

1R - 426-153

REPORTS

DATE:

4-22-09



Infrastructure, buildings, environment, communications

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2009 APR 27 PM 1 07

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Tel 432.687.5400
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www.arcadis-us.com

Brad Jones
New Mexico Oil Conservation Division
1220 So. Saint Francis Drive
Santa Fe, New Mexico 87505

Certified Mail Receipt No. 7002 2410 0001 5813 0202

Subject:

Investigation and Characterization Plan Report
Blinebry-Drinkard (BD) Junction N-32 Vent
T21S, R37E, Section 32, Unit N, Eunice, Lea County, New Mexico

Dear Mr. Jones;

RICE Operating Company (ROC) has retained ARCADIS U.S., Inc. (ARCADIS) to address potential environmental concerns at the above-referenced site. ROC is the service provider (agent) for the Blinebry-Drinkard (BD) 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 Partners, who provide all operating capital on a percentage ownership/usage basis. Environmental projects of this magnitude require System Partners AFE approval and work begins as funds are received.

On behalf of ROC, ARCADIS respectfully submits this Investigation and Characterization Plan (ICP) Report for the above-referenced site.

SITE HISTORY AND BACKGROUND

The site is located west of the town of Eunice, New Mexico (Figure 1). Elevated chlorides in this area have been reported since as early as 1952 (*Geology and ground-water conditions in southern Lea County, New Mexico* [Groundwater Report 6 by A. Nicholson, Jr. and A. Clebsch, Jr.; United States Geological Society]). The expected depth to groundwater at this site is approximately 100 feet below ground surface.

The junction was eliminated and replaced with a new junction box located 80 feet northeast of the former junction box location (Figure 2). Initial delineation began in August, 2007 and was completed on November 2, 2007. A backhoe was used to collect soil samples at one foot intervals to a depth of 12 feet below ground surface five, ten and fifteen feet north, south, east and west of the junction box locations. Soil samples were analyzed in the field for chlorides using field-adapted Method 9253 and screened in the field using a photoionization detector (PID). Field analytical results are shown in Table 1.

Date:
April 22, 2009

Contact:
Sharon Hall

Phone:
432.687.5400

Email:
shall@arcadis-us.com

Part of a bigger picture

A backhoe was used to excavate soils from an excavation around the former junction box measuring 30 feet by 30 feet by 12 feet deep. A four-point wall composite sample was collected from each of the four walls and five-point composite sample was collected from the bottom of the excavation and submitted to Cardinal Laboratories for gasoline range organics (GRO) and diesel range organics (DRO) and chloride analysis. Some elevated PID readings were observed near the source. DRO was detected at a concentration of 57.8 milligrams per kilogram (mg/kg) in the four-point wall composite sample and at a concentration of 36 mg/kg in the five-point bottom composite sample. GRO was not detected. Field and Laboratory analytical results are summarized in Table 2.

Based on the results of the soil sampling analytical results, elevated chloride concentrations are present at the subject site (Figure 2).

The site was further excavated (40 feet by 45 feet by 5 feet deep along the perimeter) to allow for installation of a clay barrier in the 12 foot deep excavation. The excavated soils were blended on-site and returned to the excavation to a depth six feet below grade. A six-foot deep shelf extending five-feet from the north, south and west walls and ten-feet from the east wall was excavated to prepare the excavation for a clay barrier. A one-foot thick clay barrier was installed at a depth of 5 to 6 feet below ground surface. The clay layer was compacted to a dry density of 93.4% and 14% moisture. The remaining fill was used to backfill the excavation to ground surface and to contour the surrounding area. An identification plate was placed on the surface at the location of the former junction box to mark the presence of the clay liner.

A sample of the blended backfill material was submitted to Cardinal Laboratories for GRO, DRO and chloride analysis. GRO was detected at a concentration of 517 mg/kg and chlorides were detected at a concentration of 1,090 mg/kg.

To further investigate the depth of chloride impacts a soil boring (SB-1) was installed to a depth of 90 feet below ground surface at a location five-feet north of the former junction box. Soil samples were collected every five-feet and analyzed in the field for chlorides using field-adapted Method 9253 and screened in the field using a PID. One sample, collected from a depth of 90 feet below ground surface was submitted to Cardinal Laboratories and analyzed for chlorides. Laboratory analysis confirms the presence of an elevated chloride concentration (1,296 mg/kg) at a depth of 90 feet below ground surface.

