

## **GROUNDWATER MONITORING REPORT MARCH 2010**

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### **UPRC 9, 9K, 10K**

On February 16, 2010, LT Environmental, Inc. (LTE) conducted groundwater sampling on behalf of Noble Energy, Inc., at the UPRC 9, 9K, 10K Tank Battery (Site). This sampling event constitutes the fourth post remediation monitoring event at this Site. Site history, remediation activities, well installation, and performance monitoring 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 April 14, 2009. A Site Map is presented in Figure 1.

Depth to groundwater ranged from 4.89 feet below top of casing (btoc) in MW01 to 5.15 feet btoc in MW03 and was used to calculate well-specific purge volumes. Following purging, groundwater samples were collected and preserved on ice. Samples were 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 for MW01 and MW03 are in compliance with Colorado Department of Public Health and Environment-Water Quality Control Commission Regulation 41 (WQCC Reg 41). MW02 exhibited a benzene concentration of 65.2 micrograms per liter ( $\mu\text{g/L}$ ), which is above the WQCC Reg 41 standard of 5.0  $\mu\text{g/L}$ . 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 applicable regulatory standards. The next quarterly groundwater sampling event is scheduled for May 2010.

**TABLE**

TABLE 1

GROUNDWATER ANALYTICAL DATA  
 UPRC 9, 9k, 10k 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) |
|--------------------------|------------|----------------------------|----------------|----------------|---------------------|----------------------|
| MW01                     | 4/28/2009  | 6.12                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 8/25/2009  | 2.21                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 11/19/2009 | 7.50                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 2/16/2010  | 4.89                       | <1.0           | <1.0           | <1.0                | <3.0                 |
| MW02                     | 4/28/2009  | 6.52                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 8/25/2009  | 2.16                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 11/19/2009 | 7.74                       | <b>29.1</b>    | <1.0           | <1.0                | <3.0                 |
|                          | 2/16/2010  | 5.06                       | <b>65.2</b>    | <1.0           | <1.0                | <3.0                 |
| MW03                     | 4/28/2009  | 6.69                       | 2.70           | <1.0           | 108                 | 519.19               |
|                          | 8/25/2009  | 2.01                       | <1.0           | <1.0           | <1.0                | <3.0                 |
|                          | 11/19/2009 | 8.03                       | 1.12           | <1.0           | 24.3                | 23.5                 |
|                          | 2/16/2010  | 5.15                       | <1.0           | <1.0           | <1.0                | <3.0                 |
| <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

ug/L - micrograms per liter

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

**BOLD** - indicates result exceeds the regulatory standard.

Benzene, toluene, ethylbenzene, and 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

