

**WELL INSTALLATION AND GROUNDWATER
MONITORING REPORT
FEBRUARY 2009**

STRONG 21-15JI

LT Environmental, Inc. (LTE) was retained by Noble Energy, Inc. (Noble) to install post-remediation monitoring wells and to conduct sampling activities at the Strong 21-15JI Tank Battery (Site). Monitoring well installation activities and groundwater sampling occurred on January 30, 2009 and February 6, 2009, respectively. Site history and remediation activities were described in the preceding *Remediation Summary Report*, dated February 2009. This well installation and groundwater monitoring event constitutes the first post remediation performance groundwater monitoring event.

LTE personnel were onsite January 30, 2009 to install three monitoring wells (MW01 through MW03) to determine if impacted groundwater exists at the Site. The monitoring wells were installed using a direct-push drill rig owned and operated by Alpine Field Services of Golden, Colorado, and were advanced to 15 feet below ground surface (bgs). The monitoring wells were completed as two-foot stickups with 1-inch diameter, 0.010-inch slotted, schedule 40, poly-vinyl chloride (PVC) screen from 7 feet bgs to 12 feet bgs. Boreholes were filled with 10-20 silica sand from total depth to 5 feet bgs. Bentonite chips were then placed from the top of the sand pack to ground surface and hydrated. Monitoring well (MW01) was installed to the west of the excavation, as an upgradient well. The remaining two monitoring wells (MW02 and MW03) were installed east of the excavation footprint (downgradient). The locations of the three monitoring wells relative to the excavation are presented as Figure 1. Borehole lithologic logs are included as Appendix A.

Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1. Depth to groundwater, which ranged from 9.39 feet below top of casing (btoc) in MW03 to 9.84 feet btoc in MW01, 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 in all three wells are in compliance with Colorado Groundwater Quality Standards (CGWQS) and are below laboratory method detection limits. The laboratory analytical report is included as Appendix B.

LTE will continue to conduct quarterly groundwater monitoring events with the goal of observing four consecutive quarters with analytical results in compliance with the CGWQS. The next quarterly groundwater sampling event is scheduled for May 2009.



TABLE



TABLE 1

**GROUNDWATER ANALYTICAL DATA
STRONG 21-15JI 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)	XYLENES (ug/L)
MW01	2/6/2009	9.84	<1.0	<1.0	<1.0	<3.0
MW02	2/6/2009	9.40	<1.0	<1.0	<1.0	<3.0
MW03	2/6/2009	9.39	<1.0	<1.0	<1.0	<3.0
CGWQS			5.0	1,000	700	1,400

NOTES:

btoc - below top of casing

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

ug/L - micrograms per liter

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

CGWQS - Colorado Groundwater Quality Standards

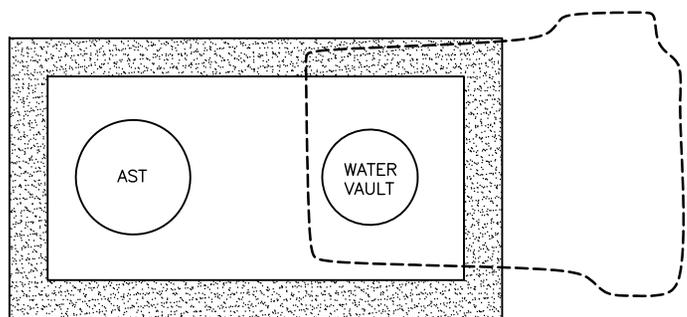


FIGURE





MW01 ⊗



MW03 ⊗
M
M

SEPARATOR

MW02 ⊗

FLARE

LEGEND

- MW01 ⊗ MONITORING WELL LOCATION
- M METER HOUSE
- ▨ BERM
- - - - - EXTENT OF EXCAVATION
- ESTIMATED GROUNDWATER FLOW DIRECTION
- AST ABOVEGROUND STORAGE TANK

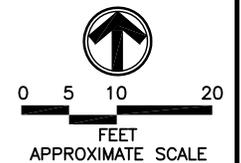


FIGURE 1
SITE MAP
STRONG 21-15 JI
WELD COUNTY, CO
NOBLE ENERGY, INC.



NEP083302

APPENDIX A
BOREHOLE LITHOLOGIC LOGS



Well Location Sketch:



Compliance - Engineering - Remediation
LT Environmental, Inc.
 4600 W. 60th Avenue
 Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <i>MWO1</i>	Project: Strong 21-15JI
Date: 1/29/2009	Project Number: NEP0833
Logged By: BDD	Drilled By: Alpine Field Services

Elevation:	Detector: MiniRAE 2000	Drilling Method: Direct Push	Sampling Method: Continuous
------------	---------------------------	---------------------------------	--------------------------------

Gravel Pack: CSSI 10x20	Seal: Bentonite Chips	Grout: <i>NA</i>
----------------------------	--------------------------	---------------------

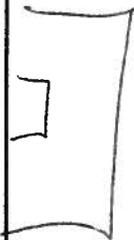
Casing Type: Sch 40 PVC	Diameter: 1"	Length:	Hole Diameter: 2"	Depth to Liquid:
----------------------------	-----------------	---------	----------------------	------------------

Screen Type: Sch 40 PVC	Slot: 0.01	Diameter: 1"	Length: 5'	Total Depth:	Depth to Water: <i>~8'</i>
----------------------------	---------------	-----------------	---------------	--------------	-------------------------------

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					0					
	Dry	0.7	N		2			SM	Sand, fine grained, silty, dk brown, no odor	
	Dry	0.6			4					
	Moist	1.4			6			SW	Sand, fine to coarse grained, w/ abundant gravel, brown, no odor	
	Moist				8					
	Wet	1.9			10					
		1.6			12					
		1.6			14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					
					40					

TD-15'

Well Location Sketch:



Compliance - Engineering - Remediation
LT Environmental, Inc.
 4600 W. 60th Avenue
 Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

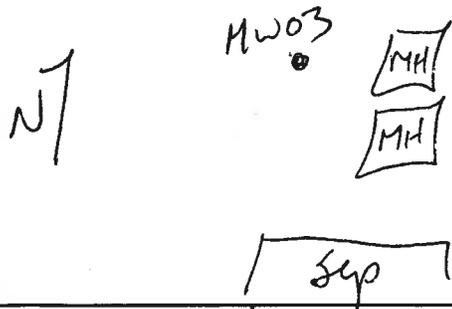
Boring/Well Number: MW02	Project: Strong 21-15JI
Date: 1/29/2009	Project Number: NEP0833
Logged By: BDD	Drilled By: Alpine Field Services
Drilling Method: Direct Push	Sampling Method: Continuous

Elevation:	Detector: MiniRAE 2000	Seal: Bentonite Chips (5'-0')	Grout: NA
Gravel Pack: CSSI 10x20 (15'-5')	Casing Type: Sch 40 PVC	Diameter: 1"	Length: 9'
Screen Type: Sch 40 PVC	Slot: 0.01	Diameter: 1"	Length: 5'
		Hole Diameter: 2"	Depth to Liquid: 28
		Total Depth: 15'	Depth to Water: 28

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					0					
Dry	0.4		N		2			SM	Sand, fine to coarse grained, silty, brown no odor	
Dry	0.3				4					
Moist	7.2				6			SW	Sand, fine to coarse grained, w/ abundant gravel, brown, no odor	
Moist	7.4				8					
Wet					10					
	1.0				12					
	1.2				14				Sand, fine to medium grained, w/ abundant gravel, brown, no odor	
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					
					40					

TD-15'

Well Location Sketch:



Compliance - Engineering - Remediation
LT Environmental, Inc.
 4600 W. 60th Avenue
 Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW03	Project: Strong 21-15JI
Date: 1/29/2009	Project Number: NEP0833
Logged By: BDD	Drilled By: Alpine Field Services
Drilling Method: Direct Push	Sampling Method: Continuous
Gravel Pack: CSSI 10x20 (15'-5')	Seal: Bentonite Chips (5'-8')
Casing Type: Sch 40 PVC	Hole Diameter: 2"
Screen Type: Sch 40 PVC	Total Depth: 15'
Slot: 0.01	Depth to Liquid: 28
Diameter: 1"	Depth to Water: 28
Length: 5'	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					0				
Dry			N		2	X	SC	Sand, fine to medium grained, clayey, dk brown, no odor	
Dry					4	X			
Moist					6	X	SW	Sand, fine to coarse grained, w/ abundant gravel, brown, no odor, non staining	
Moist					8	X			
Wet					10	X			
					12	X			
					14	X			
					16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				
					32				
					34				
					36				
					38				
					40				
								TD - 15'	

APPENDIX B
ANALYTICAL REPORT





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

February 10, 2009

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

Brian Dodek
Project Number: NEP0833
Project: Noble - Strong 21-15Jl,23

Attached are the analytical results for Noble - Strong 21-15Jl,23 received by Origins Laboratory, Inc. 2/6/2009 3:20:00PM. 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".

Laboratory Manager
Noelle E Doyle

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.

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



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

Brian Dodek
Project Number: NEP0833
Project: Noble - Strong 21-15J1,23

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW-01	X902021-01	Water	2/6/2009 1:39:00PM	02/06/2009 15:20
MW-02	X902021-02	Water	2/6/2009 1:36:00PM	02/06/2009 15:20
MW-03	X902021-03	Water	2/6/2009 1:33:00PM	02/06/2009 15:20

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: NEP0833
 Project: Noble - Strong 21-15J1,23

1202021

page _____ of _____



originslaboratory.com

Client: LTE Project Manager: BDD
 Address: 4600 W 60th Project Name: Strong 21-15J1,23
Arvada 80003 Project Number: NEP 0833 TED
 Telephone Number: _____ Samples Collected by: TED
 E-Mail Address: ON FILE

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 #			Other
MW01	2/6/09	1339	3	X				X	X				1 Please
MW02	2/6/09	1338	3	X				X	X				2 filter
MW03	2/6/09	1333	3	X				X	X				3 before
<i>[Handwritten Signature]</i>													
Relinquished by: <u>ISE</u>	Date: <u>2/6/09</u>	Time: <u>1520</u>	Received by: _____	Date: _____	Time: _____	Temperature Upon Receipt: <u>28°C</u>	Turn Around Time: _____	Same Day: _____	48-hr: _____	72-hr: <u>X</u>	Date: <u>2/6/09</u>	Time: <u>15:20</u>	Standard: _____

4640 North Pecos Street | Unit C | Denver, Colorado 80211 | Laboratory - 303.433.1322, Fax - 303.265.9645

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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.

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



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

Brian Dodek
 Project Number: NEP0833
 Project: Noble – Strong 21–15Jl,23

MW-01
X902021-01 (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	9B09001	02/09/2009	02/09/2009	
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>	106 %	70.3-123			"	"	"
<i>Surrogate: Toluene-d8</i>	86.0 %	75.9-123			"	"	"
<i>Surrogate: 4-Bromofluorobenzene</i>	105 %	83-123			"	"	"

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

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



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

Brian Dodek
 Project Number: NEP0833
 Project: Noble – Strong 21–15Jl,23

MW-02
X902021-02 (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	9B09001	02/09/2009	02/09/2009	
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>	<i>107 %</i>	<i>70.3-123</i>			"	"	"
<i>Surrogate: Toluene-d8</i>	<i>86.5 %</i>	<i>75.9-123</i>			"	"	"
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>104 %</i>	<i>83-123</i>			"	"	"

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

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



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

Brian Dodek
 Project Number: NEP0833
 Project: Noble – Strong 21–15Jl,23

MW-03
X902021-03 (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	9B09001	02/09/2009	02/09/2009	
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>	<i>106 %</i>	<i>70.3-123</i>			"	"	"
<i>Surrogate: Toluene-d8</i>	<i>86.4 %</i>	<i>75.9-123</i>			"	"	"
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>105 %</i>	<i>83-123</i>			"	"	"

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: NEP0833
 Project: Noble – Strong 21-15Jl,23

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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch 9B09001 – EPA 5030B

Blank (9B09001-BLK1)

Prepared: 02/09/2009 Analyzed: 02/09/2009

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	67.4		ug/L	62.5		108	70.3-123			
Surrogate: Toluene-d8	54.6		"	62.5		87.4	75.9-123			
Surrogate: 4-Bromofluorobenzene	64.7		"	62.5		104	83-123			

LCS (9B09001-BS1)

Prepared: 02/09/2009 Analyzed: 02/09/2009

Benzene	0.05	0.001	mg/L	0.0500		109	64.2-124			
Toluene	0.05	0.001	"	0.0500		96.3	63.9-119			
Surrogate: 1,2-Dichloroethane-d4	65.3		ug/L	62.5		104	70.3-123			
Surrogate: Toluene-d8	54.8		"	62.5		87.7	75.9-123			
Surrogate: 4-Bromofluorobenzene	66.4		"	62.5		106	83-123			

Matrix Spike (9B09001-MS1)

Source: X902021-02

Prepared: 02/09/2009 Analyzed: 02/09/2009

Benzene	0.06	0.001	mg/L	0.0500	ND	115	64.2-124			
Toluene	0.05	0.001	"	0.0500	ND	103	63.9-119			
Surrogate: 1,2-Dichloroethane-d4	65.6		ug/L	62.5		105	70.3-123			
Surrogate: Toluene-d8	55.1		"	62.5		88.2	75.9-123			
Surrogate: 4-Bromofluorobenzene	64.6		"	62.5		103	83-123			

Matrix Spike Dup (9B09001-MSD1)

Source: X902021-02

Prepared: 02/09/2009 Analyzed: 02/09/2009

Benzene	0.06	0.001	mg/L	0.0500	ND	113	64.2-124	2.44	25	
Toluene	0.05	0.001	"	0.0500	ND	95.4	63.9-119	7.53	25	
Surrogate: 1,2-Dichloroethane-d4	65.8		ug/L	62.5		105	70.3-123			
Surrogate: Toluene-d8	53.6		"	62.5		85.8	75.9-123			
Surrogate: 4-Bromofluorobenzene	63.9		"	62.5		102	83-123			

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

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



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

Brian Dodek
Project Number: NEP0833
Project: Noble – Strong 21-15Jl,23

Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

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