ROC disclosed potential groundwater impact at the site to New Mexico Oil Conservation Division (NMOCD) via e-mail on December 6, 2007. A disclosure report was submitted to NMOCD with all of the ROC 2007 Junction Box Reports in March 2008 per the ROC Junction Box Upgrade Work plan.

On behalf of ROC, ARCADIS submitted an ICP to NMOCD on May 21, 2008. The plan proposed three tasks:

INVESTIGATION AND CHARACTERIZATION PLAN

As discussed above existing site data suggest a potential for impairment of groundwater quality. Therefore the work elements described below are designed to assist ROC in selecting an appropriate vadose zone remedy and, if necessary, a groundwater remedy.

Task 1- Collect Regional Hydrogeologic Data

A one-half mile water well inventory that includes a review of water well records listed on the New Mexico State Engineer Office and United States Geological Survey (USGS) websites and windmills indicated on applicable USGS topographic maps.

Chloride impacted regional groundwater has been reported in this area near the towns of Eunice and Monument since as early as 1952 (*Geology and ground-water conditions in southern Lea County, New Mexico* [Groundwater Report 6 by A. Nicholson, Jr. and A. Clebsch, Jr.; United States Geological Society]).

Task 2- Evaluate Concentrations of Constituents of Concern in Soil and Groundwater

Installation of one monitoring well. If analytical results indicate that chloride and/or BTEX concentrations in groundwater exceed New Mexico Water Quality Control Commission standards, additional monitoring wells may be installed as warranted by the results of the investigation.

Additional soil borings were proposed approximately north, south, east and west of the former junction location.

Task 3- Evaluate Potential Flux from the Vadose Zone to Ground Water

As proposed in the ICP, the information gathered from Tasks 1 and 2 would be evaluated and utilized to design a groundwater remedy, if needed. The groundwater remedy that offers the greatest environmental benefit while causing the least environmental impairment will be selected. If the evaluation demonstrates that residual constituents pose no threat to groundwater quality, only a surface restoration plan protective of groundwater will be proposed. Such recommendations and findings will be presented to NMOCD in a subsequent Corrective Action Plan (CAP).

The proposed ICP was approved by NMOCD on May 28, 2008. On June 2, 2008, NMOCD was informed by email that an electromagnetic (EM) survey would be performed at this site to assist on placement of the proposed monitoring well and soil borings. On July 30, 2008 ARCADIS emailed NMOCD the results of the EM survey and informed NMOCD that there were no proposed changes to the approved monitoring well and soil boring locations as a result of the EM survey.

ICP INVESTIGATION RESULTS

Four soil borings (SB 2 through SB 5) and one monitoring well were drilled at the site on October 6 and 7, 2008 (Figure 2). The soil borings were each drilled to a depth of 80 feet and the monitoring well was drilled to a depth of 100 feet. Soil samples were collected every five-feet and analyzed in the field for chlorides using field-adapted Method 9253 and screened in the field using a PID. Two samples from each boring were submitted to Cardinal Laboratories and analyzed for chlorides. Soil boring logs and the monitor well log are attached and include chloride field analysis results.

The monitoring well was constructed of 4 inch PVC casing with 20 feet of 0.01 inch slotted screen and a two-foot concrete pad. Groundwater was measured at a depth of 97.17 feet on January 1, 2009.

Laboratory and field analysis confirm that elevated chloride concentrations are present in soils at the site. Soil laboratory analytical results are summarized in Table 3. A groundwater sample collected on January 1, 2009 exhibited elevated chloride and total dissolved solids (TDS) concentrations (1,540 and 3,010 milligrams per liter, respectively). Laboratory analytical results are attached.

RECOMMENDATIONS

Based on the fact that elevated chloride concentrations in groundwater have been reported in the area since the early 1950s, we propose drilling one upgradient and one downgradient monitoring well at the site to assess groundwater quality. Groundwater samples will be collected and analyzed for chlorides and TDS. Based on the results of groundwater analysis ROC will submit their recommendations for further action if warranted.

Your approval to drill two monitoring wells in the approximate locations shown on Figure 3 is requested. If you have any questions or need additional information please contact Hack Conder at (575) 393-9174 or me.

Very Truly Yours,

ARCADIS U.S, Inc.



Sharon E. Hall
Associate Vice President

Copies:

Hack Conder - Rice Operating Company

Attachments:

Figures 1, 2 and 3

Data tables 1, 2 and 3

October 2008 Investigation Laboratory Results

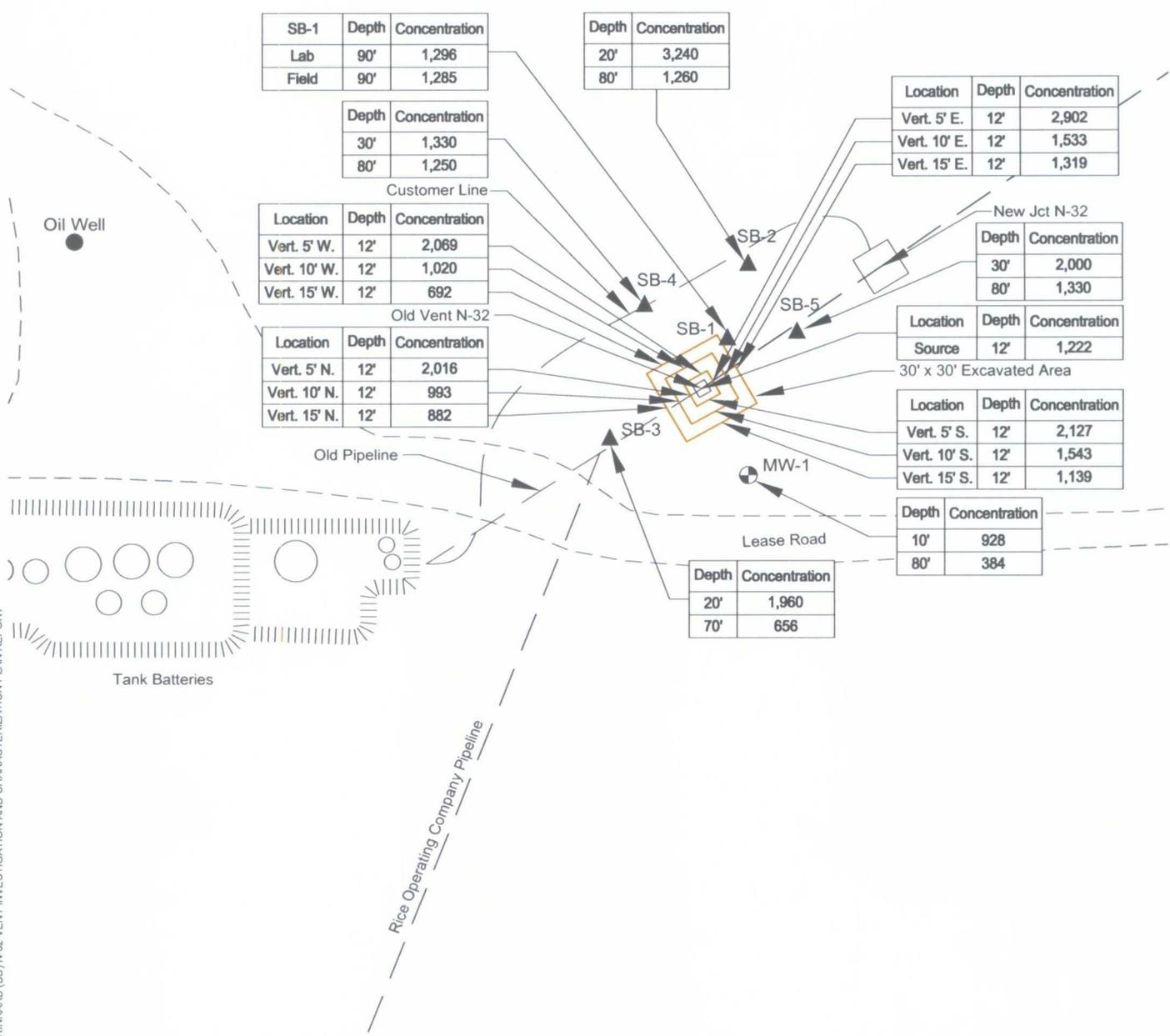
Soil Boring and Monitoring Well Logs

CITY: MIDLAND TX, DIV: GROUP: ENV, DB: HC, LD: HC, PIC: PK, SH, TIK, SH, LVR, ON: OFF, REF: UN, G:\ENV\CA\WIDLAND\ACT\M7010150001\0001\DWG\01915001.DWG, LAYOUT: 2, SAVED: 4/21/2009 7:41 AM, ACADVER: 17.05, PLOT: 4/21/2009 7:42 AM, BY: CLARDY, HERB

PROJECT NAME: BLINEBRY-DRINKARD (BD) N-32 VENT INVESTIGATION AND CHARACTERIZATION PLAN REPORT

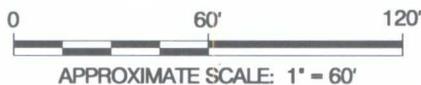
IMAGES: BD Vent N-32.rvt

XREFS:



EXPLANATION

- ▲ SOIL BORING LOCATION
- OIL WELL LOCATION
- ⊕ MONITOR WELL LOCATION
- PIPELINE TRACE
- - - LEASE ROADS
- ||||| BERMED AREAS



RICE OPERATING COMPANY
LEA COUNTY, NEW MEXICO

**BLINEBRY-DRINKARD (BD) N-32 VENT INVESTIGATION
AND CHARACTERIZATION PLAN REPORT**

**CHLORIDE CONCENTRATIONS
MILLIGRAMS PER KILOGRAM (mg/kg)**

ARCADIS

FIGURE
2

Table 1 - Soil Field Delineation Results

N/S Delineation CL							
