

1R - 426-214

WORKPLANS

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APR 22 2013

Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505

April 18, 2013

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

**RE: ICP REPORT AND CORRECTIVE ACTION PLAN (CAP)
BD F-26 VENT
UNIT "F", SEC. 26, T21S, R37E
LEA COUNTY, NEW MEXICO
NMOCD #1R426-214**

Mr. Hansen:

RICE Operating Company (ROC) has retained Tetra Tech, Inc. (Tetra Tech) to address potential environmental concerns at the Blinebry-Drinkard (BD) SWD System F-26 vent site, located in Unit F, Section 26, T-21-S, R-37-E in Lea County, New Mexico. See Figures 1 and 2 for site location. ROC is the service provider (agent) for the BD SWD System and has no ownership of any portion of the pipeline, well or facility. The BD SWD system is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis. In general, project funding is not forthcoming until NMOCD approves the work plan. Therefore, your timely review of this submission is requested.

For all environmental projects, ROC will choose a path forward that:

- protects public health,
- provides the greatest net environmental benefit,
- complies with NMOCD Rules, and
- is supported by good science.

Each site shall have three submissions or a combination of:

1. This **Investigation and Characterization Plan** (ICP) is a proposal for data gathering and site characterization and assessment.
2. Upon evaluating the data and results from the ICP, a recommended remedy will be submitted in a **Corrective Action Plan** (CAP).

Tetra Tech

1910 North Big Spring, Midland, TX 79705

Tel 432.682.4559

Fax 432.682.3946

www.tetrattech.com



3. Finally, after implementing the remedy, a Termination Request with final documentation will be submitted.

1.0 BACKGROUND & PREVIOUS WORK

As part of the ROC Junction Box Upgrade Workplan, starting on January 22, 2008, the junction box was eliminated during the pipeline replacement/upgrade program. The former junction box site was excavated to dimensions of 30 feet by 15 feet by 12 feet deep with a backhoe. PID readings and chloride field tests were conducted at regular intervals. Based on the field PID readings, TPH did not exhibit a decrease with depth. Chloride concentrations increased with depth and ranged from 1,431 milligrams per kilograms (mg/kg) at 4 feet below ground surface (bgs) to 3,149 mg/kg at 12 feet bgs. A four point composite sample for the walls was collected and submitted for analysis of TPH and chlorides. Analytical results showed a GRO reading of non-detect and a DRO reading of 963 mg/kg with a chloride concentration of 768 mg/kg. A five point bottom composite sample was collected and submitted for analysis of BTEX, TPH, and chlorides. Analytical results showed a benzene concentration of <0.020 mg/kg, a toluene concentration of 0.126, an ethyl benzene concentration of 0.706, and a total xylenes concentration of 2.17. The GRO reading was 43.9 and the DRO reading was 764 with a chloride concentration of 368 mg/kg.

Upon completion of the excavation, the soils were blended and placed back into the excavation. Laboratory analysis of the blended backfill sample resulted in a GRO reading of 12.9 mg/kg, DRO reading of 872 mg/kg, and a chloride concentration of 784 mg/kg. The excavation was then brought up to surface grade. On February 1, 2008, the site was seeded with a blend of native vegetation. On August 18, 2008, an email was submitted to the NMOCD informing of a potential groundwater impact to the site. In March 2009, ROC submitted a Junction Box Disclosure Report to the NMOCD with all the 2008 junction box closure and disclosure reports.

On October 1, 2009, ROC submitted the ICP, and in an email dated January 28, 2010, the NMOCD approved the ICP.

On March 22, 2010, ROC was onsite to oversee the installation of three soil borings (SB-1 through SB-3) within and around the former junction box location. Soil samples were collected every 5 feet beginning at a depth of 15 feet below ground surface (bgs). Samples were collected from cuttings and were field screened for TPH utilizing a photo-ionization detector (PID) and for chlorides with a field sampling kit. Field results indicate the soil chloride concentrations decrease with depth in SB-1 to a concentration of 16 mg/kg at 40 ft. bgs. TPH concentrations in SB-1 also decreased with depth with a GRO concentration below detectable limit and a DRO concentration of 17.7 mg/kg at 40 ft. bgs. TPH concentrations were below detectable limits in SB-2 and SB-3. Soil chloride concentrations in SB-3 remained low with depth with all samples being less than 240 mg/kg. Elevated soil chloride concentrations were observed in SB-2. The soil boring data is included in Figure 4 and soil boring logs are included in Appendix A.



In order to determine if groundwater was impacted from the former junction box, one monitor well was installed (MW-1) to the southeast of the excavated junction box to a depth of 57 feet bgs on March 23, 2010. On November 18, 2010, an up gradient monitor well (MW-2) was installed northwest of the existing tank battery. Groundwater was encountered at approximately 45 feet bgs. Upon completion, the monitor wells were developed and samples were submitted to Cardinal Labs of Hobbs, New Mexico for analysis of chlorides utilizing EPA standard 4500Cl-B and BTEX utilizing EPA method 8021B. Initial results showed a chloride concentration of 1,060 mg/L in MW-1 on April 20, 2013, and 1,300 mg/L in MW-2 on December 3, 2010. This proves that a non-ROC, up-gradient site is contributing to the degradation of groundwater quality. Chloride concentrations in MW-1 have since averaged 1,519 mg/L and MW-2 has averaged 1,224 mg/L. No BTEX was detected in either of the two monitoring wells. This suggests the chloride impacted groundwater is now moving across the F-26 vent site. The results of the groundwater sampling are presented in Figure 3. The monitor well installation diagrams are included in Appendix B.

