1R-427-14

WORKPLANS

Date:

5-16-12

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 0000 4569 9675

May 16th, 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: **CAP Report for Vadose Zone Remediation and Proposed Groundwater Remedy**
Rice Operating Company – EME SWD System
EME D-2 boot (1R427-14): UL/D sec. 2 T20S R36E
(formerly the EME M-35-2 boot)

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. The site was previously referred to as the EME M-35-2 boot at T19S R36E. However, GIS mapping shows the site to be located within unit letter D, section 2, Township 20S, and Range 36E. To reflect the geographical location of the site, the name has been changed to the EME D-2 boot at T20S R36E. All correspondence will reference EME D-2 boot.

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 4 miles southwest of Monument, New Mexico at UL/D sec. 2 T20S R36E as shown on the Geographical Location Map (Figure 1). Monitor well sampling conducted at the site shows groundwater to be located at 51 +/- feet.

In 2003, ROC initiated work on the former EME D-2 boot junction box. The site was delineated using a backhoe to form a trench and soil samples were screened at regular intervals for both hydrocarbons and chlorides. From the excavation, a bottom grab sample was taken to a commercial laboratory for analysis. Laboratory tests of the 12 ft bottom grab sample showed a chloride laboratory reading of 2,690 mg/kg and negligible GRO (gasoline range organics), DRO (diesel range organics), and BTEX readings. The

trench was backfilled with the excavated soils and capped with approximately 3 feet of topsoil.

The area was contoured to the surrounding landscape and an identification plate was placed on the surface of the site to mark its location for future environmental considerations. NMOCD was notified of potential groundwater impact on July 31st, 2003 and a junction box disclosure report was submitted to NMOCD with all the 2003 junction box closures and disclosures. ROC proposed additional investigative work at the site to determine if there was potential for groundwater degradation from residual chlorides and hydrocarbons at the site.

As part of the Investigation and Characterization Plan (ICP) approved by NMOCD on September 13th, 2011, eight soil bores were advanced through the former junction box site on August 29th and 31st, 2011. ROC personnel field tested the soil for chlorides and screened in the field with a photo-ionization detector (PID) for hydrocarbons. Representative samples from the bores were taken to a commercial laboratory for confirmation of chloride and hydrocarbon field numbers. Laboratory readings showed chloride numbers increasing with depth at the source bore, SB-1. In all the other bores, laboratory chloride readings decreased with depth. Laboratory GRO and DRO readings were low to non-detect in all the soil bores except for SB-4 at 5 ft bgs. In SB-4 at 5 ft bgs, the laboratory GRO reading was 67.2 mg/kg and the DRO reading was 556 mg/kg. Because the field sample for SB-4 at 5 ft bgs had a PID reading above 100 ppm, the sample was also submitted for BTEX analysis. The sample returned with a laboratory benzene reading of non-detect, a toluene reading of 0.153 mg/kg, an ethyl-benzene reading of 0.495 mg/kg and a xylene reading of 1.58 mg/kg.

On October 27th and 28th, 2011, two monitor wells and two additional soil bores were installed at the site. MW-1 is located 50 ft southeast of the former junction box and MW-2 is located 163 ft northwest of the former junction box site. As MW-2 was being installed, RECS personnel field tested the soil for chlorides and screened in the field with PID meter for hydrocarbons to determine background soil concentrations. As SB-9 and SB-10 were being advanced, RECS personnel field tested the soil for chlorides and screened in the field with a PID meter for hydrocarbons. Representative samples from the bores were taken to a commercial laboratory for confirmation of chloride and hydrocarbon field numbers. In SB-9, chloride numbers peaked at 10 ft bgs with a laboratory chloride reading of 2,240 mg/kg and decreased to 304 mg/kg at 45 ft bgs. In SB-10, chloride numbers peaked at 30 ft bgs with a laboratory chloride reading of 1,100 mg/kg and decreased to 304 mg/kg at 45 ft bgs. In both soil bores, GRO and DRO readings were non-detect.

An ICP Report and Corrective Action Plan was submitted to NMOCD on November 9th, 2011 and approved on November 21st, 2011. In the report, RECS recommended that ROC install a 20-mil reinforced poly liner measuring 51 ft x 62 ft. The liner would act as an infiltration barrier that would inhibit the downward migration of chlorides to groundwater. The liner would be installed at 5-4 ft bgs and padded both above and below with six inches of blow sand. The soils placed on top of the padded liner would have a

laboratory chloride reading below 500 mg/kg and a PID reading below 100 ppm. Excavated soil would be evaluated for use as backfill and any soils requiring disposal would be properly disposed of at a NMOCD approved facility. Soil amendments would be added as needed and the site would be seeded with a native vegetative mix. Vegetation above the liner would 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 to groundwater.

Groundwater samples would be obtained from the installed monitoring wells (MW-1 and MW-2) and analyzed on a quarterly basis. Once it was determined whether chloride impacts have occurred to groundwater beneath the site, ROC would either suggest a groundwater remedy or request site termination.

