1R - 427-181

REPORTS

DATE:

April 7, 2009

Investigation and Characterization Report and Termination Request
Rice Operating Company – EME SWD System
Phillips B EOL
UL F Sec 10 T 20S R 37E
NMOCD Case Number: 1R427-181

April 7th, 2009

Prepared by:

L. Peter Galusky, Jr. Ph.D.
Texerra
505 N. Big Spring, Suite 404
Midland, Texas 79701
Web: www.texerra.com
E-mail: lpg@texerra.com

Investigation and Characterization Report and Termination Request

Phillips B EOL
UL F Sec 10 T 20S R 37E
NMOCD Case Number: 1R427-181

Executive Summary

This report summarizes the findings of investigative work prescribed in the NMOCD approved Investigation and Characterization Plan (ICP) for this site.

Rice Operating Company replaced a wooden junction box at this location with a new, water-tight junction in July of 2004 as part of its facility maintenance and upgrade program. Preliminary site investigation associated with the junction box replacement indicated significant residual soil chloride concentrations but insignificant petroleum hydrocarbon concentrations.

The field investigation under the ICP was completed on September 8th, 2008. Five soil borings were advanced near and around the location of the former junction box to depths of 40 to 50 ft bgs where the water table capillary fringe was encountered. Soil chloride concentrations averaged 525 ppm throughout the depth of drilling but less than 250 ppm in these bottom layers above the water table. Soil petroleum hydrocarbons were insignificant. The ground surface surrounding the former junction box has become restored to natural prairie grasses and associated vegetation.

A simple soil chloride transport and groundwater dilution model was developed to estimate the potential effect of residual soil chloride leaching into groundwater. The model predicted that maximum anticipated elevation of groundwater chlorides caused by the movement of residual soil chlorides is less than 150 ppm, indicating that residual soil chlorides should not represent a hazard to groundwater quality.

Given that there are no apparent risks of groundwater contamination from this former junction box and that surface/ecological impacts are negligible, it is therefore requested that NMOCD grant Rice Operating Company a "remediation termination" or similar closure status for this project.

Investigation and Characterization Report and Termination Request

Phillips B EOL
UL F Sec 10 T 20S R 37E
NMOCD Case Number: 1R427-181

Contents

Background

This report summarizes the findings of investigative work prescribed in the Investigation and Characterization Plan (ICP) for this site, which was approved by NMOCD on July 17th, 2008 (a copy of e-mail approval is given in the Appendix).

The site is located approximately 2.7 miles southeast of Monument, New Mexico (Figures 1&2) in the rolling sandy hills (the "White Breaks") that characterize this area. The Lea County Soil Survey characterizes the surficial earth materials as sandy, moderately deep to deep sandy soils which are underlain by caliche of variable hardness. NM OSE records indicate that groundwater is likely to be encountered at a depth of 20+/- feet in unconsolidated Tertiary alluvium of the Ogallala Formation. However, field investigation encountered the capillary fringe at about 50 ft bgs.

Rice Operating Company replaced a wooden junction box at this location with a new, water-tight junction in July of 2004 as part of its facility maintenance and upgrade program. As the original wood junction box was removed, soils were sampled using a backhoe creating a 20 by 10 by 12 ft deep excavation. The excavated soils were blended and then backfilled into the excavation. The disturbed surface was then seeded with a native vegetation mix.

Insignificant concentrations (< 100 ppm) of gasoline (GRO) and diesel range organics (DRO) were encountered in the excavated soil and in the sidewalls and bottom of the excavation. Petroleum hydrocarbons were therefore ruled out as a potential constituent of concern. Chloride concentrations exceeded 2,000 ppm at adjacent sampling locations at depths of 11 ft below ground surface (bgs). The surface (ecological) impact of this release was relatively small.

Objective, Scope and Methodology

The objective of the ICP is to: **a**- quantify the magnitude and extent of residual soil chlorides and petroleum hydrocarbons; **b**- determine if these pose a threat to groundwater quality under present conditions and **c**- develop a Corrective Action Plan (CAP) to protect groundwater if this is warranted.

The scope of the ICP encompasses the measured effects of past operations of the facility on soil and groundwater in the affected vicinity.

The methodology of the ICP entailed: **a**- drilling to obtain subsurface soil samples; **b**- analyzing these for chlorides using field titration procedures and for petroleum hydrocarbons using a Photo-ionization Detector (PID); **c**- verifying (QA/QC) the field methods against a subset of samples analyzed by a commercial laboratory; **d**- analyzing the data using graphical and statistical methods and **e**- interpreting the data using a simple mass-balance dilution model.

The field investigation was completed on September 8th, 2008. Harrison and Cooper, Inc. provided drilling services and Rice Operating Company personnel performed field chloride titrations and PID analyses. L. Peter Galusky, Jr. of Texerra supervised field activities. Confirmatory laboratory analyses were subsequently performed by Cardinal Laboratories.

