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North America Division

GROUNDWATER MONITORING REPORT JULY 2009

COLLINS 14-20 TANK BATTERY

On July 1, 2009, LT Environmental, Inc. (LTE) personnel were onsite, on behalf of Noble Energy, Inc., to conduct groundwater sampling at the Collins 14-20 tank battery (Site). Site history, assessment, excavation, and injection activities have been described in preceding assessment and remediation reports.

Depth to the static groundwater table measurements were collected from the monitoring wells and used to calculate well-specific purge volumes. These measurements are summarized in Table 1. A Site Map is presented on Figure 1. Six monitoring wells were sampled during this monitoring event (SB08, SB09, SB11, SB12, SB13, and SB14). Water levels ranged from 20.70 feet below top of casing (btoc) in SB12 to 22.63 feet btoc in SB08. Following purging, samples were collected and submitted following strict chain of custody protocol to Origins Laboratory, Inc. (Origins) of Denver, Colorado for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency Method 8260B.

The Colorado Department of Public Health and Environment (CDPHE) has the Basic Standards for Groundwater in Colorado (WQCC Reg. 41) for BTEX of 5 micrograms per liter ($\mu\text{g/L}$), 560 $\mu\text{g/L}$, 700 $\mu\text{g/L}$, and 1,400 $\mu\text{g/L}$, respectively. Analytical results from the monitoring wells exhibit BTEX concentrations in compliance with WQCC Reg. 41 for all samples except SB13, which exhibited a benzene concentration of 14.2 micrograms per liter. The laboratory analytical report is included in the Appendix.

It is expected that the minimal remaining groundwater impact will dissipate due to continued bioremediation activity promoted by the in-situ injections and through enhanced natural attenuation processes.

The next quarterly groundwater sampling event is scheduled for September 2009. LTE will continue to conduct quarterly groundwater monitoring events with the goal of observing four consecutive quarters of analytical results in compliance with regulatory standards. Once this is achieved, a request for No Further Action will be drafted and submitted to the Colorado Oil and Gas Conservation Committee.



TABLE

TABLE 1

**GROUNDWATER ANALYTICAL DATA
COLLINS 14-20 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)	TOTAL XYLENES (ug/L)
SB08	10/29/2008	22.56	<1.0	<1.0	<1.0	<3.0
	2/17/2009	22.49	<1.0	<1.0	<1.0	<3.0
	2/27/2009	22.71	<1.0	<1.0	<1.0	<3.0
	7/1/2009	22.63	<1.0	<1.0	<1.0	<3.0
SB09	11/5/2008	19.65	<1.0	<1.0	<1.0	<3.0
	2/17/2009	21.95	<1.0	<1.0	<1.0	<3.0
	2/27/2009	22.04	<1.0	<1.0	<1.0	<3.0
	7/1/2009	22.11	<1.0	<1.0	<1.0	<3.0
SB11	2/17/2009	20.70	<1.0	<1.0	<1.0	<3.0
	2/27/2009	21.07	<1.0	<1.0	<1.0	<3.0
	7/1/2009	20.98	1.36	<1.0	<1.0	<3.0
SB12	2/17/2009	20.45	<1.0	<1.0	1.32	<3.0
	2/27/2009	20.78	<1.0	<1.0	<1.0	<3.0
	7/1/2009	20.70	<1.0	<1.0	<1.0	<3.0
SB13	2/27/2009	21.27	2.18	16.3	182	1,037
	7/1/2009	21.31	14.2	66.4	218	1,517
SB14	2/27/2009	19.71	17.9	486	240	2,335
	7/1/2009	20.77	2.5	<1.0	4.59	74.8
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