Vadose Zone CAP Activities

Beginning on March 16th, 2012, RECS personnel excavated the site to 51 ft x 62 ft x 5 ft deep (Figure 2). A total of 956 yards of excavated material was taken to a NMOCD approved facility for disposal. The bottom of the excavation was padded with 6 inches of clean, imported soil and a 51 ft x 62 ft, 20-mil reinforced poly liner was installed and properly seated at the base of the excavation. The top of the liner was padded with 6 inches of the clean, imported sand and a sample of the sand (import sand/wallach) was taken to a commercial laboratory for analysis. Laboratory chloride readings returned a result of 16 mg/kg. A total of 100 yards of sand was imported to the site to pad the liner. The excavation was then backfilled with imported caliche to 2 ft bgs. A total of 294 yards of caliche was imported to the site to serve as backfill. A sample of this caliche (imported caliche) was field tested for hydrocarbons and returned a result of 0.0 ppm. The sample was then taken to a commercial laboratory for analysis of chlorides and retuned a result of non-detect. A total of 502 yards of sand was imported to the site and used as a top cap to level the surface. A sample of this sand (imported blow sand) was field tested for hydrocarbons and returned a result of 0.4 ppm. The sample was then taken to a commercial laboratory for analysis of chlorides and returned a result of non-detect.

The site was seeded with a native seed blend and a silt net fence was placed around the site to maintain seed integrity. Laboratory results, PID analysis, and photo documentation of these activities can be found in Appendix A.

Groundwater Remedy

The monitor wells at the site have been sampled quarterly since their installation (Figure 3). During the most recent sampling event on February 15th, 2012, the near-source well (MW-1) had a laboratory chloride reading of 4,200 mg/L and the up gradient well (MW-2) had a laboratory chloride reading of 3,850 mg/L (Appendix B). It is evident that although the site is in a regionally impacted chloride area (Figure 4), the chlorides in the vadose zone have contributed slightly to the degradation of groundwater beneath the site. Therefore, ROC proposes to remove chloride impacted groundwater from the existing

groundwater recovery system located at EME L-6. Removed water will be used for pipeline and well maintenance. Our estimate conservatively reflects the net impact to groundwater at the site resulting from the former junction box site. It does not take into account other sources or regional conditions that may exist up gradient of the site.

- **Estimated chloride mass in the groundwater**
  The estimated impact area for the site is 3,162 square feet. The aquifer thickness is 15 ft and the porosity is estimated at 0.25. The volume of the impacted groundwater beneath the site is determined by multiplying the impact area by the aquifer thickness by the porosity. Therefore, the volume of impacted groundwater beneath the site is 11,857.50 cubic feet. The result is then converted to liters giving a value of 335,767 liters. The chloride concentration contributed from the source is the difference between the highest concentration in MW-1 and the lowest concentration in MW-2, which is determined to be 800 mg/L. The total chloride mass in the groundwater is then determined by multiplying the volume of impacted groundwater beneath the site by the chloride concentration contributed from the site. This then is converted to kilograms. Thus, the total chloride mass beneath the site is 269 kg.

Estimate of Chloride Mass in Groundwater

Parameter	Unit	Value	Description
Impact area	ft^2	3,162	Estimated Area of Impact
Aquifer Thickness	ft	15	NMOCD Approved Estimation
Porosity	%	0.25	Professional Estimate for Water Saturated Pore Volume
Volume of Impacted Groundwater Below Site	ft^3	11,857.50	Impact Area x Aquifer Thickness x Porosity
Volume of Impacted Groundwater Below Site	L	335,767	Conversion from ft^3 to Liters
Chloride Concentration from Source	mg/L	800	Difference between Concentrations in Monitor Wells (MW-1 = 4,650 mg/L and MW-2 = 3,850 mg/L)
TOTAL CHLORIDE MASS	**kg**	**269**	Volume of Impacted Groundwater Below Site x Chloride Concentration Added to Soil from Source

The recovery system located at EME L-6 is expected to extract one gallon a minute. Given the chloride concentration in MW-2R of 9,500 mg/L, approximately 178 barrels of groundwater will be required to remove 269 kg of chloride.

Estimated Groundwater Recovery System
Removal at the EME L-6

Parameter	Unit	Value	Description
Groundwater Concentration	mg/L	9,500	Groundwater Concentration from MW-2R
Groundwater Concentration	kg/gal	0.03596169	Conversion from mg/L to kg/gal
Pumping Rate	gals/min	1	Given
Extraction Rate	kg/min	0.03596169	Pumping rate x Groundwater Concentration (kg/gal)
Extraction Rate	kg/day	21.5770148	Conversion from kg/min to kg/day
Representative Total Chloride Mass	kg	269	From above
Volume Removal	gals	7,470	Pumping rate x Estimated Removal Time x 60 min/hour x 10 hr/day
Volume Removal	bbls	178	Conversion from gals to bbls
ESTIMATED REMOVAL TIME	**day**	**12**	Representative Total Chloride Mass/Extraction Rate

- **Estimated chloride mass in the vadose zone**
  With the infiltration barrier measuring 51 ft x 62 ft, that covered all soil bore points, we conclude that the chlorides remaining in the vadose zone will have little impact on the groundwater beneath the site. The infiltration barrier will prevent the vertical movement of water in the vadose zone thereby eliminating the path the chlorides take in moving to groundwater.

