1R - 427-169

REPORTS

DATE:

6-11-10

Texerra
75 Wuthering Hts Dr Colorado Springs, Colorado 80921
Tel: 917-339-6791 E-mail: lpg@texerra.com

July 22nd, 2010

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

RE: **Addendum to:** ICP Report & Termination Request
Rice Operating Company – EME SWD System
EME N-18 Boot: UL N Sec 18 T 20S R 37E
NMOCD Case No. 1R427-169

Sent Via E-mail and U.S. Certified Mail No. 7007 0710 0003 0305 3897

Mr. Hansen,

Texerra submits this ICP Report and Termination Request Addendum on behalf of Rice Operating Company (ROC). During the June 16th, 2010 meeting between ROC and NMOCD, NMOCD requested that residual soil chlorides be compensated for through the removal of an equivalent mass of groundwater chlorides from a nearby recovery well.

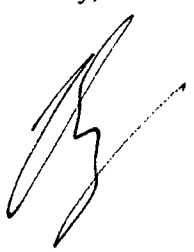
We estimate that there are 322 lbs of residual soil chloride contributed from the former EME N-18 boot based on an impact area of 20x20x27-feet, a contributed average chloride concentration of 239 ppm (mg/kg) in the unsaturated zone and 278 ppm in the saturated zone. Our calculations indicate that removing 322 lbs from the nearby groundwater recovery system located at EME L-6 boot (which exhibited a groundwater chloride concentration of 11,200 mg/L) would require the removal of approximately 91 bbls (Table 1, Figure 1).

ROC removed 580 bbls of groundwater from EME L-6 between April 26 and May 5, 2010 (Figure 2). Approximately 350 bbls of this was in excess of what was required in similar compensation for a previous project (EME Jct. I-13, NMOCD Case No. 1R427-171), which received termination through NMOCD on June 23, 2010. This overage adequately compensates for the 91 bbls required for the EME N-18 Boot site. We therefore submit that the long term potential for groundwater impacts from contributed, residual chlorides at EME N-18 Boot has been adequately addressed, and we submit this report in support of our request for administrative termination of this project.

ROC is the service provider (agent) for the EME Salt Water Disposal 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 Parties, who provide all operating capital on a percentage ownership/usage basis.

We appreciate your consideration of this request.

Sincerely,



L. Peter (Pete) Galusky, Jr. Ph.D., P.G.
Principal

Copy: Rice Operating Company

Soil Chloride Calculator			
Estimated Mass of Contributed, Residual Soil Chloride and Calculation of Equivalent			
Volume of Regionally Affected Groundwater in Compensation			
Company:	**Rice Operating Company**		
Site:	**EME N-18 Boot**		
This estimate prepared by:	L P Galusky, Jr. w/ Texerra		
Date:	7/12/2010		
Estimation of Residual Chloride Mass			
Inputs in Blue Font			
Parameter	Value	Unit	Notes
length of affected area	20	ft	limits of jct box excavation
width of affected area	20	ft	limits of jct box excavation
affected depth	27	ft	measured
depth to water table	30	ft	estimated
avg Cl- conc of affected soil in unsaturated zone	385	ppm	measured
est Cl- conc of affected soil in saturated zone	424	ppm	from lowest unsat zone measurement
est. natural background Cl- conc	146	ppm	measured adjacent to affected area
soil mass density	3,000	lbs/cu yd	estimated/assumed
thickness of affected aquifer	10	ft	prescribed by NMOCD
Output in Black and Red Fonts			
Parameter	Value	Unit	Notes
affected area	314	sq ft	calculated eliptical area
unsaturated zone Cl- conc attributed to source	239	ppm	calculated
saturated zone Cl- conc attributed to source	278	ppm	calculated
volume of affected soil in unsaturated zone	314	cu yds	calculated
mass of affected soil in unsaturated zone	942,000	lbs	calculated
volume of affected soil in saturated zone	116	cu yds	
mass of affected soil in saturated zone	348,889	lbs	
unsaturated zone mass of contributed residual soil chloride	225	lbs	calculated
saturated zone mass of contributed residual soil chloride	97	lbs	calculated
total estimated mass of contributed residual chlorides	**322**	**lbs**	**calculated**
Calculation of Equivalent Volume of Affected Groundwater to Remove to Compensate for Residual			
Inputs in Blue Font			
Cl- conc of recovery well	11,200	ppm	measured at EME L-6
avg daily pumping rate of recover well	0.5	gpm	measured/estimated
Output in Black and Red Fonts			
avg daily pumping rate of recovery well	17.1	bbls/day	calculated
Cl- conc of recovery well	3.5	lbs/bbl	calculated
# bbls to remove contributed Cl- from unsat zone	**91**	**bbls**	**calculated**
days pumping required to remove contributed Cl-	5.3	days	calculated

