

## **GROUNDWATER MONITORING REPORT JANUARY 2010**

---

### **UPRC 9, 9K, 10K**

On November 19, 2009, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc., at the UPRC 9, 9K, 10K Tank Battery (Site). This sampling event constitutes the third post remediation monitoring event at this Site. Site history, remediation activities, well installation, and performance monitoring have been described in the preceding reports.

Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1. The monitoring wells (MW01, MW02, and MW03) were installed on April 14, 2009. A Site Map is presented on Figure 1.

Depth to groundwater ranged from 7.50 feet below top of casing (btoc) in MW01 to 8.03 feet btoc in MW03 and was used to calculate well-specific purge volumes. Following purging, groundwater samples were collected and preserved on ice. Samples were submitted under strict chain of custody protocol to Origins Laboratory, Inc. of Denver, Colorado for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency Method 8260B.

Analytical results from the monitoring wells, presented in Table 1, indicated BTEX concentrations for MW01 and MW03 are in compliance with Colorado Department of Public Health and Environment-Water Quality Control Commission Regulation 41 (WQCC Reg 41). MW02 exhibited a benzene concentration of 29.1 micrograms per liter ( $\mu\text{g/L}$ ), which is above the WQCC Reg 41 standard of 5.0  $\mu\text{g/L}$ . The laboratory analytical report is included in the Appendix.

LTE will continue to conduct quarterly groundwater monitoring events with the goal of observing four consecutive quarters with analytical results in compliance with WQCC Reg 41. The next quarterly groundwater sampling event is scheduled for February 2010.

## TABLE

TABLE 1

**GROUNDWATER ANALYTICAL DATA  
UPRC 9, 9k, 10k TANK BATTERY  
WELD COUNTY, COLORADO  
NOBLE ENERGY, INC.**

MONITORING WELL	DATE	DEPTH TO WATER (feet btoc)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYLBENZENE (ug/L)	TOTAL XYLENES (ug/L)
MW01	4/28/2009	6.12	<1.0	<1.0	<1.0	<3.0
	8/25/2009	2.21	<1.0	<1.0	<1.0	<3.0
	11/19/2009	7.50	<1.0	<1.0	<1.0	<3.0
MW02	4/28/2009	6.52	<1.0	<1.0	<1.0	<3.0
	8/25/2009	2.16	<1.0	<1.0	<1.0	<3.0
	11/19/2009	7.74	<b>29.1</b>	<1.0	<1.0	<3.0
MW03	4/28/2009	6.69	2.70	<1.0	108	519.19
	8/25/2009	2.01	<1.0	<1.0	<1.0	<3.0
	11/19/2009	8.03	1.12	<1.0	24.3	23.5
<b>CDPHE WQCC Reg 41</b>			<b>5.0</b>	<b>560</b>	<b>700</b>	<b>1,400</b>

## NOTES:

btoc - below top of casing

ug/L - micrograms per liter

&lt; - indicates result is less than the stated laboratory method detection limit

