

## GROUNDWATER MONITORING REPORT AUGUST 2009

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### **STRONG 1, P-21-2, 7, 8, 9, 10J, 16, 1JI, 2JI, 7JI TANK BATTERY**

On July 15, 2009, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc. (Noble) at the Strong 1, P-21-2, 7, 8, 9, 10J, 16, 1JI, 2JI, 7JI Tank Battery (Site). This sampling event constitutes the seventh post remediation monitoring event at the Site. Site history, remediation activities, and groundwater monitoring results have been described in preceding reports.

Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1. Monitoring wells (MW01, MW02, MW03 and MW04) were installed surrounding the tank battery excavation on October 3, 2007. A Site Map is presented on Figure 1.

Depth to groundwater, which ranged from 8.53 feet below top of casing (btoc) in MW01 to 9.89 feet btoc in MW04, 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.

Groundwater analytical results indicate BTEX concentrations at monitoring wells MW01, MW02, and MW03 were in compliance with the Colorado Department of Public Health and Environment Water Quality Control Commission Regulation 41 (WQCC Reg 41). Monitoring well MW04 exhibited a benzene concentration above WQCC Reg 41, at 13.9 micrograms per liter. Toluene, ethylbenzene, and total xylenes concentrations at MW04 were below the laboratory method detection limits and in compliance with WQCC Reg 41. Analytical results are summarized in Table 1. The laboratory analytical report is attached as an 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  
 STRONG 1, P-21-2, 7, 8, 9, 10J, 16, 1JI, 2JI, 7JI TANK BATTERY  
 WELD COUNTY, COLORADO  
 NOBLE ENERGY, INC.

MONITORING		DEPTH TO	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
WELL	DATE	WATER (feet btoc)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
MW01	1/18/2008	8.19	<1.0	<1.0	<1.0	<2.0
	4/17/2008	9.37	<1.0	<1.0	<1.0	<2.0
	7/18/2008	8.11	<1.0	<1.0	<1.0	<3.0
	10/31/2008	7.06	<1.0	<1.0	<1.0	<3.0
	1/6/2009	8.28	<1.0	<1.0	<1.0	<3.0
	4/9/2009	9.65	<1.0	<1.0	<1.0	<3.0
	7/15/2009	8.53	<1.0	<1.0	<1.0	<3.0
MW02	1/18/2008	8.50	<1.0	<1.0	<1.0	<2.0
	4/17/2008	9.61	<1.0	<1.0	<1.0	<2.0
	7/18/2008	8.29	<1.0	<1.0	<1.0	<3.0
	10/31/2008	7.40	<1.0	<1.0	<1.0	<3.0
	1/6/2009	8.53	<1.0	<1.0	<1.0	<3.0
	4/9/2009	9.91	<1.0	<1.0	<1.0	<3.0
	7/15/2009	8.70	<1.0	<1.0	<1.0	<3.0
MW03	1/18/2008	8.95	<1.0	<1.0	29.3	65.52
	4/17/2008	10.12	<1.0	5.55	<1.0	37.8
	7/18/2008	8.70	<b>181</b>	<1.0	5.54	13.8
	10/31/2008	7.98	<b>5.44</b>	1.29	9.24	35.91
	1/6/2009	9.02	2.59	<1.0	6.71	21.36
	4/9/2009	10.42	<1.0	<1.0	<1.0	<3.0
	7/15/2009	9.13	<1.0	<1.0	5.25	13.2
MW04	1/18/2008	9.90	<1.0	<1.0	<1.0	<2.0
	4/17/2008	11.13	<b>34.5</b>	5.81	<1.0	18.87
	7/18/2008	9.50	<b>6.94</b>	<1.0	<1.0	<3.0
	10/31/2008	9.04	<1.0	<1.0	<1.0	2.10
	1/6/2009	9.86	<1.0	<1.0	<1.0	<3.0
	4/9/2009	11.41	<b>55.7</b>	<1.0	<1.0	<3.0
	7/15/2009	9.89	<b>13.9</b>	<1.0	<1.0	1.62
<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

< Indicates result is less than the stated laboratory method detection limit

**Bold** indicates concentration exceeds the CGWQS Standard

Benzene, toluene, ethylbenzene, and xylenes were 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

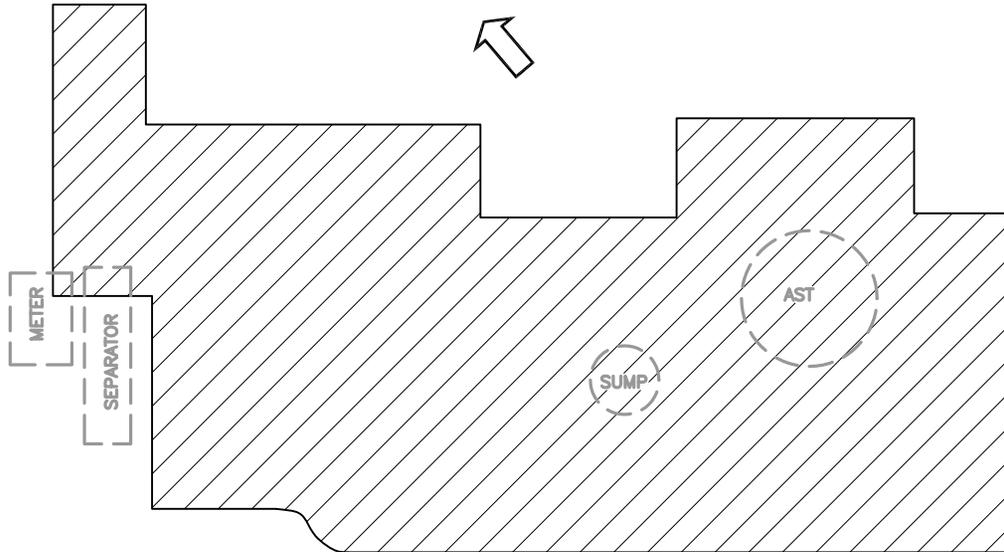


**FIGURE**

MW04

MW03

MW02



MW01

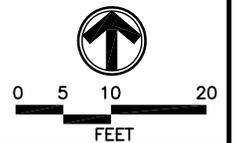
**LEGEND**

MW01  MONITORING WELL LOCATION

 EXCAVATION AREA

 ESTIMATED GROUNDWATER FLOW DIRECTION

SOURCE:  
LTE SKETCH



**FIGURE 1**  
**MONITORING WELL LOCATION MAP**  
 STRONG 1, P21-2, 7, 8, 9, 10J, 16, 1JI, 2JI, 7JI  
 TANK BATTERY  
 WELD COUNTY, COLORADO  
 NOBLE ENERGY, INC.



NEP072203

**APPENDIX**  
**ANALYTICAL REPORT**



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303.433.1322 Phone 303.265.9645 Fax

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July 21, 2009

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

Brian Dodek  
Project Number: NEP0722.05  
Project: Noble - Strong # 1

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Attached are the analytical results for Noble - Strong # 1 received by Origins Laboratory, Inc. 7/15/2009 3:30:00PM. 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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Denver, Colorado 80211  
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303.265.9645 | Fax



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

Brian Dodek  
Project Number: NEP0722.05  
Project: Noble - Strong # 1

**CROSS REFERENCE REPORT**

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW01	X907051-01	Water	7/15/2009 10:00:00AM	07/15/2009 15:30
MW02	X907051-02	Water	7/15/2009 10:05:00AM	07/15/2009 15:30
MW03	X907051-03	Water	7/15/2009 10:10:00AM	07/15/2009 15:30
MW04	X907051-04	Water	7/15/2009 10:15:00AM	07/15/2009 15:30

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.*

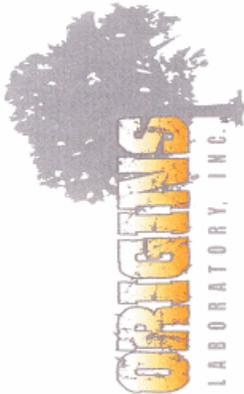
Noelle E Doyle, Laboratory Manager



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

Brian Dodek  
 Project Number: NEP0722.05  
 Project: Noble - Strong # 1

X907061



originslaboratory.com

Client: LT Environmental  
 Address: 4600 W. 60th Ave.  
Arvada, CO 80003  
 Telephone Number: 303 433 9788  
 E-Mail Address: B.Dodek@ltenvi.com

Project Manager: Brian Dodek  
 Project Name: Streams #1  
 Project Number: NEP0722.05  
 Samples Collected by: Jean Ragan

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 #			Other -
M10001	7/15	1000	3	X				X					1
M10002	7/15	1005	3	X				X					2
M10003	7/15	1010	3	X				X					3
M10004	7/15	1015	3	X				X					4
													5
													6
													7
													8
													9
													10
Relinquished by: <u>[Signature]</u>	Date: <u>7/15/09</u>	Time: <u>1550</u>	Received by: <u>[Signature]</u>	Date: <u>7/15/09</u>	Time: <u>1530</u>	Temperature Upon Receipt:		Turn Around Time:		Standard		<input checked="" type="checkbox"/> 24-hr <input type="checkbox"/> 48-hr <input type="checkbox"/> 72-hr	

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 Project: Noble – Strong # 1

**MW01**  
**X907051-01 (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	9G16003	07/16/2009	07/20/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

<i>Surrogate: 1,2-Dichloroethane-d4</i>	110 %	85.7-134			"	"	"
<i>Surrogate: Toluene-d8</i>	89.0 %	81.4-121			"	"	"
<i>Surrogate: 4-Bromofluorobenzene</i>	109 %	74.7-127			"	"	"

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**MW02**  
**X907051-02 (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	9G16003	07/16/2009	07/20/2009	
Toluene	ND	0.00100	"	"	"	"	"	
Ethylbenzene	ND	0.00100	"	"	"	"	"	
o-Xylene	ND	0.00100	"	"	"	"	"	
m,p-Xylene	ND	0.00200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	112 %	85.7-134			"	"	"	
Surrogate: Toluene-d8	88.8 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	108 %	74.7-127			"	"	"	

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**MW03**  
**X907051-03 (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	9G16003	07/16/2009	07/20/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	<b>0.00525</b>	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	<b>0.0132</b>	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	110 %	85.7-134			"	"	"
Surrogate: Toluene-d8	88.6 %	81.4-121			"	"	"
Surrogate: 4-Bromofluorobenzene	103 %	74.7-127			"	"	"

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**MW04**  
**X907051-04 (Water)**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

**Origins Laboratory, Inc.**

**BTEX by EPA 8260B**

Benzene	0.0139	0.00100	mg/L	1	9G16003	07/16/2009	07/20/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	0.00162	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	110 %	85.7-134			"	"	"
Surrogate: Toluene-d8	87.2 %	81.4-121			"	"	"
Surrogate: 4-Bromofluorobenzene	102 %	74.7-127			"	"	"

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 Project: Noble – Strong # 1

**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 9G16003 – EPA 5030B**

**Blank (9G16003-BLK1)**

Prepared: 07/16/2009 Analyzed: 07/17/2009

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	"							

<i>Surrogate: 1,2-Dichloroethane-d4</i>	68.7		ug/L	62.5		110	85.7-134			
<i>Surrogate: Toluene-d8</i>	57.7		"	62.5		92.3	81.4-121			
<i>Surrogate: 4-Bromofluorobenzene</i>	69.8		"	62.5		112	74.7-127			

**LCS (9G16003-BS1)**

Prepared: 07/16/2009 Analyzed: 07/20/2009

Benzene	0.06	0.001	mg/L	0.0500		118	74.9-126			
Toluene	0.05	0.001	"	0.0500		92.7	73.3-128			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	72.0		ug/L	62.5		115	85.7-134			
<i>Surrogate: Toluene-d8</i>	53.6		"	62.5		85.8	81.4-121			
<i>Surrogate: 4-Bromofluorobenzene</i>	66.3		"	62.5		106	74.7-127			

**Matrix Spike (9G16003-MS1)**

Source: X907045-01

Prepared: 07/16/2009 Analyzed: 07/20/2009

Benzene	0.08	0.001	mg/L	0.0500	0.02	104	78.1-132			
Toluene	0.04	0.001	"	0.0500	ND	78.3	71.7-124			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	71.2		ug/L	62.5		114	85.7-134			
<i>Surrogate: Toluene-d8</i>	53.3		"	62.5		85.3	81.4-121			
<i>Surrogate: 4-Bromofluorobenzene</i>	64.3		"	62.5		103	74.7-127			

**Matrix Spike Dup (9G16003-MSD1)**

Source: X907045-01

Prepared: 07/16/2009 Analyzed: 07/20/2009

Benzene	0.10	0.001	mg/L	0.0500	0.02	158	78.1-132	30.4	24.8	QM-07
Toluene	0.05	0.001	"	0.0500	ND	102	71.7-124	25.8	25	QM-07
<i>Surrogate: 1,2-Dichloroethane-d4</i>	67.2		ug/L	62.5		107	85.7-134			
<i>Surrogate: Toluene-d8</i>	56.4		"	62.5		90.2	81.4-121			
<i>Surrogate: 4-Bromofluorobenzene</i>	63.6		"	62.5		102	74.7-127			

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Project: Noble – Strong # 1

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### 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

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