Depth	15' S	10' S	5' S	Source	5' N	10' N	15' N
1'	230	259	150		272	247	286
2'	180	211	139		289	321	332
3'	260	621	1200		344	633	313
4'	276	840	2437	435	258	1399	780
5'	175	2017	2127	603	258	1932	457
6'	338	1748	2652	988	263	1162	625
7'	455	1287	2043	2529	1315	4401	1874
8'	1829	581	1234	4294	2903	2220	1433
9'	639	686	1283	5288	1112	903	784
10'	1587	1469	1239	2009	2015	589	1403
11'	1494	1226	1041	5244	2973	1160	701
12'	1139	1543	886	1222	2016	993	882

W/E Delineation CL							
Depth	15' W	10' W	5' W	Source	5' E	10' E	15' E
1'	253	194	400		143	432	145
2'	299	148	660		260	213	306
3'	358	235	795		140	241	300
4'	437	355	1092	435	168	565	782
5'	256	257	3529	603	447	2806	1646
6'	290	268	3411	988	322	3048	3198
7'	432	1537	1723	2529	1490	2061	2779
8'	973	3690	2443	4294	4618	2264	2738
9'	1644	1835	2031	5288	2065	2972	3184
10'	551	2822	1051	2009	994	1976	1115
11'	598	1701	1389	5244	1848	1462	1554
12'	692	1020	2069	1222	2902	1533	1319

N/S Delineation PID							
Depth	15' S	10' S	5' S	Source	5' N	10' N	15' N
1'	3.9	7.4	92.9		0.7	5.5	0
2'	131	8.8	65		0	0	0
3'	50.2	49.9	179		0	0.8	0
4'	7.3	195	582	32.9	27.7	863	455
5'	8.8	700	778	106	511	944	493
6'	0	584	1180	417	714	898	486
7'	0	316	860	892	754	512	204
8'	0	76.9	1227	928	367	209	163
9'	0	34.9	977	772	82.1	76.3	56.5
10'	0	22.5	1096	757	73.6	38.3	39.9
11'	0	24.2	478	1124	28.4	23.9	10.1
12'	0	106	292	333	18.5	23.3	13.1

