

## **GROUNDWATER MONITORING REPORT OCTOBER 2009**

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### **STATE 16-14I4**

On August 26, 2009, LT Environmental, Inc. (LTE) conducted groundwater sampling, on behalf of Noble Energy, Inc., at the State 16-14I4 Well Site (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 preceding reports.

Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1. Four wells were used to conduct groundwater sampling (MW-2, TB-23, TB-24, and TB-25). Monitoring wells TB-23, TB-24, and TB-35 were installed in February 2009 following source removal from a new release. Monitoring well MW02, a previously existing well, was the only well not destroyed during source removal activities. Figure 1 illustrates the Site layout and monitoring well locations.

Depth to groundwater, which ranged from 5.51 feet below top of casing (btoc) in TB-23 to 6.82 feet btoc in TB-24, was used to calculate well-specific purge volumes. Following purging, groundwater samples were collected and preserved on ice. Samples were then 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, indicate BTEX concentrations are in compliance with the Colorado Department of Public Health and Environment – Water Quality Control Commission Regulation 41 and below laboratory method detection limits for all samples. 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 November 2009.

**TABLE**

TABLE 1

**GROUNDWATER ANALYTICAL DATA  
STATE 16-14I4 WELL SITE  
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)
MW-2	2/15/2007	7.74	<b>180</b>	<1.0	1.9	60
	2/21/2007	7.67	<b>210</b>	<4.0	<4.0	53
	5/10/2007	5.80	<1.0	<2.0	<2.0	<6.0
	7/19/2007	7.53	<1.0	<2.0	<2.0	<6.0
	10/1/2007	5.10	<1.0	<2.0	<2.0	<4.0
	1/7/2008	3.15	<1.0	<2.0	<2.0	<4.0
	4/18/2008	5.85	<1.0	<2.0	<2.0	<2.0
	7/17/2008	7.68	<1.0	<1.0	<1.0	<3.0
	2/24/2009	5.10	<1.0	<1.0	<1.0	<3.0
	5/15/2009	6.20	<1.0	<1.0	<1.0	<3.0
	8/26/2009	6.18	<1.0	<1.0	<1.0	<3.0
TB23	2/24/2009	4.35	<1.0	<1.0	<1.0	<3.0
	5/15/2009	5.34	<1.0	<1.0	<1.0	<3.0
	8/26/2009	5.51	<1.0	<1.0	<1.0	<3.0
TB24	2/24/2009	5.59	<b>18.1</b>	<1.0	<1.0	<3.0
	5/15/2009	6.82	<1.0	<1.0	<1.0	<3.0
	8/26/2009	6.82	<1.0	<1.0	<1.0	<3.0
TB25	2/24/2009	4.51	<1.0	<1.0	<1.0	<3.0
	5/15/2009	5.70	<1.0	<1.0	<1.0	<3.0
	8/26/2009	5.61	<1.0	<1.0	<1.0	<3.0
CDPHE WQCC Reg 41			<b>5.0</b>	<b>560</b>	<b>700</b>	<b>1,400</b>