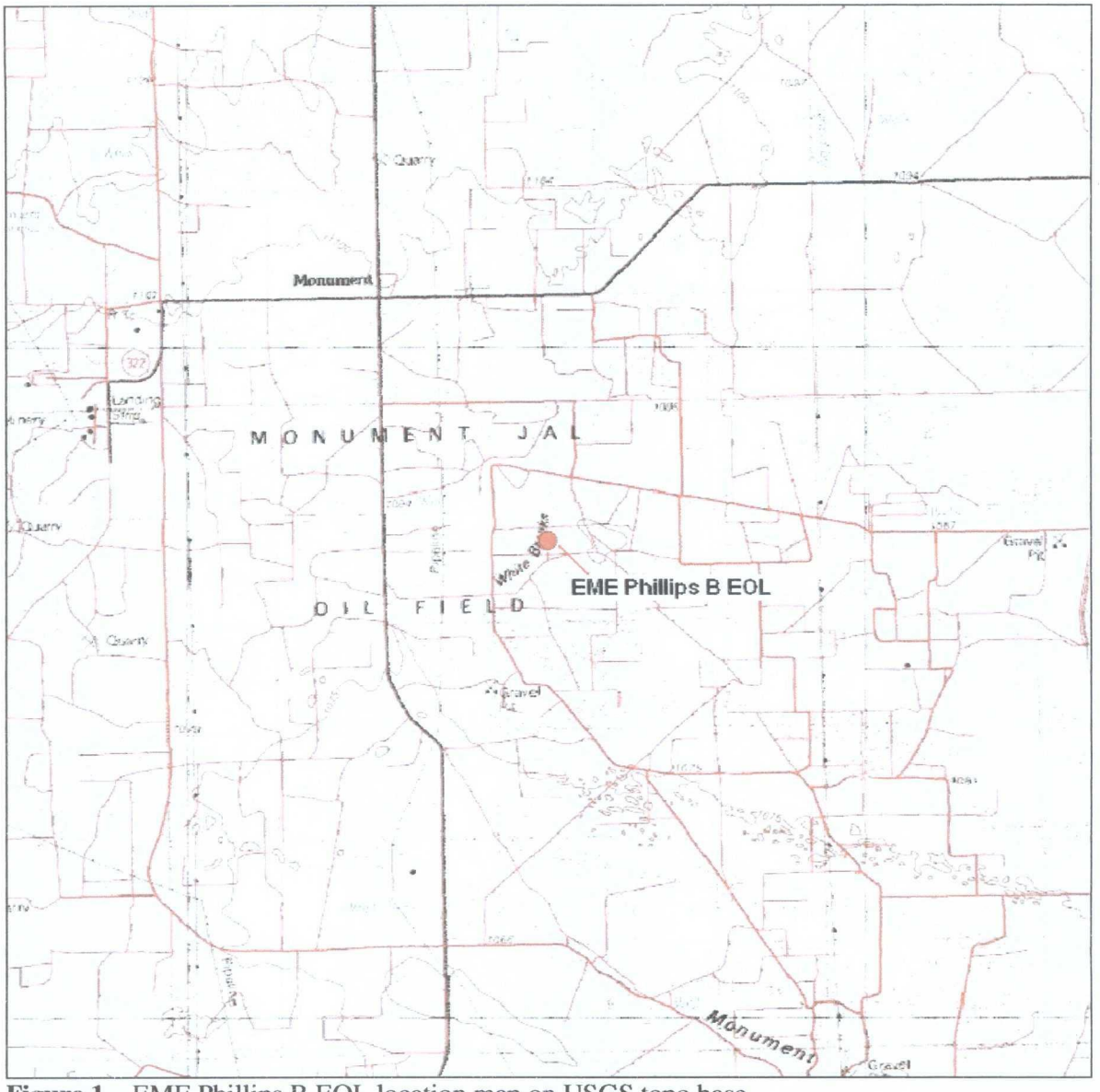


Figure 1 – EME Phillips B EOL location map on USGS topo base.

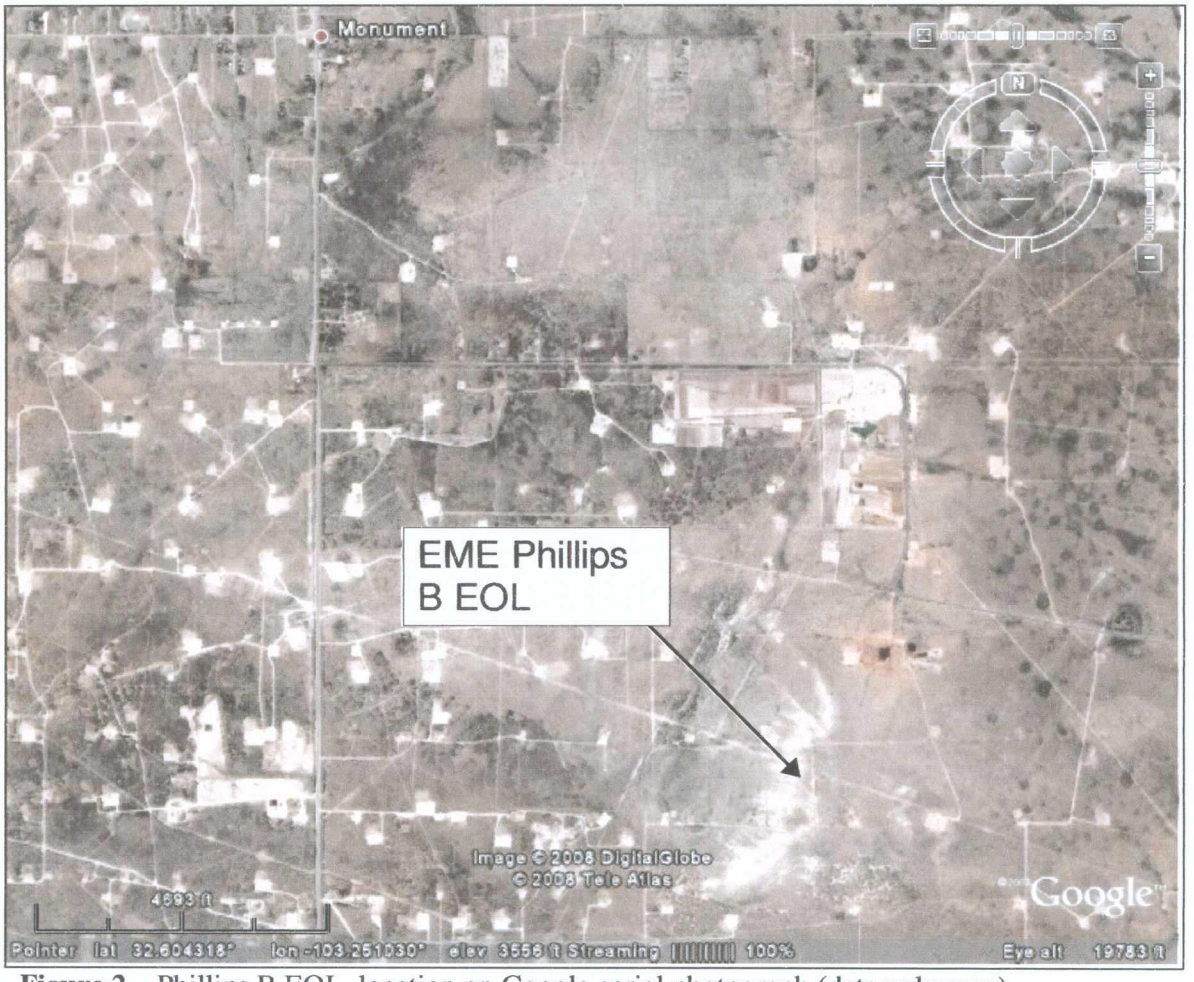


Figure 2 – Phillips B EOL location on Google aerial photograph (date unknown).