2.0 COLLECTED REGIONAL HYDROGEOLOGIC DATA

Groundwater was encountered at approximately 45 feet bgs in the two installed monitor wells at the site. No published groundwater data was found for the section containing the site.

3.0 EVALUATION

When evaluating any proposed remedy or investigative work, ROC will confirm that there is a reasonable relationship between the benefits created by the proposed remedy or assessment and the economic and social costs. In evaluating the documented levels of chlorides within the soil, it was determined that a 20 mil, reinforced polyethylene liner be utilized to prevent vertical migration of the chlorides into the surrounding underlying soils.

4.0 PROPOSED REMEDY

ROC proposes to excavate a 30 foot by 43 foot area to approximately 4 to 5 feet deep and install a 20 mil reinforced polyethylene liner. The liner will have dimensions of approximately 30 feet on the west side, 43 feet on the south side, 29 feet on the north side and then slant southeast along the northeast corner remaining a safe distance from an underground electrical line. Upon completion of the liner, the excavated soils will be evaluated for use as backfill. All backfill material will have a chloride concentration of less than 500 mg/kg and a PID (field) reading of less than 100 mg/kg. Any soil requiring disposal will be properly disposed of at an NMOCD approved facility. The site will be brought up to surface grade, contoured to the surrounding area, and seeded with native vegetation. The use of the 20 mil reinforced polyethylene liner will prevent vertical migration of chlorides and TPH within the soils, thereby protecting the underlying groundwater. Figure 4 depicts the location and proposed dimensions of the barrier.



There is an up-gradient source contributing to the degradation of groundwater quality, but the chloride concentration in the near-source monitor well, MW-1, is now greater than the concentration in the up-gradient well, MW-2. Based on this, ROC proposes to remove the following chloride mass from the first available existing recovery system located at the BD O-23 vent or BD O-23-1 vent site (Figure 5).

Estimate of Chloride Mass in Groundwater

Parameter	Unit	Value	Description
Impact area	ft ²	1,290	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	4,838	Impact Area x Aquifer Thickness x Porosity
Volume of Impacted Groundwater Below Site	L	136,982.75	Conversion from ft ³ to Liters
Chloride Concentration from Source	mg/L	1,320	Difference between the Average Chloride Concentration in Monitor Wells (MW-1 = 2,450 mg/L and MW-2 = 1,130 mg/L)
TOTAL CHLORIDE MASS	kg	181	Volume of Impacted Groundwater Below Site x Chloride Concentration Added to Soil from Source

Estimated Groundwater Recovery System Removal at the BD O-23-1 vent

Parameter	Unit	Value	Description
Groundwater Concentration	mg/L	4,550	Groundwater Concentration from RW-1
Groundwater Concentration	kg/gal	0.01722376	Conversion from mg/L to kg/gal
Pumping Rate	gals/min	1	Given
Extraction Rate	kg/min	0.01722376	Pumping rate x Groundwater Concentration (kg/gal)
Extraction Rate	kg/day	10.3342545	Conversion from kg/min to kg/day
Representative Total Chloride Mass	kg	181	From above
Volume Removal	gals	10,498	Pumping rate x Estimated Removal Time x 60 min/hour x 10 hr/day
Volume Removal	bbls	250	Conversion from gals to bbls
ESTIMATED REMOVAL TIME	day	17	Representative Total Chloride Mass/Extraction Rate

Based on a current chloride concentration of 4,550 mg/L at BD O-23-1 vent, approximately 250 barrels of groundwater and approximately 17 days of pumping will be required to



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remove the 181 kg of chloride. Removed groundwater will be utilized for pipeline and well maintenance.

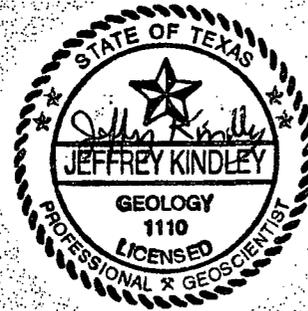
Should you have any questions, please contact Hack Conder at (575) 393-9174. Thank you for your attention to this matter.

Tetra Tech, Inc.