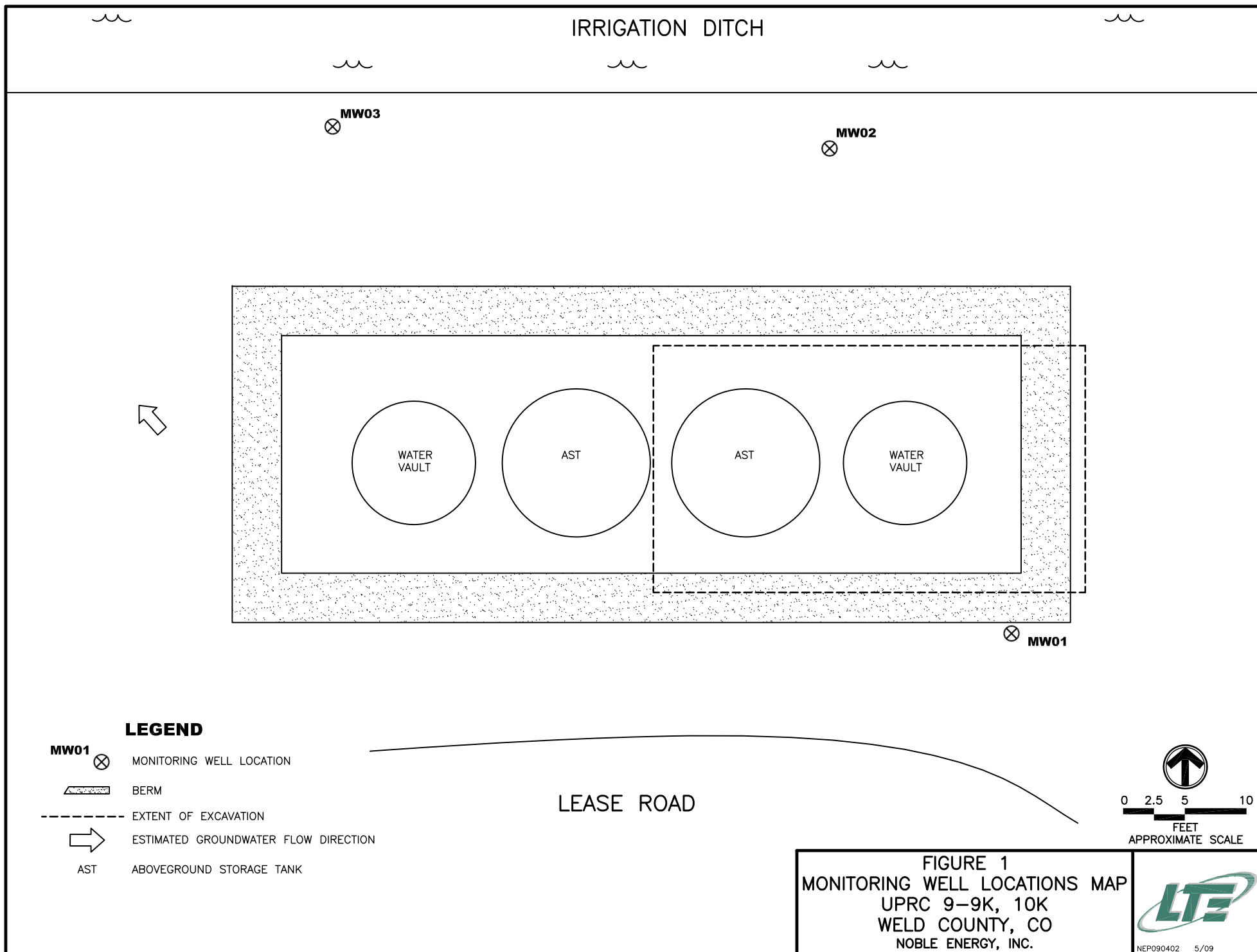
**BOLD** - indicates result exceeds the regulatory standard.

Benzene, toluene, ethylbenzene, and xylenes analyzed by EPA Method 8260B

CDPHE WQCC Reg 41 - Colorado Department of Public Health and Environment - Water Quality Control  
Commission Regulation 41 covering Basic Standards for Groundwater



**FIGURE**



**APPENDIX**  
**ANALYTICAL REPORT**



4640 Pecos Street | Unit C | Denver, Colorado 80211  
303.433.1322 Phone 303.265.9645 Fax

---

November 29, 2009

---

LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

---

Attached are the analytical results for Noble – UPRC 9, 9k– 10k received by Origins Laboratory, Inc. 11/23/2009 11:45:00AM. Please let us know if you have any questions, or if we can help with anything at all.

A handwritten signature in black ink, appearing to read "Noelle E Doyle", is written over a light blue horizontal line.

Noelle E Doyle  
Laboratory Manager

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. This laboratory report is intended solely for the above addressee and it is only to be used and or reproduced in its entirety.

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

#### CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW01	X911091-01	Water	11/19/2009 3:35:00PM	11/23/2009 11:45
MW02	X911091-02	Water	11/19/2009 4:00:00PM	11/23/2009 11:45
MW03	X911091-03	Water	11/19/2009 4:15:00PM	11/23/2009 11:45

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager



4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

11/23/09  
page 1 of 1



originslaboratory.com

Client: LT Environmental  
Address: 4600 W. 60th Ave.  
Arvada, CO 80003  
Telephone Number: 303-433-9785  
E-Mail Address: bdodek@ltenv.com

Project Manager: Brian Dodek  
Project Name: UPRC 9-9k, 10k GW Sampling  
Project Number: NEP0904  
Samples Collected by: Devlin Givlin

Sample ID - Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analysis	Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other -	Groundwater	Soil	Air - Summa Canister #		
MW01	11/19/09	1535	3	X				X				1
MW02	↓	1600	↓	X				X				2
MW03	↓	1615	↓	X				X				3
												4
												5
												6
												7
												8
												9
												10
Relinquished by: <u>Brian Dodek</u>	Date: <u>11/23/09</u>	Time: <u>11:45</u>	Time: <u>11:45</u>	Received by: <u>[Signature]</u>	Date: <u>11/23/09</u>	Time: <u>11:45</u>	Temperature Upon Receipt: <u>X</u>	Turn Around Time: <u>X</u>	Same Day <u>48-hr</u>	Standard <u>72-hr</u>		

4640 North Pecos Street | Unit C | Denver, Colorado 80211 | Laboratory - 303.433.1322 | Fax - 303.265.9645

Origins Laboratory, Inc.