Table 1 – Estimation of contributed, residual chloride mass and equivalent volume of regionally impacted groundwater to be removed in compensation. These calculations are summarized, below.

Table 1 (cont'd) – Explanation of Calculations

Calculation of Contributed, Residual Chloride Mass

- The total mass of the affected soil volume in the unsaturated zone is calculated as the surface footprint times depth to the water table, times an assumed value for porosity, times an assumed value for soil bulk density.
- The "contributed" soil chloride mass from the unsaturated zone is then calculated as the contributed average soil chloride concentration (the measured average soil chloride concentration minus a presumed value for the natural or regulatory soil chloride concentration) times the affected soil chloride mass.
- The total mass of the affected soil volume in the saturated zone is calculated as the surface footprint times a prescribed saturated thickness, times an assumed value for porosity, times an assumed value for soil bulk density.
- The "contributed" soil chloride mass from the saturated zone is then calculated as the contributed average soil chloride concentration (the measured average soil chloride concentration minus a presumed value for the natural or regulatory soil chloride concentration) times the affected saturated zone soil chloride mass.
- **The total, contributed chloride mass is then calculated as the sum of the contributed chloride mass from the unsaturated zone and the saturated zone.**

Calculation of Groundwater Volume with Equivalent Mass of Chlorides

- The chloride density from a designated pumping well is determined by measuring its groundwater chloride concentration (and converted to convenient units of lbs/bbl).
- **The equivalent volume of groundwater that needs to be withdrawn is then calculated as the total mass of contributed, residual chlorides divided by the groundwater chloride density.**