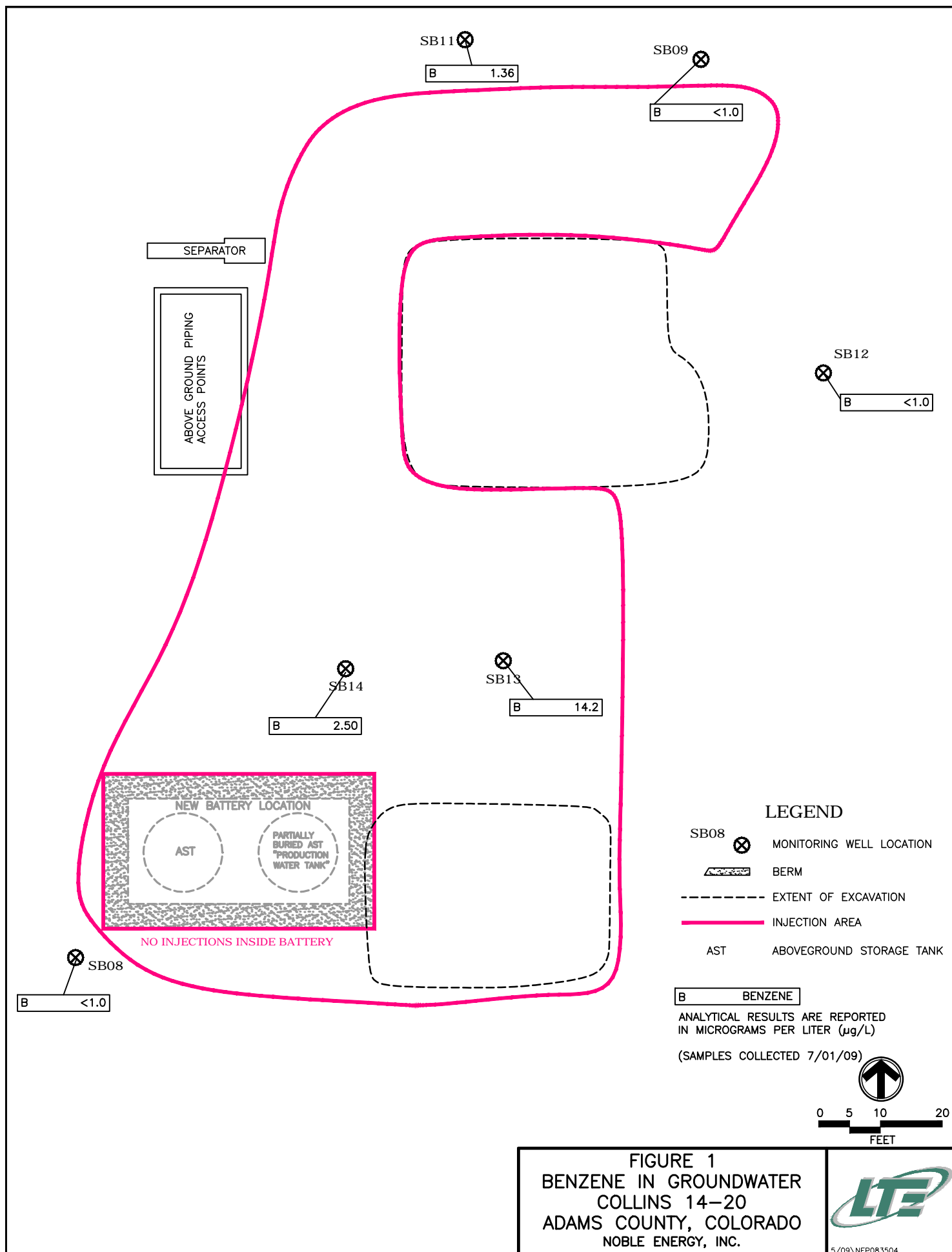
Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8260B

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

Commission Regulation 41 covering Basic Standards for Groundwater



FIGURE



APPENDIX
ANALYTICAL REPORT



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July 07, 2009

LT Environmental, Inc.

4600 West 60th Avenue

Arvada CO 80003

Brian Dodek

Project Number: NEP0835.05

Project: Noble – Collins 14–20

Attached are the analytical results for Noble – Collins 14–20 received by Origins Laboratory, Inc. 7/1/2009 3:33:00PM. 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: NEP0835.05
Project: Noble – Collins 14–20