Results and Discussion

Five soil borings were advanced near and around the location of the former junction box to depths of 40 to 50 ft bgs where the water table capillary fringe was encountered (Figure 3). Soil chloride concentrations averaged 525 ppm throughout the depth of drilling but less than 250 ppm in these bottom layers above the water table (Figure 4). The total mass of residual soil chlorides at this location was estimated to be 3,430 lbs (Figure 5). Soil petroleum hydrocarbons were insignificant (below 1.0 ppm by PID and below laboratory detection limits; Appendices B&C).

In order to determine if the residual soil chlorides represent a potential hazard to down gradient groundwater quality, a simple soil chloride transport and groundwater dilution model (Figures 6 & 7) was developed to estimate the potential effect of this residual soil chloride leaching into groundwater over time given the following assumptions:

1. The center of mass of residual chlorides moves downward at a rate of 2.0 ft/yr.
2. It is assumed that these chlorides mix uniformly within an elliptical groundwater plume of dimensions 250 ft maximum length by 100 ft maximum width through a depth of 15 ft of the water table aquifer.
3. Natural dilution of the plume occurs at a rate of 10% per year.

The model predicted that maximum anticipated elevation of groundwater chlorides caused by the movement of residual soil chlorides is under 150 ppm (Figure 8), indicating that residual soil chlorides should not represent a hazard to groundwater quality.

The ground surface surrounding the former junction box has become restored to natural prairie grasses and associated vegetation (see cover photo and Appendix D).

Given that there are no apparent risks of groundwater contamination from this former junction box and that surface/ecological impacts are negligible, it is therefore requested that NMOCD grant Rice Operating Company a "remediation termination" or similar closure status for this project.

Rice Operating Company is the service provider (agent) for the EME Salt Water Disposal (SWD) System and has no ownership of any portion of pipeline, well or facility. The EME SWD System is owned by a consortium of oil producers, System Partners, who provide all operating capital on a percentage ownership/usage basis.

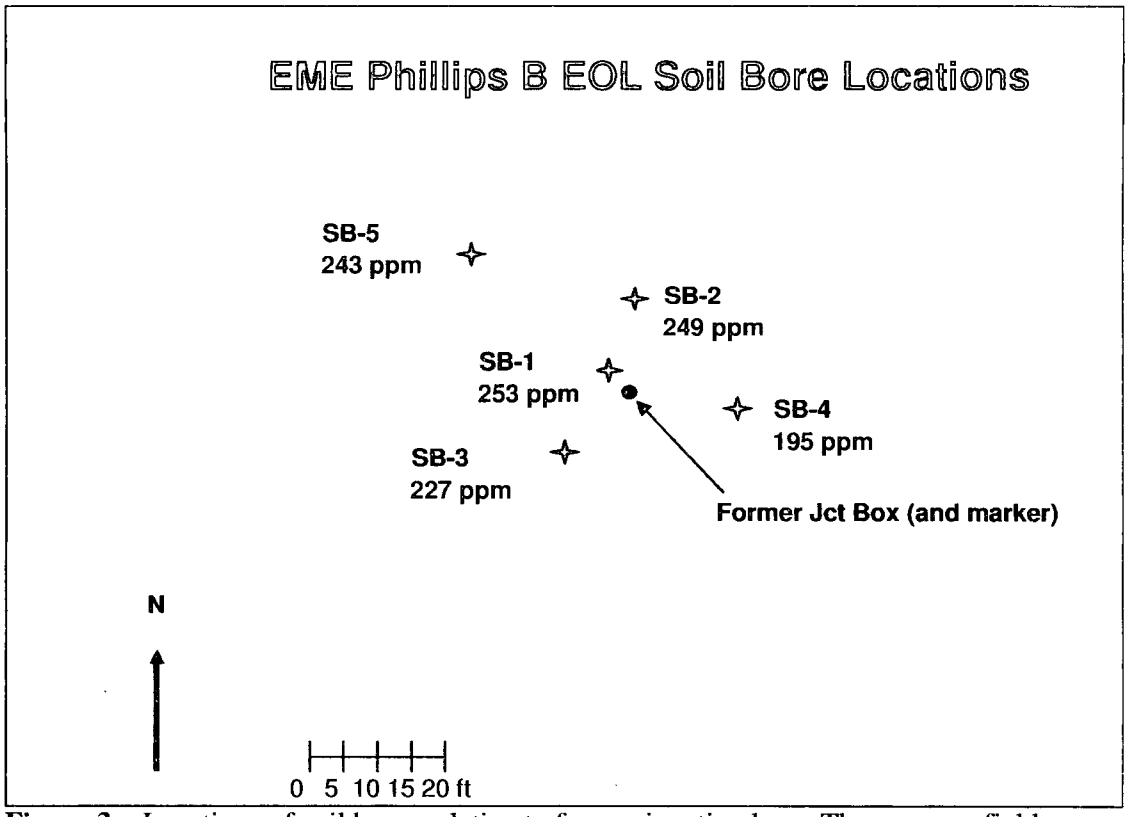


Figure 3 – Locations of soil bores relative to former junction box. The average, field-measured soil chloride concentrations are given for depths 30 to 50 ft bgs (for 30 to 40 ft bgs for SB-1). These bottom soil chloride concentrations averaged 234 ppm over all five soil borings.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**Avg of SB-1 through SB-5**
Location:	
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	55 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Cutting Description
-5	516		0.3	light grayish brown silt
-10	909		0.1	"
-15	1,154	1,053	0.1	"
-20	765		0.1	pinkish white silt
-25	648		0.1	light reddish brown fine sandy loam
				light reddish brown compact fine
-30	252		0.1	sandy clay, moist
-35	254		0.1	dark reddish brown clay, stiff
-40	231		0.2	brown reddish clay, stiff
-45	376		0.2	
-50	284	123	0.2	
-55	390		0.1	
avg	525			
avg 30 to 40 ft bgs	234			

