

## **GROUNDWATER MONITORING REPORT JULY 2010**

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### **UPRC 9, 9K, 10K TANK BATTERY**

On June 15, 2010, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc. (Noble), at the UPRC 9, 9K, 10K Tank Battery (Site). Based upon persistent elevated levels of benzene observed during February 2010 sampling, a groundwater polishing amendment was applied at the Site. Following this recent work, the June 2010 sampling event was conducted and constitutes the first post remediation performance monitoring event at the Site. Site history, assessment, and prior remediation activities have been described in preceding reports. A Site Map is presented as Figure 1.

Installation of the groundwater amendment was completed by exposing a 20 feet by 20 feet area around monitoring well MW02 to 2 feet below groundwater, and applying 200 pounds of a groundwater amendment. The groundwater amendment consists of activated carbon and electron acceptors designed to promote biodegradation of petroleum hydrocarbons. Monitoring well MW02 was destroyed during remediation activities and was replaced as MW02-R. Following the remediation work, the Site was sampled on June 15, 2010 to evaluate the effectiveness of the remediation program and begin a new cycle of quarterly sampling.

During the June 15, 2010 monitoring event, the depth to groundwater ranged from 5.52 feet below top of casing (btoc) in MW01 to 6.25 feet btoc in MW03, and was used to calculate well-specific purge volumes. Samples were collected and submitted 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 indicate BTEX concentrations for MW01 and MW03 are in compliance with Colorado Department of Public Health and Environmental-Water Quality Control Commission Regulation 41 (WQCC Reg 41). MW02-R exhibited a benzene concentration of 40.0 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 of analytical results in compliance with applicable regulatory standards. The next quarterly groundwater sampling event is scheduled for September 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
	2/16/2010	4.89	<1.0	<1.0	<1.0	<3.0
	6/15/2010	5.52	<1.0	<1.0	<1.0	<1.0
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
	2/16/2010	5.06	<b>65.2</b>	<1.0	<1.0	<3.0
	6/15/2010	5.58	<b>40.0</b>	<1.0	<1.0	<1.0
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
	2/16/2010	5.15	<1.0	<1.0	<1.0	<3.0
	6/15/2010	6.25	<1.0	<1.0	1.9	<1.0
<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 reporting limit