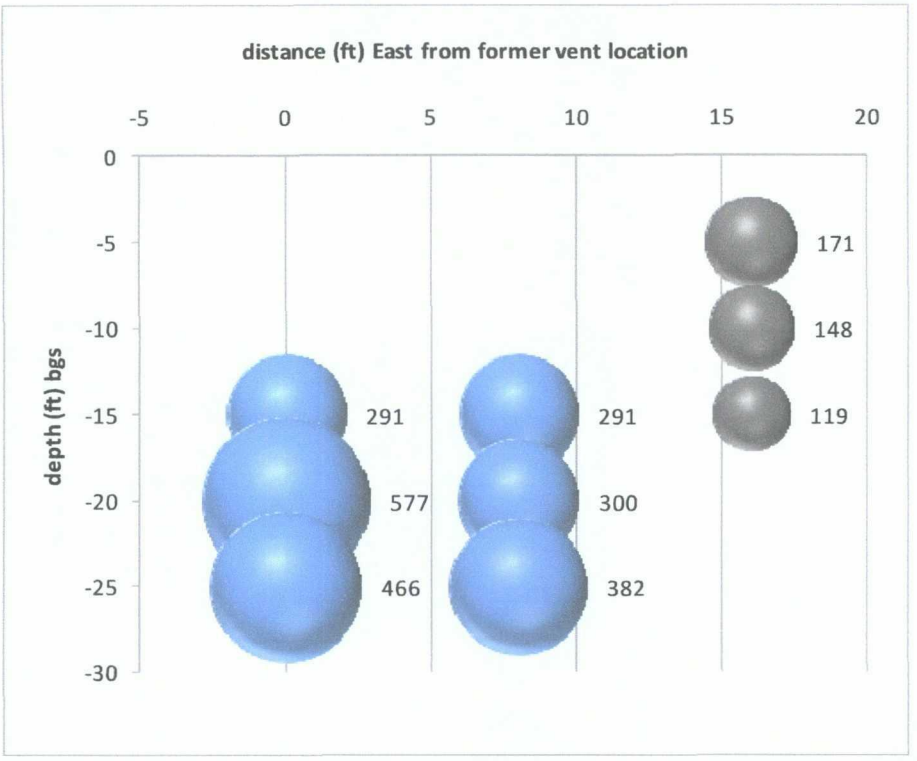


Figure 1 – EME N-18 boot residual soil chloride concentrations (measured by field titration on 06.07.10 by Rice Operating Company). Bubble diameters are proportional to the indicated chloride concentrations (in ppm). The average unsaturated zone residual soil chloride concentration within the affected radius of 10 ft (indicated by blue bubbles) was **385 ppm**. The estimated saturated zone residual chloride concentration of **424 ppm** was calculated as the average of the two deepest unsaturated zone chloride measurements within the affected radius. The estimated natural background soil chloride concentration of **146 ppm** was taken as the average of measurements outside of the affected area (gray bubbles).