Noelle E Doyle

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Noelle E Doyle, Laboratory Manager

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

**MW01**

**X911091-01 (Water)**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

**Origins Laboratory, Inc.**

**BTEX by EPA 8260B**

Benzene	ND	0.00100	mg/L	1	9K23004	11/23/2009	11/24/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	115 %	85.7-134	"	"	"
Surrogate: Toluene-d8	86.7 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	116 %	74.7-127	"	"	"

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

**MW02**

**X911091-02 (Water)**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

**Origins Laboratory, Inc.**

**BTEX by EPA 8260B**

Benzene	0.0291	0.00100	mg/L	1	9K23004	11/23/2009	11/24/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	118 %	85.7-134	"	"	"
Surrogate: Toluene-d8	84.0 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	119 %	74.7-127	"	"	"

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

**MW03**

**X911091-03 (Water)**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

**Origins Laboratory, Inc.**

**BTEX by EPA 8260B**

Benzene	0.00112	0.00100	mg/L	1	9K23004	11/23/2009	11/24/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	0.0243	0.00100	"	"	"	"	"
o-Xylene	0.00110	0.00100	"	"	"	"	"
m,p-Xylene	0.0224	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	119 %	85.7-134	"	"	"
Surrogate: Toluene-d8	83.5 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	103 %	74.7-127	"	"	"

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

**Volatile Organic Compounds by EPA Method 8260B – Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch 9K23004 – EPA 5030B**

**Blank (9K23004–BLK1)**

Prepared: 11/23/2009 Analyzed: 11/23/2009

Benzene	ND	0.001	mg/L							
Toluene	ND	0.001	"							
Ethylbenzene	ND	0.001	"							
o-Xylene	ND	0.001	"							
m,p-Xylene	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	70.9		ug/L	62.5		113	85.7–134			
Surrogate: Toluene-d8	56.0		"	62.5		89.6	81.4–121			
Surrogate: 4-Bromofluorobenzene	69.6		"	62.5		111	74.7–127			

**LCS (9K23004–BS1)**

Prepared: 11/23/2009 Analyzed: 11/23/2009

Benzene	0.04	0.001	mg/L	0.0500		79.7	74.9–126			
Toluene	0.04	0.001	"	0.0500		81.5	73.3–128			
Surrogate: 1,2-Dichloroethane-d4	70.3		ug/L	62.5		113	85.7–134			
Surrogate: Toluene-d8	54.7		"	62.5		87.5	81.4–121			
Surrogate: 4-Bromofluorobenzene	69.5		"	62.5		111	74.7–127			

**Matrix Spike (9K23004–MS1)**

Source: X911088–01

Prepared: 11/23/2009 Analyzed: 11/23/2009

Benzene	0.04	0.001	mg/L	0.0500	ND	78.8	78.1–132			
Toluene	0.04	0.001	"	0.0500	ND	79.8	71.7–124			
Surrogate: 1,2-Dichloroethane-d4	74.0		ug/L	62.5		118	85.7–134			
Surrogate: Toluene-d8	54.1		"	62.5		86.6	81.4–121			
Surrogate: 4-Bromofluorobenzene	70.4		"	62.5		113	74.7–127			

**Matrix Spike Dup (9K23004–MSD1)**

Source: X911088–01

Prepared: 11/23/2009 Analyzed: 11/23/2009

Benzene	0.04	0.001	mg/L	0.0500	ND	77.9	78.1–132	1.10	24.8	QM-07
Toluene	0.04	0.001	"	0.0500	ND	77.0	71.7–124	3.55	25	
Surrogate: 1,2-Dichloroethane-d4	72.5		ug/L	62.5		116	85.7–134			
Surrogate: Toluene-d8	53.1		"	62.5		85.0	81.4–121			
Surrogate: 4-Bromofluorobenzene	69.6		"	62.5		111	74.7–127			

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

4640 Pecos Street | Unit C  
Denver, Colorado 80211  
303.433.1322 | Laboratory  
303.265.9645 | Fax



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Brian Dodek  
Project Number: NEP0904  
Project: Noble – UPRC 9, 9k– 10k

### Notes and Definitions

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager