# 3R - 084

# Q4 2009 GWMR

# 06/01/2010

3R084

# QUARTERLY GROUNDWATER MONITORING REPORT DECEMBER 2009 SAMPLING EVENT

# FARMINGTON B COM NO. 1E

# NATURAL GAS WELL SITE FARMINGTON, SAN JUAN COUNTY, NEW MEXICO

OCD # 3R0084

API # 30-045-24774

**Prepared for:**

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May 2010

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# QUARTERLY GROUNDWATER MONITORING REPORT DECEMBER 2009 SAMPLING EVENT FARMINGTON B COM NO.1E NATURAL GAS WELL SITE FARMINGTON, SAN JUAN COUNTY, NEW MEXICO

## 1.0 INTRODUCTION

This report presents the results of quarterly groundwater monitoring completed by Tetra Tech, Inc. (Tetra Tech) on December 17, 2009, at the ConocoPhillips Company Farmington B Com No. 1E remediation site in Farmington, New Mexico (Site). This sampling event represents the fourth quarter of groundwater monitoring for 2009.

The Site is located on private property in southeast Farmington, New Mexico, near the corner of East Murray Drive and South Carlton Avenue. The Site consists of a gas production well and associated equipment and installations. The location and general features of the Site are presented as **Figures 1** and **2**, respectively. A generalized cross section is included as **Figure 3**.

### 1.1 Site History

The history of the Site is outlined on **Table 1** and discussed in more detail in the following paragraphs.

Conoco Inc., predecessor to ConocoPhillips Company, owned the property and operated the gas well between July 1991 and January 1997. Merrion Oil & Gas Company is the current property owner and well operator. A Phase II Environmental Site Assessment associated with the property transfer was conducted by On Site Technologies, Limited (On Site) in March 1997. Soil hydrocarbon impacts were confirmed north of a production storage tank and west of a separator/dehydrator pit (**Figure 2**). Impacts were described by On Site as limited to a former unlined pit area with hydrocarbon migration primarily occurring vertically through the soil profile due to the porous and permeable subsurface soils; lateral migration was considered minimal (On Site, 1997). Soil excavation of the two impacted areas occurred in September 1997. A total of 906 cubic yards of impacted soil were removed from two excavation areas. Of the 906 cubic yards, 328 were transported offsite and 578 were screened and placed back into the excavated areas along with clean fill. During backfill activities, approximately 10 gallons of liquid fertilizer was sprayed into both excavations to enhance insitu degradation of residual hydrocarbons (On Site, 1997).

Groundwater Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6 were installed at the Site in February and August 1998 under the supervision of On Site. During 1998 and 1999, results from groundwater samples collected from MW-2 through MW-6 did not have BTEX concentrations in excess of New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standards. On Site then requested that groundwater quality monitoring in monitor wells MW-2 through MW-6 be discontinued. The request was approved by the New Mexico Energy, Minerals, and Natural Resources Department (NMEMNRD) in a letter to Ms. Shirley Ebert of Conoco Inc. (NMEMNRD, 2000). Although Monitor Wells MW-2 through MW-6 showed no hydrocarbon impacts during 1998 and 1999,

light non-aqueous phase liquid (LNAPL) has been present in MW-1 since its installation and recovery has been ongoing. Souder Miller and Associates (Souder Miller) placed active and passive skimmers in MW-1 in May 2004. The passive skimmer collected a small amount of LNAPL; the active skimmer did not collect any LNAPL. Souder Miller determined that an active skimmer was not a viable method of LNAPL recovery in MW-1 and proposed passive skimming or periodic hand bailing for recovery.

Tetra Tech began groundwater quality monitoring at the site in May 2005. Tetra Tech monitors MW-6 in addition to MW-1 since it is down-gradient to MW-1. Most recently, groundwater quality monitoring took place on December 17, 2009. Groundwater elevation measurements were collected from MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6. Groundwater samples collected from Monitor Wells MW-1 and MW-6 were shipped to Southern Petroleum Laboratories in Houston, Texas to be analyzed for the presence of BTEX and dissolved iron.

# 2.0 METHODOLOGY AND RESULTS

## 2.1 Groundwater Monitoring Methodology

Groundwater Elevation Measurements

On December 17, 2009, groundwater elevation measurements were recorded in Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6 using a dual interface probe. Groundwater elevations are detailed in **Table 2**. A groundwater elevation contour map is presented as **Figure 4.** Based on December 2009 monitoring event data, groundwater flow is to the west and is consistent with historic records at this site. The Animas River is approximately ¾ miles west of the Site and flows west.

Groundwater sampling

Monitor Wells MW-1 and MW-6 were sampled, representing the seventh round of quarterly groundwater monitoring at the Site. Approximately three well volumes were purged from each monitor well with dedicated polyethylene 1.5-inch disposable bailers. Purge water was placed in a Merrion owned produced water tank. Groundwater samples were placed in laboratory prepared bottles, packed on ice, and shipped under chain of custody documentation to Southern Petroleum Laboratories in Houston, Texas. The samples were analyzed for the presence of BTEX in accordance with Environmental Protection Agency (EPA) Method 8260B and dissolved iron according to EPA Method 6010B. Groundwater sampling field forms are included as **Appendix A**.

## 2.2 Groundwater Sampling Analytical Results

December 2009 groundwater samples collected from MW-1 were not found above laboratory detection limits in toluene; ethylbenzene was detected at a concentration of 100 micrograms per liter (ug/L). The NMWQCC groundwater quality standard for ethylbenzene is 750 ug/L. The MW-1 sample contained 1.4 ug/L benzene, which is below the NMWQCC standard of 10 ug/L for benzene. Xylenes were detected at a concentration of 2.8 ug/L. The NMWQCC groundwater quality standard for xylenes is 620 ug/L. Dissolved iron was detected at a concentration of 0.521 milligrams per liter (mg/L) in MW-1, the NMWQCC groundwater quality standard for iron is 1 mg/L. BTEX constituents in MW-6 were not detected above the laboratory detection limits of 1.0 ug/L. Monitor well MW-6 contained a dissolved iron concentration of 0.0511 mg/L. **Table 3** presents the laboratory analytical results. The

laboratory analytical reports are included as **Appendix B**, and a BTEX concentration map is included as **Figure 5.** The SMA historical analytical data is attached as **Appendix C**.

## 3.0 CONCLUSIONS

Although LNAPL was found in Monitor Well MW-1 during the monitoring event conducted in January 2009, BTEX constituents in December 2009 samples were either below laboratory detection limits or were below NMWQCC groundwater quality standards. LNAPL sheen was intermittently detectable during quarterly groundwater pumping events from 2005 into 2008. Additionally, LNAPL was not found in MW-1 during subsequent 2009 quarterly sampling events. The absence of LNAPL in MW-1 could be the result of Tetra Tech's placement of an oil-absorbent sock in the well during the January 2009 sampling event. The sock was removed in March 2009.

Groundwater analytical results for monitor wells MW-1 and MW-6 continue to show BTEX concentrations below NMWQCC groundwater quality standards. Tetra Tech recommends continued quarterly groundwater sampling at the Site in order to provide sufficient data for Site closure. Site closure will be requested when groundwater quality results are consistently below NMWQCC groundwater quality standards. Please contact Kelly Blanchard at 505-237-8440 or kelly.blanchard@tetratech.com if you have any questions or require additional information.

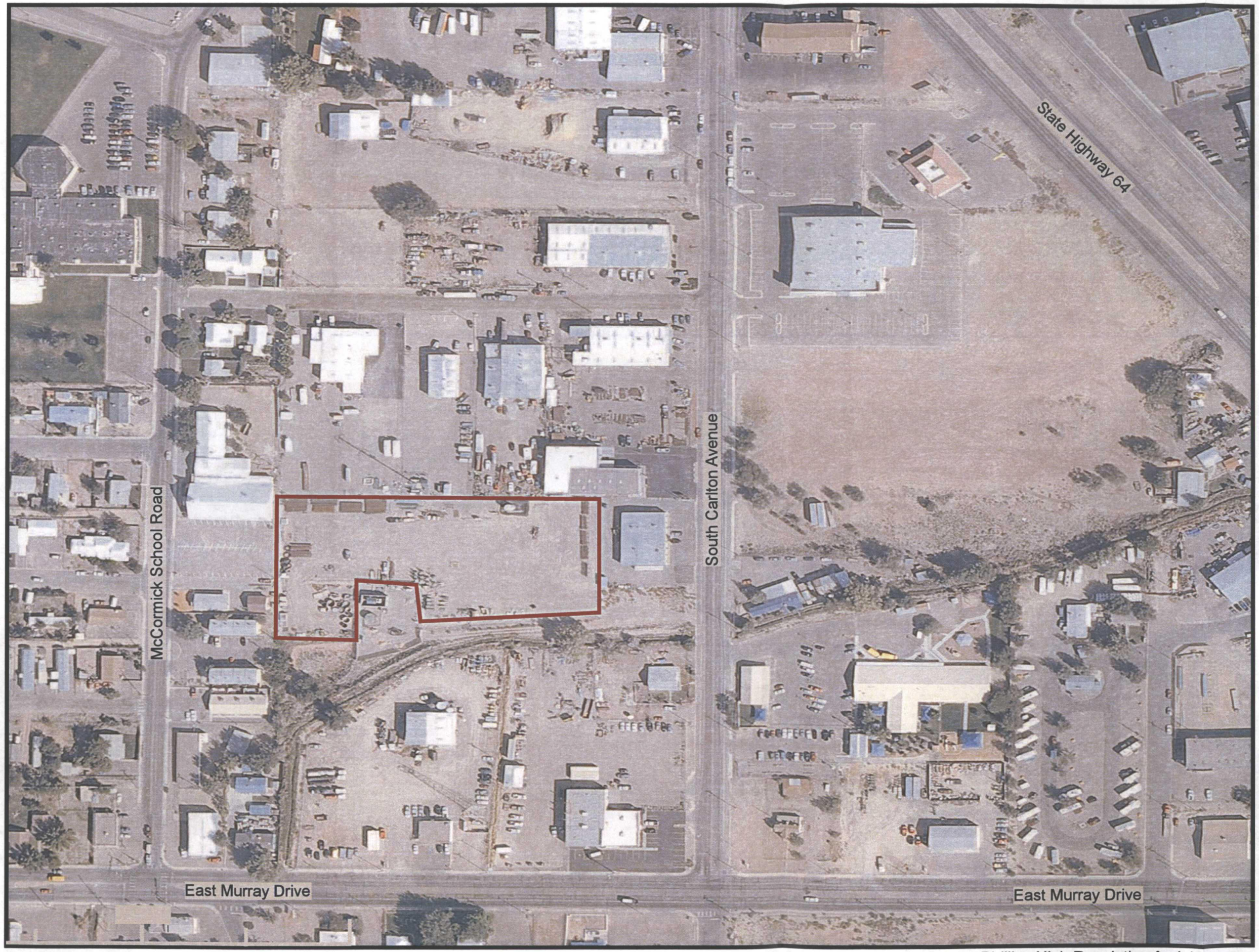
## 4.0 REFERENCES

New Mexico Energy, Minerals, and Natural Resources Department. (2000). *Re: Farmington B Com #1E Well Site.* Letter to Ms. Shirley Ebert, Conoco, Inc. December 13, 2000.

On-Site Technologies, Ltd. (1997). *Annual Summary, Pit Closures and Groundwater Impact Updates, State of New Mexico, 1996.* Prepared for Conoco Inc., Midland Division. Report dated April 22, 1997. 21 pp.

On-Site Technologies, Ltd. (1997). *Re: Remediation Summary Farmington B Com #1E.* . Letter Attn: Mr. Neal Goates, Senior Environmental Specialist, Conoco, Inc. November 26, 1997.

# FIGURES




ConocoPhillips High Resolution Aerial imagery

**FIGURE 1.**

Site Location Map
Farmington
B Com No.1E
Farmington, NM


ConocoPhillips Company B Com #1E Site Location

Feet
0 150 300

Section 15, T29N, R13W
San Juan County, NM

N

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**FIGURE 2:**
**SITE LAYOUT MAP**

FARMINGTON
B COM NO. 1E
Section 15, T29N, R13W
San Juan County, NM

LEGEND

- WELLHEAD
- MONITORING WELL
- FENCE
- FORMER SEPARATOR/DEHYDRATOR
- FORMER SEPARATOR/DEHYDRATOR PIT
- EXISTING MERRION OIL EQUIPMENT
- FORMER PIT EXCAVATION

0 40 80
FEET

N

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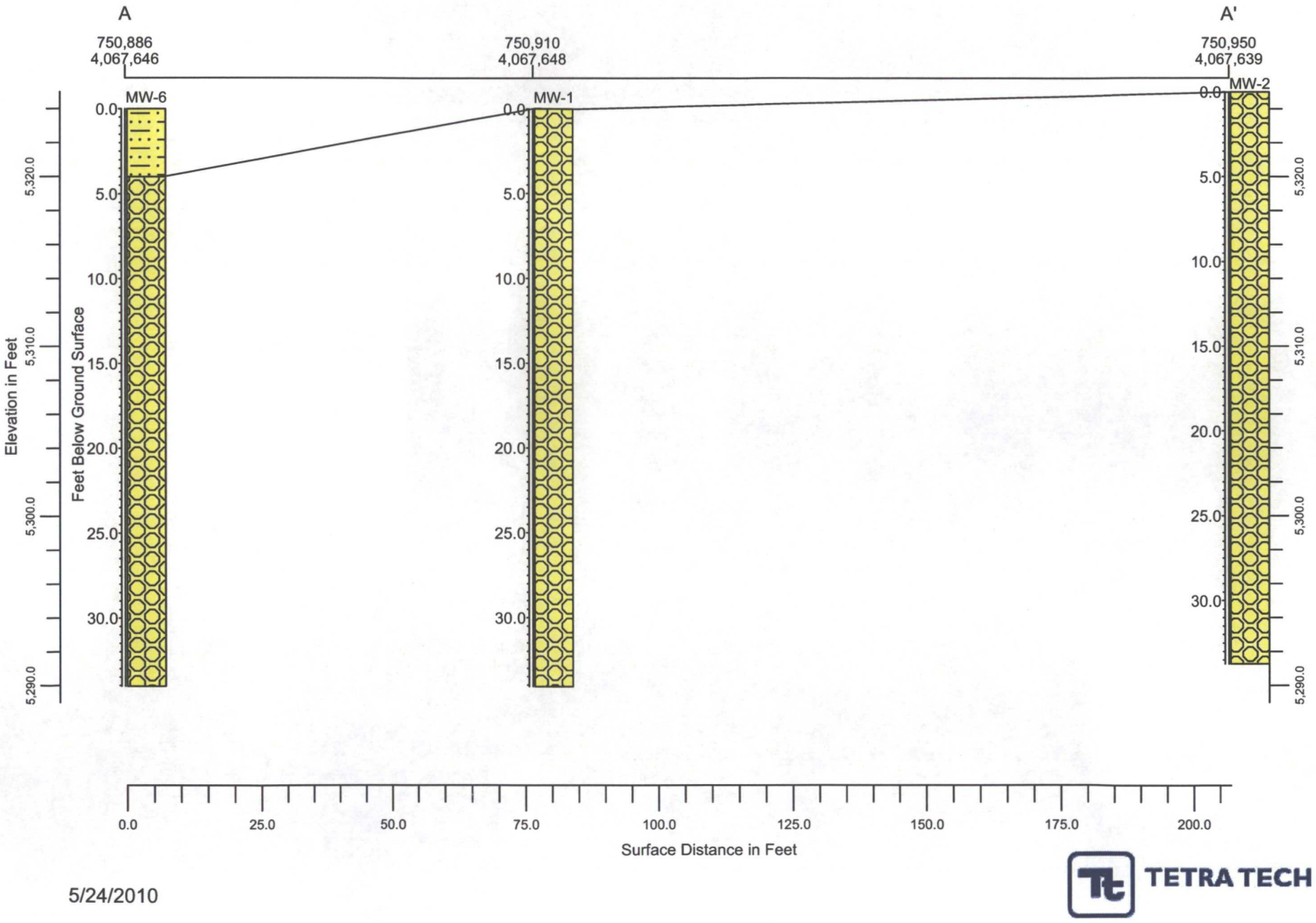
Figure 3.