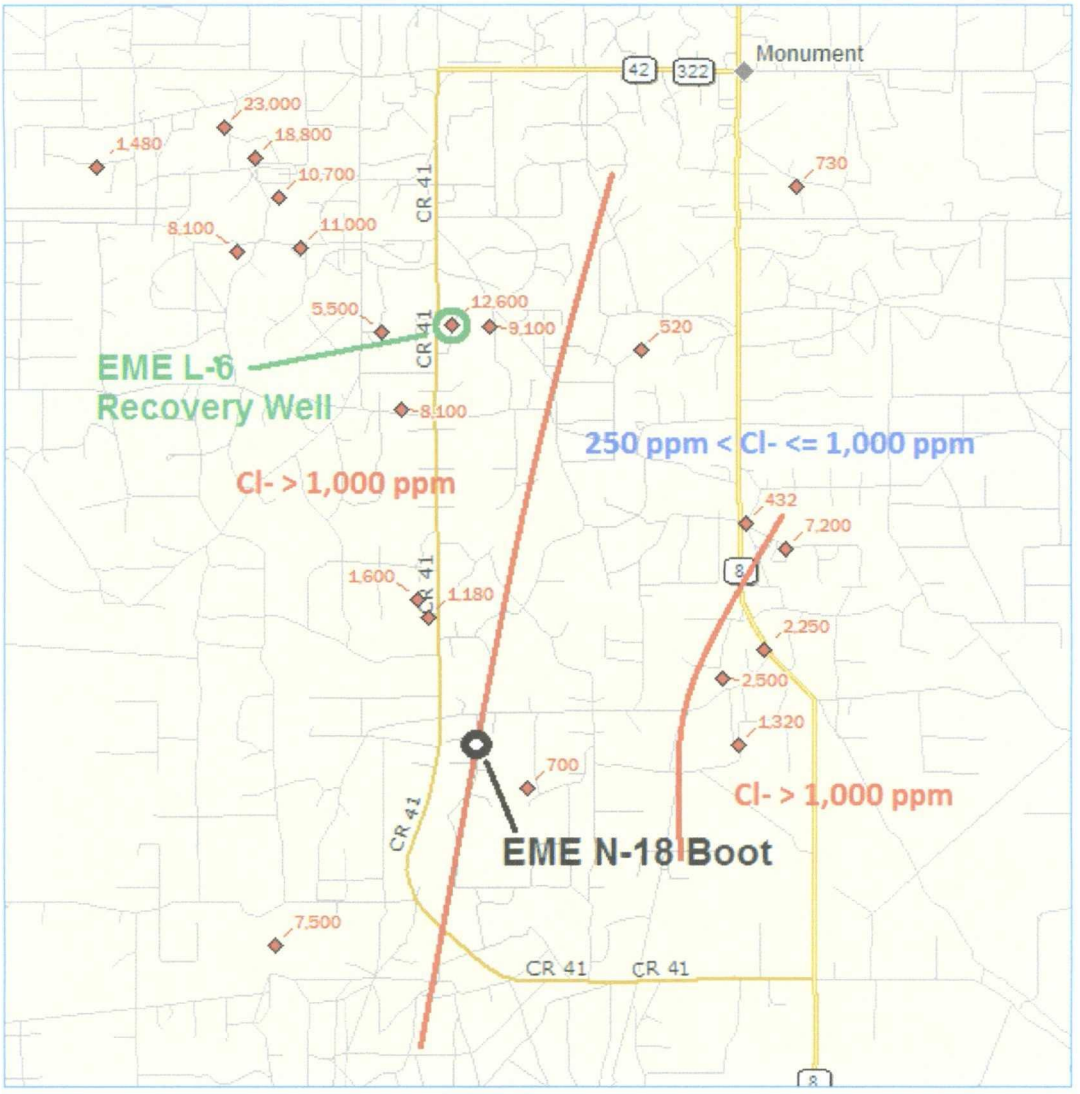


Figure 2 – Location of EME N-18 Boot relative to regional groundwater chloride plume and EME L-6 recovery well. (Data source: "up-gradient" monitor wells for various open NMOCD projects).

Texerra

505 N Big Spring, Suite 404, Midland, Texas 79701
Tel: 432-634-9257 E-mail: lpg@texerra.com

June 11th, 2010

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

RE: Investigation and Characterization Plan Report & Termination Request
Rice Operating Company – EME SWD System
EME N-18 Boot: UL N Sec 18 T 20S R 37E
NMOCD Case No. 1R427-169

Sent Via E-mail and U.S. Certified Mail No. 7007 0710 0003 0305 3880

Mr. Hansen,

Texerra has directed and supervised work outlined in the NMOCD approved Investigation and Characterization Plan of March 10th, 2009 for this project. Soil borings were advanced to the water table capillary fringe at the center of the former vent location and 10ft and 20 ft to the east.
Soil cuttings were described and residual soil chlorides and hydrocarbons were measured using field methods, which were subsequently corroborated by laboratory analysis. A brief summary of the key findings is given below

- The site is located within an area of known historical groundwater chloride impacts (Figure 1).
- Residual soil petroleum hydrocarbon concentrations were negligible (< 10 ppm) as indicated by field PID meter (Figures 2a – 2c).
- The water table was estimated to occur at approximately 27 ft bgs based on field soil moisture.
- Residual soil chloride concentrations were moderately elevated (less than 500 ppm) near the former vent location but dropped to insignificant levels 16 ft to the east (Figure 3, Appendix).
- A clay infiltration barrier was installed across the site during removal of the former vent (Figure 4) in August, 2004.
- The surface at this location is well vegetated, excepting to the south and southwest which are in and adjacent to an active oil field service roadway (Figure 5).

The risk of groundwater contamination from residual petroleum hydrocarbons is believed to be non-existent based on the insignificant levels of hydrocarbons found during the field investigation.

The risk of groundwater contamination from residual soil chlorides is believed to be exceedingly low due to the low and localized concentrations found. Any potential risk for groundwater impact is further diminished by the presence of an installed clay infiltration barrier.

Texerra therefore respectfully requests that NMOCD grant this project "remediation termination" or a similar closure status.

ROC is the service provider (agent) for the EME Salt Water Disposal 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 Parties, who provide all operating capital on a percentage ownership/usage basis.

We greatly appreciate your consideration of this request.

Thank you for your consideration.