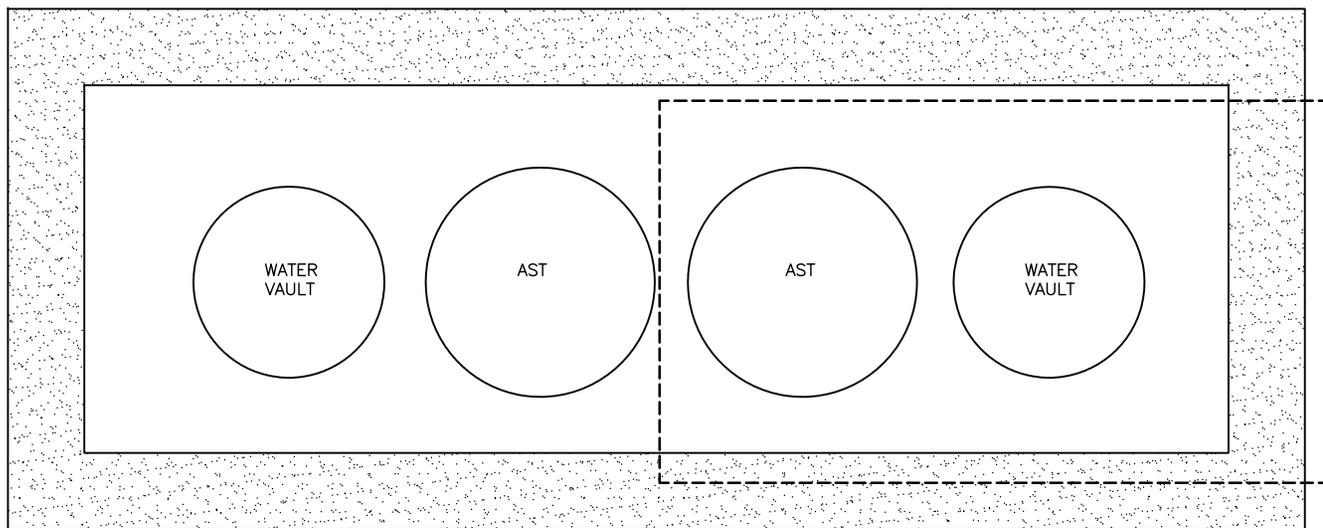


**FIGURE**

IRRIGATION DITCH

MW03

MW02

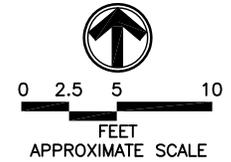


MW01

**LEGEND**

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

LEASE ROAD



**FIGURE 1**  
**MONITORING WELL LOCATIONS MAP**  
 UPRC 9-9K, 10K  
 WELD COUNTY, CO  
 NOBLE ENERGY, INC.



**APPENDIX**  
**ANALYTICAL REPORT**

2/18/2010

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

Project Name- Noble - UPRC 9, 9k- 10k

Project Number- NEP0904

Attached are your analytical results for Noble - UPRC 9, 9k- 10k received by Origins Laboratory, Inc. February 16, 2010 4:00 pm. This project is associated with Origins project number X002057-01 .

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

Matthew Harrison  
Project Number: NEPO904  
Project: Noble - UPRC 9, 9k- 10k

**CROSS REFERENCE REPORT**

| Sample ID | Laboratory ID | Matrix | Sampled             | Date Received    |
|-----------|---------------|--------|---------------------|------------------|
| MW01      | X002057-01    | Water  | 2/16/2010 2:45:00PM | 02/16/2010 16:00 |
| MW02      | X002057-02    | Water  | 2/16/2010 2:50:00PM | 02/16/2010 16:00 |
| MW03      | X002057-03    | Water  | 2/16/2010 2:55:00PM | 02/16/2010 16:00 |

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager



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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

**MW01**

2/16/2010 2:45:00PM

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Notes |
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|

Origins Laboratory, Inc.  
X002057-01 (Water)

**BTEX by EPA 8260B**

|              |    |         |      |   |         |            |            |  |
|--------------|----|---------|------|---|---------|------------|------------|--|
| Benzene      | ND | 0.00100 | mg/L | 1 | OB17001 | 02/17/2010 | 02/17/2010 |  |
| 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 %  | 73.5-130 |  |  | " | " | " |  |
| Surrogate: Toluene-d8            | 92.1 % | 79.3-113 |  |  | " | " | " |  |
| Surrogate: 4-Bromofluorobenzene  | 97.7 % | 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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

**MW02**

2/16/2010 2:50:00PM

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Notes |
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|

Origins Laboratory, Inc.  
X002057-02 (Water)

**BTEX by EPA 8260B**

|              |        |         |      |   |         |            |            |  |
|--------------|--------|---------|------|---|---------|------------|------------|--|
| Benzene      | 0.0652 | 0.00100 | mg/L | 1 | OB17001 | 02/17/2010 | 02/17/2010 |  |
| Toluene      | ND     | 0.00100 | "    | " | "       | "          | "          |  |
| Ethylbenzene | ND     | 0.00100 | "    | " | "       | "          | "          |  |
| o-Xylene     | ND     | 0.00100 | "    | " | "       | "          | "          |  |
| m,p-Xylene   | ND     | 0.00200 | "    | " | "       | "          | "          |  |

|                                  |        |          |  |  |   |   |   |  |
|----------------------------------|--------|----------|--|--|---|---|---|--|
| Surrogate: 1,2-Dichloroethane-d4 | 103 %  | 73.5-130 |  |  | " | " | " |  |
| Surrogate: Toluene-d8            | 92.4 % | 79.3-113 |  |  | " | " | " |  |
| Surrogate: 4-Bromofluorobenzene  | 99.1 % | 81.5-117 |  |  | " | " | " |  |

Origins Laboratory, Inc.