# B Com No. 1E - Cross-Section A-A'

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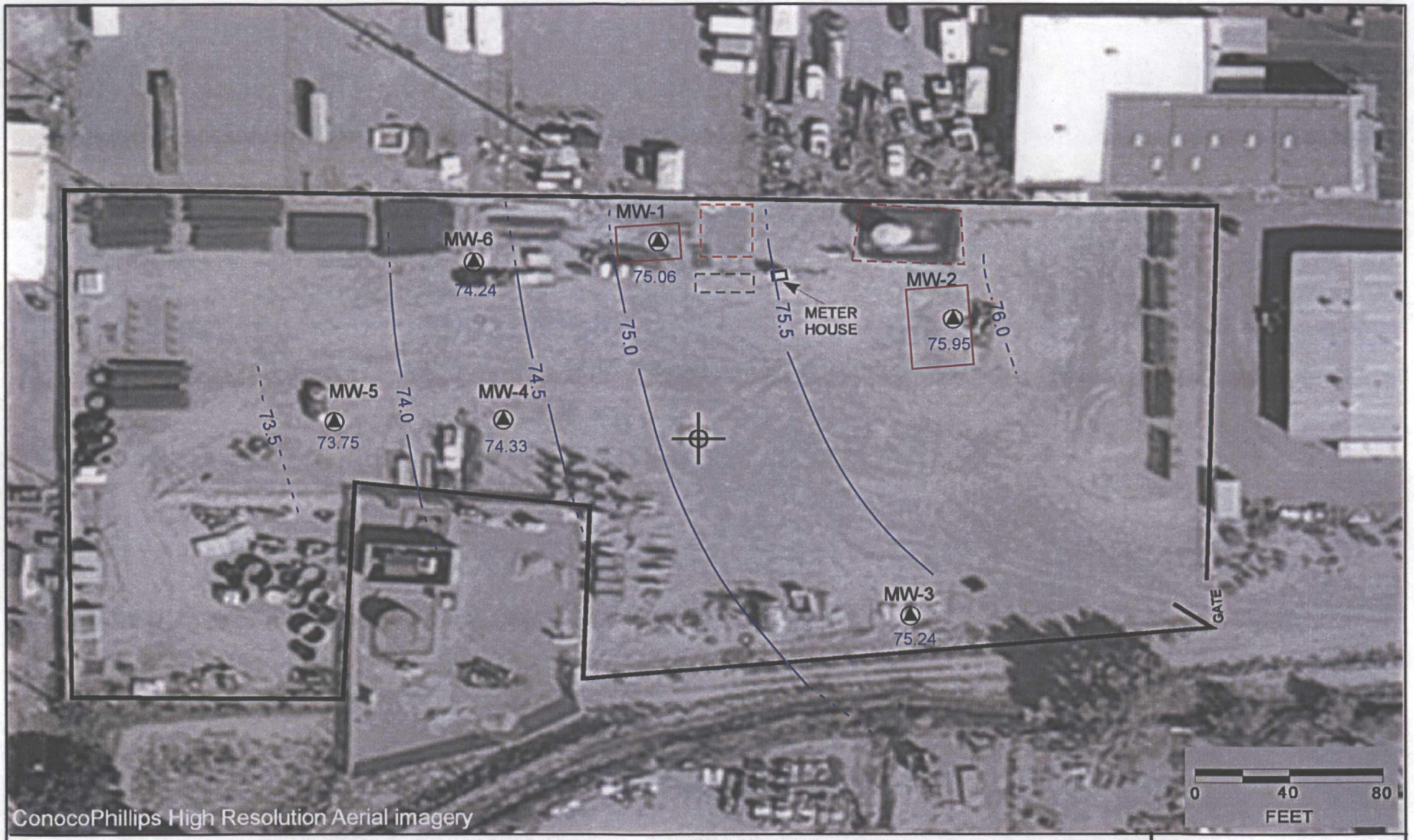


**FIGURE 4:**
**GROUNDWATER ELEVATION CONTOUR MAP**
**12/17/2009**
FARMINGTON B COM NO. 1E
Section 15, T29N, R13W
San Juan County, NM

LEGEND

- WELLHEAD
- MONITORING WELL
- FENCE
- GW CONTOUR LINE
- INFERRED GW CONTOUR LINE
- FORMER SEPARATOR/DEHYDRATOR
- FORMER SEPARATOR/DEHYDRATOR PIT
- EXISTING MERRION OIL PRODUCED WATER AND CONDENSATE TANKS
- FORMER PIT EXCAVATION

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**FIGURE 5:**
**BTEX CONCENTRATION MAP**
**12/17/2009**
**FARMINGTON**
**B COM NO. 1E**
**Section 15, T29N, R13W**
**San Juan County, NM**

LEGEND

- WELLHEAD
- MONITORING WELL
- FENCE
- FORMER SEPARATOR/DEHYDRATOR
- FORMER SEPARATOR/DEHYDRATOR PIT
- EXISTING MERRION OIL PRODUCED WATER AND CONDENSATE TANKS
- FORMER PIT EXCAVATION

0 40 80
FEET

N

TETRA TECH, INC.

# TABLES

## Table 1. Site History Timeline - Farmington B Com No. 1E

| Date/Time Period | Event/Action | Description |
|---|---|---|
| February 18, 1982 | Well Completed | Pioneer Production Corp. completed the Farmington B-COM No. 1E gas production well |
| July 1, 1991 | Conoco Inc. well purchase | Conoco Inc. purchases wellsite from Mesa Operating Limited Partnership of Amarillo, Texas |
| January 1, 1997 | Change of ownership | Conoco Inc. sold the property and mineral lease to Merrion Oil & Gas Co. |
| March, 1997 | Site Assessment | Phase II Environmental Site Assessment is conducted by On Site Technologies.Three test holes advanced with Auger refusal encountered at 7 feet below ground surface (bgs) due to gravel and cobbles. No samples collected. On Site Technologies later excavates four additional test holes ranging in depth from 14 to 19 feet bgs. Soil samples are collected from each excavation. TPH and BTEX contamination is found in the vicinity of a former unlined pit. |
| September, 1997 | Soil Excavation | On Site Technologies oversees soil excavation of two pits. 906 cubic yards of impacted soil were removed; of which 328 were disposed of offsite and 578 cubic yards were placed back in the pits along with clean fill. Approximately 10 gallons of liquid fertilizer was sprayed into each pit during backfill. |
| February and August 1998 | Monitor Well Installation | Six monitor wells (MW-1 through MW-6) installed at the site under the supervision of On Site. |
| October 29, 2004 | Groundwater Removal from Monitor Well MW-1 | First removal of groundwater - 160 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| November 1, 2004 | Groundwater Removal from Monitor Well MW-1 | 40 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| December 3, 2004 | Groundwater Removal from Monitor Well MW-1 | 150 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| May 9th and 10th, 2005 | Monitor Well Sampling | Tetra Tech begins quarterly monitoring at the site. Groundwater samples collected from monitor wells MW-1 and MW-6. A sheen is noted in MW-1; an oil absorbant sock is placed in the well. |
| July 6, 2005 | Groundwater Removal from Monitor Well MW-1 | 138 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| October 19, 2005 | Groundwater Removal from Monitor Well MW-1 and Monitor Well Sampling | Groundwater samples collected from monitor wells MW-1 and MW-6. 186 gallons removed from MW-1; a sheen is observed in purge water and oil absorbant sock is replaced. |
| February 16, 2006 | Groundwater Removal from Monitor Well MW-1 | 144 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| May 15, 2006 | | 152 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| August 2, 2006 | | 457 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| November 14, 2006 | | 423 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| November 14, 2006 | Monitor Well Sampling | Third sampling of monitor wells MW-1 and MW-6 conducted by Tetra Tech |
| February 20, 2007 | Groundwater Removal from Monitor Well MW-1 | 220 gallons removed vacuum truck operated by Riley Industrial Services of Farmington, NM |
| May 15, 2007 | | 364 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| August 21, 2007 | | 684 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| November 7, 2007 | | 651 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| November 7, 2007 | Monitor Well Sampling | Fourth sampling of monitor wells MW-1 and MW-6 conducted by Tetra Tech |
| January 16, 2008 | Groundwater Removal from Monitor Well MW-1 | 149 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| March 18, 2008 | Groundwater Removal from Monitor Well MW-1 | 93 gallons removed by vacuum truck operated by Riley Industrial Services of Farmington, NM |
| July 24, 2008 | Monitor Well Sampling | Initiation of quarterly sampling for monitor wells MW-1and MW-6 |
| October 22, 2008 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6 |

## Table 1. Site History Timeline - Farmington B Com No. 1E

| Date/Time Period | Event/Action | Description |
|---|---|---|
| January 21, 2009 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6. Free product found in MW-1; oil absorbent sock placed in the well. |
| April 1, 2009 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6. No free product detected in MW-1. |
| June 10, 2009 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6. No free product detected in MW-1. |
| October 1, 2009 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6. No free product detected in MW-1. **First quarter of compliance** with all COCs bellow NMWQCC standards. |
| December 17, 2009 | Monitor Well Sampling | Continuation of quarterly sampling for monitor wells MW-1 and MW-6. No free product detected in MW-1. **Second quarter of compliance** with all COCs bellow NMWQCC standards. |