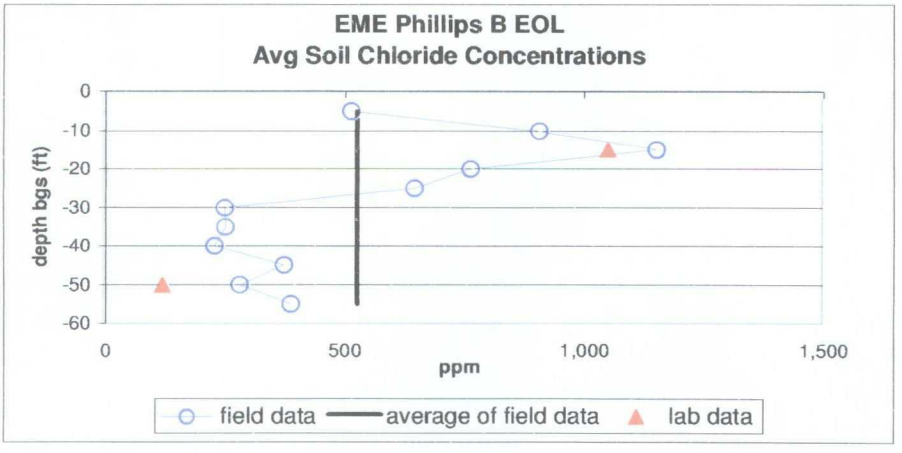


Figure 4 – Average soil chloride and petroleum hydrocarbon concentrations from five soil borings taken at or near former junction box location.

Soil Chloride Calculator		
Estimates Mass of Soil Chloride, based upon Soil Chloride Concentration		
Rice Operating Company		
Site:	**EME Phillips B EOL**	
This estimate prepared by:	L. Peter Galusky, Jr.	
Date:	4/1/2009	
Inputs in **Blue** Font		
length of affected area (ft)		**35**
width of affected area (ft)		**35**
affected area (sq ft)		**1,225**
affected depth (ft)		**48**
depth to water table (ft)		**50**
avg Cl- conc of affected soil (ppm)		**525**
unsat zone mass density (lbs/cu yd)		**3,000**
volume of affected soil (cu yds)		**2,178**
total mass of affected soils (lbs)		**6,533,333**
mass of residual soil chloride (lbs)		**3,430**

Figure 5 - Estimation of residual soil chloride mass.