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

Matthew Harrison  
 Project Number: NEP0904  
 Project: Noble - UPRC 9, 9k- 10k

**MW03**

2/16/2010 2:55:00PM

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Notes |
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|
|---------|--------|-----------------|-------|----------|-------|----------|----------|-------|

Origins Laboratory, Inc.  
 X002057-03 (Water)

**BTEX by EPA 8260B**

|              |    |         |      |   |         |            |            |  |
|--------------|----|---------|------|---|---------|------------|------------|--|
| Benzene      | ND | 0.00100 | mg/L | 1 | OB17001 | 02/17/2010 | 02/17/2010 |  |
| 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 %  | 73.5-130 |  |  | " | " | " |  |
| Surrogate: Toluene-d8            | 90.8 % | 79.3-113 |  |  | " | " | " |  |
| Surrogate: 4-Bromofluorobenzene  | 101 %  | 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

Matthew Harrison  
 Project Number: NEP0904  
 Project: Noble - UPRC 9, 9k- 10k

**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 OB17001 - EPA 5030B**

**Blank (OB17001-BLK1)**

Prepared: 02/17/2010 Analyzed: 02/17/2010

|              |    |       |      |  |  |  |  |  |  |  |
|--------------|----|-------|------|--|--|--|--|--|--|--|
| 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 | "    |  |  |  |  |  |  |  |

|   |      |  |      |      |  |      |          |  |  |  |
|---|------|--|------|------|--|------|----------|--|--|--|
| <i>Surrogate: 1,2-Dichloroethane-d4</i> | 63.1 |  | ug/L | 62.5 |  | 101  | 73.5-130 |  |  |  |
| <i>Surrogate: Toluene-d8</i>            | 57.5 |  | "    | 62.5 |  | 92.0 | 79.3-113 |  |  |  |
| <i>Surrogate: 4-Bromofluorobenzene</i>  | 60.1 |  | "    | 62.5 |  | 96.1 | 81.5-117 |  |  |  |

**Blank (OB17001-BLK2)**

Prepared: 02/17/2010 Analyzed: 02/17/2010

|              |    |       |      |  |  |  |  |  |  |  |
|--------------|----|-------|------|--|--|--|--|--|--|--|
| 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 | "    |  |  |  |  |  |  |  |

|   |      |  |      |      |  |      |          |  |  |  |
|---|------|--|------|------|--|------|----------|--|--|--|
| <i>Surrogate: 1,2-Dichloroethane-d4</i> | 65.6 |  | ug/L | 62.5 |  | 105  | 73.5-130 |  |  |  |
| <i>Surrogate: Toluene-d8</i>            | 57.3 |  | "    | 62.5 |  | 91.7 | 79.3-113 |  |  |  |
| <i>Surrogate: 4-Bromofluorobenzene</i>  | 60.3 |  | "    | 62.5 |  | 96.5 | 81.5-117 |  |  |  |

**LCS (OB17001-BS1)**

Prepared: 02/17/2010 Analyzed: 02/17/2010

|   |      |       |      |        |  |      |          |  |  |  |
|---|------|-------|------|--------|--|------|----------|--|--|--|
| Benzene                                 | 0.05 | 0.001 | mg/L | 0.0500 |  | 98.1 | 77.3-128 |  |  |  |
| Toluene                                 | 0.05 | 0.001 | "    | 0.0500 |  | 93.3 | 81.7-118 |  |  |  |
| <i>Surrogate: 1,2-Dichloroethane-d4</i> | 64.0 |       | ug/L | 62.5   |  | 102  | 73.5-130 |  |  |  |
| <i>Surrogate: Toluene-d8</i>            | 58.2 |       | "    | 62.5   |  | 93.0 | 79.3-113 |  |  |  |
| <i>Surrogate: 4-Bromofluorobenzene</i>  | 62.1 |       | "    | 62.5   |  | 99.3 | 81.5-117 |  |  |  |

**LCS (OB17001-BS2)**

Prepared: 02/17/2010 Analyzed: 02/17/2010

|         |      |       |      |        |  |      |          |  |  |  |
|---------|------|-------|------|--------|--|------|----------|--|--|--|
| Benzene | 0.05 | 0.001 | mg/L | 0.0500 |  | 103  | 77.3-128 |  |  |  |
| Toluene | 0.05 | 0.001 | "    | 0.0500 |  | 95.8 | 81.7-118 |  |  |  |

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Noelle E Doyle, Laboratory Manager