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

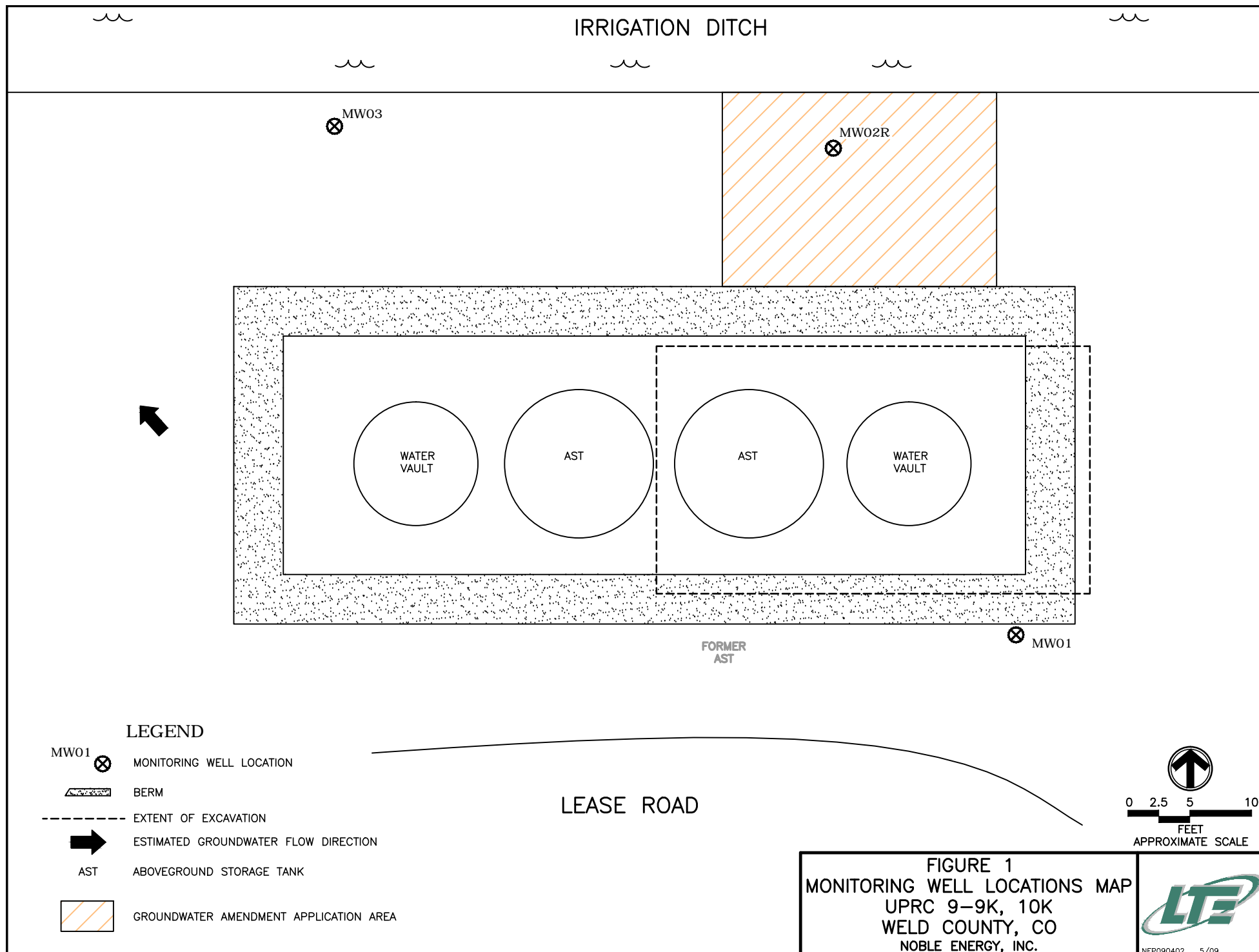
Benzene, toluene, ethylbenzene, and xylenes analyzed by EPA Method 8260B

CDPHE WQCC Reg 41 - Colorado Department of Public Health and Environment - Water Quality Control

Commission Regulation 41 covering Basic Standards for Groundwater



**FIGURE**



**APPENDIX A**  
**ANALYTICAL REPORTS**

6/17/2010

LT Environmental, Inc.

Matthew Harrison

4600 West 60th Avenue

Arvada

CO

80003

Project Name- Noble - UPRC 9, 9k- 10k

Project Number- NEP0904

Attached are your analytical results for Noble - UPRC 9, 9k- 10k received by Origins Laboratory, Inc. June 15, 2010 3:55 pm. This project is associated with Origins project number X006102-01 .

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.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all,

Origins Laboratory, Inc.

303.433.1322

o-squad@oelabinc.com



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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW01	X006102-01	Water	6/15/2010 1:10:00PM	06/15/2010 15:55
MW02R	X006102-02	Water	6/15/2010 12:25:00PM	06/15/2010 15:55
MW03	X006102-03	Water	6/15/2010 1:00:00PM	06/15/2010 15:55

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



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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

**ORIGINS** LABORATORY, INC

www.originslaboratory.com

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**Client:** LTE

**Project Manager:** M. Harrison

**Project Name:** UPRC 9-9K, 10K


**Project Number:** NEP0904

**Samples Collected By:** D. Burns

**Address:**

**Telephone Number:**

**Email Address:**

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions	Turnaround Time:
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summa #			
MW01	6/15/10	1310	2										
MW02R	↓	1225	↓										
MW03	↓	1300	↓										
													
<p>Relinquished By:  Date: 6/15/10 Time: 1555</p> <p>Relinquished By:  Date: 6/15/10 Time: 1555</p>													

Fax: 303.265.9645 | Phone: 303.433.1322 | Denver, CO 80211 | 1725 Elk Place

Origins Laboratory, Inc.



