



Remediation # 5137

## **GROUNDWATER MONITORING REPORT FEBRUARY 2011**

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### **McCLELLAN 3-1, 3-32, 3-35**

On January 12, 2011, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc., at the McClellan 3-1, 3-32, 3-35 Tank Battery (Site). This sampling event constitutes the third post remediation monitoring event at this Site. Site history, remediation activities, well installation, and performance monitoring results have been described in the preceding reports.

Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1. The monitoring wells (MW01, MW02, and MW03) were installed on July 15, 2010. A Site Map is presented on Figure 1.

Depth to groundwater, which ranged from 3.71 feet below top of casing (btoc) in MW02 to 4.69 feet btoc in MW01, was used to calculate well-specific purge volumes. Samples were submitted 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 are in compliance with 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 with analytical results in compliance with WQCC Reg 41. The next quarterly groundwater sampling event is scheduled for April 2011.

## **TABLE**

**TABLE 1**

**GROUNDWATER ANALYTICAL DATA  
McCLELLAN 3-1, 3-32, 3-35 TANK BATTERY  
WELD COUNTY, COLORADO  
NOBLE ENERGY, INC.**

<b>MONITORING WELL</b>	<b>DATE</b>	<b>DEPTH TO WATER (feet btoc)</b>	<b>BENZENE (µg/l)</b>	<b>TOLUENE (µg/l)</b>	<b>ETHYLBENZENE (µg/l)</b>	<b>XYLENES (µg/l)</b>
MW01	7/20/2010	4.36	<1.0	<1.0	<1.0	<1.0
	10/21/2010	4.24	<1.0	<1.0	<1.0	<3.0
	1/12/2011	4.69	<1.0	<1.0	<1.0	<1.0
MW02	7/20/2010	3.23	<1.0	<1.0	<1.0	<1.0
	10/21/2010	3.17	<1.0	<1.0	<1.0	<3.0
	1/12/2011	3.71	<1.0	<1.0	<1.0	<1.0
MW03	7/20/2010	3.41	<1.0	<1.0	<1.0	<1.0
	10/21/2010	3.20	<1.0	<1.0	<1.0	<3.0
	1/12/2011	3.87	<1.0	<1.0	<1.0	<1.0
<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

