# 3R - 098

# QUARTERLY GWMR

# MAY 2011

3R098

# QUARTERLY GROUNDWATER MONITORING REPORT
# DECEMBER 2010 SAMPLING EVENT

## CONOCOPHILLIPS COMPANY
## SHEPHERD & KELSEY NO.1E
## BLOOMFIELD, NEW MEXICO

OCD # 3RP-98-0
API # - 30-045-24316

**Prepared for:**

ConocoPhillips

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May 2011

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# QUARTERLY GROUNDWATER MONITORING REPORT CONOCOPHILLIPS COMPANY SHEPHERD & KELSEY NO. 1E BLOOMFIELD, NEW MEXICO

## 1.0 INTRODUCTION

ConocoPhillips Company (ConocoPhillips) retained Tetra Tech, Inc (Tetra Tech) to perform additional site characterization work and quarterly groundwater monitoring at the Shepherd & Kelsey No. 1E site in Bloomfield, New Mexico (Site). This report presents the results of a quarterly groundwater monitoring event conducted at the Site by Tetra Tech on December 14, 2010. This sampling event represents the ninth consecutive quarter of groundwater monitoring completed by Tetra Tech at the Site to include all four Site monitoring wells.

The Site is located on private land leased by ConocoPhillips near the intersection of New Mexico Highway 64 and County Road 5097 in Bloomfield, NM. The Site consists of a gas production well head with associated equipment and installations and is surrounded by agricultural land. The geographical location coordinates are 36° 42' 6.8"N and 108° 01' 12.2" W; the location and general features of the Site are presented as **Figure 1** and **Figure 2**, respectively.

### 1.1 Site History

A historical timeline for the Site is presented in **Table 1**, and is discussed in more detail below.

Contaminated soil was discovered at the Site during routine maintenance on June 5, 2007. Envirotech Inc. of Farmington, New Mexico (Envirotech) performed soil excavation (Excavation #1, **Figure 2**) at the Site, during which three soil samples were collected and analyzed for total petroleum hydrocarbons (TPH). The concentration of TPH was found to be below the New Mexico Oil Conservation Division (NMOCD) recommended action level. On June 12, 2007 a separate area of TPH soil contamination was discovered. An excavation of the additional area was performed by Envirotech from June 15 through June 18, 2007 (Excavation #2, **Figure 2**). Soil samples taken during the second excavation were found to be above the NMOCD recommended action level for TPH. Groundwater samples collected from the excavation were found to contain benzene and total xylenes above New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standards. Monitor Well MW-1 was installed by Envirotech on September 26, 2007. Soil and groundwater samples collected during drilling were analyzed for TPH and for benzene, toluene, ethylbenzene and total xylenes (BTEX); results were below NMOCD recommended action levels. In November 2007, Envirotech recommended plugging and abandoning MW-1 and a no further action status from NMOCD. However, in April 2008, NMOCD indicated that further investigation was necessary before closure could be granted.

Tetra Tech began quarterly sampling of MW-1 on October 23, 2008. On January 22, 2009, three additional groundwater monitor wells were installed by WDC Exploration and Drilling of Peralta, NM (WDC), under the supervision of Tetra Tech. Monitor Wells MW-2, MW-3, and MW-4 were initially

sampled on January 30, 2009 and have since been incorporated into the quarterly monitoring schedule with MW-1.

# 2.0 METHODOLOGY AND RESULTS

Quarterly groundwater sampling was conducted on December 14, 2010. Groundwater samples were collected from Monitor Wells MW-1, MW-2, MW-3 and MW-4. Prior to sampling, depth to groundwater in each well was recorded using a dual interface probe. Results are summarized in **Table 2**.

The casings for all Site monitor wells were surveyed by Tetra Tech in January 2009, with the wellhead assigned an arbitrary reference elevation of 100 feet above mean sea level (amsl). Using these data, it was determined that the groundwater flow direction at the Site is to the south (**Figure 4**). A generalized geologic cross section for the Site is presented as **Figure 3**.