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

Matthew Harrison  
 Project Number: NEP0904  
 Project: Noble - UPRC 9, 9k- 10k

**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 OB17001 - EPA 5030B</b>       |        |                 |       |             |   |      |   |       |           |       |
| <b>LCS (OB17001-BS2)</b>               |        |                 |       |             | Prepared: 02/17/2010 Analyzed: 02/17/2010 |      |   |       |           |       |
| Surrogate: 1,2-Dichloroethane-d4       | 64.0   |                 | ug/L  | 62.5        |   | 102  | 73.5-130                                  |       |           |       |
| Surrogate: Toluene-d8                  | 57.1   |                 | "     | 62.5        |   | 91.4 | 79.3-113                                  |       |           |       |
| Surrogate: 4-Bromofluorobenzene        | 61.8   |                 | "     | 62.5        |   | 98.8 | 81.5-117                                  |       |           |       |
| <b>Matrix Spike (OB17001-MS1)</b>      |        |                 |       |             | Source: X002057-01                        |      | Prepared: 02/17/2010 Analyzed: 02/17/2010 |       |           |       |
| Benzene                                | 0.05   | 0.001           | mg/L  | 0.0500      | ND  | 101  | 74.5-132                                  |       |           |       |
| Toluene                                | 0.05   | 0.001           | "     | 0.0500      | ND  | 94.3 | 74.2-116                                  |       |           |       |
| Surrogate: 1,2-Dichloroethane-d4       | 63.3   |                 | ug/L  | 62.5        |   | 101  | 73.5-130                                  |       |           |       |
| Surrogate: Toluene-d8                  | 57.0   |                 | "     | 62.5        |   | 91.2 | 79.3-113                                  |       |           |       |
| Surrogate: 4-Bromofluorobenzene        | 62.6   |                 | "     | 62.5        |   | 100  | 81.5-117                                  |       |           |       |
| <b>Matrix Spike (OB17001-MS2)</b>      |        |                 |       |             | Source: X002057-02                        |      | Prepared: 02/17/2010 Analyzed: 02/17/2010 |       |           |       |
| Benzene                                | 0.11   | 0.001           | mg/L  | 0.0500      | 0.07                                      | 88.0 | 74.5-132                                  |       |           |       |
| Toluene                                | 0.04   | 0.001           | "     | 0.0500      | ND  | 82.4 | 74.2-116                                  |       |           |       |
| Surrogate: 1,2-Dichloroethane-d4       | 65.2   |                 | ug/L  | 62.5        |   | 104  | 73.5-130                                  |       |           |       |
| Surrogate: Toluene-d8                  | 56.1   |                 | "     | 62.5        |   | 89.7 | 79.3-113                                  |       |           |       |
| Surrogate: 4-Bromofluorobenzene        | 61.3   |                 | "     | 62.5        |   | 98.1 | 81.5-117                                  |       |           |       |
| <b>Matrix Spike Dup (OB17001-MSD1)</b> |        |                 |       |             | Source: X002057-01                        |      | Prepared: 02/17/2010 Analyzed: 02/17/2010 |       |           |       |
| Benzene                                | 0.05   | 0.001           | mg/L  | 0.0500      | ND  | 98.8 | 74.5-132                                  | 1.80  | 13.1      |       |
| Toluene                                | 0.05   | 0.001           | "     | 0.0500      | ND  | 93.5 | 74.2-116                                  | 0.916 | 21.2      |       |
| Surrogate: 1,2-Dichloroethane-d4       | 64.1   |                 | ug/L  | 62.5        |   | 103  | 73.5-130                                  |       |           |       |
| Surrogate: Toluene-d8                  | 57.3   |                 | "     | 62.5        |   | 91.7 | 79.3-113                                  |       |           |       |
| Surrogate: 4-Bromofluorobenzene        | 61.2   |                 | "     | 62.5        |   | 97.9 | 81.5-117                                  |       |           |       |
| <b>Matrix Spike Dup (OB17001-MSD2)</b> |        |                 |       |             | Source: X002057-02                        |      | Prepared: 02/17/2010 Analyzed: 02/17/2010 |       |           |       |
| Benzene                                | 0.11   | 0.001           | mg/L  | 0.0500      | 0.07                                      | 89.6 | 74.5-132                                  | 0.730 | 13.1      |       |
| Toluene                                | 0.04   | 0.001           | "     | 0.0500      | ND  | 82.7 | 74.2-116                                  | 0.339 | 21.2      |       |
| Surrogate: 1,2-Dichloroethane-d4       | 65.0   |                 | ug/L  | 62.5        |   | 104  | 73.5-130                                  |       |           |       |
| Surrogate: Toluene-d8                  | 56.2   |                 | "     | 62.5        |   | 89.9 | 79.3-113                                  |       |           |       |
| Surrogate: 4-Bromofluorobenzene        | 60.7   |                 | "     | 62.5        |   | 97.2 | 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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

**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 OB17001 - EPA 5030B

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

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

Matthew Harrison  
Project Number: NEP0904  
Project: Noble - UPRC 9, 9k- 10k

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**Notes and Definitions**

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

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager