

# **GROUNDWATER MONITORING REPORT AND NO FURTHER ACTION REQUEST JANUARY 2009**

---

## **REICHERT 9-4, 5, 7 WELL SITES**

On December 16, 2008 and December 18, 2008, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc. (Noble), at the Reichert 9-4, 5, 7 Tank Battery (Site). This sampling event constitutes the fourth post remediation monitoring event at this site. Site history, remediation activities, and post-remediation groundwater results have been described in the preceding reports.

Groundwater level measurements were collected from four monitoring wells and are summarized in Table 1. Monitoring wells (MW-2, MW-3, MW-4, and MW-5) were installed on February 28, 2008 to determine if impacted groundwater remained at the Site. Monitoring well MW-1 was destroyed by farming activities after the first post-remediation sampling event. A Site Map is presented on Figure 1.

Depth to groundwater, which ranged from 3.90 feet below top of casing (btoc) in MW-2 to 7.01 feet btoc in MW-5, 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 are below regulatory limits in all samples. Monitoring well MW-3 is the only well that exhibited analytical results above the laboratory method detection limits. The ethylbenzene concentration observed at monitoring well MW-3 was 5.58 micrograms per liter (ug/L), which is below the Colorado Groundwater Quality Standard (CGWQS) of 700 ug/L. The total xylenes concentration observed at monitoring well MW-3 was 43.3 ug/L, which is also well below the CGWQS of 1,400 ug/L. The laboratory analytical reports are included as an Appendix.

The December 2008 monitoring event constitutes the fourth post-remediation quarterly groundwater monitoring event conducted at the Site. Of the four quarterly monitoring events, only one monitoring event exhibited concentrations exceeding the CGWQS. On June 23, 2008, during the second post-remediation quarterly monitoring event, monitoring well MW-3 exhibited a Total xylenes concentration of 1,610.53 ug/L. In the following two quarters, Total xylenes concentrations decreased significantly to 43.3 ug/L, which is below the regulatory standard and demonstrates a direct trend of consecutive order of magnitude reductions in total xylenes. All remaining wells have exhibited BTEX concentrations below the laboratory method detection limit and/or the CGWQS. Analytical results indicate that remediation activities were successful and groundwater impact no longer exists at the Site. Based on this data, the Site has been remediated and the groundwater exposure pathway is now closed.

LTE, on behalf of Noble, respectfully requests a No Further Action condition be granted for the Site.



**TABLE**



TABLE 1

**GROUNDWATER ANALYTICAL DATA  
REICHERT 9-4, 5, 7 TANK BATTERY  
WELD COUNTY, COLORADO  
NOBLE ENERGY, INC.**

MONITORING		DEPTH TO				TOTAL
WELL	DATE	WATER	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
		(feet btoc)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
MW-1	03/19/08	4.85	<1.00	<1.00	<1.00	<2.00
	06/23/08		WELL DESTROYED			
MW-2	03/19/08	.	<1.00	<1.00	<1.00	<2.00
	06/23/08	3.13	<1.00	<1.00	<1.00	<2.00
	09/29/08	1.85	<1.00	<1.00	<1.00	<2.00
	12/16/08	3.90	<1.00	<1.00	<1.00	<3.00
MW-3	03/19/08	5.91	<1.00	1.07	<1.00	381.5
	06/23/08	2.84	<1.00	<1.00	<1.00	<b>1,610.53</b>
	09/29/08	2.19	<1.00	<1.00	<1.00	450.0
	12/16/08	4.27	<1.00	<1.00	5.58	43.3
MW-4	03/19/08	5.79	<1.00	<1.00	<1.00	<2.00
	06/23/08	1.70	<1.00	<1.00	<1.00	<2.00
	09/29/08	1.89	<1.00	<1.00	<1.00	<2.00
	12/18/08	4.25	<1.00	<1.00	<1.00	<3.00
MW-5	03/19/08	8.69	<1.00	<1.00	<1.00	<2.00
	06/23/08	3.83	<1.00	<1.00	<1.00	<2.00
	10/01/08	3.49	<1.00	<1.00	<1.00	<2.00
	12/16/08	7.01	<1.00	<1.00	<1.00	<3.00
<b>CGWQS</b>			<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>1,400</b>

