'	161.2
SB1 @ 18'	84.3	SB2 @ 18'	388.9
SB1 @ 21'	23.9	SB2 @ 21'	209.4
SB1 @ 24'	15.6	SB2 @ 24'	344.6
		SB2 @ 27'	147.1

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Amber Groves DATE: 7/14/14

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.			
		MODEL: PGM 7300	SERIAL NO: 590-000508
	X	MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM ____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : GAM-248-1004	EXPIRATION DATE: 6-7-16
METER READING ACCURACY: 100ppm	

COMPANY
Rice

SITE	UNIT	SECTION	TOWN SHIP	RANGE
EME F-18 EOL	F	18	20	37

SAMPLE ID	PID	SAMPLE ID	PID
SB3 @ Surface	11.6	SB4 @ Surface	3.4
SB3 @ 3'	427.3	SB4 @ 3'	4.7
SB3 @ 6'	404.2	SB4 @ 6'	8.5
SB3 @ 9'	450.6	SB4 @ 9'	10
SB3 @ 12'	272.7	SB4 @ 12'	32.7
SB3 @ 15'	172.2	SB4 @ 15'	195.9
SB3 @ 18'	142.9	SB4 @ 18'	303.4
SB3 @ 21'	342.8	SB4 @ 21'	321.8
SB3 @ 24'	337.6	SB4 @ 24'	419.7
SB3 @ 27'	221.4	SB4 @ 27'	289.4

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Amber Graves DATE: 7/14/14

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.		MODEL: PGM 7300	SERIAL NO: 590-000508
	X	MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM _____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : GAM-248-1004	EXPIRATION DATE: 6-7-16
METER READING ACCURACY: 100ppm	

COMPANY
Rice

SITE	UNIT	SECTION	TOWN SHIP	RANGE
EME F-18 EOL	F	18	20	37

SAMPLE ID	PID	SAMPLE ID	PID
SB5 @ Surface	3.3		
SB5 @ 3'	10.9		
SB5 @ 6'	11.8		
SB5 @ 9'	13.4		
SB5 @ 12'	9.1		
SB5 @ 15'	7.4		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Amber Graves DATE: 7/14/14

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM ____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : GAM-248-1004	EXPIRATION DATE: 6-7-16
METER READING ACCURACY: 100ppm	

COMPANY
Rice

SITE	UNIT	SECTION	TOWN SHIP	RANGE
EME F-18 EOL	F	18	20S	37E

SAMPLE ID	PID	SAMPLE ID	PID
SB1 @ 27'	14.2		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Amber Groves DATE: 7/16/14

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM _____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : GAM-248-1004	EXPIRATION DATE: 6-7-16
METER READING ACCURACY: 100ppm	

COMPANY
Rice

SITE	UNIT	SECTION	TOWN SHIP	RANGE
EME F-18 EOL	F	18	20	37

SAMPLE ID	PID	SAMPLE ID	PID
SB6 @ Surface	1.2		
SB6 @ 3'	1.2		
SB6 @ 6'	2.1		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Jennifer Chaves DATE: 9/8/14

CARDINAL Laboratories

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

July 15, 2014

KYLE NORMAN

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME F-18 EOL

Enclosed are the results of analyses for samples received by the laboratory on 07/14/14 16:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-13-5. 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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 1 @ 21' (H402141-01)

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	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**636**	100	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane	*128 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*162 %*	*63.6-154*

Sample ID: SB 1 @ 24' (H402141-02)

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	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**243**	10.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane	*126 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*140 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 2 @ 18' (H402141-03)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.200	0.200	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	**0.362**	0.200	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**1.48**	0.200	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**2.55**	0.600	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**4.39**	1.20	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *162 %* *89.4-126*

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	**336**	100	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**4710**	100	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *136 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *314 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 2 @ 27' (H402141-04)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.100	0.100	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	**0.113**	0.100	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**0.317**	0.100	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**0.580**	0.300	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**1.01**	0.600	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *133 %* *89.4-126*

TPH 8015M mg/kg Analyzed By: MS

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	**13.2**	10.0	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**260**	10.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *125 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *137 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 3 @ 9' (H402141-05)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.200	0.200	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	**0.326**	0.200	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**2.11**	0.200	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**3.74**	0.600	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**6.29**	1.20	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *185 %* *89.4-126*