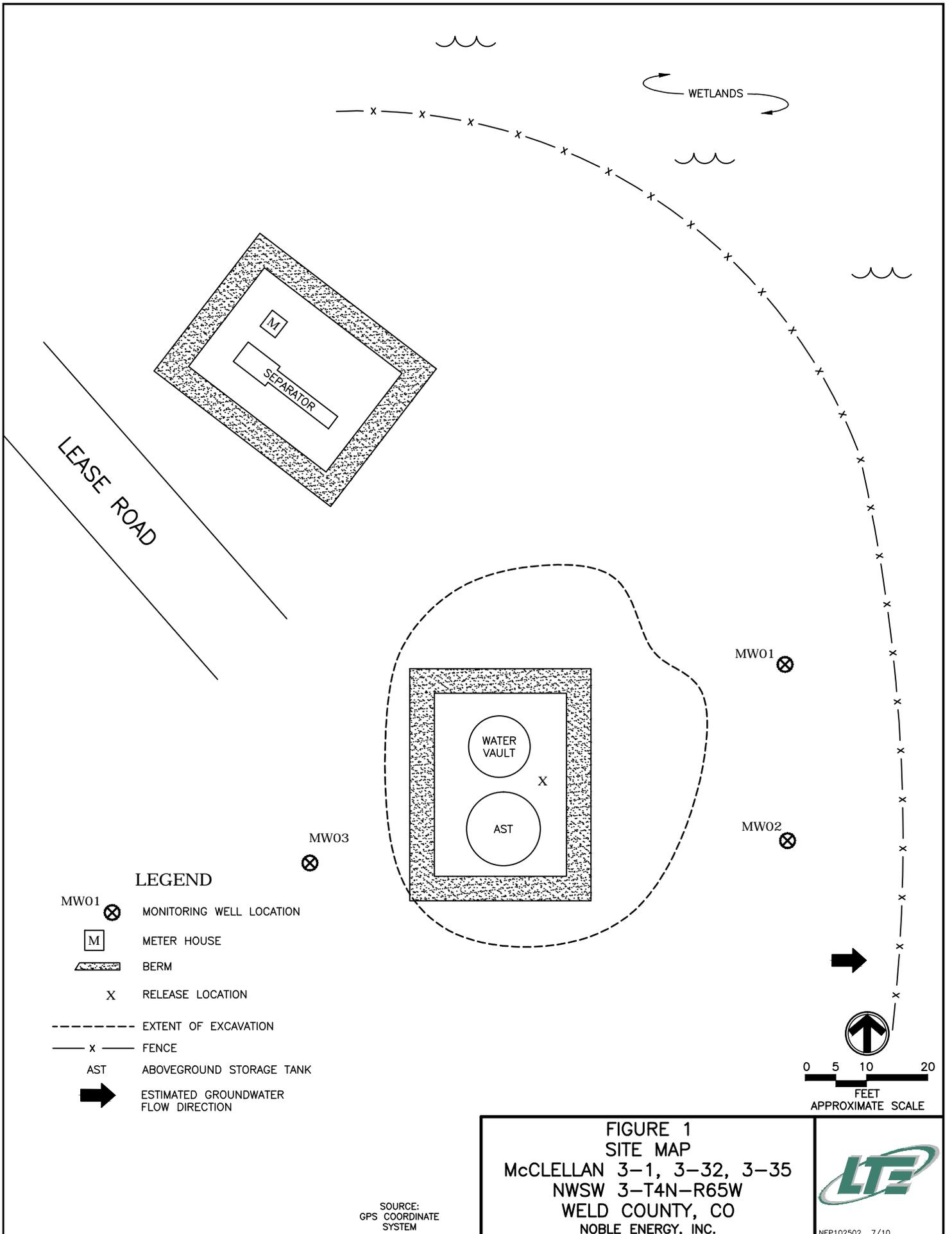
µg/l - micrograms per liter

< - indicates result is less than the stated laboratory method reporting limit

CDPHE WQCC Reg 41 - Colorado Department of Public Health and Environment - Water Quality Control  
Commission Regulation 41 covering Basic Standards for Groundwater

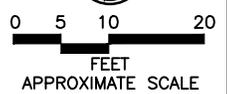
Benzene, toluene, ethylbenzene, total xylenes analyzed by EPA Method 8260B

**FIGURE**



**LEGEND**

- MW01 ⊗ MONITORING WELL LOCATION
- [M] METER HOUSE
- ▨ BERM
- x RELEASE LOCATION
- - - - - EXTENT OF EXCAVATION
- x - FENCE
- AST ABOVEGROUND STORAGE TANK
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION



**FIGURE 1**  
**SITE MAP**  
 McCLELLAN 3-1, 3-32, 3-35  
 NWSW 3-T4N-R65W  
 WELD COUNTY, CO  
 NOBLE ENERGY, INC.



SOURCE:  
GPS COORDINATE  
SYSTEM

**APPENDIX**  
**ANALYTICAL REPORT**

January 14, 2011

LT Environmental, Inc.

Rob Rebel

4600 West 60th Avenue

Arvada CO 80003

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**Project Name - Noble - McClellan 3-1**

**Project Number NEP1025**

Attached are you analytical results for Noble - McClellan 3-1 received by Origins Laboratory, Inc. 1/12/2011 3:39:00PM. This project is associated with Origins project number X101032-01.

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.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



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

Rob Rebel  
Project Number: NEP1025  
Project: Noble - McClellan 3-1

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-01	X101032-01	Water	January 12, 2011 12:50	01/12/2011 15:39
MW-02	X101032-02	Water	January 12, 2011 12:55	01/12/2011 15:39
MW-03	X101032-03	Water	January 12, 2011 13:00	01/12/2011 15:39

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

Rob Rebel  
 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

MW-01  
 1/12/2011 12:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
 X101032-01 (Water)

**BTEX by EPA 8260B**

Benzene	ND	1.00	ug/L	1	1A13001	01/13/2011	01/13/2011	
Toluene	ND	1.00	"	"	"	"	"	
Ethylbenzene	ND	1.00	"	"	"	"	"	
Xylenes, total	ND	1.00	"	"	"	"	"	

<i>Surrogate: 1,2-Dichloroethane-d4</i>	119 %	73.5-130			"	"	"	
<i>Surrogate: Toluene-d8</i>	98.2 %	79.3-113			"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>	102 %	81.5-117			"	"	"	

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

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

Rob Rebel  
 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

MW-02  
 1/12/2011 12:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
 X101032-02 (Water)

**BTEX by EPA 8260B**

Benzene	ND	1.00	ug/L	1	1A13001	01/13/2011	01/13/2011	
Toluene	ND	1.00	"	"	"	"	"	
Ethylbenzene	ND	1.00	"	"	"	"	"	
Xylenes, total	ND	1.00	"	"	"	"	"	

<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>116 %</i>	<i>73.5-130</i>			"	"	"	
<i>Surrogate: Toluene-d8</i>	<i>98.7 %</i>	<i>79.3-113</i>			"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>102 %</i>	<i>81.5-117</i>			"	"	"	

Origins Laboratory, Inc.



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 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

MW-03  
 1/12/2011 1:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
 X101032-03 (Water)

**BTEX by EPA 8260B**

Benzene	ND	1.00	ug/L	1	1A13001	01/13/2011	01/13/2011	
Toluene	ND	1.00	"	"	"	"	"	
Ethylbenzene	ND	1.00	"	"	"	"	"	
Xylenes, total	ND	1.00	"	"	"	"	"	

<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>119 %</i>	<i>73.5-130</i>			"	"	"	
<i>Surrogate: Toluene-d8</i>	<i>97.9 %</i>	<i>79.3-113</i>			"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>103 %</i>	<i>81.5-117</i>			"	"	"	

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Rob Rebel  
 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