## NOTES:

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

btoc - below top of casing

ug/L - micrograms per liter

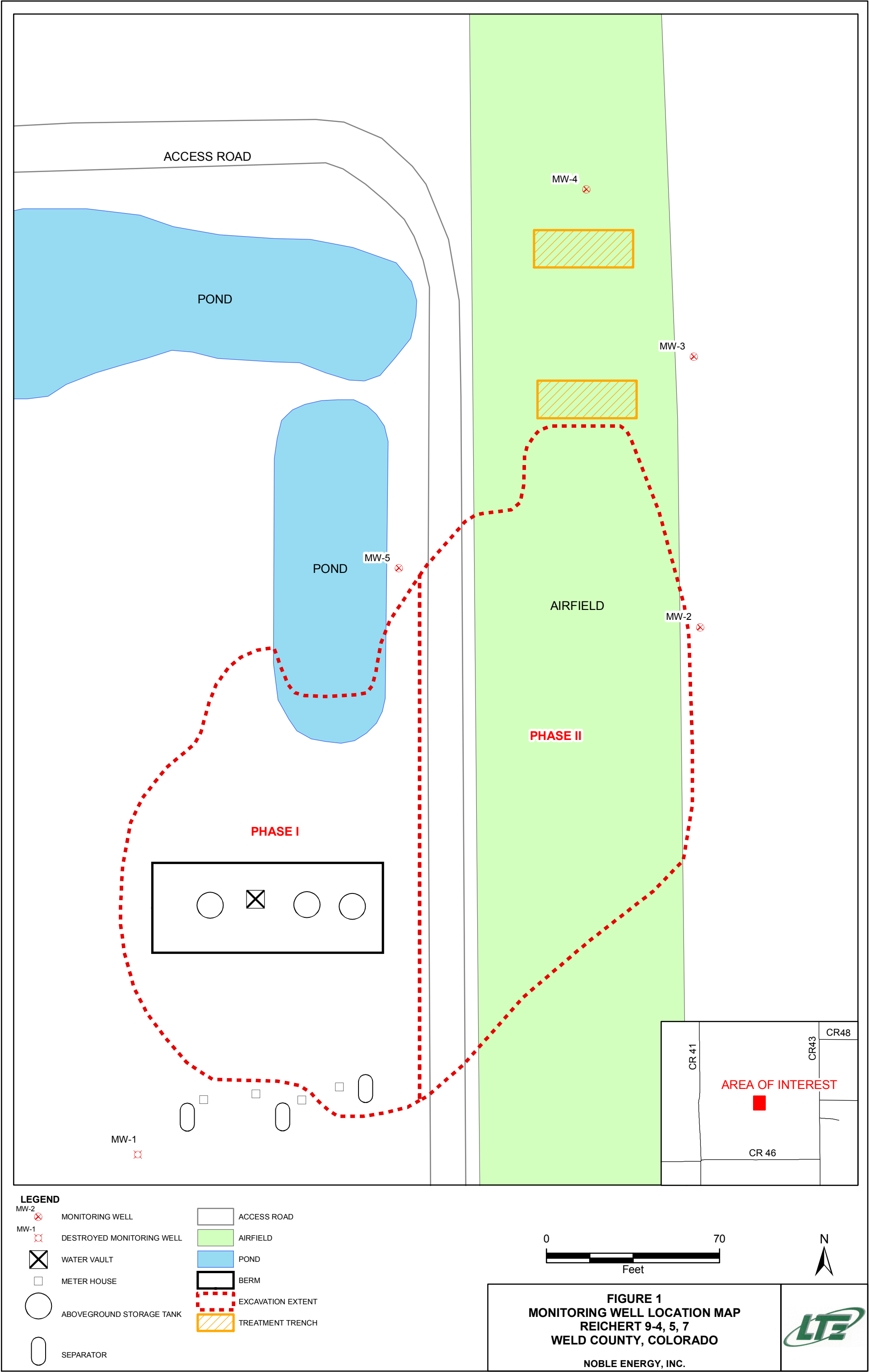
**Bold** indicates concentration exceeds the CGWQS Standard

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

CGWQS - Colorado Groundwater Quality Standards

**FIGURE**





**APPENDIX**  
**ANALYTICAL REPORT**





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

---

December 23, 2008

---

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

Brian Dodek  
Project Number: NEP0703  
Project: Reichert 9-5,6,7

---

Attached are the analytical results for Reichert 9-5,6,7 received by Origins Laboratory, Inc. 12/18/2008 4:34:00PM. 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", is written in a cursive style.