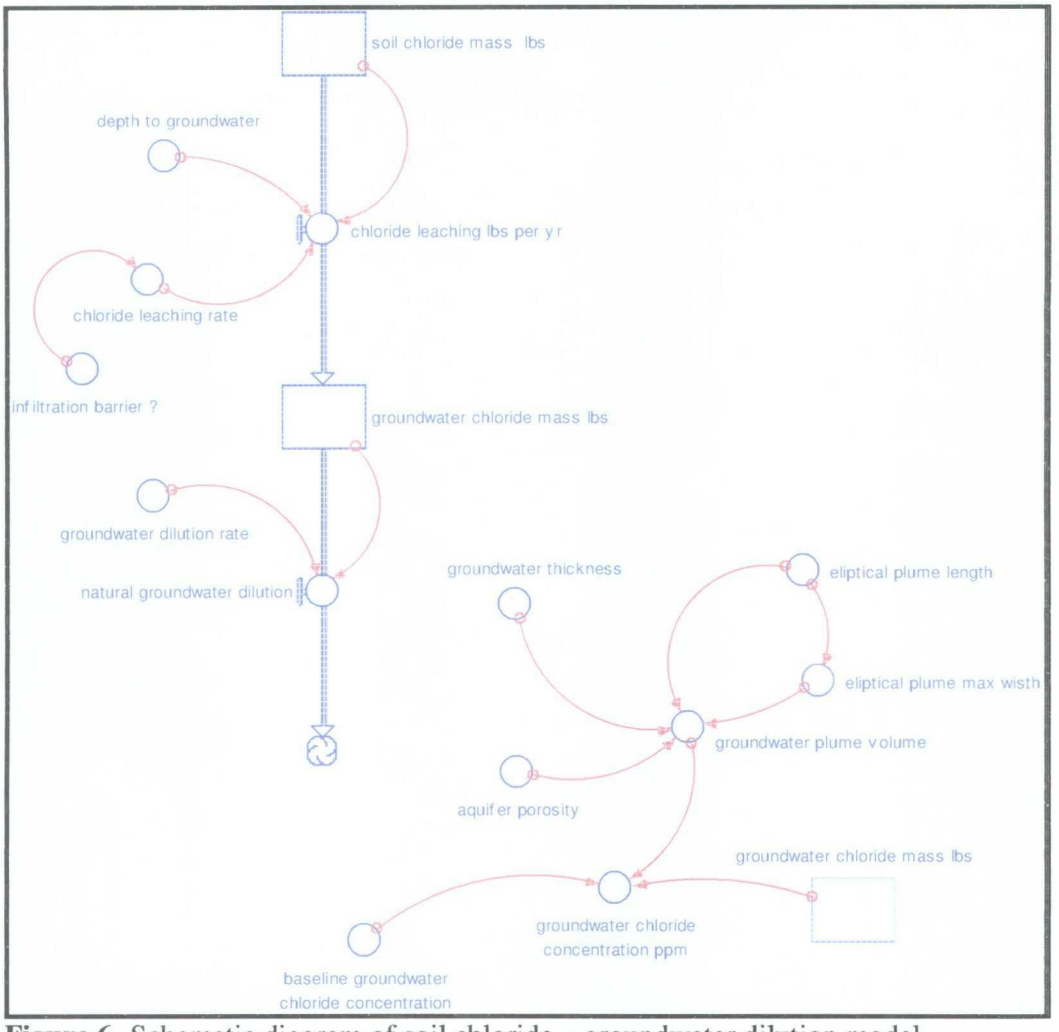


Figure 6- Schematic diagram of soil chloride – groundwater dilution model.

```
groundwater_chloride_mass_lbs(t) = groundwater_chloride_mass_lbs(t - dt) +
(chloride_leaching_lbs_per_yr - natural_groundwater_dilution) * dt
INIT groundwater_chloride_mass_lbs = 0

INFLOWS:
chloride_leaching_lbs_per_yr =
(chloride_leaching_rate/depth_to_groundwater)*soil_chloride_mass__lbs
OUTFLOWS:
natural_groundwater_dilution =
groundwater_chloride_mass_lbs*groundwater_dilution_rate
soil_chloride_mass__lbs(t) = soil_chloride_mass__lbs(t - dt) + (-
chloride_leaching_lbs_per_yr) * dt
INIT soil_chloride_mass__lbs = 3430

OUTFLOWS:
chloride_leaching_lbs_per_yr =
(chloride_leaching_rate/depth_to_groundwater)*soil_chloride_mass__lbs
aquifer_porosity = 0.33
baseline_groundwater_chloride_concentration = 0
chloride_leaching_rate = IF(infiltration_barrier_?=0) THEN 2.0 ELSE 2.0/20
depth_to_groundwater = 50
eliptical_plume_length = 250
eliptical_plume_max_wisth = eliptical_plume_length/2.5
groundwater_chloride_concentration_ppm =
119962*(groundwater_chloride_mass_lbs)/(groundwater_plume_volume*7.5)+baseline_gr
oundwater_chloride_concentration
groundwater_Cl_std = 250
groundwater_dilution_rate = 0.1
groundwater_plume_volume =
(3.14*(eliptical_plume_length/2)*(eliptical_plume_max_wisth/2)*groundwater_thickness)*
aquifer_porosity
groundwater_thickness = 15
infiltration_barrier_? = 0
```

Figure 7 – Model equations and parameter values for soil chloride – groundwater dilution model.

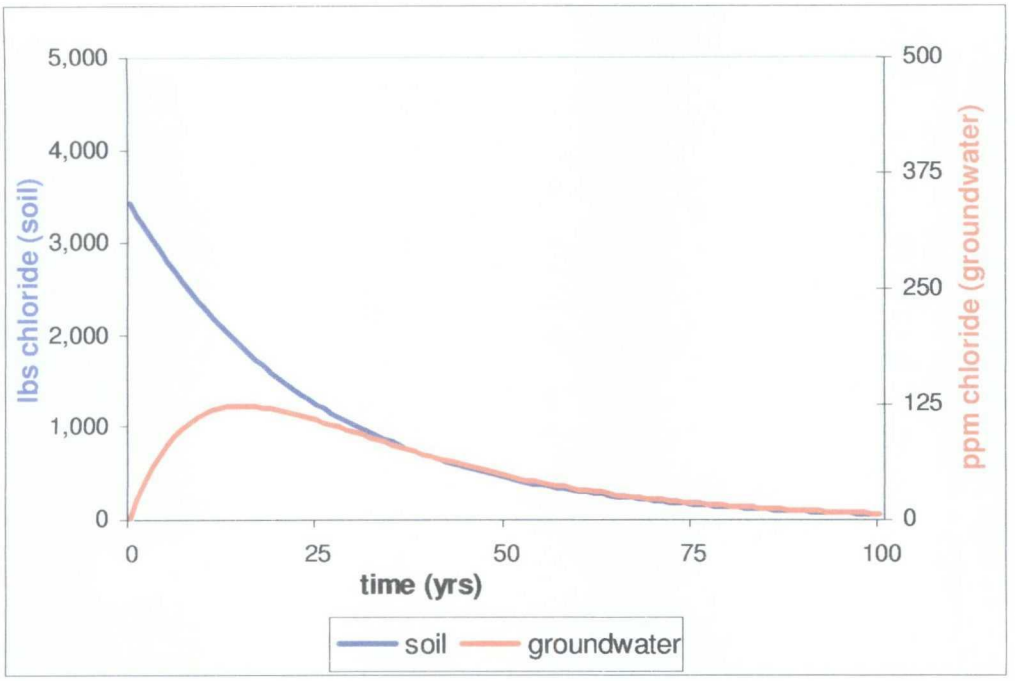


Figure 8 – Estimated change in baseline groundwater chloride concentrations (right axes) over time.

APPENDICES

- Appendix A - NMOCD approval of Investigation and Characterization Plan
- Appendix B – Soil bore descriptions and analytical data
- Appendix C - Laboratory data
- Appendix D – Photographs

at&t YAHOO! MAIL Classic SMALL BUSINESS Email Print - Close Window

Subject: ICP Approvals: #1R427-06; #1R427-181; #1R426-117; #1R426-150

Date: Thu, 17 Jul 2008 17:01:24 -0600

From: "Hansen, Edward J., EMNRD" <edward.j.hansen@state.nm.us>

To: "Mack Conder" <hconder@riceswd.com>

CC: "Price, Wayne, EMNRD" <wayne.price@state.nm.us>, mburrows@valornet.com, lpg@texerra.com

Dear Mr. Conder:

The New Mexico Oil Conservation Division (NMOCD) has reviewed the submitted Investigation Characterization Plans (ICPs), dated May 30, 2008 and June 3, 2008, for the above referenced sites. The NMOCD hereby conditionally approves the following ICPs for the Rice Operating Company sites:

1. EME SWD Jct. O-19 submitted by Texerra on 6/6/2008 #1R427-06
2. EME SWD Phillips 'B' EOL submitted by Texerra on 6/6/2008 #1R427-181
3. BD SWD Oxy Owen 'A' submitted by Texerra on 6/6/2008 #1R426-117
4. BD SWD Jct. P-35-1 submitted by Texerra on 6/6/2008 #1R426-150

In the proposed work elements for all ICPs please include that the delineation of chlorides will be to 250 mg/Kg.