Upon the completed of the groundwater remedy, ROC will submit a written report that will include a request for 'remediation termination' 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

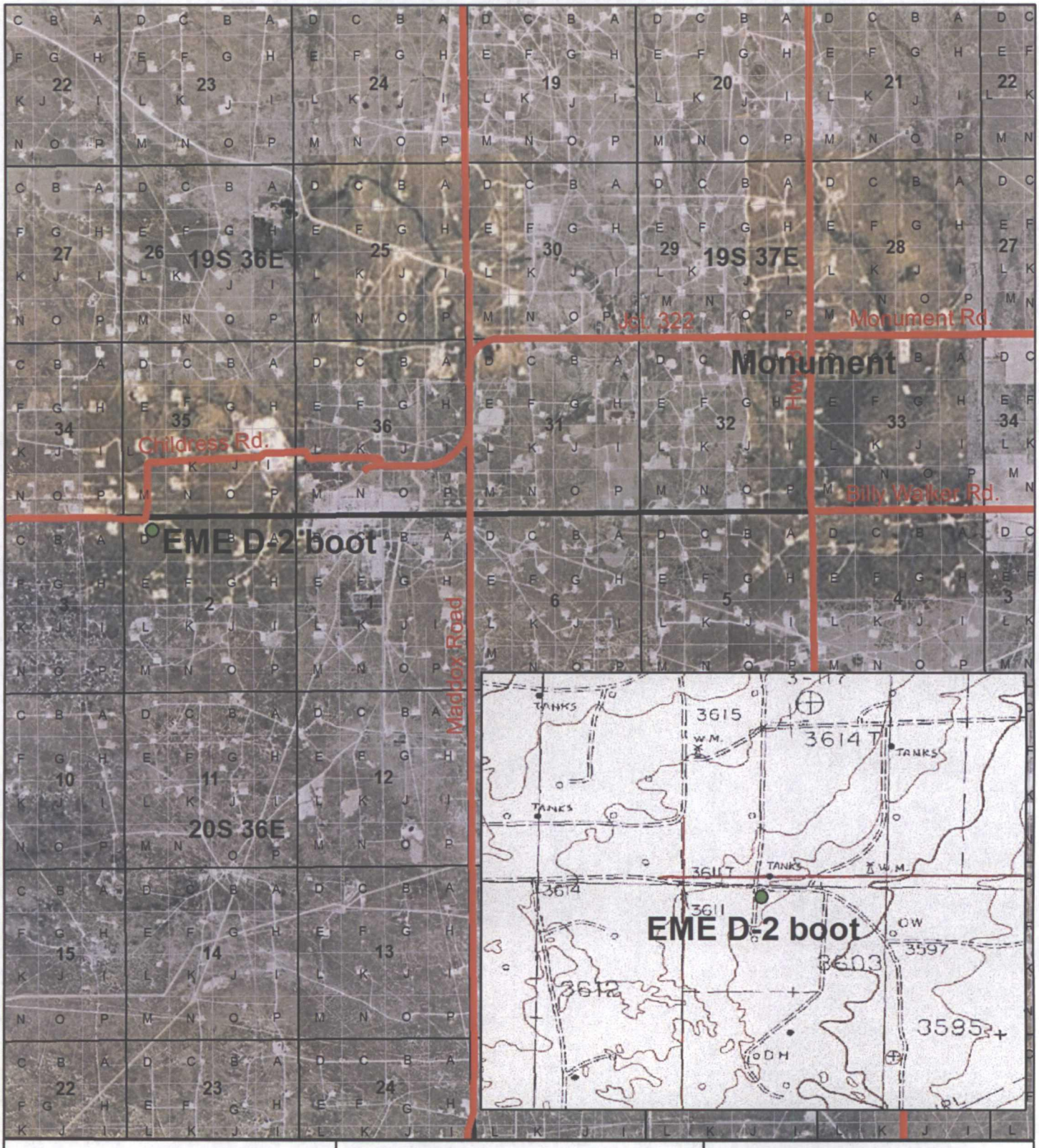
Attachments:

Figure 1 – Geographical Location Map
Figure 2 – NMOCD Approved Liner
Figure 3 – MW Sampling Data
Figure 4 – EME Groundwater Contamination
Appendix A – Vadose Zone Activities Documentation
Appendix B – MW Sampling Lab

Figures

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

Geographical Location Map



RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC — RECS

EME D-2 boot

LEGALS: UL/D sec. 2
T20S R36E

Case#: 1R427-14

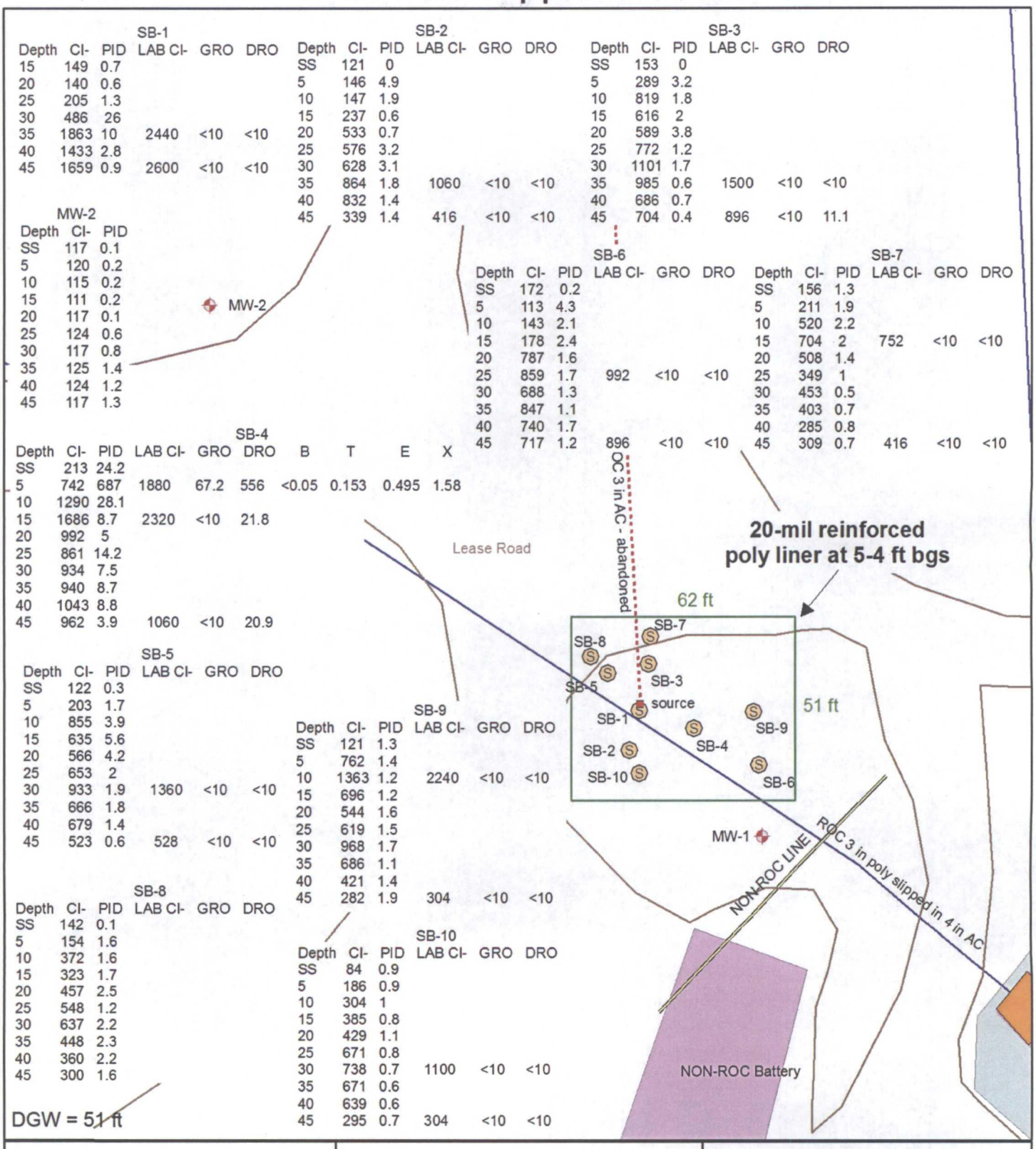
Figure 1

N W E S

0 0.3 0.6 1.2 Miles

Drawing date: 8-3-11
Drafted by: L. Weinheimer

NMOCD Approved Liner



RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

EME D-2 boot

LEGALS: UL/D sec. 2
T20S R36E

Case#: 1R427-14

Figure 2

N W E S

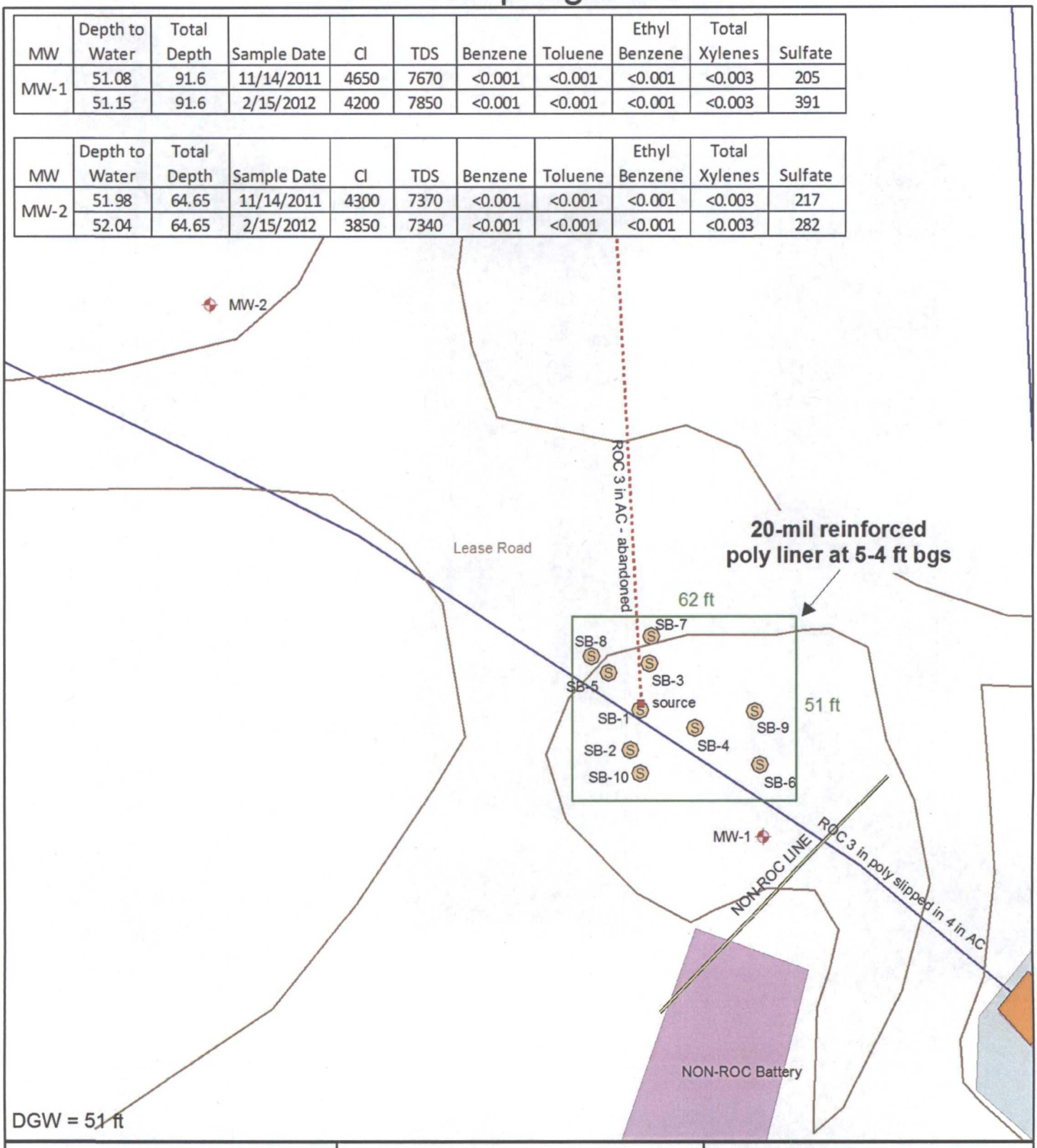
0 15 30 60 Feet

Drawing date: 11-4-11
Drafted by: L. Weinheimer

MW Sampling Data

MW	Depth to Water	Total Depth	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
MW-1	51.08	91.6	11/14/2011	4650	7670	<0.001	<0.001	<0.001	<0.003	205
	51.15	91.6	2/15/2012	4200	7850	<0.001	<0.001	<0.001	<0.003	391

MW	Depth to Water	Total Depth	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
MW-2	51.98	64.65	11/14/2011	4300	7370	<0.001	<0.001	<0.001	<0.003	217
	52.04	64.65	2/15/2012	3850	7340	<0.001	<0.001	<0.001	<0.003	282



RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

EME D-2 boot

LEGALS: UL/D sec. 2
T20S R36E

Case#: 1R427-14

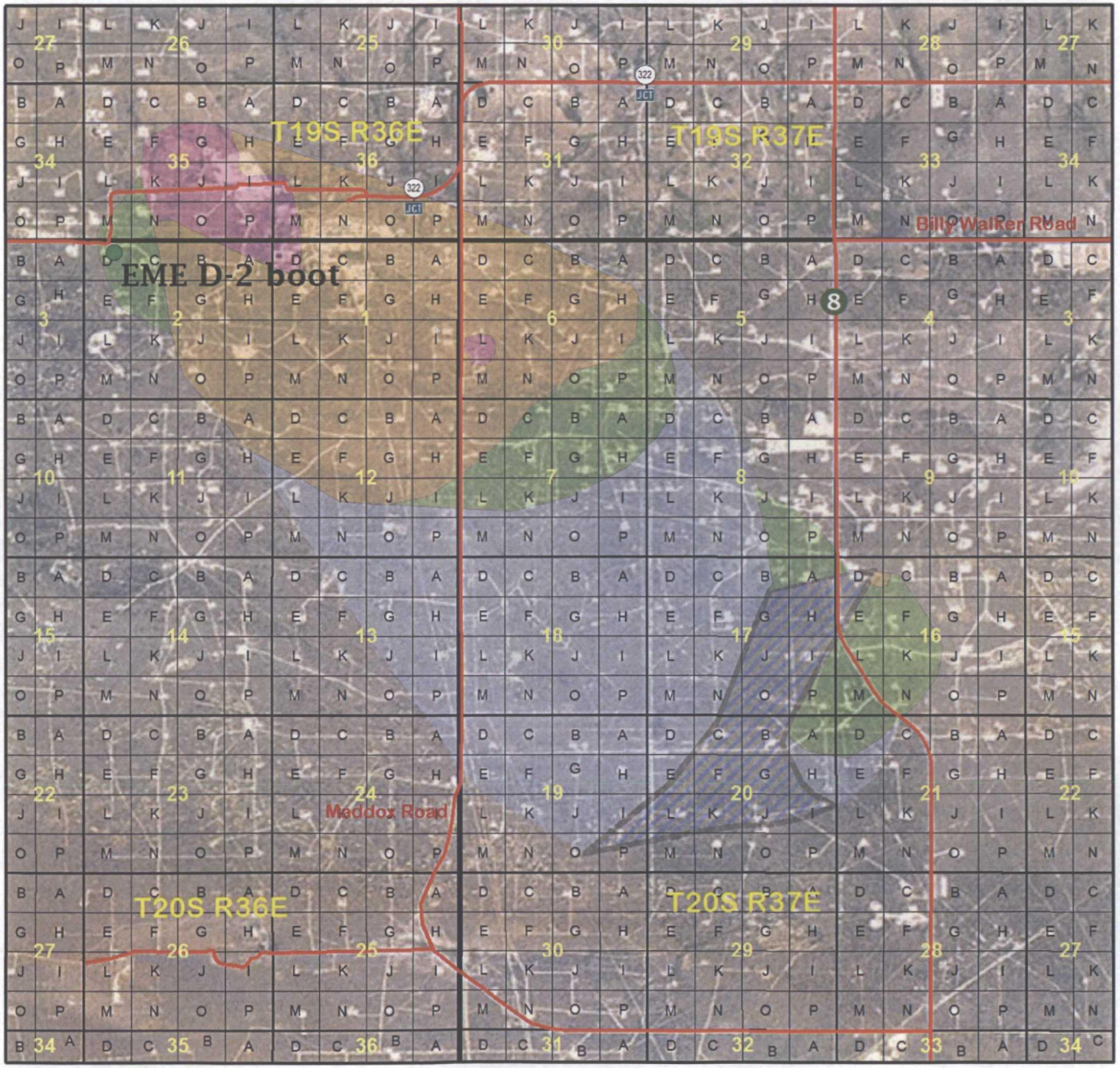
Figure 3

N W E S

0 15 30 60 Feet

Drawing date: 5-9-12
Drafted by: L. Weinheimer

EME Groundwater Contamination



RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC
RECS

122 W. Taylor
Hobbs, NM 88240
Phone (575) 393-9174
Fax (575) 397-1471

- Cl- concentration > 10,000
- 10,000 > Cl- concentration > 5,000
- 5,000 > Cl- concentration > 2,000
- 2,000 > Cl- concentration > 700
- Hypothetical Cl- contamination area

N
W E
S

0 0.5 1 Miles

This map was prepared for Rice Operating Company. This map represents the known chloride impact concentrations in the groundwater as of 2011. As conditions change and/or new monitor wells are added, the contamination plume will undergo permutations that will be reflected in future maps. Rice Operating Company does not assume any responsibility for the use of this information by others.

Drawing date: 12-15-09
Revision date: 5-1-12
Drafted by: Lara Weinheimer

Figure 4

Appendix A

Vadose Zone Activities Documentation

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

CARDINAL Laboratories

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

March 26, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME D-2 BOOT

Enclosed are the results of analyses for samples received by the laboratory on 03/23/12 8:10.

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:	03/23/2012	Sampling Date:	03/22/2012
Reported:	03/26/2012	Sampling Type:	Soil
Project Name:	EME D-2 BOOT	Sampling Condition:	** (See Notes)
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T20S-R36E-SEC2 D-LEA CTY., NM		

Sample ID: IMPORT SAND/WALLACH (H200707-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**16.0**	16.0	03/23/2012	ND	400	100	400	0.00	

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

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: ~~Apache~~ RICE	BILL TO	P.O. #:	
Project Manager: Zach Conder		Company:	
Address:		Attn:	
City: State: NM Zip:		Address:	
Phone #: Fax #:		City:	
Project #: Project Owner:		State: Zip:	
Project Name: EME D-2 BOOT		Phone #:	
Project Location:		Fax #:	
Sampler Name: TONY GRIECO			

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				
H2007107																								
1	Impact sand/wallack	C	1			✓							3/22/12	10:55	✓									

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: 3/23/12	Received By:	Phone Result: ☐ Yes ☑ No Add'l Phone #:
	Time: 8:10	Jodi Henson	Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: email results
	Time:		Zconder@rice-ecs.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)

† 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

March 29, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME - D2 - BOOT

Enclosed are the results of analyses for samples received by the laboratory on 03/28/12 9:45.