Jeffrey Kindley, P.G.
Senior Environmental Geologist

cc: ROC – Hack Conder



RECEIVED OGD
2010 APR 22 P 2:35

FIGURES

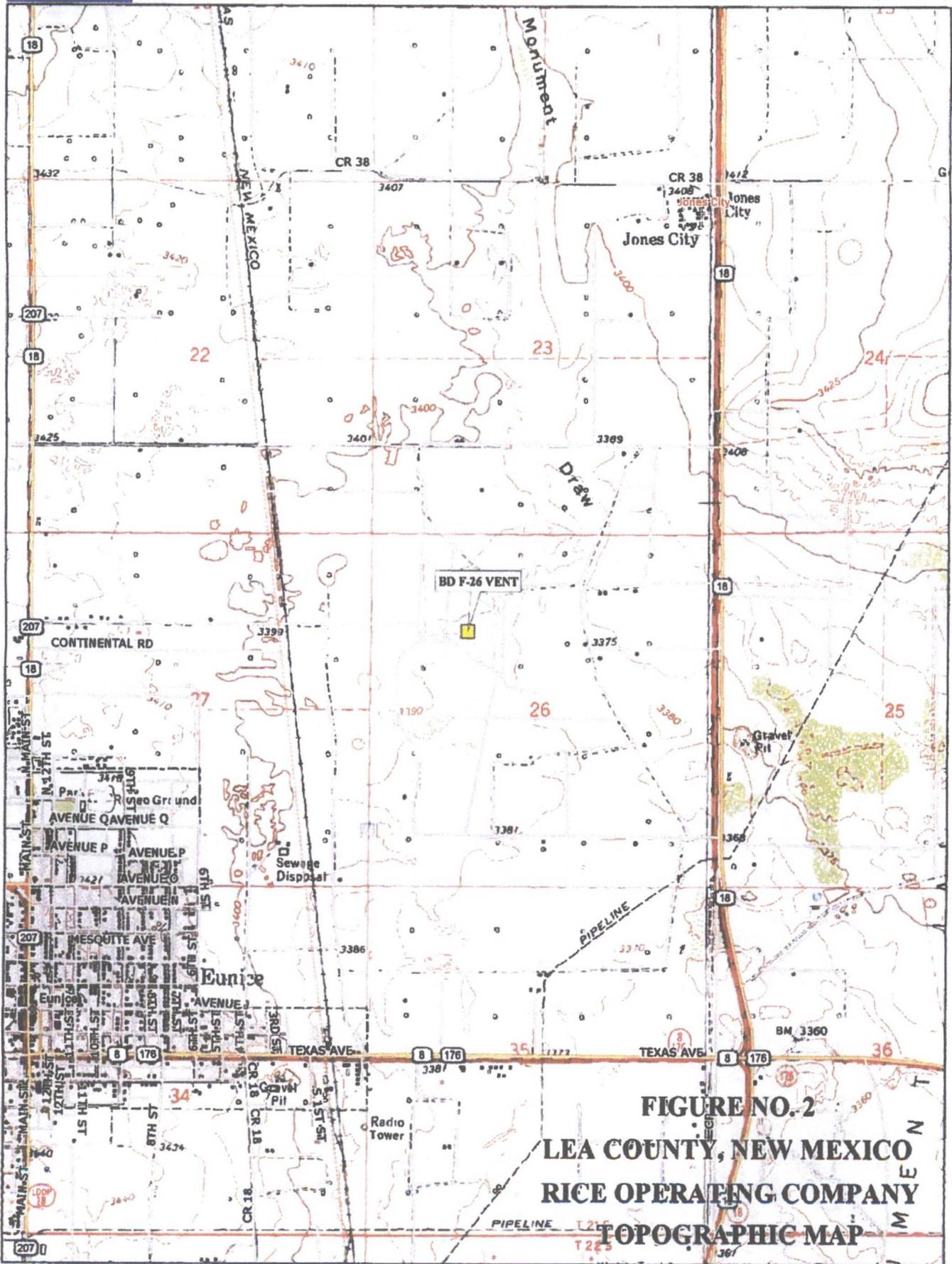


FIGURE NO. 2
LEA COUNTY, NEW MEXICO
RICE OPERATING COMPANY
TOPOGRAPHIC MAP

Data use subject to license.

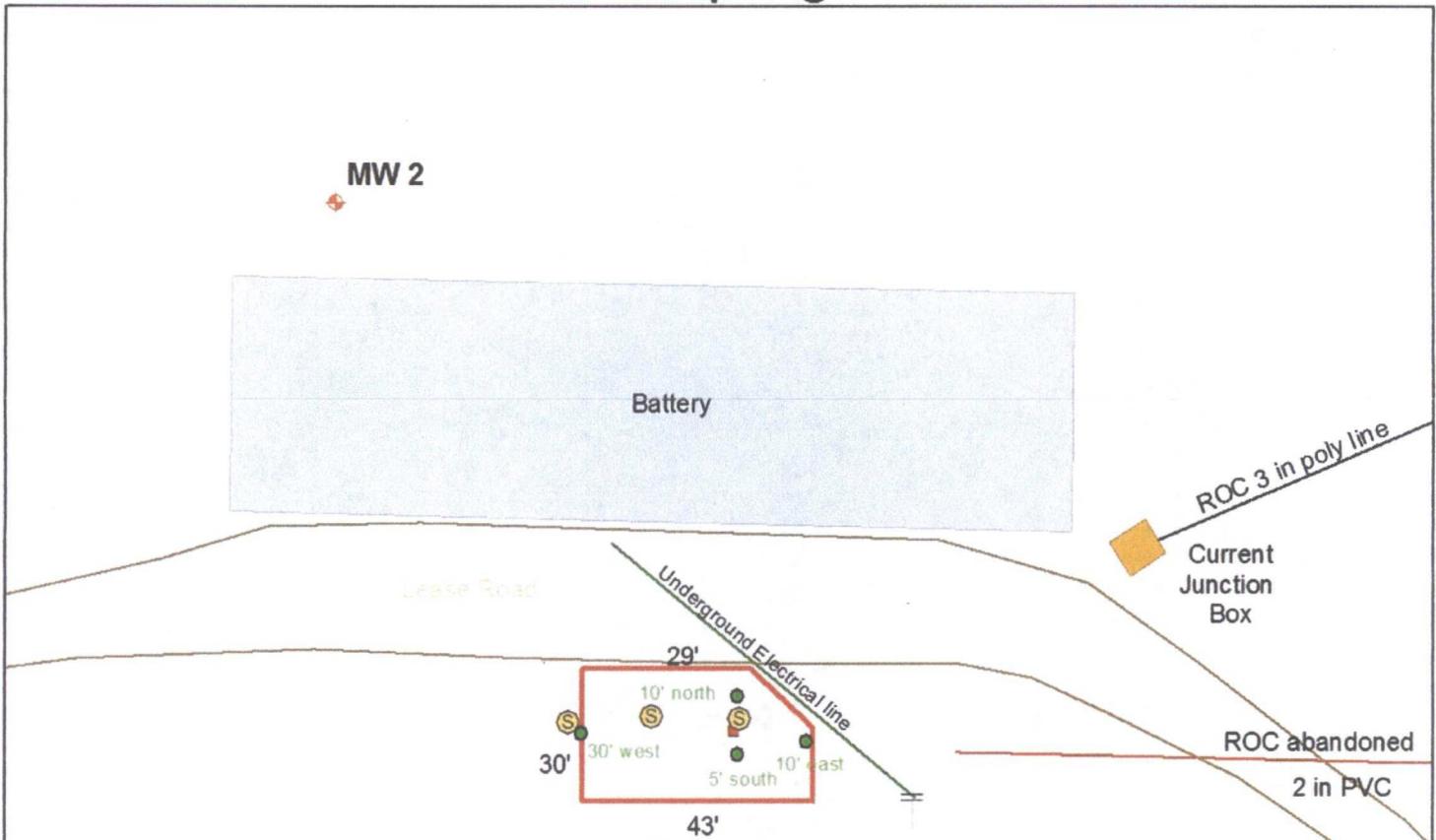
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Scale 1 : 24,000
 1" = 2,000.0 ft Data Zoom 13-0