Table 2. Farmington B Com #1E
Groundwater Elevation Summary

| Well ID | Total Depth (ft. bgs) | Screen Interval (ft) | *Elevation (ft.) (TOC) | Date Measured | Depth to Water (ft. below TOC) | Depth to Product (ft. below TOC)** | Relative Groundwater Elevation (ft TOC) |
|---|---|---|---|---|---|---|---|
| MW-1 | 34.09 | 19.09 - 34.09 | 101.37 | 5/9/2005 | 28.30 | Sheen | 73.07 |
| | | | | 7/6/2005 | 26.50 | NA | 74.87 |
| | | | | 10/19/2005 | 25.12 | Sheen | 76.25 |
| | | | | 2/16/2006 | 28.23 | NA | 73.14 |
| | | | | 5/15/2006 | 27.02 | NA | 74.35 |
| | | | | 8/2/2006 | 24.37 | NA | 77.00 |
| | | | | 11/14/2006 | 26.48 | Sheen | 74.89 |
| | | | | 2/20/2007 | 29.03 | Sheen | 72.34 |
| | | | | 5/15/2007 | 26.97 | NA | 74.40 |
| | | | | 8/21/2007 | 25.20 | Sheen | 76.17 |
| | | | | 11/7/2007 | 26.30 | 26.1 | 75.07 |
| | | | | 1/16/2008 | 29.24 | 27.88 | 72.13 |
| | | | | 3/18/2008 | 29.27 | 29.27 | 72.10 |
| | | | | 7/24/2008 | 25.73 | Sheen | 75.64 |
| | | | | 10/22/2008 | 25.35 | Sheen | 76.02 |
| | | | | 1/21/2009 | 28.25 | 27.90 | 73.12 |
| | | | | 4/1/2009 | 29.47 | NA | 71.90 |
| | | | | 6/10/2009 | 26.75 | NA | 74.62 |
| | | | | 10/1/2009 | 23.14 | NA | 78.23 |
| | | | | 12/17/2009 | 26.31 | NA | 75.06 |
| MW-2 | 33.72 | 18.72 - 33.72 | 101.57 | 5/9/2005 | 27.28 | NA | 74.29 |
| | | | | 7/6/2005 | 25.52 | NA | 76.05 |
| | | | | 10/19/2005 | 24.30 | NA | 77.27 |
| | | | | 2/16/2006 | 27.38 | NA | 74.19 |
| | | | | 5/15/2006 | 25.62 | NA | 75.95 |
| | | | | 8/2/2006 | 23.51 | NA | 78.06 |
| | | | | 11/14/2006 | 26.08 | NA | 75.49 |
| | | | | 2/20/2007 | 28.13 | NA | 73.44 |
| | | | | 5/15/2007 | 25.86 | NA | 75.71 |
| | | | | 8/21/2007 | 24.45 | NA | 77.12 |
| | | | | 11/7/2007 | 25.31 | NA | 76.26 |
| | | | | 1/16/2008 | 27.27 | NA | 74.30 |
| | | | | 3/18/2008 | 28.68 | NA | 72.89 |
| | | | | 7/24/2008 | 24.77 | NA | 76.80 |
| | | | | 10/22/2008 | 24.55 | NA | 77.02 |
| | | | | 1/21/2009 | 27.23 | NA | 74.34 |
| | | | | 4/1/2009 | 28.76 | NA | 72.81 |
| | | | | 6/10/2009 | 25.76 | NA | 75.81 |
| | | | | 10/1/2009 | 22.22 | NA | 79.35 |
| | | | | 12/17/2009 | 25.62 | NA | 75.95 |

Table 2. Farmington B Com #1E
Groundwater Elevation Summary

| Well ID | Total Depth (ft. bgs) | Screen Interval (ft) | *Elevation (ft.) (TOC) | Date Measured | Depth to Water (ft. below TOC) | Depth to Product (ft. below TOC)** | Relative Groundwater Elevation (ft TOC) |
|---|---|---|---|---|---|---|---|
| MW-3 | 32.44 | 17.44 - 32.44 | 102.1 | 5/9/2005 | 27.81 | NA | 74.29 |
| | | | | 7/6/2005 | 26.03 | NA | 76.07 |
| | | | | 10/19/2005 | 25.06 | NA | 77.04 |
| | | | | 2/16/2006 | 28.57 | NA | 73.53 |
| | | | | 5/15/2006 | 26.15 | NA | 75.95 |
| | | | | 8/2/2006 | 23.83 | NA | 78.27 |
| | | | | 11/14/2006 | 26.75 | NA | 75.35 |
| | | | | 2/20/2007 | 29.31 | NA | 72.79 |
| | | | | 5/15/2007 | 26.23 | NA | 75.87 |
| | | | | 8/21/2007 | 25.00 | NA | 77.10 |
| | | | | 11/7/2007 | 26.12 | NA | 75.98 |
| | | | | 1/16/2008 | 28.46 | NA | 73.64 |
| | | | | 3/18/2008 | 29.97 | NA | 72.13 |
| | | | | 7/24/2008 | 25.27 | NA | 76.83 |
| | | | | 10/22/2008 | 25.35 | NA | 76.75 |
| | | | | 1/21/2009 | 28.56 | NA | 73.54 |
| | | | | 4/1/2009 | 30.20 | NA | 71.90 |
| | | | | 6/10/2009 | 26.55 | NA | 75.55 |
| | | | | 10/1/2009 | 23.00 | NA | 79.10 |
| | | | | 12/17/2009 | 26.86 | NA | 75.24 |
| MW-4 | 32.72 | 17.72 - 32.72 | 101.4 | 5/9/2005 | 28.73 | NA | 72.67 |
| | | | | 7/6/2005 | 26.66 | NA | 74.74 |
| | | | | 10/19/2005 | 25.62 | NA | 75.78 |
| | | | | 2/16/2006 | 28.91 | NA | 72.49 |
| | | | | 5/15/2006 | 26.86 | NA | 74.54 |
| | | | | 8/2/2006 | 24.59 | NA | 76.81 |
| | | | | 11/14/2006 | 27.02 | NA | 74.38 |
| | | | | 2/20/2007 | 29.61 | NA | 71.79 |
| | | | | 5/15/2007 | 27.25 | NA | 74.15 |
| | | | | 8/21/2007 | 25.56 | NA | 75.84 |
| | | | | 11/7/2007 | 26.50 | NA | 74.90 |
| | | | | 1/16/2008 | 28.55 | NA | 72.85 |
| | | | | 3/18/2008 | 29.99 | NA | 71.41 |
| | | | | 7/24/2008 | 26.02 | NA | 75.38 |
| | | | | 10/22/2008 | 25.84 | NA | 75.56 |
| | | | | 1/21/2009 | 28.69 | NA | 72.71 |
| | | | | 4/1/2009 | 30.22 | NA | 71.18 |
| | | | | 6/10/2009 | 27.31 | NA | 74.09 |
| | | | | 10/1/2009 | 23.80 | NA | 77.60 |
| | | | | 12/17/2009 | 27.07 | NA | 74.33 |

Table 2. Farmington B Com #1E
Groundwater Elevation Summary

| Well ID | Total Depth (ft. bgs) | Screen Interval (ft) | *Elevation (ft.) (TOC) | Date Measured | Depth to Water (ft. below TOC) | Depth to Product (ft. below TOC)** | Relative Groundwater Elevation (ft TOC) |
|---|---|---|---|---|---|---|---|
| MW-5 | 34.09 | 19.09 - 34.09 | 100.52 | 5/9/2005 | 28.50 | NA | 72.02 |
| | | | | 7/6/2005 | 26.32 | NA | 74.20 |
| | | | | 10/19/2005 | 25.30 | NA | 75.22 |
| | | | | 2/16/2006 | 28.62 | NA | 71.90 |
| | | | | 5/15/2006 | 26.55 | NA | 73.97 |
| | | | | 8/2/2006 | 24.23 | NA | 76.29 |
| | | | | 11/14/2006 | 27.67 | NA | 72.85 |
| | | | | 2/20/2007 | 29.34 | NA | 71.18 |
| | | | | 5/15/2007 | 27.04 | NA | 73.48 |
| | | | | 8/21/2007 | 25.21 | NA | 75.31 |
| | | | | 11/7/2007 | 26.13 | NA | 74.39 |
| | | | | 1/16/2008 | 28.18 | NA | 72.34 |
| | | | | 3/18/2008 | 29.65 | NA | 70.87 |
| | | | | 7/24/2008 | 25.73 | NA | 74.79 |
| | | | | 10/22/2008 | 25.49 | NA | 75.03 |
| | | | | 1/21/2009 | 28.38 | NA | 72.14 |
| | | | | 4/1/2009 | 29.92 | NA | 70.60 |
| | | | | 6/10/2009 | 27.09 | NA | 73.43 |
| | | | | 10/1/2009 | 23.50 | NA | 77.02 |
| | | | | 12/17/2009 | 26.77 | NA | 73.75 |
| MW-6 | 34.02 | 19.02 - 34.02 | 102.14 | 5/9/2005 | 29.94 | NA | 72.20 |
| | | | | 7/6/2005 | 27.89 | NA | 74.25 |
| | | | | 10/19/2005 | 26.70 | NA | 75.44 |
| | | | | 2/16/2006 | 29.85 | NA | 72.29 |
| | | | | 5/15/2006 | 28.11 | NA | 74.03 |
| | | | | 8/2/2006 | 25.83 | NA | 76.31 |
| | | | | 11/14/2006 | 27.91 | NA | 74.23 |
| | | | | 2/20/2007 | 30.52 | NA | 71.62 |
| | | | | 5/15/2007 | 28.61 | NA | 73.53 |
| | | | | 8/21/2007 | 26.67 | NA | 75.47 |
| | | | | 11/7/2007 | 27.52 | NA | 74.62 |
| | | | | 1/16/2008 | 29.43 | NA | 72.71 |
| | | | | 3/18/2008 | 30.85 | NA | 71.29 |
| | | | | 7/24/2008 | 27.26 | NA | 74.88 |
| | | | | 10/22/2008 | 26.85 | NA | 75.29 |
| | | | | 1/21/2009 | 29.52 | NA | 72.62 |
| | | | | 4/1/2009 | 31.00 | NA | 71.14 |
| | | | | 6/10/2009 | 28.44 | NA | 73.70 |
| | | | | 10/1/2009 | 24.75 | NA | 77.39 |
| | | | | 12/17/2009 | 27.90 | NA | 74.24 |