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	**423**	100	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**5760**	100	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *147 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *324 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 3 @ 27' (H402141-06)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.200	0.200	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	**0.220**	0.200	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**1.98**	0.200	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**3.67**	0.600	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**5.87**	1.20	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *193 %* *89.4-126*

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	**427**	200	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**4830**	200	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *138 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *305 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 4 @ 18' (H402141-07)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.100	0.100	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	<0.100	0.100	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**0.454**	0.100	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**0.833**	0.300	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**1.29**	0.600	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *158 %* *89.4-126*

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	**110**	50.0	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**1860**	50.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *122 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *187 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 4 @ 24' (H402141-08)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.200	0.200	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	**0.213**	0.200	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**1.25**	0.200	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**2.27**	0.600	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**3.73**	1.20	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *174 %* *89.4-126*

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	**246**	100	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**2780**	100	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *128 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *209 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 4 @ 27' (H402141-09)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.100	0.100	07/15/2014	ND	1.95	97.5	2.00	6.70	
Toluene*	<0.100	0.100	07/15/2014	ND	1.96	98.0	2.00	4.51	
Ethylbenzene*	**0.450**	0.100	07/15/2014	ND	1.98	99.0	2.00	4.74	
Total Xylenes*	**0.844**	0.300	07/15/2014	ND	6.10	102	6.00	4.88	
Total BTEX	**1.29**	0.600	07/15/2014	ND					

Surrogate: 4-Bromofluorobenzene (PID *162 %* *89.4-126*

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	**95.8**	50.0	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	**1660**	50.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane *117 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *169 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/14/2014	Sampling Date:	07/14/2014
Reported:	07/15/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 5 @ 12' (H402141-10)

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	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	<10.0	10.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane	*127 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*132 %*	*63.6-154*

Sample ID: SB 5 @ 15' (H402141-11)

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	07/15/2014	ND	182	90.8	200	1.69	
DRO >C10-C28	<10.0	10.0	07/15/2014	ND	190	94.8	200	6.55	

Surrogate: 1-Chlorooctane	*118 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*124 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene

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

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

RUSH

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: Kyle Norman	P.O. #:
Address:	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: EME F-18 EOL	State: Zip:
Project Location:	Phone #:
Sampler Name: Amber Groves	Fax #:

FOR LAB USE ONLY Lab I.D.	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	ANALYSIS REQUEST: Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS
H402141																				
1	SB1 @ 21ft	G	1			✓					✓		7-14-14	8:30		✓				
2	SB1 @ 24ft	G	1			✓					✓		7-14-14	9:35		✓				
3	SB2 @ 18ft	G	1			✓					✓		7-14-14	9:30		✓	✓			
4	SB2 @ 27ft	G	1			✓					✓		7-14-14	9:45		✓	✓			
5	SB3 @ 9ft	G	1			✓					✓		7-14-14	11:00		✓	✓			
6	SB3 @ 27ft	G	1			✓					✓		7-14-14	11:15		✓	✓			
7	SB4 @ 18ft	G	1			✓					✓		7-14-14	1:00		✓	✓			
8	SB4 @ 24ft	G	1			✓					✓		7-14-14	1:10		✓	✓			
9	SB4 @ 27ft	G	1			✓					✓		7-14-14	1:20		✓	✓			
10	SB5 @ 12ft	G	1			✓					✓		7-14-14	2:30		✓				

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: Amber Groves	Date: 7-14-14	Received By: Jodi Henson	Phone Result: ☐ Yes ☑ No Add'l Phone #:
	Time: 4:30		Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: email results knorman@rice-ecs.com hconder@rice-ecs.com; Lweinheimer@rice-ecs.com; kjones@riceswd.com; Lpena@riceswd.com; sedwards@rice-ecs.com agroves@rice-ecs.com ; phurts@rice-ecs.com
	Time:		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	4.3°C	Sample Condition Cool: Yes ☑ Intact: Yes ☑ / No ☐	CHECKED BY: (Initials)

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

Pg 1 of 2

RUSH

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: Kyle Norman	P.O. #:
Address:	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: EME F-18EOL	State: Zip:
Project Location:	Phone #:
Sampler Name: Amber Groves	Fax #:

