



## **GROUNDWATER MONITORING REPORT MAY 2009**

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

On May 15, 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 second 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 area removal from a new release. Monitoring well MW02, a previously existing well, was the only well not destroyed during source area removal activities. Figure 1 illustrates the Site layout and monitoring well locations.

Depth to groundwater, which ranged from 5.34 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 (WQCC Reg 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 August 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
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
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
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
<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

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

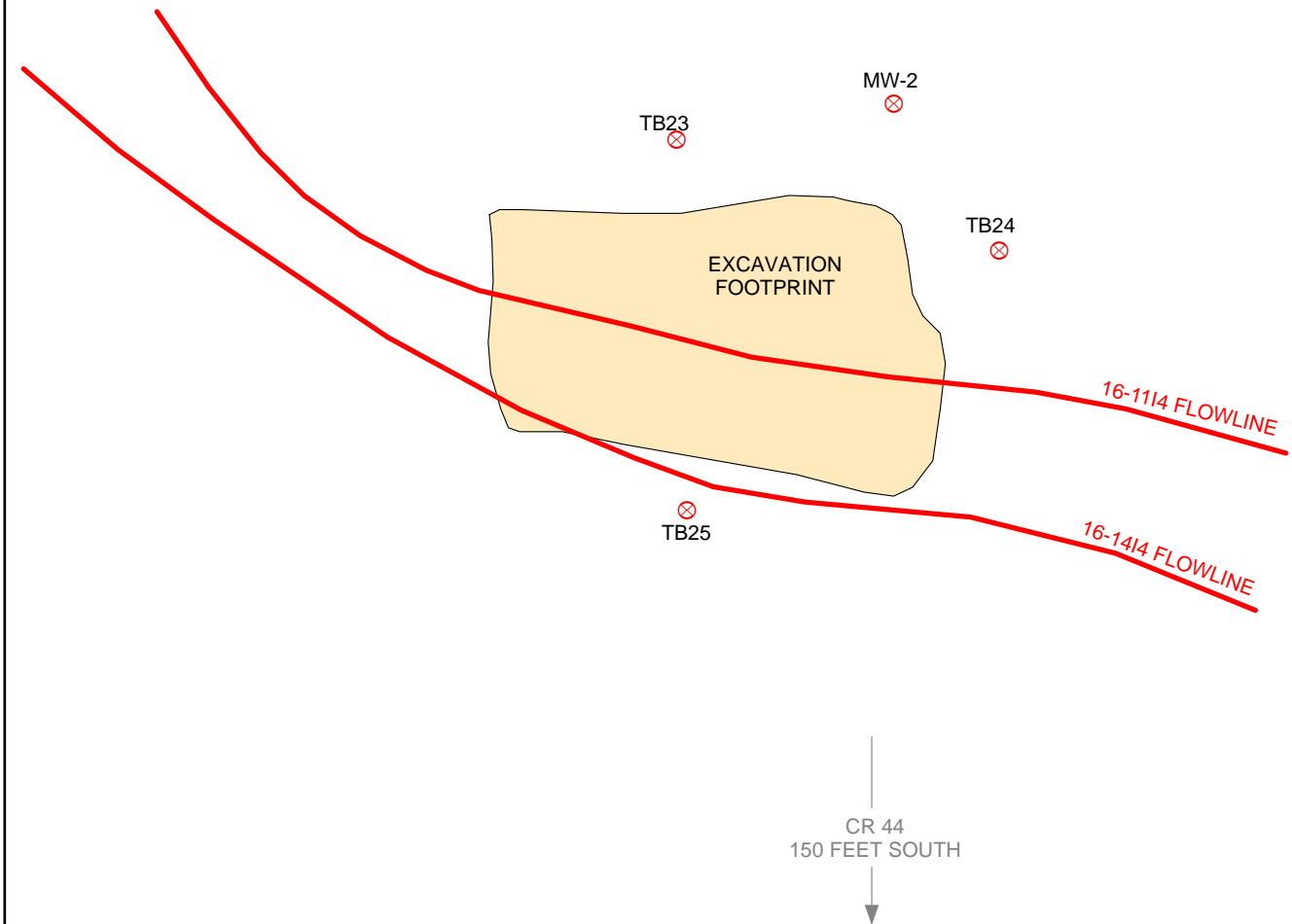


**FIGURE**






	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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May 19, 2009

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

Brian Dodek  
Project Number: NEP 0701  
Project: Noble – State 16-1114

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Attached are the analytical results for Noble – State 16-1114 received by Origins Laboratory, Inc. 5/15/2009 3:35:00PM. 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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303.265.9645 | Fax



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

Brian Dodek  
Project Number: NEP 0701  
Project: Noble – State 16–1114

#### CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW02	X905062-01	Water	5/15/2009 2:00:00PM	05/15/2009 15:35
TB23	X905062-02	Water	5/15/2009 1:50:00PM	05/15/2009 15:35
TB24	X905062-03	Water	5/15/2009 1:55:00PM	05/15/2009 15:35
TB25	X905062-04	Water	5/15/2009 1:45:00PM	05/15/2009 15:35

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager



Brian Dodek

Project Number: NEP 0701

Project: Noble – State 16-1114

page 1 of 1

Client \_\_\_\_\_  
Address LTIE  
Telephone Number \_\_\_\_\_  
E-Mail Address \_\_\_\_\_

Project Manager BDD  
Project Name Stair 16-1124  
Project Number NZP0701  
Samples Collected by JL