ft. = Feet
TOC = Top of casing
bgs = below ground surface
* Relative Elevation
** Where non-aqueous phase liquid (NAPL) is present, depth to water equals the Top of Casing elevation minus the depth to water, plus the NAPL thickness multiplied by 0.79.
NA - not applicable or not measured.

## Table 3. Farmington B Com No.1E Groundwater Laboratory Analytical Results Summary

| Well ID | Date | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Xylenes (µg/L) | Nitrate as N (mg/L) | Sulfate (mg/L) | Iron (mg/L) |
|---|---|---|---|---|---|---|---|---|
| MW-1 | 2/19/1998 | **210** | 34 | 370 | **2,044** | NS | NS | NS |
| | 6/12/1998 | 3" free product in bailer - not sampled | | | | | | |
| | 9/15/1998 | free product - not sampled | | | | | | |
| | 12/29/1998 | **350** | BDL | 420 | **2,800** | NS | NS | NS |
| | 1/22/2004 | free product - not sampled | | | | | | |
| | 5/9/2005 | **17** | <0.7 | 74 | 250 | <0.40 | 77.8 | 14.9* |
| | 10/19/2005 | **34** | <1.0 | 170 | **1400** | 0.15 | 39.9 | 15* |
| | 11/14/2006 | **18** | <0.7 | 190 | **1600** | <0.015 | 145 | 8.8* |
| | 11/7/2007 | 7 | <0.7 | 120 | 250 | <0.015 | 38.4 | 6.4* |
| | 7/24/2008 | <5.0 | <5.0 | 90 | 35 | <0.5 | 4.76 | 17.2* |
| | Duplicate | <5.0 | <5.0 | 110 | 59 | NS | NS | NS |
| | 10/22/2008 | <5.0 | <5.0 | 88 | 165 | <0.5 | 17 | 21.1* |
| | Duplicate | <5.0 | <5.0 | 95 | 186 | NS | NS | NS |
| | 1/21/2009 | free product - not sampled | | | | | | |
| | 4/1/2009 | <5.0 | <5.0 | 11 | <5.0 | NS | NS | 5.26* |
| | 6/10/2009 | <5.0 | <5.0 | 96 | <5.0 | NS | NS | 9.8* |
| | 10/1/2009 | 1.3 | <1.0 | 58 | 142 | NS | NS | 0.233 |
| | 12/17/2009 | 1.4 | <1.0 | 100 | 2.8 | NS | NS | 0.521 |
| MW-6 | 9/15/1998 | BDL | BDL | BDL | BDL | NS | NS | NS |
| | 12/29/1998 | BDL | BDL | BDL | BDL | NS | NS | NS |
| | 3/3/1999 | BDL | BDL | BDL | BDL | NS | NS | NS |
| | 6/15/1999 | BDL | BDL | BDL | BDL | NS | NS | NS |
| | 9/15/1999 | BDL | 0.7 | 1.1 | BDL | NS | NS | NS |
| | 12/14/1999 | BDL | 1.8 | 0.7 | 1.9 | NS | NS | NS |
| | 1/22/2004 | BDL | BDL | BDL | BDL | NS | NS | NS |
| | 5/9/2005 | <0.5 | <0.7 | <0.8 | <0.8 | <0.4 | 97 | 15.9* |
| | 10/19/2005 | <0.5 | <0.7 | <0.8 | <0.8 | 5.4 | 52.6 | 1.4* |
| | 11/14/2006 | <0.5 | <0.7 | <0.8 | 1 | <0.015 | 159 | 5.8* |
| | 11/7/2007 | <0.5 | <0.7 | <0.8 | <0.8 | <0.015 | 112 | 3* |
| | 7/24/2008 | <5.0 | <5.0 | <5.0 | <5.0 | <0.5 | 44.4 | 28.5* |
| | 10/22/2008 | <5.0 | <5.0 | <5.0 | <5.0 | <0.5 | 43.7 | 1.77* |
| | 1/21/2009 | <5.0 | <5.0 | <5.0 | <5.0 | <0.5 | 31.1 | 9.59* |
| | 4/1/2009 | <5.0 | <5.0 | <5.0 | <5.0 | NS | NS | 16.2* |
| | 6/10/2009 | <5.0 | <5.0 | <5.0 | <5.0 | NS | NS | 3.86* |
| | 10/1/2009 | <1.0 | <1.0 | <1.0 | <1.0 | NS | NS | <0.02 |
| | 12/17/2009 | <1.0 | <1.0 | <1.0 | <1.0 | NS | NS | 0.0511 |
| **NMWQCC Standards** | | **10 (µg/L)** | **750 (µg/L)** | **750 (µg/L)** | **620 (µg/L)** | **10 (mg/L)** | **600 (mg/L)** | **1 (mg/L)** |

NMWQCC = New Mexico Water Quality Control Commission
mg/L = milligrams per liter (parts per million)
µg/L = micrograms per liter (parts per billion)
NE=Not Established
NS = not sampled

BDL = Below laboratory detection limits
<0.7 = Below laboratory detection limit of 0.7 µg/L
* = Results reported for total ferrous iron, not comparable to NMWQCC standard for dissolved iron

# APPENDIX A
# GROUNDWATER SAMPLING FIELD FORMS

TETRA TECH, INC.

# WATER SAMPLING FIELD FORM

Project Name B Com 1E — Page 1 of 2

Project No.

Site Location Farmington, NM

Site/Well No. MW-1 — Coded/ Replicate No. Duplicate @ 750 — Date 12/17/09

Weather Cold, 18°F — Time Sampling Began 730 — Time Sampling Completed 745

## EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface — MP Elevation

Total Sounded Depth of Well Below MP 34.09 — Water-Level Elevation

Held — Depth to Water Below MP 26.31 — Diameter of Casing 2"

Wet — Water Column in Well 7.78 — Gallons Pumped/Bailed Prior to Sampling 3.75 gallons

Gallons per Foot 0.16

Gallons in Well 1.24 x 3 = 3.73 — Sampling Pump Intake Setting (feet below land surface) —

Purging Equipment Purge pump (Bailer)

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm) | TDS (g/L) | DO (mg/L) | ORP (mV) | gallons |
|---|---|---|---|---|---|---|---|
| 740 | 16.43 | 7.14 | 927 | .602 | 1.29 | -32.3 | 2.00 |
| 742 | 16.14 | 7.23 | 916 | .596 | 2.84 | -30.7 | 2.75 |
| 745 | 16.24 | 7.21 | 912 | .593 | 1.39 | -32.7 | 3.75 |
| | | | | | | | |
| | | | | | | | |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Fe (ok) Fe dissolved | 1 16 oz plastic (32) | none (to be filtered & preserved @ lab) |

Remarks H2O, slight spotty discontinuous sheen, weathered HC odor observed

Sampling Personnel CM, AM

### Well Casing Volumes

| Gal./ft. | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 ¼" = 0.077 | 2" = 0.16 | 3" = 0.37 | 4" = 0.65 |
| | 1 ½" = 0.10 | 2 ½" = 0.24 | 3" ½ = 0.50 | 6" = 1.46 |

TETRA TECH, INC.