W/E Delineation PID							
Depth	15' W	10' W	5' W	Source	5' E	10' E	15' E
1'	16.3	8.9	44.5		29.9	4.6	2.3
2'	7.7	7.8	80.3		23	3.5	0
3'	5.3	5.4	768		77.4	13.1	0
4'	3.4	7.8	875	32.9	49.3	67.1	11.4
5'	2.3	6.5	685	106	622	22.6	0
6'	1.5	6.6	846	417	902	377	0
7'	4.6	6.1	718	892	1116	162	0
8'	2.5	4.6	891	928	1183	29.1	0
9'	2.5	6.2	1116	772	908	14.7	0
10'	1.9	3.3	929	757	1079	10.1	0
11'	6.5	5.3	202	1124	1341	11.8	0
12'	2.5	2.6	118	333	790	13.6	0

Table 2- Soil Field and Laboratory Results - Excavation and Backfill Sampling

Test	Field		Lab Results	
	CL	PID	DRO	GRO
Wall Composite Samples	N	834	170	
	S	873	23.5	
	E	989	12.6	
	W	772	8.3	
4pt Wall Composite 30 x 30 Blended Backfill		976	106	688
		894	20.1	1090
Bottom Samples	1	1353		
	2	1311		
	3	1758		
	4	1318		
	5	2754		
5pt Bottom Composite @ 12'	1708	8.8	2400	36 <10

Table 3

Soil Boring Sampling Chloride Results

Sample ID	Depth (feet)	Concentration (milligrams per kilogram)
SB #1	90	1,296
SB #2	20	3,240
SB #2	80	1,260
SB #3	20	1960
SB #3	70	656
SB #4	30	1,330
SB #4	80	1,250
SB #5	30	2,000
SB #5	80	1,330
MW-1	10	928
MW-1	80	384



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

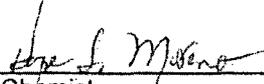
Receiving Date: 10/17/08
 Reporting Date: 10/17/08
 Project Number: NOT GIVEN
 Project Name: BD N-32 VENT
 Project Location: BD N-32 VENT

Analysis Date: 10/17/08
 Sampling Date: 10/06/08 & 10/07/08
 Sample Type: SOIL
 Sample Condition: COOL & INTACT
 Sample Received By: HM
 Analyzed By: HM/TR

LAB NO.	SAMPLE ID	Cl ⁻ (mg/kg)
H16132-1	MW #1 @ 10'	928
H16132-2	MW #1 @ 80'	384
H16132-3	SB #2 @ 20'	3,240
H16132-4	SB #2 @ 80'	1,260
H16132-5	SB #3 @ 20'	1,960
H16132-6	SB #3 @ 70'	656
H16132-7	SB #4 @ 30'	1,330
H16132-8	SB #4 @ 80'	1,250
H16132-9	SB #5 @ 30'	2,000
H16132-10	SB #5 @ 80'	1,330
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods 4500-Cl⁻B

Note: Analyses performed on 1:4 w:v aqueous extracts.


 Chemist

10-20-08
 Date

H16132 RICE

GW 97.18

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

ARDINAL 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

ANALYSIS REQUEST

Company Name: Rice Operating Company
Project Manager: Hack Conder
Address: 122 West Taylor
City: Hobbs **State:** NM **Zip:** 88240
Phone #: 393-9174 **Fax #:** 397-1471
Project #: **Project Owner:**
Project Name: BD N-32 vent
Project Location: BD N-32 vent
Sampler Name: Lara Weinheimer/ Tony Grieco

Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP	# CONTAINERS	MATRIX				PRESERV	SAMPLING	DATE	TIME	
				GROUNDWATER	WASTEWATER	SOIL	OIL					
H16132-1	MW #1 @ 10'	1	1	✓				✓	10/7/08	09:25	chlorides	✓
	MW #1 @ 80'	1	1	✓				✓	10/7/08	09:52		✓
	SB #2 @ 20'	1	1	✓				✓	10/6/08	11:08		✓
	SB #2 @ 80'	1	1	✓				✓	10/6/08	11:55		✓
	SB #3 @ 20'	1	1	✓				✓	10/6/08	02:00		✓
	SB #3 @ 70'	1	1	✓				✓	10/6/08	02:26		✓
	SB #4 @ 30'	1	1	✓				✓	10/6/08	03:15		✓
	SB #4 @ 80'	1	1	✓				✓	10/6/08	03:45		✓
	SB #5 @ 30'	1	1	✓				✓	10/7/08	08:22		✓
	SB #5 @ 80'	1	1	✓				✓	10/7/08	08:40		✓