## NOTES:

btoc - below top of casing

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

ug/L - micrograms per liter

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

**BOLD** - indicates result is above the applicable standard

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

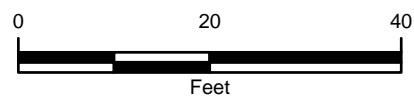
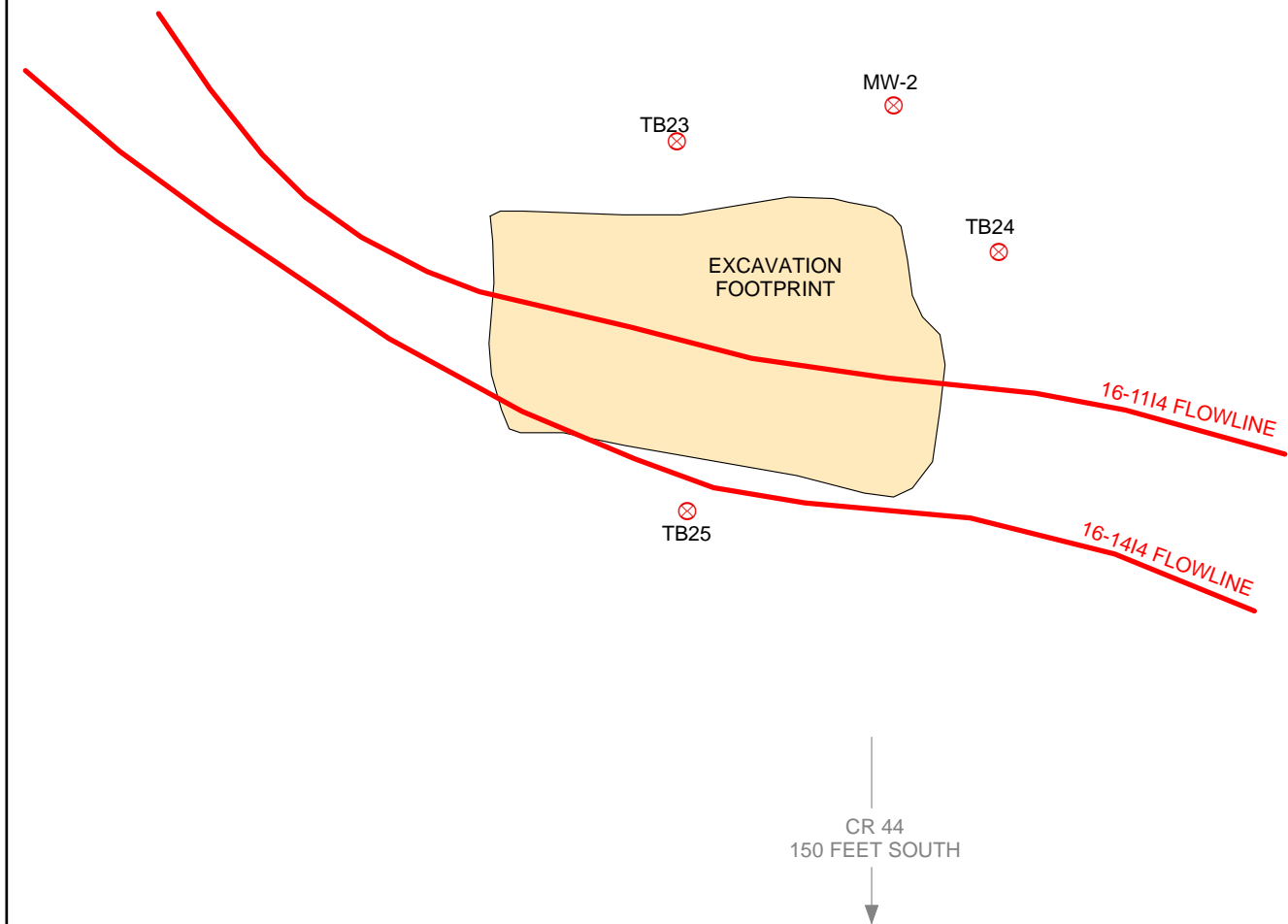
Commission Regulation 41 covering Basic Standards for Groundwater



**FIGURE**

	CR 46	
CR44		
CR 53		CR 55

AREA OF INTEREST



# LEGEND

- ⊗ MONITORING WELL
- FLOWLINE
- EXCAVATION FOOTPRINT

**FIGURE 1**  
**MONITORING WELL LOCATION MAP**  
**STATE 16-1414**  
**WELD COUNTY, COLORADO**

NOBLE ENERGY, INC.



**APPENDIX**  
**ANALYTICAL LABORATORY REPORT**



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303.433.1322 Phone 303.265.9645 Fax

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September 01, 2009

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

Brian Dodek  
Project Number: NEP0701.04  
Project: Noble – State 16-1414

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Attached are the analytical results for Noble – State 16-1414 received by Origins Laboratory, Inc. 8/26/2009 4:30:00PM. 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".

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.