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: NEP0703  
Project: Reichert 9-5,6,7

#### CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
MW-2	X812071-01	Water	12/16/2008 3:05:00PM	12/18/2008 16:34
MW-3	X812071-02	Water	12/16/2008 2:20:00PM	12/18/2008 16:34
MW-5	X812071-03	Water	12/16/2008 1:45:00PM	12/18/2008 16:34
MW-4	X812071-04	Water	12/18/2008 2:30:00PM	12/18/2008 16:34

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.*





Brian Dodek  
Project Number: NEP0703  
Project: Reichert 9-5,6,7

Sample ID - Description	Date Sampled	Time Sampled	Preservative		Matrix				Analysis	Sample Instructions
			Unpreserved	HCl	HNO <sub>3</sub>	Other -	Groundwater	Soil		
MW-2	12/16/08	1505	3							
MW-3	1	1420	1							
MW-5	1	1345	1							
MW-4	12/18	1430	3							

Reinquisition by:	Date	Time	Received by:	Date	Time	Temperature Upon Receipt
S-12	12/18/08	1124	[Signature]	12/18/08	1124	29

Reinquisition by:	Date	Time	Received by:	Date	Time	Temperature Upon Receipt

Sample Day	Standard
24 hr	
48 hr	
72 hr	

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

Naucke

Page 3 of 9

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: NEP0703  
Project: Reichert 9-5,6,7

**MW-2**

**X812071-01 (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	8L19003	12/19/2008	12/19/2008
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	87.6 %	70.3-123	"	"	"
Surrogate: Toluene-d8	98.3 %	75.9-123	"	"	"
Surrogate: 4-Bromofluorobenzene	108 %	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: NEP0703  
Project: Reichert 9-5,6,7

**MW-3**

**X812071-02 (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	8L19003	12/19/2008	12/19/2008
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	<b>0.00558</b>	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	<b>0.0433</b>	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	97.5 %	70.3-123	"	"	"
Surrogate: Toluene-d8	98.7 %	75.9-123	"	"	"
Surrogate: 4-Bromofluorobenzene	98.1 %	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: NEP0703  
Project: Reichert 9-5,6,7

**MW-5**

**X812071-03 (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	8L19003	12/19/2008	12/19/2008
Toluene	ND	0.00100	"	"	"	"	"
Ethylbenzene	ND	0.00100	"	"	"	"	"
o-Xylene	ND	0.00100	"	"	"	"	"
m,p-Xylene	ND	0.00200	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	91.9 %	70.3-123	"	"	"
Surrogate: Toluene-d8	98.5 %	75.9-123	"	"	"
Surrogate: 4-Bromofluorobenzene	107 %	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: NEP0703  
Project: Reichert 9-5,6,7

**MW-4**

**X812071-04 (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	8L19003	12/19/2008	12/19/2008
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 %	70.3-123	"	"	"
Surrogate: Toluene-d8	107 %	75.9-123	"	"	"
Surrogate: 4-Bromofluorobenzene	98.1 %	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: NEP0703  
Project: Reichert 9-5,6,7

**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 8L19003 – EPA 5030B**

**Blank (8L19003-BLK1)**

Prepared: 12/19/2008 Analyzed: 12/19/2008

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	62.6		ug/L	62.5		100	70.3-123			
Surrogate: Toluene-d8	68.6		"	62.5		110	75.9-123			
Surrogate: 4-Bromofluorobenzene	66.1		"	62.5		106	83-123			

**LCS (8L19003-BS1)**

Prepared: 12/19/2008 Analyzed: 12/19/2008

Benzene	0.05	0.001	mg/L	0.0500		95.9	64.2-124			
Toluene	0.05	0.001	"	0.0500		98.5	63.9-119			
Surrogate: 1,2-Dichloroethane-d4	60.9		ug/L	62.5		97.5	70.3-123			
Surrogate: Toluene-d8	60.3		"	62.5		96.5	75.9-123			
Surrogate: 4-Bromofluorobenzene	65.0		"	62.5		104	83-123			

**Matrix Spike (8L19003-MS1)**

Source: X812056-01

Prepared: 12/19/2008 Analyzed: 12/19/2008

Benzene	0.05	0.001	mg/L	0.0500	ND	108	64.2-124			
Toluene	0.05	0.001	"	0.0500	ND	106	63.9-119			
Surrogate: 1,2-Dichloroethane-d4	59.8		ug/L	62.5		95.7	70.3-123			
Surrogate: Toluene-d8	60.9		"	62.5		97.4	75.9-123			
Surrogate: 4-Bromofluorobenzene	67.4		"	62.5		108	83-123			

**Matrix Spike Dup (8L19003-MSD1)**

Source: X812056-01

Prepared: 12/19/2008 Analyzed: 12/19/2008

Benzene	0.05	0.001	mg/L	0.0500	ND	100	64.2-124	7.92	25	
Toluene	0.05	0.001	"	0.0500	ND	98.2	63.9-119	8.04	25	
Surrogate: 1,2-Dichloroethane-d4	58.2		ug/L	62.5		93.1	70.3-123			
Surrogate: Toluene-d8	66.2		"	62.5		106	75.9-123			
Surrogate: 4-Bromofluorobenzene	69.1		"	62.5		111	83-123			

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: NEP0703  
Project: Reichert 9-5,6,7

### 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