

GROUNDWATER MONITORING REPORT JANUARY 2010

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

On November 19, 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 eighth 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 7.26 feet below top of casing (btoc) in MW01 to 9.09 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, 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). 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 January 2010.

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				
WELL	DATE	WATER (feet btoc)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYLBENZENE (ug/L)	XYLENES (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
	11/19/2009	7.26	<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
	11/19/2009	7.49	<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	181	<1.0	5.54	13.8
	10/31/2008	7.98	5.44	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
	11/19/2009	7.94	<1.0	<1.0	3.73	18.02
MW04	1/18/2008	9.90	<1.0	<1.0	<1.0	<2.0
	4/17/2008	11.13	34.5	5.81	<1.0	18.87
	7/18/2008	9.50	6.94	<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	55.7	<1.0	<1.0	<3.0
	7/15/2009	9.89	13.9	<1.0	<1.0	1.62
	11/19/2009	9.09	<1.0	<1.0	<1.0	1.16
CDPHE WQCC Reg 41			5.0	560	700	1,400

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

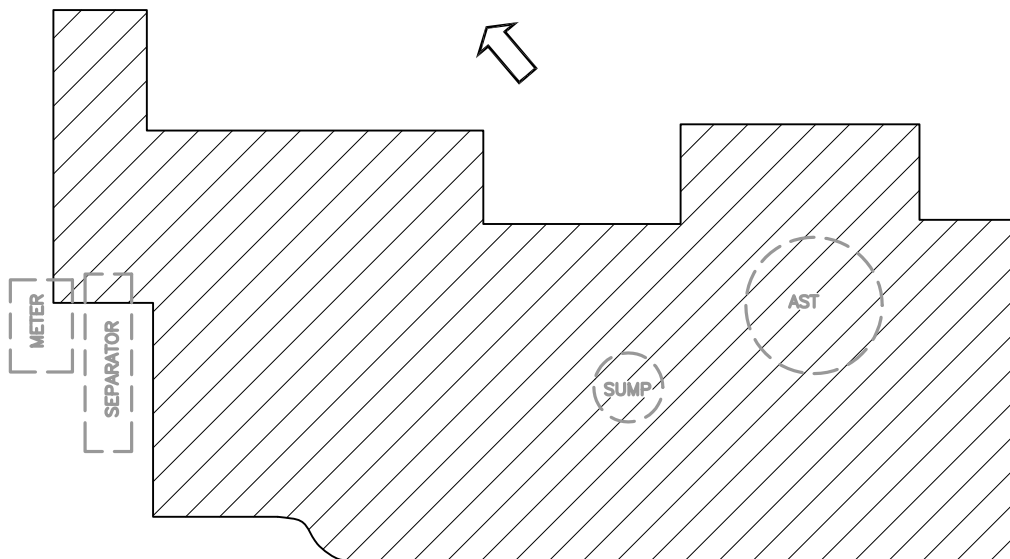


FIGURE

MW04

MW03

MW02



MW01

LEGEND

MW01  MONITORING WELL LOCATION

 EXCAVATION AREA

 ESTIMATED GROUNDWATER FLOW DIRECTION

SOURCE:
LTE SKETCH

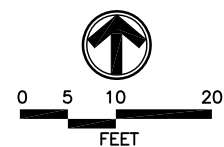


FIGURE 1
MONITORING WELL LOCATION MAP
STRONG 1, P21-2, 7, 8, 9, 10J, 16, 1JI, 2JI, 7JI
TANK BATTERY
WELD COUNTY, COLORADO
NOBLE ENERGY, INC.



NEP072203

APPENDIX
ANALYTICAL REPORT



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

December 03, 2009

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

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

Attached are the analytical results for Noble – Strong # 1 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.

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: NEP0722.05
Project: Noble – Strong # 1

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW01	X911090-01	Water	11/19/2009 11:40:00AM	11/23/2009 11:45
MW02	X911090-02	Water	11/19/2009 12:00:00PM	11/23/2009 11:45
MW03	X911090-03	Water	11/19/2009 12:15:00PM	11/23/2009 11:45
MW04	X911090-04	Water	11/19/2009 12:30:00PM	11/23/2009 11:45

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager

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LT Environmental, Inc.
4600 West 60th Avenue
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Brian Dodek
Project Number: NEP0722.05
Project: Noble – Strong # 1

X9110990
page 1 of 1



originslaboratory.com

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

Project Manager: Brian Dodek
Project Name: Strong - GW Sampling
Project Number: NEP0722
Samples Collected by: Devin Givlin

Sample ID - Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analysis	Sample Instructions
				Unpreserved	HCl	HNO ₃	Other -	Groundwater	Soil	Air - Summa Canister #		
MW01	11/11/09	11:40	3	X				X				1
MW02	↓	12:00	↓	X				X				2
MW03	↓	12:15	↓	X				X				3
MW04	↓	12:30	↓	X				X				4
												5
												6
												7
												8
												9
												10
Relinquished by: <u>B. Dodek</u>	Date: <u>11/23/09</u>	Time: <u>11:45</u>	Received by: <u>B. Dodek</u>	Date: <u>11/23/09</u>	Time: <u>11:45</u>	Date: <u>11/23/09</u>	Time: <u>11:45</u>	Turn Around Time: <u>24-hr</u>	Standard: <u>X</u>			
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Date:	Time:	Turn Around Time: <u>48-hr</u>	Standard:			

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4600 West 60th Avenue
Arvada CO 80003

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

MW01

X911090-01 (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	130 %	76.8-127	"	"	"	S-GC
Surrogate: Toluene-d8	80.5 %	71.4-123	"	"	"	"
Surrogate: 4-Bromofluorobenzene	121 %	87.6-133	"	"	"	"

Origins Laboratory, Inc.

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MW02

X911090-02 (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	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	129 %	76.8-127	"	"	"	S-GC
Surrogate: Toluene-d8	77.5 %	71.4-123	"	"	"	"
Surrogate: 4-Bromofluorobenzene	124 %	87.6-133	"	"	"	"

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Project: Noble – Strong # 1

MW03

X911090-03 (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	9K23004	11/23/2009	11/24/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	0.00373	0.00100	"	"	"	"	"
o-Xylene	0.00142	0.00100	"	"	"	"	"
m,p-Xylene	0.0166	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	127 %	76.8-127	"	"	"
Surrogate: Toluene-d8	79.5 %	71.4-123	"	"	"
Surrogate: 4-Bromofluorobenzene	107 %	87.6-133	"	"	"

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Project: Noble – Strong # 1

MW04

X911090-04 (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	9K23004	11/23/2009	11/24/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	0.00116	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	113 %	76.8-127	"	"	"
Surrogate: Toluene-d8	87.3 %	71.4-123	"	"	"
Surrogate: 4-Bromofluorobenzene	107 %	87.6-133	"	"	"

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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 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	76.8-127			
Surrogate: Toluene-d8	56.0		"	62.5		89.6	71.4-123			
Surrogate: 4-Bromofluorobenzene	69.6		"	62.5		111	87.6-133			

LCS (9K23004–BS1)

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

Benzene	0.04	0.001	mg/L	0.0500		79.7	79.3-122			
Toluene	0.04	0.001	"	0.0500		81.5	73.4-130			
Surrogate: 1,2-Dichloroethane-d4	70.3		ug/L	62.5		113	76.8-127			
Surrogate: Toluene-d8	54.7		"	62.5		87.5	71.4-123			
Surrogate: 4-Bromofluorobenzene	69.5		"	62.5		111	87.6-133			

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	80.2-129			QM-07
Toluene	0.04	0.001	"	0.0500	ND	79.8	74.8-126			
Surrogate: 1,2-Dichloroethane-d4	74.0		ug/L	62.5		118	76.8-127			
Surrogate: Toluene-d8	54.1		"	62.5		86.6	71.4-123			
Surrogate: 4-Bromofluorobenzene	70.4		"	62.5		113	87.6-133			

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	80.2-129	1.10	18.7	QM-07
Toluene	0.04	0.001	"	0.0500	ND	77.0	74.8-126	3.55	21.9	
Surrogate: 1,2-Dichloroethane-d4	72.5		ug/L	62.5		116	76.8-127			
Surrogate: Toluene-d8	53.1		"	62.5		85.0	71.4-123			
Surrogate: 4-Bromofluorobenzene	69.6		"	62.5		111	87.6-133			

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Notes and Definitions

S-GC	Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.
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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