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Received By: *Lara Weinheimer* **Date:** 10-17-08
Received By: *Tony Grieco* **Date:** 11-12-08
Time: 11:32
Time:
Sample Condition: Cool Intact Yes No
Checked By: *ASW* (Initials)
Delivered By: (Circle One) Bus Other:
Sample - UPS - Bus - Other:
Phone Result: Yes No **Add'l Phone #:**
Fax Result: Yes No **Add'l Fax #:**
REMARKS:
 email results
 Hconder@riceswd.com; jpurvis@riceswd.com;
 Lweinheimer@riceswd.com

1 Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476
NEED SAMPLES BACK, PLEASE



ANALYTICAL RESULTS FOR
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 HOBBS, NM 88240
 FAX TO: (575) 397-1471

Receiving Date: 01/23/09
 Reporting Date: 01/29/09
 Project Number: NOT GIVEN
 Project Name: BD N-32 VENT
 Project Location: T21S-R37E-SEC32 N~ LEA CO., NM

Sampling Date: 01/21/09
 Sample Type: WATER
 Sample Condition: COOL & INTACT
 Sample Received By: ML
 Analyzed By: ZL

LAB NUMBER	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		01/28/09	01/28/09	01/28/09	01/28/09
H16750-1	MONITOR WELL #1	<0.001	<0.001	<0.001	<0.003
Quality Control		0.055	0.056	0.055	0.167
True Value QC		0.050	0.050	0.050	0.150
% Recovery		110	112	110	111
Relative Percent Difference		1.7	1.7	<1.0	<1.0

METHOD: EPA SW-846 8021B

TEXAS NELAP CERTIFICATION T104704398-08-TX FOR BENZENE, TOLUENE, ETHYL BENZENE,
 AND TOTAL XYLENES.


 Chemist

01/29/09
 Date

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 FAX TO: (575) 397-1471

Receiving Date: 01/23/09
 Reporting Date: 01/27/09
 Project Number: NOT GIVEN
 Project Name: BD N-32 VENT
 Project Location: T21S-R37E-SEC32 N ~ LEA CO., NM

Sampling Date: 01/21/09
 Sample Type: WATER
 Sample Condition: COOL & INTACT
 Sample Received By: ML
 Analyzed By: TR

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (μ S/cm)	T-Alkalinity (mgCaCO ₃ /L)
ANALYSIS DATE:		01/27/09	01/27/09	01/27/09	01/27/09	01/26/09	01/26/09
H16750-1	MONITOR WELL #1	931	116	43.7	20.9	4,540	216
Quality Control		NR	48.1	51.0	2.78	1,429	NR
True Value QC		NR	50.0	50.0	3.00	1,413	NR
% Recovery		NR	96.2	102	92.6	101	NR
Relative Percent Difference		NR	<0.1	<0.1	7.3	0.1	NR

METHODS:	SM3500-Ca-D	3500-Mg E	8049	120.1	310.1
----------	-------------	-----------	------	-------	-------

	Cl (mg/L)	SO ₄ (mg/L)	CO ₃ (mg/L)	HCO ₃ (mg/L)	pH (s.u.)	TDS (mg/L)	
ANALYSIS DATE:	01/26/09	01/26/09	01/26/09	01/26/09	01/26/09	01/26/09	
H16750-1	MONITOR WELL #1	1,540	130	0	264	7.16	3,010
Quality Control	490	42.1	NR	1000	7.00	NR	
True Value QC	500	40.0	NR	1000	7.00	NR	
% Recovery	98.0	105	NR	100	100	NR	
Relative Percent Difference	2.0	3.1	NR	<0.1	0.1	NR	

METHODS:	SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1
----------	-------------	-------	-------	-------	-------	-------

Cheryl Keane

 Chemist

01/28/09

 Date

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