Noelle E Doyle, Laboratory Manager

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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

## MW01

6/15/2010 1:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X006102-01 (Water)

### BTEX by EPA 8260B

Benzene	ND	0.00100	mg/L	1	OF15005	06/15/2010	06/16/2010
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
Xylenes, total	ND	0.00100	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	106 %	73.5-130	"	"	"
Surrogate: Toluene-d8	97.5 %	79.3-113	"	"	"
Surrogate: 4-Bromofluorobenzene	92.8 %	81.5-117	"	"	"

Origins Laboratory, Inc.



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## MW02R

6/15/2010 12:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X006102-02 (Water)

### BTEX by EPA 8260B

Benzene	0.0400	0.00100	mg/L	1	OF15005	06/15/2010	06/16/2010
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
Xylenes, total	ND	0.00100	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	106 %	73.5-130	"	"	"
Surrogate: Toluene-d8	97.5 %	79.3-113	"	"	"
Surrogate: 4-Bromofluorobenzene	92.7 %	81.5-117	"	"	"

Origins Laboratory, Inc.



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## MW03

6/15/2010 1:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X006102-03 (Water)

### BTEX by EPA 8260B

Benzene	ND	0.00100	mg/L	1	OF15005	06/15/2010	06/16/2010	
Toluene	ND	0.00100	"	"	"	"	"	
Ethylbenzene	0.00190	0.00100	"	"	"	"	"	
Xylenes, total	ND	0.00100	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	105 %	73.5-130			"	"	06/16/2010	
Surrogate: Toluene-d8	96.9 %	79.3-113			"	"	"	
Surrogate: 4-Bromofluorobenzene	92.8 %	81.5-117			"	"	"	

Origins Laboratory, Inc.



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## 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
<b>Batch OF15005 - EPA 5030B</b>										
<b>Blank (OF15005-BLK1)</b>					Prepared: 06/15/2010 Analyzed: 06/15/2010					
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	65.1		ug/L	62.5		104	73.5-130			
Surrogate: Toluene-d8	60.4		"	62.5		96.7	79.3-113			
Surrogate: 4-Bromofluorobenzene	58.1		"	62.5		93.0	81.5-117			
<b>LCS (OF15005-BS1)</b>					Prepared: 06/15/2010 Analyzed: 06/15/2010					
Benzene	0.05	0.001	mg/L	0.0500		105	77.3-128			
Toluene	0.06	0.001	"	0.0500		113	81.7-118			
Surrogate: 1,2-Dichloroethane-d4	65.6		ug/L	62.5		105	73.5-130			
Surrogate: Toluene-d8	61.1		"	62.5		97.8	79.3-113			
Surrogate: 4-Bromofluorobenzene	57.5		"	62.5		92.1	81.5-117			
<b>Matrix Spike (OF15005-MS1)</b>					Source: X006103-01	Prepared: 06/15/2010 Analyzed: 06/15/2010				
Benzene	0.05	0.001	mg/L	0.0500	0.001	105	74.5-132			
Toluene	0.06	0.001	"	0.0500	ND	113	74.2-116			
Surrogate: 1,2-Dichloroethane-d4	65.7		ug/L	62.5		105	73.5-130			
Surrogate: Toluene-d8	61.1		"	62.5		97.7	79.3-113			
Surrogate: 4-Bromofluorobenzene	58.0		"	62.5		92.7	81.5-117			
<b>Matrix Spike Dup (OF15005-MSD1)</b>					Source: X006103-01	Prepared: 06/15/2010 Analyzed: 06/15/2010				
Benzene	0.05	0.001	mg/L	0.0500	0.001	104	74.5-132	0.915	13.1	
Toluene	0.06	0.001	"	0.0500	ND	111	74.2-116	1.63	21.2	
Surrogate: 1,2-Dichloroethane-d4	65.0		ug/L	62.5		104	73.5-130			
Surrogate: Toluene-d8	60.9		"	62.5		97.5	79.3-113			
Surrogate: 4-Bromofluorobenzene	58.0		"	62.5		92.8	81.5-117			

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### Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit  
RPD Relative Percent Difference

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