In the proposed work elements for EME SWD Phillips 'B' EOL (#1R427-181) and BD SWD Oxy Owen 'A' (#1R426-117) please include that the delineation of petroleum hydrocarbons will be to 100 ppm using a PID (or equivalent).

Also, for BD SWD Oxy Owen 'A' (#1R426-117) please include re-sampling of the backfill material for petroleum hydrocarbons.

In the proposed work elements for all ICPs please include the analyses for "general chemistry" (including chloride, TDS, and sulfate) and BTEX for potential groundwater sampling.

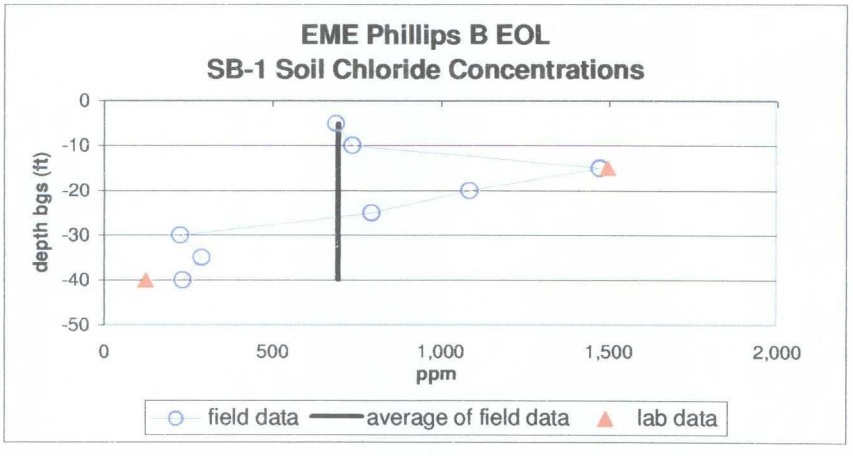
Also, please be advised that NMOCD approval of these plans does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD approval does not relieve the owner/operator of responsibility for compliance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

Appendix A – NMOCD approval of Investigation and Characterization Plan.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**SB-1**
Location:	Approx. 5 ft NW of Rice marker
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	40 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Lab GRO test (ppm)	Lab DRO test (ppm)	Cutting Description
-5	691		0.9			light grayish brown silt
-10	740		0.0			"
-15	1,477	1,500	0.0	< 25.0	< 25.0	"
-20	1,089		0.0			pinkish white silt
-25	798		0.0			light reddish brown fine sandy loam
-30	230		0.0			light reddish brown compact fine sandy clay, moist
-35	293		0.0			dark reddish brown clay, stiff
-40	237	128	0.0	< 25.0	< 25.0	brown reddish clay, stiff
avg	694					
avg 30 to 40 ft bgs	253					

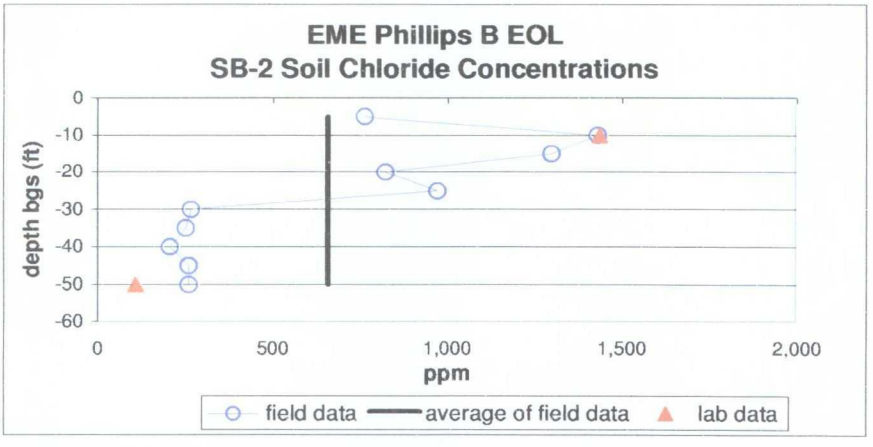


Appendix B1 – Soil boring SB-1 cuttings descriptions and analytical data.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**SB-2**
Location:	Approx. 15 ft NNW of Rice marker
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	50 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Lab GRO test (ppm)	Lab DRO test (ppm)	Cutting Description
-5	767		0.0			light grayish brown silt
-10	1,433	1,440	0.0	< 25.0	< 25.0	"
-15	1,302		0.0			light brown find sandy loam
-20	826		0.0			light gray & white silty clay loam, stiff.
-25	975		0.0			pale brown silt
-30	271		0.1			brownish red sandy clay, stiff
-35	256		0.0			red clay, stiff
-40	211		0.3			variegated red & brownish yellow clay, stiff, some free water
-45	264		0.4			"
-50	265	112	0.5	< 25.0	< 25.0	red clay, stiff
avg	657					
avg 30 to 50 ft bgs	249					