# WATER SAMPLING FIELD FORM

Page 2 of 2

Project Name

Project No. B-COM.1E

Site Location

Site/Well No. MW-6 Coded/ Replicate No. — Date 12/16/17/09

Weather Cold, 18°F Time Sampling Began 710 Time Sampling Completed 730

## EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP 34.02 Water-Level Elevation

Held ____ Depth to Water Below MP 27.90 Diameter of Casing 2"

Wet ____ Water Column in Well 6.12 Gallons Pumped/Bailed Prior to Sampling 3.00

Gallons per Foot .16

Gallons in Well .979 Sampling Pump Intake Setting (feet below land surface) —

Purging Equipment Purge pump (Bailer) X 3 = 2.94

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm³) | TDS (g/L) | DO (mg/L) | ORP (mV) | gallons |
|---|---|---|---|---|---|---|---|
| 721 | 17.47 | 7.22 | 958 | .623 | 1.99 | -35.0 | 2.25 |
| 723 | 17.52 | 7.23 | 948 | .616 | 1.76 | -14.0 | 2.50 |
| 726 | 17.57 | 7.24 | 946 | .615 | 1.87 | -9.9 | 3.00 |
| | | | | | | | |
| | | | | | | | |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Fe Dissolved | (1) 32oz plastic | none |
| | | |

Remarks $H_2O$ is brown, no odor, no sheen observed

Sampling Personnel

### Well Casing Volumes

| Gal./ft. | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 ¼" = 0.077 | 2" = 0.16 | 3" = 0.37 | 4" = 0.65 |
| | 1 ½" = 0.10 | 2 ½" = 0.24 | 3" ½ = 0.50 | 6" = 1.46 |

# APPENDIX B

# LABORATORY ANALYTICAL REPORT

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

## Conoco Phillips

**Certificate of Analysis Number:**

**09120782**

| Report To: | | Project Name: | COP BCom #1E |
|---|---|---|---|
| Tetra Tech, Inc. | | Site: | Farmington, NM |
| Kelly Blanchard | | Site Address: | |
| 6121 Indian School Road, N.E. | | | |
| Suite 200 | | PO Number: | 4509596739 |
| Albuquerque | | State: | New Mexico |
| NM | | State Cert. No.: | |
| 87110- | | Date Reported: | 12/29/2009 |
| ph: (505) 237-8440 | fax: | | |

This Report Contains A Total Of 12 Pages

Excluding This Page, Chain Of Custody

And

Any Attachments

12/29/2009

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

## Case Narrative for:
## Conoco Phillips

### Certificate of Analysis Number:
### 09120782

| Report To: | | Project Name: | COP BCom #1E |
|---|---|---|---|
| Tetra Tech, Inc. | | Site: | Farmington, NM |
| Kelly Blanchard | | Site Address: | |
| 6121 Indian School Road, N.E. | | | |
| Suite 200 | | PO Number: | 4509596739 |
| Albuquerque | | State: | New Mexico |
| NM | | State Cert. No.: | |
| 87110- | | Date Reported: | 12/29/2009 |
| ph: (505) 237-8440 | fax: | | |

I. SAMPLE RECEIPT:

All samples were received intact. The internal ice chest temperatures were measured on receipt and are recorded on the attached Sample Receipt Checklist.

II: ANALYSES AND EXCEPTIONS:

Per the Conoco Phillips TSM Revision 0, a copy of the internal chain of custody is to be included in final data package. However, due to LIMS limitations, this cannot be provided at this time.

III. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report (" mg\kg-dry " or " ug\kg-dry " ).

Matrix spike (MS) and matrix spike duplicate (MSD) samples are chosen and tested at random from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. Since the MS and MSD are chosen at random from an analytical batch, the sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The Laboratory Control Sample (LCS) and the Method Blank (MB) are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

Some of the percent recoveries and RPD's on the QC report for the MS/MSD may be different than the calculated recoveries and RPD's using the sample result and the MS/MSD results that appear on the report because, the actual raw result is used to perform the calculations for percent recovery and RPD.

Any other exceptions associated with this report will be footnoted in the analytical result page(s) or the quality control summary page(s).

Please do not hesitate to contact us if you have any questions or comments pertaining to this data report. Please reference the above Certificate of Analysis Number.



SPL, Inc. is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or by his designee, as verified by the following signature.



Erica Cardenas
Project Manager

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

# Conoco Phillips

## Certificate of Analysis Number:

## 09120782

**Report To:** Tetra Tech, Inc.
Kelly Blanchard
6121 Indian School Road, N.E.
Suite 200
Albuquerque
NM
87110-
ph: (505) 237-8440 fax: (505) 881-3283

**Fax To:**

**Project Name:** COP BCom #1E
**Site:** Farmington, NM
**Site Address:**

**PO Number:** 4509596739
**State:** New Mexico
**State Cert. No.:**
**Date Reported:** 12/29/2009

| Client Sample ID | Lab Sample ID | Matrix | Date Collected | Date Received | COC ID | HOLD |
|---|---|---|---|---|---|---|
| MW-6 | 09120782-01 | Water | 12/17/2009 7:30:00 AM | 12/18/2009 9:30:00 AM | 292733 | ☐ |
| MW-1 | 09120782-02 | Water | 12/17/2009 7:45:00 AM | 12/18/2009 9:30:00 AM | 292714 | ☐ |
| Duplicate | 09120782-03 | Water | 12/17/2009 7:50:00 AM | 12/18/2009 9:30:00 AM | 292714 | ☐ |
| Trip Blank | 09120782-04 | Water | 12/17/2009 11:30:00 AM | 12/18/2009 9:30:00 AM | 292714 | ☐ |

E Cardenas

12/29/2009

Erica Cardenas
Project Manager

Date

Kesavalu M. Bagawandoss Ph.D., J.D.
Laboratory Director

Ted Yen
Quality Assurance Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

**Client Sample ID:** MW-6 **Collected:** 12/17/2009 7:30 **SPL Sample ID:** 09120782-01

**Site: Farmington, NM**

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | **MCL** | **SW6010B** | **Units: mg/L** | | |
| Iron | 0.0511 | | 0.02 | 1 | 12/29/09 12:43 | AB1 | 5346741 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/21/2009 10:00 | R_V | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Ethylbenzene | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Toluene | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| m,p-Xylene | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| o-Xylene | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Xylenes,Total | ND | | 1 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Surr: 1,2-Dichloroethane-d4 | 109 | | % 70-130 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Surr: 4-Bromofluorobenzene | 94.1 | | % 74-125 | 1 | 12/25/09 8:00 | JC | 5343614 |
| Surr: Toluene-d8 | 97.4 | | % 82-118 | 1 | 12/25/09 8:00 | JC | 5343614 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

**Client Sample ID:** MW-1 **Collected:** 12/17/2009 7:45 **SPL Sample ID:** 09120782-02

**Site: Farmington, NM**

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | **MCL** | **SW6010B** | **Units: mg/L** | | |
| Iron | 0.521 | | 0.02 | 1 | 12/29/09 12:48 | AB1 | 5346742 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/21/2009 10:00 | R_V | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | 1.4 | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Ethylbenzene | 100 | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Toluene | ND | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| m,p-Xylene | 2.8 | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| o-Xylene | ND | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Xylenes,Total | 2.8 | | 1 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Surr: 1,2-Dichloroethane-d4 | 101 | % | 70-130 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Surr: 4-Bromofluorobenzene | 103 | % | 74-125 | 1 | 12/25/09 8:31 | JC | 5343615 |
| Surr: Toluene-d8 | 92.2 | % | 82-118 | 1 | 12/25/09 8:31 | JC | 5343615 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

**Client Sample ID:** Duplicate **Collected:** 12/17/2009 7:50 **SPL Sample ID:** 09120782-03

**Site: Farmington, NM**

| Analyses/Method | Result | QUAL | Rep.Limit | | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|---|
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | | **SW8260B** | **Units: ug/L** | | |
| Benzene | 1.3 | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| Ethylbenzene | 100 | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| Toluene | ND | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| m,p-Xylene | 2 | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| o-Xylene | ND | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| Xylenes,Total | 2 | | 1 | | 1 | 12/25/09 9:02 | JC | 5343616 |
| Surr: 1,2-Dichloroethane-d4 | 100 | | % | 70-130 | 1 | 12/25/09 9:02 | JC | 5343616 |
| Surr: 4-Bromofluorobenzene | 100 | | % | 74-125 | 1 | 12/25/09 9:02 | JC | 5343616 |
| Surr: Toluene-d8 | 92.7 | | % | 82-118 | 1 | 12/25/09 9:02 | JC | 5343616 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

**Client Sample ID:** Trip Blank **Collected:** 12/17/2009 11:30 **SPL Sample ID:** 09120782-04

**Site: Farmington, NM**

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Ethylbenzene | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Toluene | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| m,p-Xylene | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| o-Xylene | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Xylenes,Total | ND | | 1 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Surr: 1,2-Dichloroethane-d4 | 104 | | % 70-130 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Surr: 4-Bromofluorobenzene | 100 | | % 74-125 | 1 | 12/25/09 9:32 | JC | 5343617 |
| Surr: Toluene-d8 | 98.0 | | % 82-118 | 1 | 12/25/09 9:32 | JC | 5343617 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

# *Quality Control Documentation*

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

## Quality Control Report

**Conoco Phillips**
**COP BCom #1E**

**Analysis:** Metals by Method 6010B, Dissolved
**Method:** SW6010B
**WorkOrder:** 09120782
**Lab Batch ID:** 96603

**Method Blank**

RunID: ICP2_091229A-5346723 Units: mg/L
Analysis Date: 12/29/2009 11:17 Analyst: AB1
Preparation Date: 12/21/2009 10:00 Prep By: R_V Method: SW3005A

**Samples in Analytical Batch:**

| Lab Sample ID | Client Sample ID |
|---|---|
| 09120782-01B | MW-6 |
| 09120782-02B | MW-1 |

| Analyte | Result | Rep Limit |
|---|---|---|
| Iron | ND | 0.02 |

**Laboratory Control Sample (LCS)**

RunID: ICP2_091229A-5346724 Units: mg/L
Analysis Date: 12/29/2009 11:22 Analyst: AB1
Preparation Date: 12/21/2009 10:00 Prep By: R_V Method: SW3005A

| Analyte | Spike Added | Result | Percent Recovery | Lower Limit | Upper Limit |
|---|---|---|---|---|---|
| Iron | 0.1000 | 0.1059 | 105.9 | 80 | 120 |

**Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

Sample Spiked: 09120780-01
RunID: ICP2_091229A-5346726 Units: mg/L
Analysis Date: 12/29/2009 11:31 Analyst: AB1
Preparation Date: 12/21/2009 10:00 Prep By: R_V Method: SW3005A

| Analyte | Sample Result | MS Spike Added | MS Result | MS % Recovery | MSD Spike Added | MSD Result | MSD % Recovery | RPD | RPD Limit | Low Limit | High Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 0.05310 | 0.1 | 0.1464 | 93.30 | 0.1 | 0.1658 | 112.7 | 12.43 | 20 | 75 | 125 |

**Qualifiers:**
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

# Quality Control Report

## Conoco Phillips

**COP BCom #1E**

**Analysis:** Volatile Organics by Method 8260B **WorkOrder:** 09120782
**Method:** SW8260B **Lab Batch ID:** R292268

### Method Blank

RunID: Q_091225A-5343605 Units: ug/L
Analysis Date: 12/25/2009 3:22 Analyst: JC

| Analyte | Result | Rep Limit |
|---|---|---|
| Benzene | ND | 1.0 |
| Ethylbenzene | ND | 1.0 |
| Toluene | ND | 1.0 |
| m,p-Xylene | ND | 1.0 |
| o-Xylene | ND | 1.0 |
| Xylenes,Total | ND | 1.0 |
| Surr: 1,2-Dichloroethane-d4 | 107.0 | 70-130 |
| Surr: 4-Bromofluorobenzene | 94.3 | 74-125 |
| Surr: Toluene-d8 | 96.5 | 82-118 |

**Samples in Analytical Batch:**

| Lab Sample ID | Client Sample ID |
|---|---|
| 09120782-01A | MW-6 |
| 09120782-02A | MW-1 |
| 09120782-03A | Duplicate |
| 09120782-04A | Trip Blank |

### Laboratory Control Sample (LCS)

RunID: Q_091225A-5343604 Units: ug/L
Analysis Date: 12/25/2009 2:51 Analyst: JC

| Analyte | Spike Added | Result | Percent Recovery | Lower Limit | Upper Limit |
|---|---|---|---|---|---|
| Benzene | 20.0 | 20.5 | 102 | 74 | 123 |
| Ethylbenzene | 20.0 | 18.2 | 91.2 | 72 | 127 |
| Toluene | 20.0 | 19.6 | 98.0 | 74 | 126 |
| m,p-Xylene | 40.0 | 38.5 | 96.3 | 71 | 129 |
| o-Xylene | 20.0 | 20.1 | 100 | 74 | 130 |
| Xylenes,Total | 60.0 | 58.6 | 97.7 | 71 | 130 |
| Surr: 1,2-Dichloroethane-d4 | 50.0 | 48.2 | 96.4 | 70 | 130 |
| Surr: 4-Bromofluorobenzene | 50.0 | 51.9 | 104 | 74 | 125 |
| Surr: Toluene-d8 | 50.0 | 47.8 | 95.6 | 82 | 118 |

### Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 09120911-01
RunID: Q_091225A-5343607 Units: ug/L
Analysis Date: 12/25/2009 4:24 Analyst: JC

**Qualifiers:**
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

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8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

## Quality Control Report

### Conoco Phillips

**COP BCom #1E**

**Analysis:** Volatile Organics by Method 8260B **WorkOrder:** 09120782
**Method:** SW8260B **Lab Batch ID:** R292268

| Analyte | Sample Result | MS Spike Added | MS Result | MS % Recovery | MSD Spike Added | MSD Result | MSD % Recovery | RPD | RPD Limit | Low Limit | High Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | ND | 20 | 18.3 | 91.3 | 20 | 19.5 | 97.6 | 6.68 | 22 | 70 | 124 |
| Ethylbenzene | ND | 20 | 17.7 | 88.4 | 20 | 17.7 | 88.3 | 0.0736 | 20 | 76 | 122 |
| Toluene | ND | 20 | 17.7 | 88.4 | 20 | 18.8 | 93.8 | 6.01 | 24 | 80 | 117 |
| m,p-Xylene | ND | 40 | 35.2 | 87.9 | 40 | 36.1 | 90.3 | 2.74 | 20 | 69 | 127 |
| o-Xylene | ND | 20 | 18.4 | 92.1 | 20 | 18.6 | 93.1 | 1.06 | 20 | 84 | 114 |
| Xylenes,Total | ND | 60 | 53.6 | 89.3 | 60 | 54.7 | 91.2 | 2.17 | 20 | 69 | 127 |
| Surr: 1,2-Dichloroethane-d4 | ND | 50 | 47.9 | 95.8 | 50 | 51.0 | 102 | 6.28 | 30 | 70 | 130 |
| Surr: 4-Bromofluorobenzene | ND | 50 | 51.4 | 103 | 50 | 50.4 | 101 | 1.96 | 30 | 74 | 125 |
| Surr: Toluene-d8 | ND | 50 | 47.8 | 95.6 | 50 | 47.4 | 94.9 | 0.708 | 30 | 82 | 118 |

**Qualifiers:**
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

*Sample Receipt Checklist*

*And*

*Chain of Custody*

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

# Sample Receipt Checklist

| | | | |
|---|---|---|---|
| Workorder: | 09120782 | Received By: | RE |
| Date and Time Received: | 12/18/2009 9:30:00 AM | Carrier name: | Fedex-Standard Overnight |
| Temperature: | 2.3°C | Chilled by: | Water Ice |

| | | | | |
|---|---|---|---|---|
| 1. | Shipping container/cooler in good condition? | Yes ☑ | No ☐ | Not Present ☐ |
| 2. | Custody seals intact on shippping container/cooler? | Yes ☑ | No ☐ | Not Present ☐ |
| 3. | Custody seals intact on sample bottles? | Yes ☐ | No ☐ | Not Present ☑ |
| 4. | Chain of custody present? | Yes ☑ | No ☐ | |
| 5. | Chain of custody signed when relinquished and received? | Yes ☑ | No ☐ | |
| 6. | Chain of custody agrees with sample labels? | Yes ☑ | No ☐ | |
| 7. | Samples in proper container/bottle? | Yes ☑ | No ☐ | |
| 8. | Sample containers intact? | Yes ☑ | No ☐ | |
| 9. | Sufficient sample volume for indicated test? | Yes ☑ | No ☐ | |
| 10. | All samples received within holding time? | Yes ☑ | No ☐ | |
| 11. | Container/Temp Blank temperature in compliance? | Yes ☑ | No ☐ | |
| 12. | Water - VOA vials have zero headspace? | Yes ☑ | No ☐ | VOA Vials Not Present ☐ |
| 13. | Water - Preservation checked upon receipt (except VOA*)? | Yes ☐ | No ☐ | Not Applicable ☑ |