Sincerely,

L. Peter (Pete) Galusky, Jr. Ph.D., P.G.
Principal

Copy: Rice Operating Company

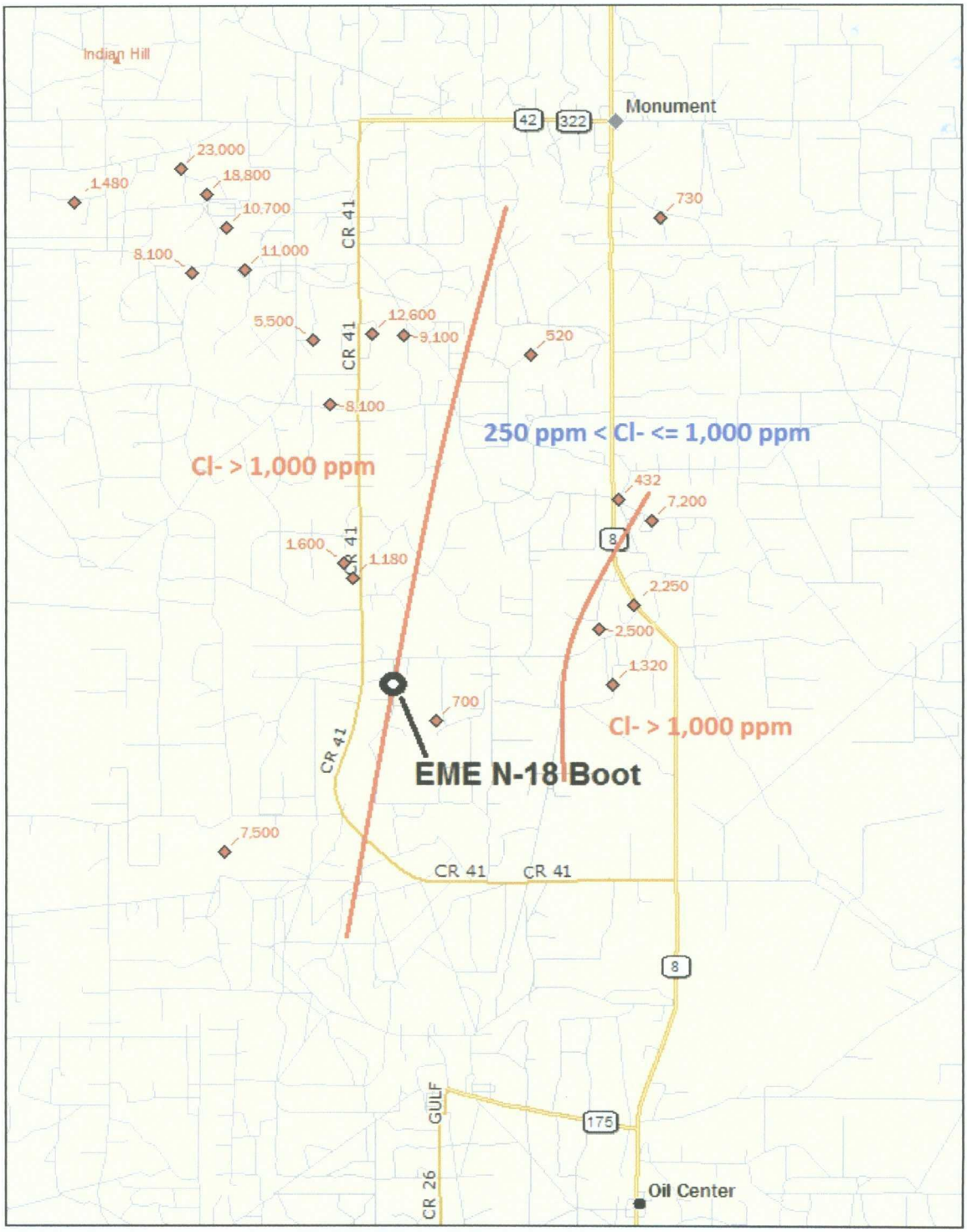


Figure 1 – Location of EME N-18 Boot relative to regional groundwater chloride plume. (Data source: "up-gradient" monitor wells for various open NMOCD projects).

Logger:	Pete Galusky
Driller:	Harrison & Cooper
Consultant:	Texerra
Drilling Method	Air Rotary
Start Date:	6/7/2010
End Date:	6/7/2010

Former jct. box site

SB-1 SB-3 SB-2

RICE OPERATING COMPANY ROC SINCE 1955

Project Name: EME N-18 boot **Well ID:** SB-1

Comments: Located at the source of the former junction box site.