MW Sampling Data



MW	Depth to Water	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
1	49.41	4/20/2010	1060	2290	<0.001	<0.001	<0.001	<0.003	197
	45.46	7/26/2010	975	2420	<0.001	<0.001	<0.001	<0.003	138
	45.58	10/13/2010	1100	2860	<0.001	<0.001	<0.001	<0.003	128
	44.66	2/11/2011	1340	2520	<0.001	<0.001	<0.001	<0.003	151
	45.63	4/20/2011	1240	2400	<0.001	<0.001	<0.001	<0.003	172
	45.65	7/21/2011	1060	2140	<0.001	<0.001	<0.001	<0.003	126
	46.12	10/18/2011	1480	3030	<0.001	<0.001	<0.001	<0.003	130
	46.11	1/24/2012	1620	3160	<0.001	<0.001	<0.001	<0.003	169
	45.94	4/26/2012	1780	3320	<0.001	<0.001	<0.001	<0.003	152
	46.22	7/23/2012	1880	3990	<0.001	<0.001	<0.001	<0.001	181
	46.29	10/17/2012	2250	4110	<0.001	<0.001	<0.001	<0.003	145
46.33	1/16/2013	2450	3990	<0.001	<0.001	<0.001	<0.003	150	

MW	Depth to Water	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
2	45.92	12/3/2010	1300	3050	<0.001	<0.001	<0.001	<0.003	458
	44.66	2/11/2011	1200	2800	<0.001	<0.001	<0.001	<0.003	415
	45.92	4/20/2011	1200	2610	<0.001	<0.001	<0.001	<0.003	398
	45.94	7/21/2011	1360	2720	<0.001	<0.001	<0.001	<0.003	120
	46.41	10/18/2011	1360	2700	<0.001	<0.001	<0.001	<0.003	104
	46.34	1/24/2012	1300	2510	<0.001	<0.001	<0.001	<0.003	147
	46.25	4/26/2012	1070	2550	<0.001	<0.001	<0.001	<0.003	303
	46.43	7/23/2012	1100	2660	<0.001	<0.001	<0.001	<0.003	325
	46.59	10/17/2012	1220	2740	<0.001	<0.001	<0.001	<0.003	340
	46.58	1/16/2013	1130	2520	<0.001	<0.001	<0.001	<0.003	258

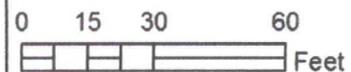
 Proposed 20 mil reinforced liner installed at 4-5 bgs.