**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
<b>Batch 1A13001 - EPA 5030B</b>										
<b>Blank (1A13001-BLK1)</b>										
					Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	ND	1.00	ug/L							
Toluene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
o-Xylene	ND	1.00	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	73.3		"	62.5		117	73.5-130			
<i>Surrogate: Toluene-d8</i>	61.7		"	62.5		98.7	79.3-113			
<i>Surrogate: 4-Bromofluorobenzene</i>	65.0		"	62.5		104	81.5-117			
<b>Blank (1A13001-BLK2)</b>										
					Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	ND	1.00	ug/L							
Toluene	ND	1.00	"							
Ethylbenzene	ND	1.00	"							
m,p-Xylene	ND	2.00	"							
o-Xylene	ND	1.00	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	74.3		"	62.5		119	73.5-130			
<i>Surrogate: Toluene-d8</i>	60.9		"	62.5		97.4	79.3-113			
<i>Surrogate: 4-Bromofluorobenzene</i>	63.5		"	62.5		102	81.5-117			
<b>LCS (1A13001-BS1)</b>										
					Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	49.5	1.00	ug/L	50.0		99.0	77.3-128			
Toluene	49.6	1.00	"	50.0		99.2	81.7-118			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	72.6		"	62.5		116	73.5-130			
<i>Surrogate: Toluene-d8</i>	59.6		"	62.5		95.3	79.3-113			
<i>Surrogate: 4-Bromofluorobenzene</i>	64.2		"	62.5		103	81.5-117			
<b>LCS (1A13001-BS2)</b>										
					Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	49.1	1.00	ug/L	50.0		98.2	77.3-128			

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 Arvada CO 80003

Rob Rebel  
 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

**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
<b>Batch 1A13001 - EPA 5030B</b>										
<b>LCS (1A13001-BS2)</b>					Prepared: 01/13/2011 Analyzed: 01/13/2011					
Toluene	48.2	1.00	ug/L	50.0		96.4	81.7-118			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>72.6</i>		<i>"</i>	<i>62.5</i>		<i>116</i>	<i>73.5-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>59.3</i>		<i>"</i>	<i>62.5</i>		<i>94.8</i>	<i>79.3-113</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>64.2</i>		<i>"</i>	<i>62.5</i>		<i>103</i>	<i>81.5-117</i>			
<b>Matrix Spike (1A13001-MS1)</b>		<b>Source: X101036-08</b>			Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	52.0	1.00	ug/L	50.0	ND	104	74.5-132			
Toluene	51.9	1.00	"	50.0	ND	104	74.2-116			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>74.0</i>		<i>"</i>	<i>62.5</i>		<i>118</i>	<i>73.5-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>59.5</i>		<i>"</i>	<i>62.5</i>		<i>95.2</i>	<i>79.3-113</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>66.2</i>		<i>"</i>	<i>62.5</i>		<i>106</i>	<i>81.5-117</i>			
<b>Matrix Spike (1A13001-MS2)</b>		<b>Source: X101037-01</b>			Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	50.0	1.00	ug/L	50.0	ND	100	74.5-132			
Toluene	52.3	1.00	"	50.0	ND	105	74.2-116			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>70.8</i>		<i>"</i>	<i>62.5</i>		<i>113</i>	<i>73.5-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>60.7</i>		<i>"</i>	<i>62.5</i>		<i>97.1</i>	<i>79.3-113</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>64.3</i>		<i>"</i>	<i>62.5</i>		<i>103</i>	<i>81.5-117</i>			
<b>Matrix Spike Dup (1A13001-MSD1)</b>		<b>Source: X101036-08</b>			Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	51.5	1.00	ug/L	50.0	ND	103	74.5-132	0.908	13.1	
Toluene	50.2	1.00	"	50.0	ND	100	74.2-116	3.37	21.2	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>73.2</i>		<i>"</i>	<i>62.5</i>		<i>117</i>	<i>73.5-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>59.2</i>		<i>"</i>	<i>62.5</i>		<i>94.7</i>	<i>79.3-113</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>64.5</i>		<i>"</i>	<i>62.5</i>		<i>103</i>	<i>81.5-117</i>			
<b>Matrix Spike Dup (1A13001-MSD2)</b>		<b>Source: X101037-01</b>			Prepared: 01/13/2011 Analyzed: 01/13/2011					
Benzene	52.1	1.00	ug/L	50.0	ND	104	74.5-132	4.02	13.1	

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

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 Arvada CO 80003

Rob Rebel  
 Project Number: NEP1025  
 Project: Noble - McClellan 3-1

**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 1A13001 - EPA 5030B

Matrix Spike Dup (1A13001-MSD2)	Source: X101037-01			Prepared: 01/13/2011 Analyzed: 01/13/2011						
Toluene	51.9	1.00	ug/L	50.0	ND	104	74.2-116	0.691	21.2	
Surrogate: 1,2-Dichloroethane-d4	71.9		"	62.5		115	73.5-130			
Surrogate: Toluene-d8	60.0		"	62.5		96.0	79.3-113			
Surrogate: 4-Bromofluorobenzene	64.9		"	62.5		104	81.5-117			

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Rob Rebel  
Project Number: NEP1025  
Project: Noble - McClellan 3-1

**Notes and Definitions**

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

Origins Laboratory, Inc.



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