*VOA Preservation Checked After Sample Analysis

SPL Representative: _____ Contact Date & Time: _____

Client Name Contacted: _____

Non Conformance Issues: _____

Client Instructions: _____

**SPL, Inc.**
Analysis Request & Chain of Custody Record

SPL Workorder No. 292714
09120782
page ____ of ____

Client Name: Tetra Tech
Address: 6121 Indian School Rd. NE Suite 200
City Albuquerque State NM Zip 87110
Phone/Fax: 505 237-8440
Client Contact: Kelly Blanchard Email: Kelly.blanchard@tetratech.com
Project Name/No.: B Com 1E
Site Name:
Site Location: Farmington, NM
Invoice To: ConocoPhillips Ph:

| SAMPLE ID | DATE | TIME | comp | grab | matrix (W=water S=soil O=oil A=air SL=sludge E=encore X=other) | bottle (P=plastic A=amber glass G=glass V=vial X=other) | size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz X=other) | pres. (1=HCl 2=HNO3 3=H2SO4 X=other none) | Number of Containers | Requested Analysis: BTEX | Requested Analysis: Dissolved Fe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-6 | 12/17/09 | 0730 | | X | W | V | 40 | 1 | 3 | X | |
| MW-6 | 12/17/09 | 0730 | | X | W | P | 1 | X | 1 | | X |
| MW-1 | 12/17/09 | 0745 | | X | W | V | 40 | 1 | 3 | X | |
| MW-1 | 12/17/09 | 0745 | | X | W | P | 1 | X | 1 | | X |
| Duplicate | 12/17/09 | 0750 | | X | W | V | 40 | 1 | 3 | X | |
| Trip Blank | 12/17/09 | 1130 | | X | W | V | 40 | 1 | 2 | X | |

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☐ Y ☐ N
Ice? ☑ Y ☐ N
Temp: 2.5c

RUSH

**Requested TAT**
☐ 1 Business Day ☐ Contract
☐ 2 Business Days ☒ Standard
☐ 3 Business Days
☐ Other ____
Rush TAT requires prior notice

Special Reporting Requirements / Results: Fax ☐ Email ☐ PDF ☐
Standard QC ☐ Level 3 QC ☐ Level 4 QC ☐ TX TRRP ☐ LA RECAP ☐

Special Detection Limits (specify):

PM review (initial):

| | date | time | | |
|---|---|---|---|---|
| 1. Relinquished by Sampler: | 12/17/09 | 1200 | 2. Received by: | |
| 3. Relinquished by: | date | time | 4. Received by: | |
| 5. Relinquished by: | 12/18/09 | 0730 | 6. Received by Laboratory: | |

☒ 8880 Interchange Drive
Houston, TX 77054 (713) 660-0901

☐ 500 Ambassador Caffery Parkway
Scott, LA 70583 (337) 237-4775

☐ 459 Hughes Drive
Traverse City, MI 49686 (231) 947-5777

# APPENDIX C

# HISTORICAL ANALYTICAL DATA

Table 2
BTEX Ground Water Analytical Summary
Farmington B Com 1E
Unit O, Sec. 15 T29N, R13W

| Sample Date | Sample ID# | Monitor Well | Remarks | BTEX per EPA 8020 (ppb) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Benzene | Toluene | Ethylbenzene | Total-Xylene |
| 2/19/98 | 9802020-01A | MW#1 | On Site Lab. | 210.0 | 34.0 | 370.0 | 2044.0 |
| 6/12/98 | 3" of free product | in the bailer | | | | | |
| 9/15/98 | Not Sampled | free product | in well | | | | |
| 12/29/98 | 9812053-04A | | | 350.0 | BDL | 420 | 2800.0 |
| No | Water | Samples | Taken | in | 1999 | | |
| 1/22/04 | Not Sampled | free product | in well | | | | |
| | | | | | | | |
| 2/19/98 | 9802020-02A | MW#2 | On Site Lab. | 2.4 | 5.3 | 16.0 | 470.0 |
| 6/12/98 | 9806055-02A | | | 0.8 | 2.7 | 32.0 | 171.0 |
| 9/15/98 | 9809035-01A | | | 1.3 | 2.5 | 39.0 | 33.3 |
| 12/29/98 | 9812053-05A | | | BDL | 0.6 | 2.1 | 35.0 |
| 3/3/99 | 9903012-05A | | | BDL | BDL | 64 | 119.0 |
| 6/15/99 | 9906055-05A | | | BDL | BDL | BDL | BDL |
| 9/15/99 | 9909054-05A | | | BDL | BDL | 4.1 | 68.1 |
| 12/14/99 | 9912018-05A | | | BDL | BDL | 1.8 | 36.4 |
| 1/22/04 | 0401011-004A | | lina ba Lab | BDL | BDL | BDL | BDL |
| | | | | | | | |
| 2/19/98 | 9802020-03A | MW#3 | On Site Lab. | 0.9 | 1.2 | 1.6 | 5.3 |
| 06/12/98 | 9806055-01A | | | BDL | BDL | 0.5 | 2.0 |
| 9/15/98 | 9809035-02A | | | BDL | BDL | BDL | BDL |
| 12/29/98 | 9812053-06A | | | BDL | BDL | BDL | BDL |
| 3/3/99 | 9903012-04A | | | BDL | BDL | BDL | BDL |
| 6/15/99 | 9906055-04A | | | BDL | 0.9 | 3.1 | 56.0 |
| 9/15/99 | 9909054-04A | | | BDL | 0.6 | BDL | BDL |
| 12/14/99 | 9912018-04A | | | BDL | BDL | BDL | BDL |
| 1/22/04 | 0401011-002A | | lina ba Lab | BDL | BDL | BDL | BDL |
| WQCC | Action | Levels | | 10.0 | 750.0 | 750.0 | 620.0 |

Table 2
BTEX Ground Water Analytical Summary
Farmington B Com 1E
Unit O, Sec. 15 T29N, R13W

| Sample Date | Sample ID# | Monitor Well | Remarks | BTEX per EPA 8020 (ppb) | | | |
|---|---|---|---|---|---|---|---|
| 9/15/98 | 9809035-03A | MW#4 | On Site Lab. | BDL | BDL | BDL | BDL |
| 12/29/98 | 9812053-03A | | | BDL | BDL | 0.6 | BDL |
| 3/3/99 | 9903012-03A | | | BDL | BDL | BDL | BDL |
| 6/15/99 | 9906055-03A | | | BDL | BDL | BDL | BDL |
| 9/15/99 | 9909054-03A | | | BDL | BDL | BDL | BDL |
| 12/14/99 | 9912018-03A | | | BDL | 0.7 | BDL | BDL |
| 3/27/00 | 0003041-01A | | | BDL | BDL | BDL | BDL |
| 6/5/00 | 0006009-02A | | | BDL | BDL | BDL | BDL |
| 9/11/00 | 0009020*01A | | | BDL | BDL | BDL | BDL |
| 1/22/04 | 0401011-003A | | Iina ba Lab | BDL | BDL | BDL | BDL |
| | | | | | | | |
| 9/15/98 | 9809035-04A | MW#5 | On Site Lab. | BDL | BDL | BDL | BDL |
| 12/29/98 | 9812053-02A | | | BDL | BDL | BDL | BDL |
| 3/3/99 | 9903012-02A | | | BDL | BDL | BDL | BDL |
| 6/15/99 | 9906055-02A | | | BDL | BDL | BDL | BDL |
| 9/15/99 | 9909054-02A | | | BDL | BDL | BDL | BDL |
| 12/14/99 | 9912018-02A | | | BDL | 0.8 | BDL | BDL |
| 3/27/00 | 0003041-02A | | | BDL | BDL | BDL | BDL |
| 6/5/00 | 0006009-01A | | | BDL | BDL | BDL | BDL |
| 12/14/99 | 9912018-05A | | | BDL | BDL | 1.8 | 36.4 |
| 1/22/04 | 0401011-005A | | Iina ba Lab | BDL | BDL | BDL | BDL |
| | | | | | | | |
| 9/15/98 | 9809035-05A | MW#6 | On Site Lab. | BDL | BDL | BDL | BDL |
| 12/29/98 | 9812053-01A | | | BDL | BDL | BDL | BDL |
| 3/3/99 | 9903012-01A | | | BDL | BDL | BDL | BDL |
| 6/15/99 | 9906055-01A | | | BDL | BDL | BDL | BDL |
| 9/15/99 | 9909054-01A | | | BDL | 0.7 | 1.1 | BDL |
| 12/14/99 | 9912018-01A | | | BDL | 1.8 | 0.7 | 1.9 |
| 1/22/04 | 0401011-006A | | Iina ba Lab | BDL | BDL | BDL | BDL |
| WQCC | Action | Levels | | 10.0 | 750.0 | 750.0 | 620.0 |

Table 2
BTEX Ground Water Analytical Summary
Farmington B Com 1E
Unit O, Sec. 15 T29N, R13W

| Sample Date | Sample ID# | Monitor Well | Remarks | Anions ppm | Iron ppm | BOD | COD |
|---|---|---|---|---|---|---|---|
| 1/22/04 | | MW#1 | Iina ba Lab | Not Sampled | | | |
| 1/22/04 | 0401011-004 | MW#2 | | 65.1 | BDL | | |
| 1/22/04 | 0401011-002 | MW#3 | | 73.3 | BDL | | |
| 1/22/04 | 0401011-003 | MW#4 | | 67.7 | BDL | | |
| 1/22/04 | 0401011-005 | MW#5 | | 86.8 | BDL | | |
| 1/22/04 | 0401011-006 | MW#6 | | 28.2 | 0.194 | | |