BD F-26 vent

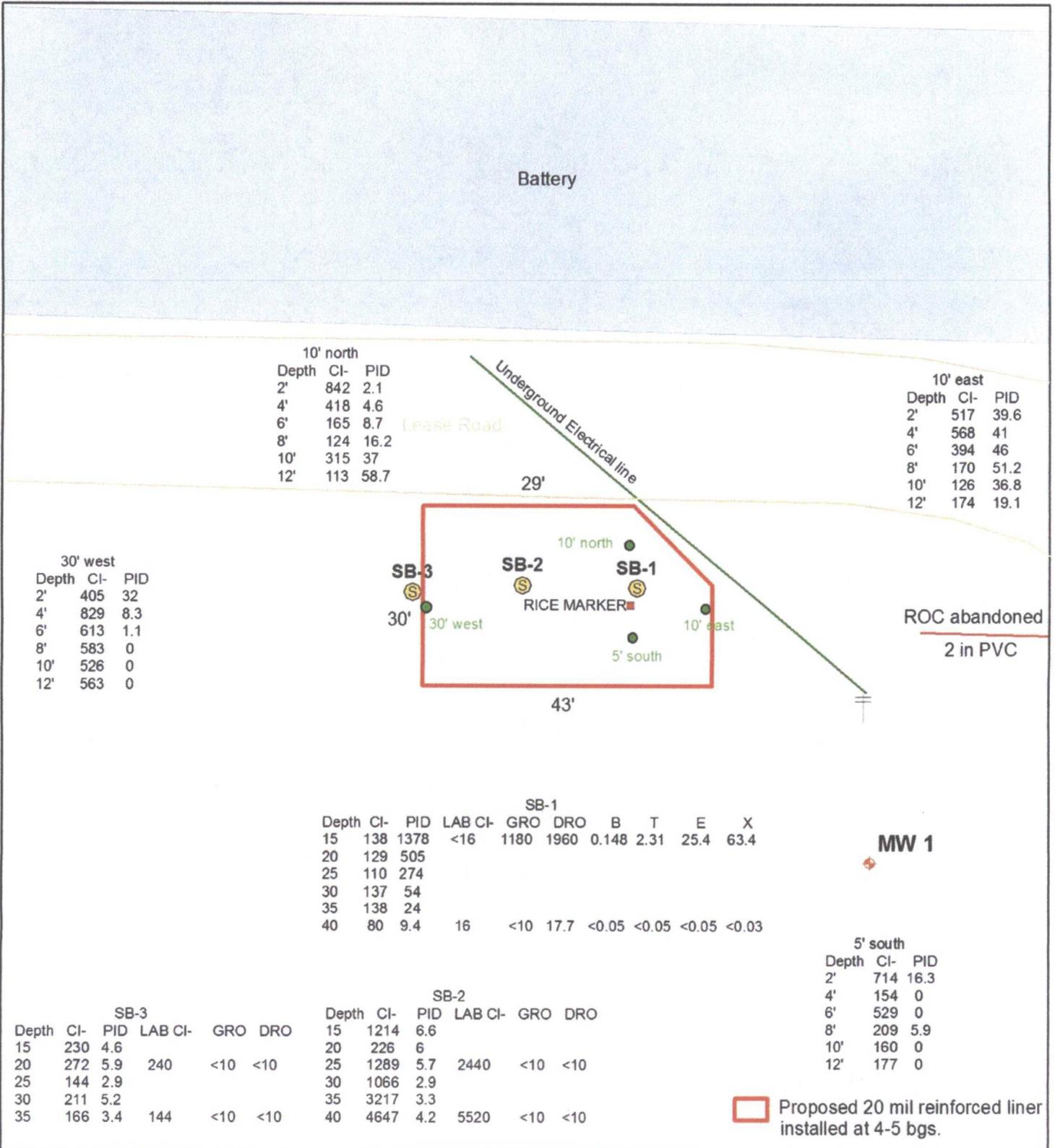
Legals: UL/F sec. 26
T21S R37E
NMOCD Case #: 1R426-214

Figure 3



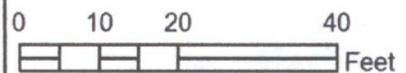
Drawing date: 4/4/13
Drafted by: L. Weinheimer

Proposed Liner



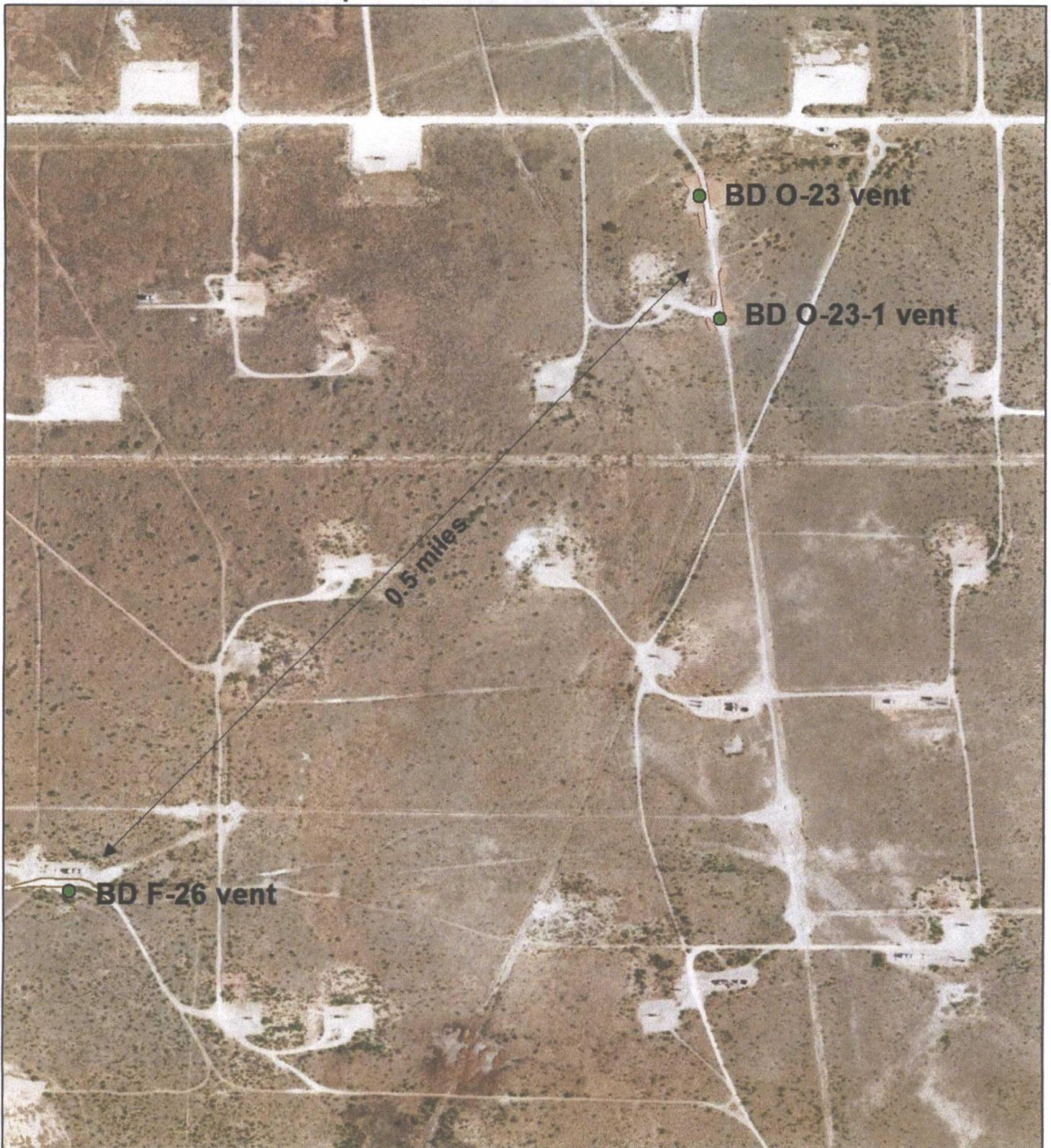
BD F-26 vent
Legals: UL/F sec. 26
T21S R37E
NMOCD Case #: 1R426-214

Figure 4



Drawing date: 5-21-12
 Drafted by: L. Weinheimer

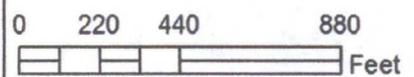
Relationship to O-23 vent and O-23-1 vent



BD F-26 vent

Legals: UL/F sec. 26
T21S R37E
NMOCD Case #: 1R426-214

Figure 5



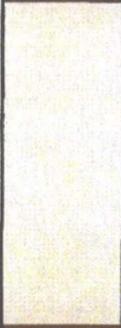
Drawing date: 4/4/13
Drafted by: L. Weinheimer

**APPENDIX A
SOIL BORING LOGS**

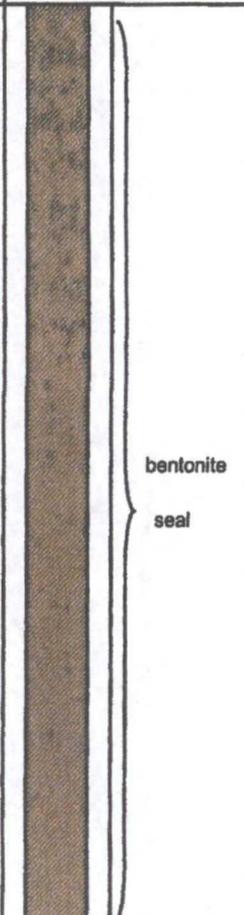
Logger:	Bruce Baker			
Driller:	Harrison & Cooper, Inc. Drilling			
Consultant:	Tetra Tech			
Drilling Method:	Air rotary			
Start Date:	3/22/10			
End Date:	3/22/10			
Comments: Split spoon sampling through 35 ft. All other were from cuttings. Located at the source of the former junction box.			Project Name: BD F-26 vent	Well ID: SB-1
Drafted by: Lara Weinheimer TD = 40 ft GW = 45 ft			Location: UL/F sec. 26 T21S R37E	
			Lat: 32°27'10.892"N	County: Lea
			Long: 103°8'15.721" W	State: NM

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
15	138	Cl- <16	1378	10 - 25 ft COARSE CALICHE blackish-tan, odor present, dry		
	B 0.148 T 2.31 E 25.4 X 63.4	GRO 1180 DRO 1960				
20	129		505			
25	110		274			
30	137		54	25 - 40 ft COARSE CALICHE coarse, brown, slight odor, dry		
35	138		24			
40	80	Cl- 16	9.4			
	B <0.05 T <0.05 E <0.05 X <0.03	GRO <10 DRO 17.7				

Logger:	Bruce Baker		
Driller:	Harrison & Cooper, Inc. Drilling		
Consultant:	Tetra Tech		
Drilling Method:	Air rotary		
Start Date:	3/22/10		
End Date:	3/22/10		
Comments: All samples were from cuttings. Located 16 ft west of the former junction box.			Project Name: BD F-26 vent
Drafted by: Lara Weinheimer TD = 40 ft GW = 45 ft			Well ID: SB-2
			Location: UL/F sec. 26 T21S R37E
			Lat: 32°27'10.899"N County: Lea
			Long: 103°8'15.919" W State: NM

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
				10 - 15 ft		
				FINE SAND		
15	1214		6.6	brown, slight odor, dry		
				15 - 25 ft		
				FINE TO COARSE CALICHE		
20	226		6	tan, dry, slight odor		
				25 - 30 ft		bentonite seal
				FINE TO COARSE CALICHE		
25	1289	CI-2440	5.7	brown, dry, no odor		
		GRO <10				
		DRO <10				
30	1066		2.9			
				30 - 40 ft		
				FINE TO COARSE CALICHE		
35	3217		3.3	tan, dry, no odor		
				40 - 45 ft		
				FINE TO COARSE CALICHE		
40	4647	CI-5520	4.2			
		GRO <10				
		DRO <10				

Logger:	Bruce Baker		
Driller:	Harrison & Cooper, Inc. Drilling		
Consultant:	Tetra Tech		
Drilling Method:	Air rotary		
Start Date:	3/22/10		
End Date:	3/22/10		
Comments: All samples were from cuttings. Located 32 ft west of the former junction box.			Project Name: BD F-26 vent
Drafted by: Lara Weinheimer TD = 35 ft GW = 45 ft			Well ID: SB-3
			Location: UL/F sec. 26 T21S R37E
			Lat: 32°27'10.886"N County: Lea
			Long: 103°8'16.108" W State: NM

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction	
15	230		4.6	10 - 30 ft FINE TO COARSE CALICHE brown, no odor, dry			
20	272	CI-240 GRO <10 DRO <10	5.9				
25	144		2.9				
30	211		5.2				
35	166	CI-144 GRO <10 DRO <10	3.4	30 - 35 ft FINE TO COARSE CALICHE tan, dry, no odor			

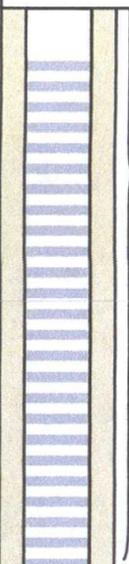
APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

Logger:	None		
Driller:	Harrison & Cooper, Inc. Drilling		
Consultant:	Tetra Tech		
Drilling Method:	Air rotary		
Start Date:	3/23/10		
End Date:	3/23/10		
Comments: No sampling completed on monitor well. Located 56 ft SE of former junction box site.			Project Name: BD F-26 vent Well ID: MW-1 Location: UL/Fsec. 26 T21S R37E Lat: N32°27'10.472" County: LEA Long: W103°8'15.321" State: NM
TD = 57 ft		GW = 45 ft	

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Well Construction	
5				NO SAMPLES TAKEN		2 x 2 ft concrete pad on surface	
10						2 in diameter PVC	bentonite seal
15							
20							sand pack
25							
30							
35							screen = 0.01"
40							
45							
50							
55							
57							

Logger:	Jordan Woodfin		
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air rotary		
Start Date:	11/18/2010		
End Date:	11/18/2010		
Comments: Located 141 ft north west of the former junction box site.		Project Name: BD F-26 vent Well ID: MW-2 Project Consultant: Tetra Tech	
DRAFTED BY: L. Weinheimer TD = 60 ft GW = 45 ft		Location: UL/F sec. 26 T21S R37E Lat: 32°27'12.03"N County: LEA Long: 103°8'16.635"W State: NM	

Depth (feet)	chloride field tests	LAB	PID	Description	Lithology	Well Construction
				Light brown fine sand and caliche		 bentonite seal
5 ft	89		1.3			
				White very fine silty sand		
10 ft	179		0.9			
				Tan fine sand and caliche		
15 ft	140		9			
				Light brown to tan fine sand and caliche		
20 ft	207		1.5			
25 ft	517	Cl- 896	2.2			
		GRO <10				
		DRO <10				
30 ft	293		1.1			
				Tan fine sand and caliche		
35 ft	136		0.7			
40 ft	149		0.6			

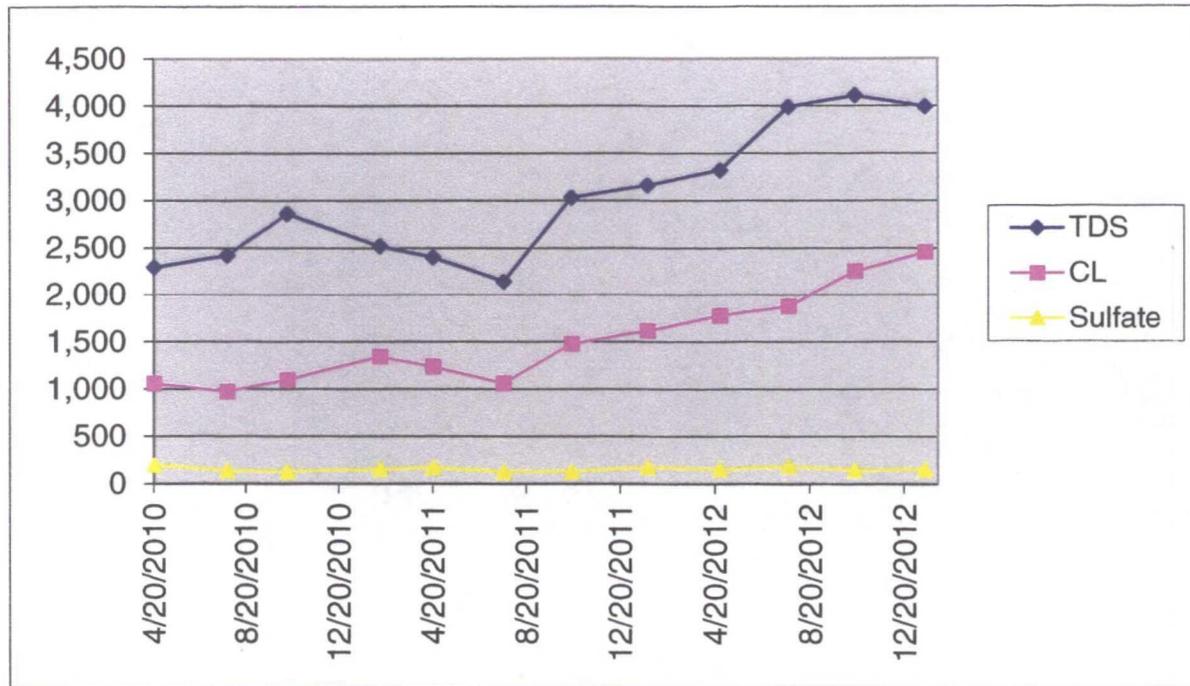
Depth (feet)	chloride field tests	LAB	PID	Description	Lithology	Well Construction
45 ft				NO SAMPLES TAKEN		
50 ft						
55 ft						
60 ft						