Drafted by: Lara Weinheimer

TD = 25 ft DGW = 27 ft

Location: UL/N sec. 18 T20S R37E
Lat: 32°34'10.105"N **County:** Lea
Long: 103°17'43.493"W **State:** NM

Depth (feet)	chloride field tests	LAB	PID	Description
				10 - 15 ft
				SILTY CALICHE RUBBLE
15 ft	291		0	light gray
				20 - 25 ft
20 ft	577	Cl- 816	0.1	GRAVELLY SILTY SAND
		GRO < 10.0		light brown
		DRO < 10.0		
25 ft	466	Cl- 768	0	
		GRO < 10.0		
		DRO < 10.0		

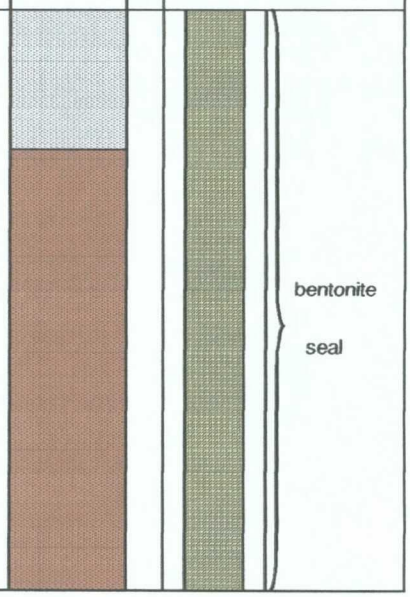


Figure 2a – Soil boring log, residual chloride and petroleum hydrocarbon concentrations at the former junction box location (boring no. SB-1).

Logger:	Pete Galusky
Driller:	Harrison & Cooper
Consultant:	Texerra
Drilling Method	Air Rotary
Start Date:	6/7/2010
End Date:	6/7/2010

Former jct. box site

SB-1 SB-3 SB-2

RICE OPERATING COMPANY ROC SINCE 1955

Project Name: EME N-18 boot **Well ID:** SB-2

Comments: Located 16 ft east of the former junction box site.

Location: UL/N sec. 18 T20S R37E

Drafted by: Lara Weinheimer

Lat: 32°34'10.095"N **County:** Lea

TD = 15 ft DGW = 27 ft **Long:** 103°17'43.297"W **State:** NM

Depth (feet)	chloride field tests	LAB	PID	Description
				0 - 5 ft
				CALICHE RUBBLE
5 ft	171	Cl- < 16	0.6	light brown
		GRO < 10.0		
		DRO < 10.0		
10 ft	148		0.3	5 - 15 ft
				COARSE LOAMY SAND
				light brown
15 ft	119	Cl- < 16	0.2	
		GRO < 10.0		
		DRO < 10.0		

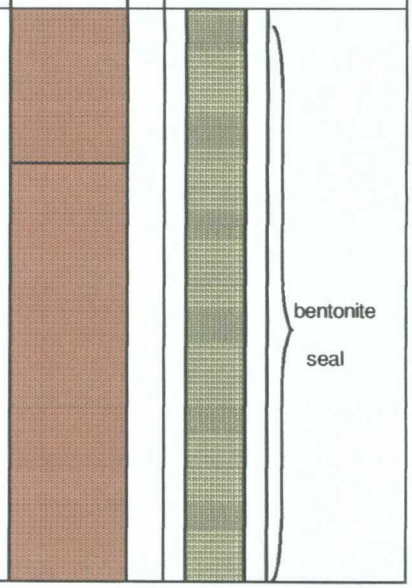


Figure 2b – Soil boring log, residual chloride and petroleum hydrocarbon concentrations 16 ft east of the former junction box location (boring no. SB-1).

Logger:	Pete Galusky
Driller:	Harrison & Cooper
Consultant:	Texerra
Drilling Method	Air Rotary
Start Date:	6/7/2010
End Date:	6/7/2010

Former jct. box site

SB-1 SB-3 SB-2

RICE OPERATING COMPANY ROC SINCE 1955

Project Name: EME N-18 boot **Well ID:** SB-3

Comments: Located 8 ft east of the former junction box site.

Drafted by: Lara Weinheimer

TD = 25 ft DGW = 27 ft

Location: UL/N sec. 18 T20S R37E
Lat: 32°34'10.113"N **County:** Lea
Long: 103°17'43.389"W **State:** NM

Depth (feet)	chloride field tests	LAB	PID	Description
				10 - 15 ft
				SANDY CALICHE RUBBLE
15 ft	291		0	light brown
20 ft	300	Cl- 256	0	
		GRO < 10.0		15 - 30 ft
		DRO < 10.0		GRAVELLY COARSE LOAMY SAND
25 ft	382	Cl- 464	0.1	light brown
		GRO < 10.0		
		DRO < 10.0		