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

Brian Dodek  
Project Number: NEP0701.04  
Project: Noble – State 16–1414

#### CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW02	X908102-01	Water	8/26/2009 1:00:00PM	08/26/2009 16:30
TB23	X908102-02	Water	8/26/2009 1:10:00PM	08/26/2009 16:30
TB24	X908102-03	Water	8/26/2009 1:20:00PM	08/26/2009 16:30
TB25	X908102-04	Water	8/26/2009 1:30:00PM	08/26/2009 16:30

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

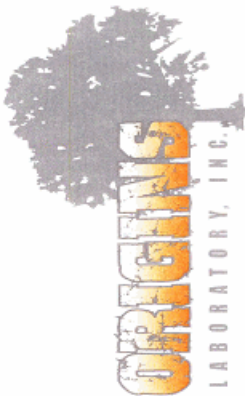
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20180610Z  
page 1 of 1



originslaboratory.com

Client: LT ENV  
Address: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_  
E-Mail Address: \_\_\_\_\_  
Project Manager: Brian Dodek  
Project Name: State 16-1414  
Project Number: NEP0701  
Samples Collected by: M. Harrison

Sample ID - Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix	Analysis	Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other -			
MWDZ	8/26/09	1300	2	X						1
TB 23		1310	1						X BTEX	2
TB 24		1320	1						X BTEX	3
TB 25		1330	1						X BTEX	4
										5
										6
										7
										8
										9
										10

Relinquished by: [Signature] Date: 8/26/09 Time: 1330  
Received by: [Signature] Date: 8/26/09 Time: 1630  
Turn Around Time: 24-hr ☒ 48-hr ☐ 72-hr ☐

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[Signature]

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**MW02**

**X908102–01 (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	9H28001	08/28/2009	08/31/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	113 %	85.7–134	"	"	"
Surrogate: Toluene-d8	90.0 %	81.4–121	"	"	"
Surrogate: 4-Bromofluorobenzene	114 %	74.7–127	"	"	"

Origins Laboratory, Inc.

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**TB23**

**X908102-02 (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	9H28001	08/28/2009	08/31/2009
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	91.5 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	117 %	74.7-127	"	"	"

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**TB24**

**X908102-03 (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	9H28001	08/28/2009	08/31/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	116 %	85.7-134	"	"	"
Surrogate: Toluene-d8	89.6 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	116 %	74.7-127	"	"	"

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**TB25**  
**X908102-04 (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	9H28001	08/28/2009	08/31/2009
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	90.5 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	119 %	74.7-127	"	"	"

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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
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**Batch 9H28001 – EPA 5030B**

**Blank (9H28001–BLK1)**

Prepared: 08/28/2009 Analyzed: 08/31/2009

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	66.5		ug/L	62.5		106	85.7–134			
Surrogate: Toluene-d8	59.5		"	62.5		95.2	81.4–121			
Surrogate: 4-Bromofluorobenzene	67.4		"	62.5		108	74.7–127			

**LCS (9H28001–BS1)**

Prepared: 08/28/2009 Analyzed: 08/31/2009

Benzene	0.05	0.001	mg/L	0.0500		105	74.9–126			
Toluene	0.05	0.001	"	0.0500		102	73.3–128			
Surrogate: 1,2-Dichloroethane-d4	69.1		ug/L	62.5		111	85.7–134			
Surrogate: Toluene-d8	57.6		"	62.5		92.1	81.4–121			
Surrogate: 4-Bromofluorobenzene	70.3		"	62.5		112	74.7–127			

**Matrix Spike (9H28001–MS1)**

Source: X908102–01

Prepared: 08/28/2009 Analyzed: 08/31/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	102	78.1–132			
Toluene	0.05	0.001	"	0.0500	ND	95.2	71.7–124			
Surrogate: 1,2-Dichloroethane-d4	68.7		ug/L	62.5		110	85.7–134			
Surrogate: Toluene-d8	57.0		"	62.5		91.2	81.4–121			
Surrogate: 4-Bromofluorobenzene	69.9		"	62.5		112	74.7–127			

**Matrix Spike Dup (9H28001–MSD1)**

Source: X908102–01

Prepared: 08/28/2009 Analyzed: 08/31/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	102	78.1–132	0.764	24.8	
Toluene	0.05	0.001	"	0.0500	ND	95.2	71.7–124	0.00	25	
Surrogate: 1,2-Dichloroethane-d4	69.4		ug/L	62.5		111	85.7–134			
Surrogate: Toluene-d8	56.7		"	62.5		90.8	81.4–121			
Surrogate: 4-Bromofluorobenzene	70.1		"	62.5		112	74.7–127			

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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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