FOR LAB USE ONLY Lab I.D.	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
H40 2141	SB5@15ft	G	1			✓					✓		7/14/14	2:45		✓				

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: Amber Groves	Date: 7/14/14	Received By: Brad Henson	Phone Result: ☐ Yes ☑ No Add'l Phone #:
	Time: 4:30		Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: email results knorman@rice-ecs.com hconder@rice-ecs.com; Lweinheimer@rice-ecs.com; kjones@riceswd.com; Lpena@riceswd.com; sedwards@rice-ecs.com agroves@rice-ecs.com; phurks@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

#54 pg. 2052

CARDINAL Laboratories

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

July 21, 2014

KYLE NORMAN

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME F-18 EOL

Enclosed are the results of analyses for samples received by the laboratory on 07/16/14 15:50.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-13-5. 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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	07/16/2014	Sampling Date:	07/14/2014
Reported:	07/21/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 1 @ 27' (H402164-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	**66.6**	50.0	07/18/2014	ND	189	94.3	200	2.51	
DRO >C10-C28	**828**	50.0	07/18/2014	ND	210	105	200	4.14	

Surrogate: 1-Chlorooctane	*99.4 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*138 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

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

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene

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: Kyle Norman	P.O. #:
Address:	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: EME F-18 EOL	State: Zip:
Project Location:	Phone #:
Sampler Name: Amber Groves	Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	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
H402164-1	SB1 @ 27ft	G	1			✓					✓		7-14-14	8:40		✓				

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: Amber Groves	Date: 7-16-14	Received By: Jodi Henson	
	Time: 3:50		
Relinquished By:	Date:	Received By:	
	Time:		

Phone Result: ☐ Yes ☑ No Add'l Phone #:
Fax Result: ☐ Yes ☑ No Add'l Fax #:
REMARKS:

email results
Knorman@rice-ecs.com
Kjones@riceswd.com; jkamplain@rice-ecs.com
hconder@rice-ecs.com; Lweinheimer@rice-ecs.com;
sedwards@rice-ecs.com; lflores@rice-ecs.com; agroves@rice-ecs.com

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

#54

CARDINAL Laboratories

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

September 09, 2014

KYLE NORMAN

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME F-18 EOL

Enclosed are the results of analyses for samples received by the laboratory on 09/08/14 14:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-13-5. 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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	09/08/2014	Sampling Date:	09/08/2014
Reported:	09/09/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 6 @ SURFACE (H402781-01)

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	09/09/2014	ND	168	84.2	200	0.658	
DRO >C10-C28	<10.0	10.0	09/09/2014	ND	194	97.0	200	3.28	

Surrogate: 1-Chlorooctane	*97.0 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*106 %*	*63.6-154*

Sample ID: SB 6 @ 3' (H402781-02)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<200	200	09/09/2014	ND	168	84.2	200	0.658	
DRO >C10-C28	**477**	200	09/09/2014	ND	194	97.0	200	3.28	

Surrogate: 1-Chlorooctane	*99.0 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*136 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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
KYLE NORMAN
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	09/08/2014	Sampling Date:	09/08/2014
Reported:	09/09/2014	Sampling Type:	Soil
Project Name:	EME F-18 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB 6 @ 6' (H402781-03)

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	09/09/2014	ND	168	84.2	200	0.658	
DRO >C10-C28	<50.0	50.0	09/09/2014	ND	194	97.0	200	3.28	

Surrogate: 1-Chlorooctane	*99.8 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*105 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

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

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 client for 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 thirty (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 the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celey D. Keene, Lab Director/Quality Manager

RUSH

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
Project Manager:	Kyle Norman
Address:	
City: Hobbs	State: NM Zip: 88240
Phone #:	Fax #:
Project #:	Project Owner:
Project Name:	EME F-18 EOL
Project Location:	
Sampler Name:	Amber Groves

BILL TO

P.O. #:	
Company:	
Attn:	
Address:	
City:	
State: Zip:	
Phone #:	
Fax #:	

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	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
H402781																				
1	SB6 @ Surface	G	1			✓							9-8-14	9:00		✓				
2	SB6 @ 3ft	G	1			✓							9-8-14	9:05		✓				
3	SB6 @ left	G	1			✓							9-8-14	9:10		✓				

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 consequental 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: Amber Groves	Date: 9-8-14 Time: 2:30	Received By: Jodi Henson	
Relinquished By:	Date: Time:	Received By:	

Delivered By: (Circle One)
Sampler - UPS - Bus - Other: 4.2°C

Sample Condition: Cool: ☑ Yes ☐ No; Intact: ☑ Yes ☐ No
CHECKED BY: (Initials)

Phone Result: ☐ Yes ☑ No Add'l Phone #:
Fax Result: ☐ Yes ☑ No Add'l Fax #:
REMARKS:

email results
Knorman@rice-ecs.com
Kjones@riceswd.com; jkamplain@rice-ecs.com
hconder@rice-ecs.com; Lweinheimer@rice-ecs.com;
sedwards@rice-ecs.com; lflores@rice-ecs.com; agroves@rice-ecs.com
cwsanic@rice-ecs.com

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

#454

EME F-18 EOL

Unit F, Section 18, T20S, R37E

Drilling SB-1, facing north 7/14/14

Plugging SB-1 in total with bentonite 7/14/14

Completed SB-1 7/14/14

Drilling SB-2, facing south 7/14/14

Plugging SB-2 in total with bentonite 7/14/14

Completed SB-2 7/14/14

Drilling SB-3, facing north 7/14/14

Plugging SB-3 in total with bentonite 7/14/14

Completed SB-3 7/14/14

Drilling SB-4, facing southeast 7/14/14

Plugging SB-4 in total with bentonite 7/14/14

Completed SB-4 7/14/14

Drilling SB-5, facing southeast 7/14/14

Plugging SB-5 in total with bentonite 7/14/14

Completed SB-5 7/14/14

Drilling SB-6, facing southwest 9/8/14

Plugging SB-6 in total with bentonite 9/8/14

SB-6 completed 9/8/14

Appendix B

Multimed Documentation

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948 Hobbs, NM 88241
Phone 575.393.2967

MULTIMED V1.01 DATE OF CALCULATIONS: 25-NOV-2014 TIME: 9: 6: 5

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED (Version 1.50, 2005)

1
Run options
--- -------

Rice EME F-18 EOL

1R427-167
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
------- ------
Van Genuchten functional coefficients
User defined coordinate system
1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY
1	1.22	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	1.22	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 MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	1.22	-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 MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS 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 MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.152E-01	-999.	-999.	-999.
Area of waste disposal unit	m^2	CONSTANT	6.00	-999.	-999.	-999.
Duration of pulse	yr	DERIVED	0.100E-08	-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	0.500E-01	0.000	0.000	0.000
Initial concentration at landfill	mg/l	CONSTANT	3.67	-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

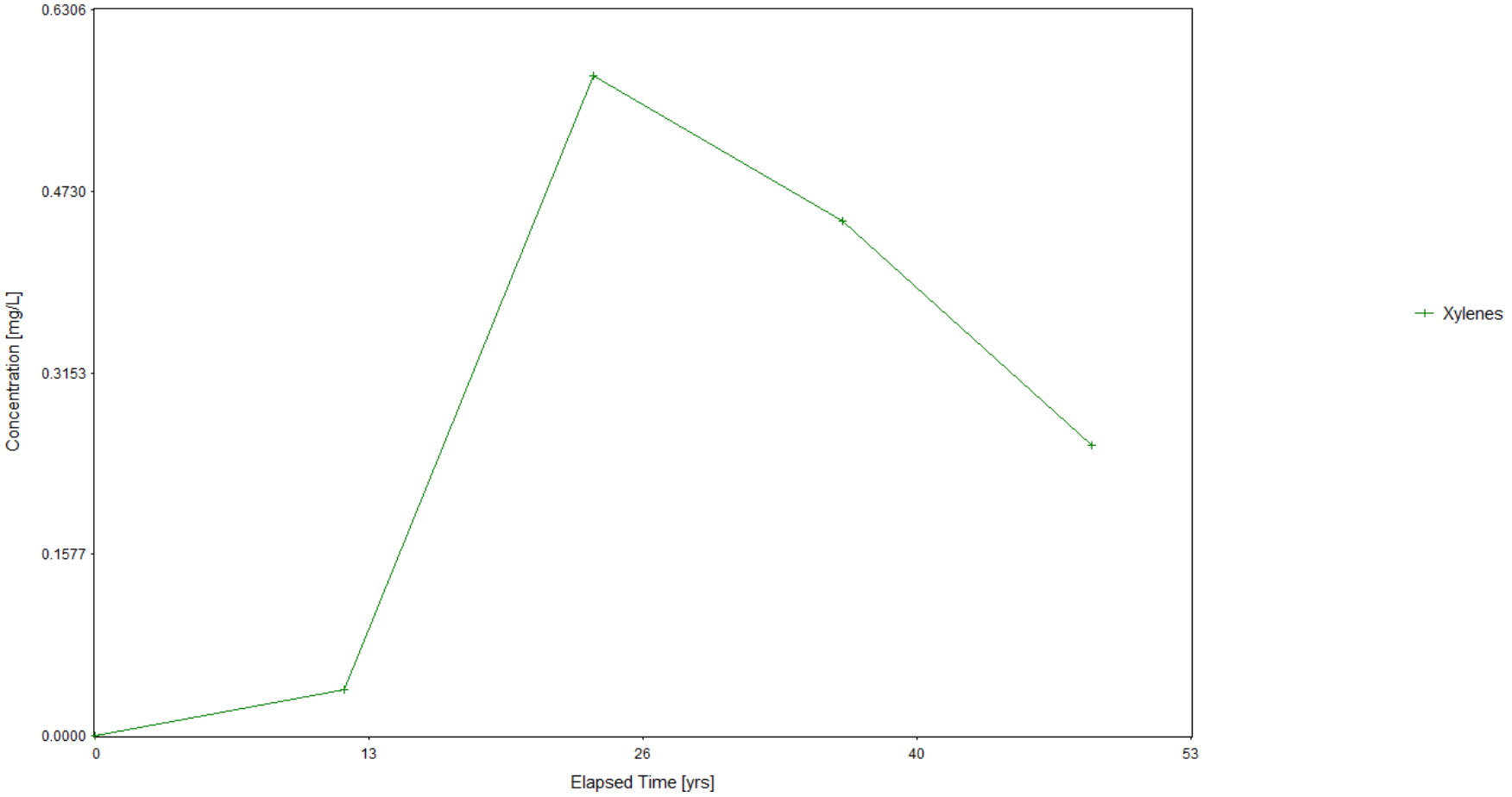
VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	-999.	-999.	-999.	-999.
Aquifer porosity	--	CONSTANT	0.300	-999.	-999.	-999.
Bulk density	g/cc	CONSTANT	1.86	-999.	-999.	-999.
Aquifer thickness	m	CONSTANT	6.10	-999.	-999.	-999.
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	-999.	-999.
Conductivity (hydraulic)	m/yr	CONSTANT	315.	-999.	-999.	-999.
Gradient (hydraulic)		CONSTANT	0.300E-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
0.000E+00	0.00000E+00
0.120E+02	0.40213E-01
0.240E+02	0.57331E+00
0.360E+02	0.44675E+00
0.480E+02	0.25201E+00

Xylenes Concentration At The Receptor Well

Rice EME F-18 EOL



EME F-18 EOL
Unit F, Section 18, T20S, R37E
Depth to GW: 31 ft
Proposed Liner: 34x41 ft

SB1

	Field	Lab	
	PID	GRO	DRO
SS	56.3		
3	21.9		
6	5.8		
9	5.6		
12	17.6		
15	73.2		
18	84.3		
21	23.9	<100	636
24	15.6	<10	243
27	14.2	66.6	828

SB2

	Field	Lab					
	PID	GRO	DRO	Benzene	Toluene	Ethyl-Benzene	Xylene
SS	0.3						
3	1.4						
6	58.8						
9	134.8						
12	104.2						
15	161.2						
18	388.9	336	4,710	<0.2	0.362	1.48	2.55
21	209.4						
24	344.6						
27	147.1	13.2	260	<0.1	0.113	0.317	0.580

SB3

	Field	Lab					
	PID	GRO	DRO	Benzene	Toluene	Ethyl-Benzene	Xylene
SS	11.6						
3	427.3						
6	404.2						
9	450.6	423	5,760	<0.2	0.326	2.11	3.74
12	272.7						
15	172.2						
18	142.9						
21	342.8						
24	337.6						
27	221.4	427	4,830	<0.2	0.220	1.98	3.67

SB4

	Field	Lab					
	PID	GRO	DRO	Benzene	Toluene	Ethyl-Benzene	Xylene
SS	3.4						
3	4.7						
6	8.5						
9	10						
12	32.7						
15	195.9						
18	303.4	110	1,860	<0.1	<0.1	0.454	0.833
21	321.8						
24	419.7	246	2,780	<0.2	0.213	1.25	2.27
27	289.4	95.8	1,660	<0.1	<0.1	0.450	0.844

SB5

	Field	Lab	
	PID	GRO	DRO
SS	3.3		
3	10.9		
6	11.8		
9	13.4		
12	9.1	<10	<10
15	7.4	<10	<10

SB6

	Field	Lab	
	PID	GRO	DRO
SS	1.2	<10	<10
3	1.2	<200	477
6	2.1	<50	<50

Max Xylene Concentration	3.67	mg/kg
Depth of Max Xylene Concentration	27	ft
Depth to GW - Average Depth	4	ft

General						
1	Title					EME F-18 EOL
2	Application Type					Generic
3	Run Type					Deterministic
4	Source Type					Transient
5	Aquifer Source Patch					Gaussian
6	Active Modules					Unsaturated Zone
						Saturated Zone
Source						
7	Source Area			5.95	m^2	Area
8	Source Length	8	ft	2.44	m	Length
9	Source Width	8	ft	2.44	m	Width
10	Source Infiltration Rate	0.6	in	0.01524	m/yr	Poor Liner
11	Outside Recharge Rate				m/yr	0
12	Initial Leachate Concentration			3.67	mg/L	Max Concentration
13	Source Duration				yrs	Derive
14	Source Decay Coefficient				1/yr	5.0%
15	Initial Spread of Source				m	Derive
Chemical						
16	Chemical Name					Xylenes
17	Dissolved Decay Coefficients				1/yr	Derive
18	Sorbed Phase Decay Coef.				1/yr	Derive
19	Overall Aquifer Decay Coef.				1/yr	Derive
20	Acid Catalyzed Rate				l/mole-yr	0
21	Neutral Rate				1/yr	0
22	Base Catalyzed Rate				l/mole-yr	0
23	Reference Temperature				deg C	25
24	Normalized Distribution Coef.				ml/g	0
25	Aquifer Distribution Coef.				ml/g	Derive
Unsaturated Zone Flow						
26	Layer Thickness and Material Number	4	ft	1.22	m	distance to gw
27	Saturated Hydraulic Conductivity				cm/hr	3.6
28	Effective Porosity				fraction	0.25
29	Air Entry Pressure Head				m	0.7
30	Residual Water Content				fraction	0.116
31	van Genuchten Alpha				1/cm	0.005
32	van Genuchten Beta				fraction	1.09
33	Brooks and Corey Exponent				fraction	-------
Unsaturated Zone Transport						
34	Transport Layer Thickness	4	ft	1.22	m	distance to gw
35	Longitudinal Dispersivity				m	Derive
36	Percent Organic Matter				%	0
37	Bulk Density				g/cm^3	1.99

38	Biological Decay Coefficient				1/yr	0
	Saturated Zone Flow					
39	Aquifer Thickness	20	ft	6.10	m	Aquifer Thickness
40	Mixing Zone Thickness				m	Derive
41	Effective Porosity				fraction	0.3
42	Bulk Density				g/cm^3	1.855
43	Saturated Hydraulic Conductivity				m/yr	315
44	Hydraulic Gradient				fraction	0.003
45	Seepage Velocity				m/yr	Derive
46	Longitudinal Dispersivity				m	Derive
47	Transverse Dispersivity				m	Derive
48	Vertical Dispersivity				m	Derive
49	Aquifer Temperature				deg C	20
50	Aquifer pH					7
51	Fraction Organic Carbon				fraction	0
52	Retardation Factor				fraction	Derive
53	Biological Decay Coefficient				1/yr	0
	Well Location and Time					
54	Radial Distance to Well				m	1
55	Angle Off Plume Axis				degree	0
56	Well Screen Depth Fraction				fraction	0
57	Time Step Option					Max Concentration
						Time Intervals
	Run Project					
						0.573 mg/L at 24 years