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
SB08	X907007-01	Water	7/1/2009 2:10:00PM	07/01/2009 15:33
SB09	X907007-02	Water	7/1/2009 2:15:00PM	07/01/2009 15:33
SB11	X907007-03	Water	7/1/2009 2:20:00PM	07/01/2009 15:33
SB12	X907007-04	Water	7/1/2009 2:25:00PM	07/01/2009 15:33
SB13	X907007-05	Water	7/1/2009 2:30:00PM	07/01/2009 15:33
SB14	X907007-06	Water	7/1/2009 2:35:00PM	07/01/2009 15:33

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager

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4600 West 60th Avenue
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Brian Dodek
Project Number: NEP0835.05
Project: Noble – Collins 14-20

X907007

page 1 of 1



originslaboratory.com

Client	LT Environmental	Project Manager	BAD
Address		Project Name	Collins 14-20
Telephone Number	On file	Project Number	NEP0835.05
E-Mail Address		Samples Collected by	

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 #		
5608	7-1-09	1410		X								Lab Filter
5609		1415		X								
5611		1420		X								
5612		1425		X								
5613		1430		X								
5614		1435		X								
Relinquished by	Date	Time	Received by	Date	Time	Temperature Upon Receipt						
WJF	7-1-09	1530				32						
Relinquished by	Date	Time	Received by	Date	Time	Turn Around Time						
				7-1-09	1530	Same Day	24-hr	48-hr	72-hr			

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Brian Dodek
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Project: Noble – Collins 14-20

SB08

X907007-01 (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	9G02002	07/02/2009	07/04/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	100 %	85.7-134	"	"	"
Surrogate: Toluene-d8	95.8 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	117 %	74.7-127	"	"	"

Origins Laboratory, Inc.

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Brian Dodek
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SB09

X907007-02 (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	9G02002	07/02/2009	07/04/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	102 %	85.7-134	"	"	"
Surrogate: Toluene-d8	94.9 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	114 %	74.7-127	"	"	"

Origins Laboratory, Inc.

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Brian Dodek
Project Number: NEP0835.05
Project: Noble – Collins 14-20

SB11

X907007-03 (Water)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

BTEX by EPA 8260B

Benzene	0.00136	0.00100	mg/L	1	9G02002	07/02/2009	07/04/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	102 %	85.7-134	"	"	"
Surrogate: Toluene-d8	96.1 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	113 %	74.7-127	"	"	"

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SB12

X907007-04 (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	9G02002	07/02/2009	07/04/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	102 %	85.7-134	"	"	"
Surrogate: Toluene-d8	94.5 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	118 %	74.7-127	"	"	"

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SB13

X907007-05 (Water)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

BTEX by EPA 8260B

Benzene	0.0142	0.0100	mg/L	10	9G02002	07/02/2009	07/07/2009
Toluene	0.0664	0.0100	"	"	"	"	"
Ethylbenzene	0.218	0.0100	"	"	"	"	"
o-Xylene	0.277	0.0100	"	"	"	"	"
m,p-Xylene	1.24	0.0200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	102 %	85.7-134	"	"	07/04/2009
Surrogate: Toluene-d8	94.1 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	107 %	74.7-127	"	"	"

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SB14

X907007-06 (Water)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

BTEX by EPA 8260B

Benzene	0.00250	0.00100	mg/L	1	9G02002	07/02/2009	07/07/2009
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	0.00459	0.00100	"	"	"	"	"
o-Xylene	0.0136	0.00100	"	"	"	"	"
m,p-Xylene	0.0612	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	100 %	85.7-134	"	"	07/04/2009
Surrogate: Toluene-d8	94.5 %	81.4-121	"	"	"
Surrogate: 4-Bromofluorobenzene	117 %	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 9G02002 – EPA 5030B

Blank (9G02002-BLK1)

Prepared: 07/02/2009 Analyzed: 07/03/2009

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	62.4		ug/L	62.5		99.9	85.7-134			
Surrogate: Toluene-d8	60.6		"	62.5		96.9	81.4-121			
Surrogate: 4-Bromofluorobenzene	71.7		"	62.5		115	74.7-127			

Blank (9G02002-BLK2)

Prepared: 07/02/2009 Analyzed: 07/03/2009

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	63.1		ug/L	62.5		101	85.7-134			
Surrogate: Toluene-d8	60.0		"	62.5		96.0	81.4-121			
Surrogate: 4-Bromofluorobenzene	72.7		"	62.5		116	74.7-127			

LCS (9G02002-BS1)

Prepared: 07/02/2009 Analyzed: 07/03/2009

Benzene	0.06	0.001	mg/L	0.0500		114	74.9-126			
Toluene	0.05	0.001	"	0.0500		104	73.3-128			
Surrogate: 1,2-Dichloroethane-d4	63.0		ug/L	62.5		101	85.7-134			
Surrogate: Toluene-d8	59.2		"	62.5		94.7	81.4-121			
Surrogate: 4-Bromofluorobenzene	70.7		"	62.5		113	74.7-127			

LCS (9G02002-BS2)

Prepared: 07/02/2009 Analyzed: 07/03/2009

Benzene	0.06	0.001	mg/L	0.0500		119	74.9-126			
Toluene	0.05	0.001	"	0.0500		107	73.3-128			

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 Project: Noble – Collins 14-20

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 9G02002 – EPA 5030B										
LCS (9G02002–BS2)					Prepared: 07/02/2009 Analyzed: 07/03/2009					
Surrogate: 1,2-Dichloroethane-d4	63.9		ug/L	62.5		102	85.7–134			
Surrogate: Toluene-d8	59.4		"	62.5		95.0	81.4–121			
Surrogate: 4-Bromofluorobenzene	71.5		"	62.5		114	74.7–127			
Matrix Spike (9G02002–MS1)					Source: X907007–01		Prepared: 07/02/2009 Analyzed: 07/03/2009			
Benzene	0.06	0.001	mg/L	0.0500	ND	126	78.1–132			
Toluene	0.06	0.001	"	0.0500	ND	116	71.7–124			
Surrogate: 1,2-Dichloroethane-d4	58.6		ug/L	62.5		93.7	85.7–134			
Surrogate: Toluene-d8	61.7		"	62.5		98.7	81.4–121			
Surrogate: 4-Bromofluorobenzene	109		"	62.5		175	74.7–127			S–GC
Matrix Spike (9G02002–MS2)					Source: X907007–02		Prepared: 07/02/2009 Analyzed: 07/03/2009			
Benzene	0.06	0.001	mg/L	0.0500	ND	114	78.1–132			
Toluene	0.05	0.001	"	0.0500	ND	103	71.7–124			
Surrogate: 1,2-Dichloroethane-d4	64.4		ug/L	62.5		103	85.7–134			
Surrogate: Toluene-d8	59.0		"	62.5		94.5	81.4–121			
Surrogate: 4-Bromofluorobenzene	71.7		"	62.5		115	74.7–127			
Matrix Spike Dup (9G02002–MSD1)					Source: X907007–01		Prepared: 07/02/2009 Analyzed: 07/03/2009			
Benzene	0.06	0.001	mg/L	0.0500	ND	116	78.1–132	7.96	24.8	
Toluene	0.05	0.001	"	0.0500	ND	102	71.7–124	13.4	25	
Surrogate: 1,2-Dichloroethane-d4	63.7		ug/L	62.5		102	85.7–134			
Surrogate: Toluene-d8	58.7		"	62.5		93.9	81.4–121			
Surrogate: 4-Bromofluorobenzene	70.9		"	62.5		113	74.7–127			
Matrix Spike Dup (9G02002–MSD2)					Source: X907007–02		Prepared: 07/02/2009 Analyzed: 07/03/2009			
Benzene	0.06	0.001	mg/L	0.0500	ND	119	78.1–132	4.21	24.8	
Toluene	0.05	0.001	"	0.0500	ND	103	71.7–124	0.252	25	
Surrogate: 1,2-Dichloroethane-d4	64.2		ug/L	62.5		103	85.7–134			

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Brian Dodek
Project Number: NEP0835.05
Project: Noble – Collins 14–20

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 9G02002 – EPA 5030B

Matrix Spike Dup (9G02002–MSD2)

Source: X907007–02

Prepared: 07/02/2009 Analyzed: 07/03/2009

Surrogate: Toluene-d8	58.9		ug/L	62.5		94.2	81.4–121			
Surrogate: 4–Bromofluorobenzene	70.9		"	62.5		113	74.7–127			

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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.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

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