[illegible]

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MW02  
X905062–01 (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	9E18001	05/18/2009	05/18/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	105 %	70.3–128	"	"	"
Surrogate: Toluene-d8	97.1 %	78.8–125	"	"	"
Surrogate: 4-Bromofluorobenzene	103 %	75.5–131	"	"	"

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**TB23**

**X905062–02 (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	9E18001	05/18/2009	05/18/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	106 %	70.3–128	"	"	"
Surrogate: Toluene-d8	100 %	78.8–125	"	"	"
Surrogate: 4-Bromofluorobenzene	106 %	75.5–131	"	"	"

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**TB24**  
**X905062–03 (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	9E18001	05/18/2009	05/18/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	109 %	70.3–128	"	"	"
Surrogate: Toluene-d8	98.3 %	78.8–125	"	"	"
Surrogate: 4-Bromofluorobenzene	103 %	75.5–131	"	"	"

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TB25  
X905062–04 (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	9E18001	05/18/2009	05/18/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	110 %	70.3–128	"	"	"
Surrogate: Toluene-d8	95.5 %	78.8–125	"	"	"
Surrogate: 4-Bromofluorobenzene	105 %	75.5–131	"	"	"

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 Project: Noble – State 16–1114

**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 9E18001 – EPA 5030B**

**Blank (9E18001–BLK1)**

Prepared: 05/18/2009 Analyzed: 05/18/2009

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	71.8		ug/L	62.5		115	70.3–128			
Surrogate: Toluene-d8	59.5		"	62.5		95.2	78.8–125			
Surrogate: 4-Bromofluorobenzene	62.9		"	62.5		101	75.5–131			

**Blank (9E18001–BLK2)**

Prepared: 05/18/2009 Analyzed: 05/18/2009

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	70.6		ug/L	62.5		113	70.3–128			
Surrogate: Toluene-d8	60.5		"	62.5		96.8	78.8–125			
Surrogate: 4-Bromofluorobenzene	64.0		"	62.5		102	75.5–131			

**LCS (9E18001–BS1)**

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500		100	64.2–124			
Toluene	0.05	0.001	"	0.0500		98.5	63.9–119			
Surrogate: 1,2-Dichloroethane-d4	74.1		ug/L	62.5		119	70.3–128			
Surrogate: Toluene-d8	57.7		"	62.5		92.4	78.8–125			
Surrogate: 4-Bromofluorobenzene	63.7		"	62.5		102	75.5–131			

**LCS (9E18001–BS2)**

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500		98.2	64.2–124			
Toluene	0.05	0.001	"	0.0500		94.2	63.9–119			

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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 9E18001 – EPA 5030B**

**LCS (9E18001–BS2)**

Prepared: 05/18/2009 Analyzed: 05/18/2009

Surrogate: 1,2-Dichloroethane-d4	72.2		ug/L	62.5		115	70.3–128			
Surrogate: Toluene-d8	57.6		"	62.5		92.2	78.8–125			
Surrogate: 4-Bromofluorobenzene	62.6		"	62.5		100	75.5–131			

**Matrix Spike (9E18001–MS1)**

Source: X905062–01

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	100	64.2–124			
Toluene	0.05	0.001	"	0.0500	ND	98.8	63.9–119			
Surrogate: 1,2-Dichloroethane-d4	66.2		ug/L	62.5		106	70.3–128			
Surrogate: Toluene-d8	59.5		"	62.5		95.2	78.8–125			
Surrogate: 4-Bromofluorobenzene	79.4		"	62.5		127	75.5–131			

**Matrix Spike (9E18001–MS2)**

Source: X905064–01

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	98.2	64.2–124			
Toluene	0.05	0.001	"	0.0500	ND	92.4	63.9–119			
Surrogate: 1,2-Dichloroethane-d4	72.1		ug/L	62.5		115	70.3–128			
Surrogate: Toluene-d8	56.6		"	62.5		90.6	78.8–125			
Surrogate: 4-Bromofluorobenzene	64.9		"	62.5		104	75.5–131			

**Matrix Spike Dup (9E18001–MSD1)**

Source: X905062–01

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	97.7	64.2–124	2.85	25	
Toluene	0.05	0.001	"	0.0500	ND	92.4	63.9–119	6.69	25	
Surrogate: 1,2-Dichloroethane-d4	72.5		ug/L	62.5		116	70.3–128			
Surrogate: Toluene-d8	56.9		"	62.5		91.0	78.8–125			
Surrogate: 4-Bromofluorobenzene	66.3		"	62.5		106	75.5–131			

**Matrix Spike Dup (9E18001–MSD2)**

Source: X905064–01

Prepared: 05/18/2009 Analyzed: 05/18/2009

Benzene	0.05	0.001	mg/L	0.0500	ND	96.1	64.2–124	2.10	25	
Toluene	0.05	0.001	"	0.0500	ND	91.6	63.9–119	0.848	25	
Surrogate: 1,2-Dichloroethane-d4	73.2		ug/L	62.5		117	70.3–128			

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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 9E18001 – EPA 5030B**

**Matrix Spike Dup (9E18001–MSD2)**

**Source: X905064–01**

Prepared: 05/18/2009 Analyzed: 05/18/2009

Surrogate: Toluene-d8	55.8	ug/L	62.5	89.3	78.8–125
Surrogate: 4–Bromofluorobenzene	66.0	"	62.5	106	75.5–131

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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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