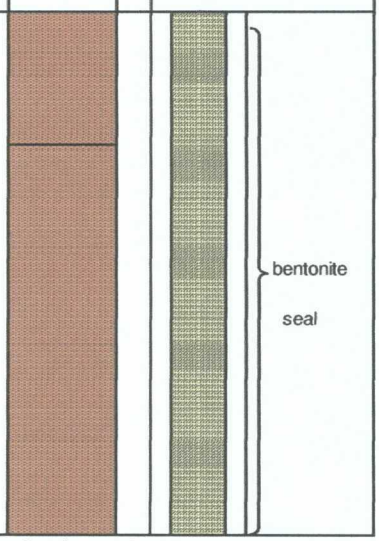


Figure 2c – Soil boring log, residual chloride and petroleum hydrocarbon concentrations 8 ft east of the former junction box location (boring no. SB-1).

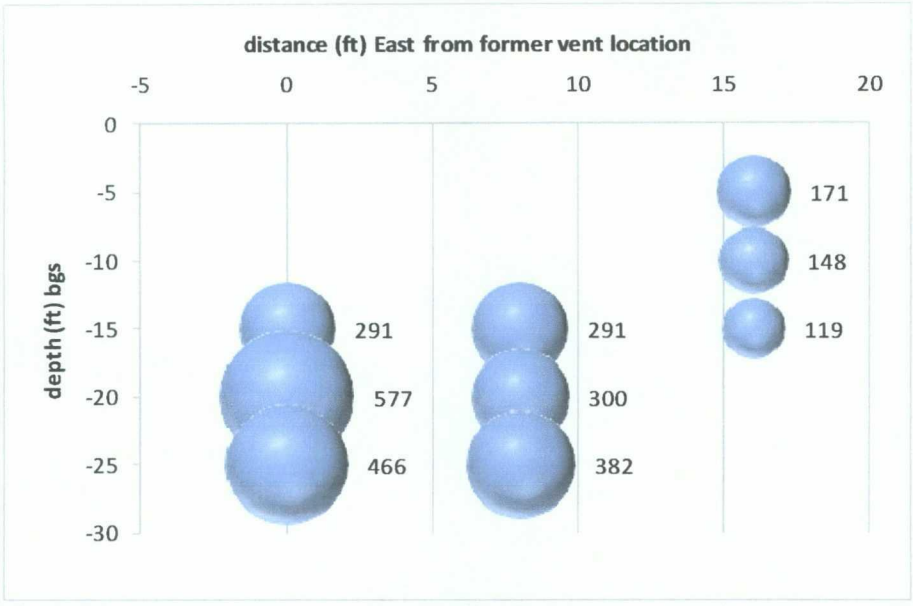


Figure 3 – EME N-18 boot residual soil chloride concentrations (measured by field titration on 06.07.10 by Rice Operating Company). Bubble diameters are proportional to the indicated chloride concentrations (in ppm).

Figure 4 – Clay infiltration barrier installed at EME N-18 boot in August, 2004.

Figure 5 – Photograph of EME N-18 Boot location taken on June 7th, 2010.

Appendix – Laborotory Analyses

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
112 W. TAYLOR
HOBBS, NM 88240

Receiving Date: 06/08/10
Reporting Date: 06/10/10
Project Number: NOT GIVEN
Project Name: EME N-18 BOOT
Project Location: EME N-18 BOOT

Sampling Date: 06/07/10
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: JH
Analyzed By: AB

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE		06/09/10	06/09/10	06/09/10
H20050-1	SB-1 @ 20'	<10.0	<10.0	816
H20050-2	SB-1 @ 25'	<10.0	<10.0	768
H20050-3	SB-2 @ 5'	<10.0	<10.0	<16
H20050-4	SB-2 @ 15'	<10.0	<10.0	<16
H20050-5	SB-3 @ 20'	<10.0	<10.0	256
H20050-6	SB-3 @ 25'	<10.0	<10.0	464
Quality Control		490	457	500
True Value QC		500	500	500
% Recovery		98.0	91.4	100
Relative Percent Difference		1.2	0.5	7.4

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

Chemist

Date

H20050 TCL RICE