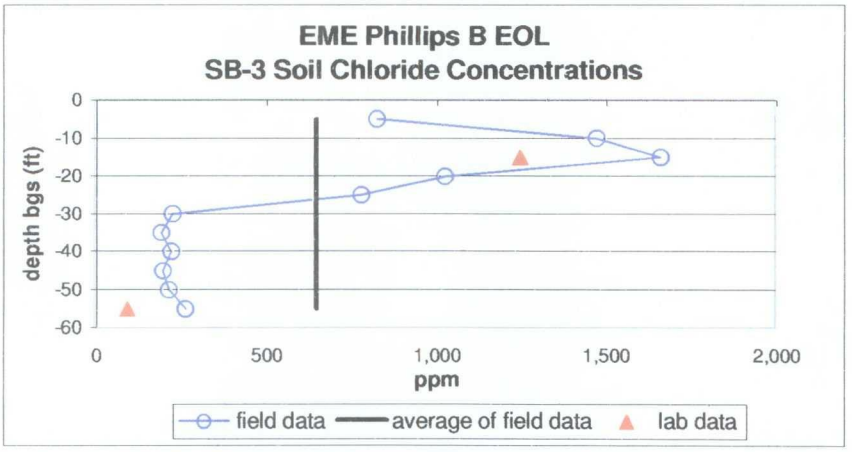


Appendix B2 – Soil boring SB-2 cuttings descriptions and analytical data.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**SB-3**
Location:	Approx. 10 ft SW of Rice marker
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	55 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Lab GRO test (ppm)	Lab DRO test (ppm)	Cutting Description
-5	829		0.1			light gray brown silt
-10	1,475		0.1			"
-15	1,662	1,250	0.1	< 25.0	< 25.0	light brown fine sandy clay loam
-20	1,028		0.1			variegated pinkish white silt
-25	783		0.0			"
-30	228		0.0			reddish brown sandy clay loam
-35	195		0.2			brownish red stiff clay
-40	225		0.3			brownish red stiff clay, slightly moist
-45	199		0.3			"
-50	218		0.0			"
-55	266	96	0.3	< 25.0	< 25.0	"
avg	646					
avg 30 to 50 ft bgs	227					

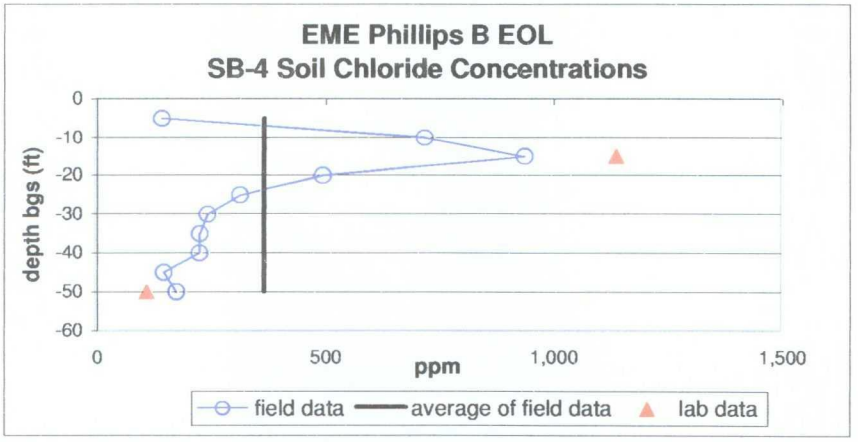


Appendix B3 – Soil boring SB-3 cuttings descriptions and analytical data.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**SB-4**
Location:	Approx. 16 ft ESE of Rice marker
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	50 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Lab GRO test (ppm)	Lab DRO test (ppm)	Cutting Description
-5	145		0.2			light gray brown silt
-10	720		0.0			"
-15	939	1,140	0.0	< 25.0	< 25.0	"
-20	497		0.2			variegated pinkish white silt
-25	316		0.1			light reddish brown fine sandy loam
-30	245		0.1			variegated pinkish white & red silty clay, firm
-35	228		0.0			brownish red stiff clay, slightly moist
-40	227		0.1			"
-45	149		0.1			"
-50	177	112	0.4	< 25.0	< 25.0	"
avg	364					
avg 30 to 50 ft bgs	195					

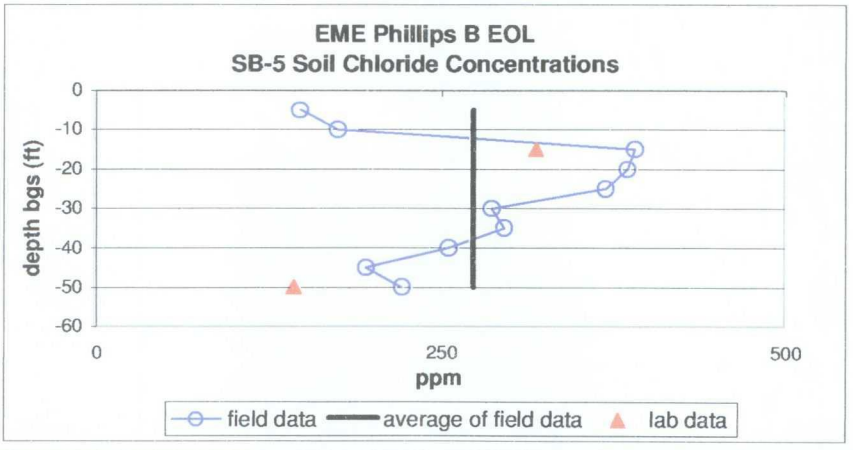


Appendix B4 – Soil boring SB-4 cuttings descriptions and analytical data.

Soil Boring Log
Rice Operating Company
EME SWD System
EME Phillips B EOL

Identification:	**SB-5**
Location:	Approx. 42 ft NW Rice marker
Date:	9/8/2008
Driller:	Harrison & Cooper, Inc. (Ken Cooper supervising)
Drill method:	Air rotary
Logged by:	L. Peter Galusky, Jr., Texerra
Total depth:	50 ft below ground surface
Screened interval:	n/a (no well installed)
Pipe diameter:	"

Depth (ft below ground surface)	Field Chloride Test (ppm)	Lab Chloride Test (ppm)	Field PID test (ppm)	Lab GRO test (ppm)	Lab DRO test (ppm)	Cutting Description
-5	148		0.4			light grayish brown silt
-10	176		0.2			"
-15	391	320	0.4	< 25.0	< 25.0	light brown fine sandy loam
-20	386		0.4			pale brown silt
-25	370		0.3			variegated pinkish white & red sandy clay
-30	288		0.3			"
-35	297		0.2			"
-40	256		0.3			reddish brown sandy clay
-45	196		0.2			dark reddish brown silty clay, firm
-50	222	144	0.1	< 25.0	< 25.0	"
avg	273					
avg 30 to 50 ft bgs	243					



Appendix B5 – Soil boring SB-5 cuttings descriptions and analytical data.

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 09/11/08
Reporting Date: 09/15/08
Project Number: NOT GIVEN
Project Name: EME PHILLIPS 'B' EOL
Project Location: EME PHILLIPS 'B' EOL

Sampling Date: 09/08/08
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl (mg/kg)
ANALYSIS DATE		09/12/08	09/12/08	09/12/08
H15907-1	SB #1 @ 15'	<25.0	<25.0	1,500
H15907-2	SB #1 @ 40'	<25.0	<25.0	128
H15907-3	SB #2 @ 10'	<25.0	<25.0	1,440
H15907-4	SB #2 @ 50'	<25.0	<25.0	112
H15907-5	SB #3 @ 15'	<25.0	<25.0	1,260
H15907-6	SB #3 @ 55'	<25.0	<25.0	95
H15907-7	SB #4 @ 15'	<25.0	<25.0	1,140
H15907-8	SB #4 @ 50'	<25.0	<25.0	112
H15907-9	SB #5 @ 15'	<25.0	<25.0	320
H15907-10	SB #5 @ 50'	<25.0	<25.0	144
Quality Control		494	439	490
True Value QC		500	500	500
% Recovery		99.0	87.8	98.0
Relative Percent Difference		2.7	4.0	< 0.1

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-ClB
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

Date

H15907 TCL RICE

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 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.

Appendix C1 – Cardinal Laboratories soil analysis data

Appendix C2 – Cardinal Laboratories sample chain-of-custody form.

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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

Company Name:	Rice Operating Company
Project Manager:	Hnd A Conder
Address:	122 West Taylor
City: Hobbs	State: NM Zip: 88240
Phone #: 393-9174	Fax #: 397-1471
Project #:	Project Owner:
Project Name:	EME Phillips 'B' EOL
Project Location:	EME Phillips 'B' EOL
Sampler Name:	Larry Weinheimer, Brandi Mitchell

BILL TO

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

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(GRAB=G OR COMP=C)	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV: ACID/BASE	ICE/COOL	OTHER	SAMPLING: DATE	TIME	Chlorides	TPH 8015 M
H5907-1	BH #1 @ 15'		1			✓					✓		9/8/08	07:45	✓	✓
-2	BH #1 @ 40'		1			✓					✓		9/8/08	08:26	✓	✓
-3	BH #2 @ 10'		1			✓					✓		9/8/08	08:55	✓	✓
-4	BH #2 @ 30'		1			✓					✓		9/8/08	10:00	✓	✓
-5	BH #3 @ 10'		1			✓					✓		9/8/08	12:05	✓	✓
-6	BH #3 @ 35'		1			✓					✓		9/8/08	01:28	✓	✓
-7	BH #4 @ 15'		1			✓					✓		9/8/08	01:49	✓	✓
-8	BH #4 @ 30'		1			✓					✓		9/8/08	02:16	✓	✓
-9	BH #5 @ 15'		1			✓					✓		9/8/08	03:31	✓	✓
-10	BH #5 @ 30'		1			✓					✓		9/8/08	03:46	✓	✓

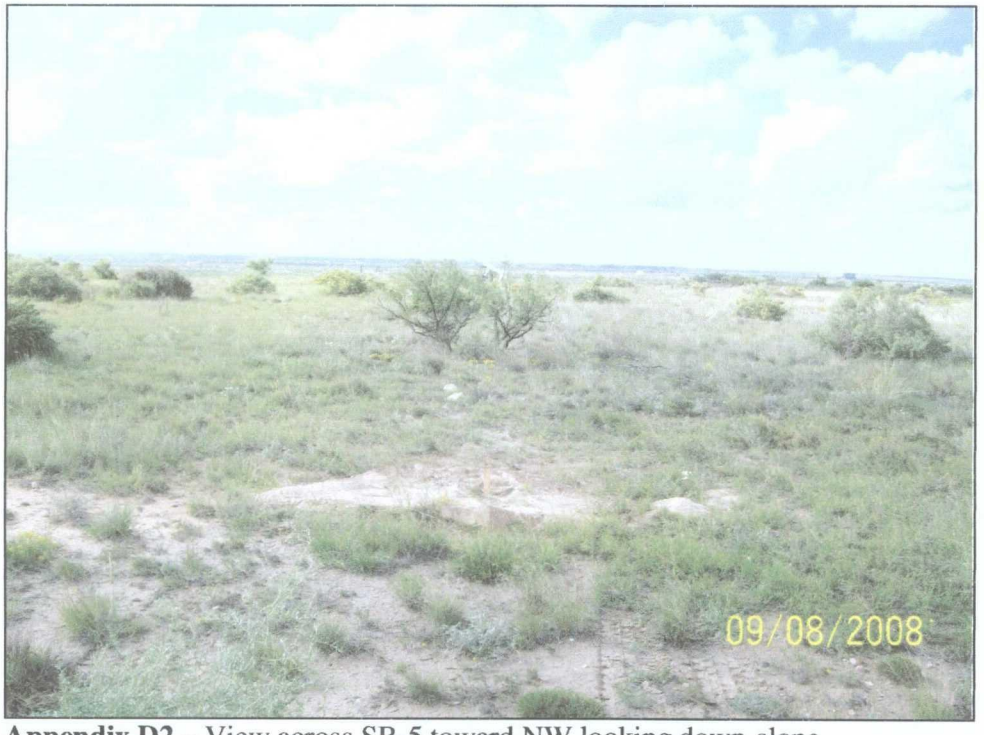
PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 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.

Relinquished By: L. Weinheimer	Date: 9-11-08 Time: 9:55	Received By:	Phone Result: ☐ Yes ☑ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☑ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	REMARKS: email results

Hconder@riceswd.com; jpurvis@riceswd.com; Lweinheimer@riceswd.com

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

Appendix D1 – View from SB-5 toward SE across former junction box location.



Appendix D2 – View across SB-5 toward NW looking down-slope.

Appendix D3 – View across SB-1 (and former jct box location) toward WSW.