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:	03/28/2012	Sampling Date:	03/23/2012
Reported:	03/29/2012	Sampling Type:	Soil
Project Name:	EME - D2 - BOOT	Sampling Condition:	** (See Notes)
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	MONUMENT, NM		

Sample ID: IMPORTED BLOW SAND (H200733-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	03/28/2012	ND	416	104	400	0.00	

Sample ID: IMPORTED CALICHE (H200733-02)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	03/28/2012	ND	416	104	400	0.00	

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

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

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: ~~Apache Corp.~~ Rice	**BILL TO**
Project Manager: ~~Natalie Gladden~~ Hach Conder	P.O. #:
Address: ~~Apache Corp.~~	Company:
City: State: NM Zip:	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: EME-D2-Boot	State: Zip:
Project Location: Monument	Phone #:
Sampler Name: Roberto Para	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					
H200733																									
1	Imported Blow Sand	G	✓			✓						✓	3.23.12	8:00	✓										
2	Imported Caliche	G	✓			✓						✓	3.23.12	10:00	✓										

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: Roberto Para	Date: 3.23.12 Time: 9:45	Received By: Jodi Henson	
Relinquished By:	Date: Time:	Received By:	
Delivered By: (Circle One) Sampler - UPS - Bus - Other: 18°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
zconder@rice-ecs.com; Lweinheimer@rice-ecs.com
Hconder@riceswd.com; Bbaker@rice-ecs.com
~~Natalie.Gladden@usa.apachecorp.com~~

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

#26

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
		MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7320	SERIAL NO: 592-903318
	X	MODEL: PGM 7600	SERAIL NO: 110-013744

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : HAL-248-100-1	EXPIRATION: 7-1-2015
METER READING ACCURACY: 100 PPM	

ACCURACY : +/- 2%

COMPANY
Rice Operating Company

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
EME	D-2 boot	D	2	20S	36E

SAMPLE ID	PID	SAMPLE ID	PID
IMPORTED BLOW SAND	0.4		
IMPORTED CALICHE	0.0		

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

SIGNATURE: Roberto Rana

DATE: 3/23/12

RICE ENVIRONMENTAL
RECS
CONSULTING & SAFETY, LLC

PO Box 5630
Hobbs, NM 88241
Phone: (575) 393-4411
Fax: (575) 393-0293

VEGETATION FORM

1. General Information

Site name: EME D-2 Boot						
U/L D	Section 2	Township 20S	Range 36E	County Lea	Latitude N 32° 36.545'	Longitude W 103°19.865'
Contact Name ZACH CONDER						
Email Zconder@rice-ecs.com						
Site size: 5,600 SQFT			Map detail of site attached ☐			
Additional information:						

2. Soils **Do not rip caliche subsoils; caliche rocks brought to the surface by ripping shall be removed.*

Salvaged from site ☐	Bioremediated ☐	Imported ☒	Blended ☐	Depth (in):
Texture: Sandy	Describe soil & subsoil: Blow sand and subsoil caliche			
Soil prep methods:	Rip ☐ Depth(in):	Disc ☐ Depth (in):		Rollerpack ☐
Date completed: 3-26-12				

3. Bioremediation

Fertilizer ☐	Hay ☐	Other ☐ Describe:
Type:		
Lbs/acre:		

4. Seeding **Attach seed bag tags to this form. Seed bag tags shall contain the site name and S-T-R.*

Custom seed mix ☒	Prescribed mix ☐	Seed mix name: 5 lbs blue grama, 5 lbs side oats grama, 5 lbs horse oats	Seeding date: 4-10-12
Broadcast ☒ Method: mechanical seeder			
Soil conditions during seeding: Dry ☒ Damp ☐ Wet ☐			
Photos attached ☐ Number of photos:	Observations:		

5. Certification I hereby certify that the information in this form and attachments is true and complete to the best of my knowledge and belief.

Name: ROBERTO PARRA	Title: Environmental Tech.	Date: 4-10-12
Signature: Roberto Parra		

EME D-2 boot (1R427-14)
Unit Letter D, Section 2, T20S, R36E

Site prior to excavation, facing east 1/20/12

Excavating site, facing west-northwest 3/20/12

Excavation complete, facing west-northwest 3/21/12

Exporting soil, facing north-northwest 3/21/12

Importing blow sand, facing east 3/22/2012

Installed bottom 6" blow sand pad, facing southeast 3/21/12

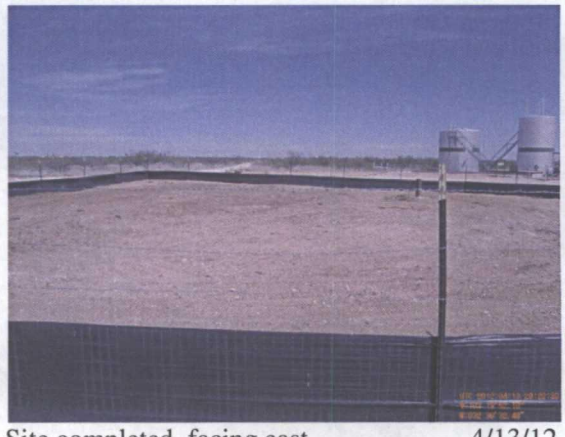
Installing 62 x 51 ft 20-mil reinforced liner, facing east 3/22/12

Installing top 6" blow sand pad above liner, facing northeast 3/22/12

Backfilling with imported caliche up to 4' BGS, facing south 3/23/12

Backfilling with imported top soil to ground surface, facing south 3/26/12

Seeding site, facing southeast 4/10/2012



Site completed, facing east 4/13/12

Appendix B

MW Sampling Lab

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

CARDINAL Laboratories

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

February 29, 2012

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME D-2 BOOT

Enclosed are the results of analyses for samples received by the laboratory on 02/20/12 10:36.

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:	02/20/2012	Sampling Date:	02/15/2012
Reported:	02/29/2012	Sampling Type:	Water
Project Name:	EME D-2 BOOT	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T20S-R36E-SEC2 D-LEA CTY., NM		

Sample ID: MONITOR WELL #1 (H200451-01)

BTEX 8021B mg/L **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	02/26/2012	ND	0.050	101	0.0500	6.76	
Toluene*	<0.001	0.001	02/26/2012	ND	0.052	104	0.0500	6.98	
Ethylbenzene*	<0.001	0.001	02/26/2012	ND	0.053	106	0.0500	6.60	
Total Xylenes*	<0.003	0.003	02/26/2012	ND	0.163	108	0.150	7.07	

Surrogate: 4-Bromofluorobenzene (PIL *105 %* *70.7-118*

Chloride, SM4500Cl-B mg/L **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride*	**4200**	4.00	02/22/2012	ND	100	100	100	0.00	

Sulfate 375.4 mg/L **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate*	**391**	10.0	02/28/2012	ND	18.8	94.0	20.0	9.62	

TDS 160.1 mg/L **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS*	**7850**	5.00	02/20/2012	ND	234	97.5	240	0.00	

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:	02/20/2012	Sampling Date:	02/15/2012
Reported:	02/29/2012	Sampling Type:	Water
Project Name:	EME D-2 BOOT	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T20S-R36E-SEC2 D-LEA CTY., NM		

Sample ID: MONITOR WELL #2 (H200451-02)

BTEX 8021B mg/L Analyzed By: AP

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	02/26/2012	ND	0.050	101	0.0500	6.76	
Toluene*	<0.001	0.001	02/26/2012	ND	0.052	104	0.0500	6.98	
Ethylbenzene*	<0.001	0.001	02/26/2012	ND	0.053	106	0.0500	6.60	
Total Xylenes*	<0.003	0.003	02/26/2012	ND	0.163	108	0.150	7.07	

Surrogate: 4-Bromofluorobenzene (PIL *110 %* *70.7-118*

Chloride, SM4500Cl-B mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride*	**3850**	4.00	02/22/2012	ND	100	100	100	0.00	

Sulfate 375.4 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate*	**282**	10.0	02/28/2012	ND	18.8	94.0	20.0	9.62	

TDS 160.1 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS*	**7340**	5.00	02/20/2012	ND	234	97.5	240	0.00	

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

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

Celey D. Keene, Lab Director/Quality Manager

101 East Marland - Hobbs, New Mexico 88240
Tel.(575) 393-2326
Fax (575) 393-2476

Cardinal Laboratories, Inc.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # _____

Company Name: RICE Operating Company	BILL TO Company: RICE Operating Company — PO#
Project Manager: Hack Conder	Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240
Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240	Phone#: (575) 393-9174 — Fax#: (575)397-1471
Phone #: (575) 393-9174	Fax #: (575)397-1471
Project #:	Project Name: EME D-2 Boot
Project Location: T20S-R36E-Sec2 D ~ Lea County - New Mexico	Sampler Signature: Rozanne Johnson (575)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY) H20045	FIELD CODE	(G)rab or (C)omp	# CONTAINERS	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL (2 40ml VOA)	HNO_3	$NaHSO_4$	H_2SO_4	ICE (1-1Liter HDPE)	NONE	SAMPLING: DATE (2012)	TIME
1	Monitor Well #1	G	3	X				2				1		2-15	12:15
2	Monitor Well #2	G	3	X				2				1		2-15	8:50

ANALYSIS REQUEST
(Circle or Specify Method No.)

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	Sulfates	Total Dissolved Solids	Chlorides	Turn Around Time ~ 24 Hours
	X																	X	X	X	
	X																	X	X	X	

Relinquished by: Rozanne Johnson	Date: 2-20-2012	Time: 10:36	Received by: Jodi Henson
Relinquished by:	Date:	Time:	Received By: (Laboratory Staff)

Date: 2/20/12 Time: 10:36

Phone Results: [ ] Yes [ ] No
Fax Results: [ ] Yes [ ] No Additional Fax Number:

REMARKS:

Email Results to: hconder@riceswd.com
lwainheimer@rice-ags.com
klones@riceswd.com
rozanne@valornet.com

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

Sample Condition: Cool: Yes ✓ / No — Intact: Yes ✓ / No

CHECKED BY: (Initials) GH

#26