APPENDIX C
MONITOR WELL DATA TABLES

Rice Operating Company
BD F-26 Vent
Lea County, New Mexico

MW	Depth to Water	Total Depth	Well Volume	Volume Purged	Sample Date	Cl mg/L	TDS mg/L	Benzene mg/L	Toluene mg/L	Ethyl Benzene mg/L	Total Xylenes mg/L	Sulfate mg/L	Comments
1	49.41	59.10	1.60	8.0	04/20/10	1,060	2,290	<0.001	<0.001	<0.001	<0.003	197	Clear no odor
1	45.46	59.10	2.20	8.0	07/26/10	975	2,420	<0.001	<0.001	<0.001	<0.003	138	Clear no odor
1	45.58	59.10	2.20	8.0	10/13/10	1,100	2,860	<0.001	<0.001	<0.001	<0.003	128	Clear no odor
1	44.66	59.08	2.30	8.0	02/11/11	1,340	2,520	<0.001	<0.001	<0.001	<0.003	151	Clear no odor
1	45.63	59.08	2.20	8.0	04/20/11	1,240	2,400	<0.001	<0.001	<0.001	<0.003	172	Clear no odor
1	45.65	59.08	2.10	8.0	07/21/11	1,060	2,140	<0.001	<0.001	<0.001	<0.003	126	Clear no odor
1	46.12	59.08	2.10	8.0	10/18/11	1,480	3,030	<0.001	<0.001	<0.001	<0.003	130	Clear no odor
1	46.11	59.08	2.10	8.0	01/24/12	1,620	3,160	<0.001	<0.001	<0.001	<0.003	169	Clear no odor
1	45.94	59.08	2.10	8.0	04/26/12	1,780	3,320	<0.001	<0.001	<0.001	<0.003	152	Clear no odor
1	46.22	59.08	2.10	8.0	07/23/12	1,880	3,990	<0.001	<0.001	<0.001	<0.003	181	Clear no odor
1	46.29	59.08	2.10	8.0	10/17/12	2,250	4,110	<0.001	<0.001	<0.001	<0.003	145	Clear no odor
1	46.33	59.08	2.10	8.0	01/16/13	2,450	3,990	<0.001	<0.001	<0.001	<0.003	150	Clear no odor

Graph 1
Rice Operating Company
MW-1
BD F-26 Vent
Lea County, New Mexico



Rice Operating Company
BD F-26 Vent
Lea County, New Mexico

MW	Depth to Water	Total Depth	Well Volume	Volume Purged	Sample Date	Cl mg/L	TDS mg/L	Benzene mg/L	Toluene mg/L	Ethyl Benzene mg/L	Total Xylenes mg/L	Sulfate mg/L	Comments
2	45.92	62.10	2.60	8.0	12/03/10	1,100	2,860	<0.001	<0.001	<0.001	<0.003	128	Clear/No odor
2	45.95	62.10	2.60	9.0	02/11/11	1,200	2,800	<0.001	<0.001	<0.001	<0.003	415	Clear/No odor
2	45.92	62.10	2.60	9.0	04/20/11	1,200	2,610	<0.001	<0.001	<0.001	<0.003	398	Clear/No odor
2	45.94	62.10	2.60	9.0	07/21/11	1,360	2,720	<0.001	<0.001	<0.001	<0.003	120	Clear/No odor
2	46.41	62.10	2.50	9.0	10/18/11	1,360	2,700	<0.001	<0.001	<0.001	<0.003	104	Clear/No odor
2	46.34	62.10	2.50	9.0	01/24/12	1,300	2,510	<0.001	<0.001	<0.001	<0.003	147	Clear/No odor
2	46.25	62.10	2.50	9.0	04/26/12	1,070	2,550	<0.001	<0.001	<0.001	<0.003	303	Clear/No odor
2	46.43	62.10	2.50	9.0	07/23/12	1,100	2,660	<0.001	<0.001	<0.001	<0.003	325	Clear/No odor
2	46.59	62.10	2.50	9.0	10/17/12	1,220	2,740	<0.001	<0.001	<0.001	<0.003	340	Clear/No odor
2	46.58	62.10	2.50	9.0	01/16/13	1,130	2,520	<0.001	<0.001	<0.001	<0.003	258	Clear/No odor

Graph 2
Rice Operating Company
MW-2
BD F-26 Vent
Lea County, New Mexico