## 2.1 Groundwater Sampling Methodology

Monitor Wells MW-1, MW-2, MW-3, and MW-4 were sampled during the December 14, 2010 groundwater monitoring event. Prior to sampling, all monitor wells were purged of at least 3 casing volumes of groundwater using a dedicated 1.5-inch diameter, polyethylene disposable bailer. Groundwater quality parameters were collected using a YSI 556 multi-parameter sonde during each purge. Results were recorded on a Tetra Tech Water Sampling Field Form (**Appendix A**). Groundwater samples were placed in laboratory prepared bottles, packed on ice, and shipped under chain-of-custody documentation to Southern Petroleum Laboratory (SPL) of Houston, Texas. Samples were analyzed for dissolved manganese by EPA Method 6010B; total dissolved solids (TDS) by EPA Method 2540C; and for BTEX by EPA Method 8260B.

## 2.2 Groundwater Sampling Analytical Results

The NMWQCC mandates that groundwater quality in New Mexico be protected, and has issued groundwater quality standards in Title 20, Chapter 6, Part 2, Section 3103 of the New Mexico Administrative Code (20.6.2.3103 NMAC). A historical summary of groundwater analytical results is provided in **Table 3**. The laboratory analytical report is included as **Appendix B**.

- **Manganese**

  The groundwater quality standard for dissolved manganese is 0.2 milligrams per liter (mg/L). Groundwater collected on December 14, 2010 Monitor Well MW-4 was found to contain dissolved manganese at a concentration of 0.514 mg/L.

- **TDS**

  The groundwater quality standard for TDS is 1000 mg/L. Groundwater collected from Monitor Well MW-2 and Monitor Well MW-4 was found at a concentration of 1,120 mg/L and 1,580 mg/L, respectively.

## 3.0 CONCLUSIONS

This is the ninth consecutive quarter with groundwater sample analytical results below NMWQCC standards for BTEX for all four Site monitoring wells. During this latest monitoring period, only one well revealed dissolved manganese above the NMWQCC standard and only two wells revealed TDS concentrations above the NMWQCC standard. In order to move toward Site closure with NMOCD, continued groundwater quality monitoring is recommended for TDS and dissolved manganese to determine if seasonal trends are influencing Site groundwater quality and if the levels appear to be stable and at background concentrations. The next groundwater monitoring event is scheduled for March 2011. Please contact Kelly Blanchard at 505-237-8440 or kelly.blanchard@tetratech.com if you have any questions or require additional information.

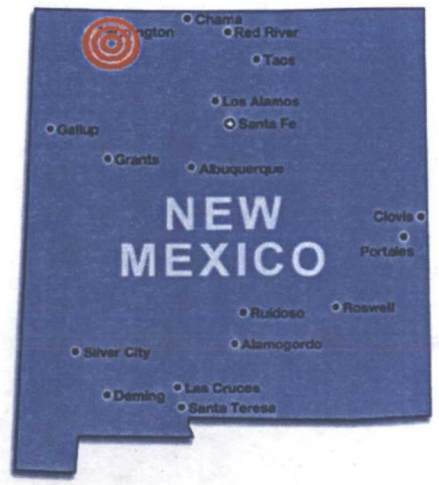
# FIGURES

1. Site Location Map
2. Site Detail Map
3. Generalized Geologic Cross Section
4. Groundwater Contour Map – December 2010


ConocoPhillips High Resolution Aerial IR Photography 2008

**FIGURE 1.**

Site Location Map
ConocoPhillips Company
Shepherd & Kelsey No. 1E
Bloomfield, NM
36° 42' 6.8" N
108° 01' 12.2" W




Approximate
Site location

N

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**FIGURE 2:**
**SITE DETAIL MAP**
**CONOCOPHILLIPS COMPANY**
**SHEPHERD & KELSEY No.1E**
**Section 29 of T29N, R11W**
**Bloomfield, New Mexico**

**LEGEND**

- WELLHEAD
- BERM
- EQUIPMENT
- CONDENSATE TANK
- PRODUCED WATER TANK
- PLAN VIEW OF CROSS-SECTION A A'

N

TETRA TECH, INC.

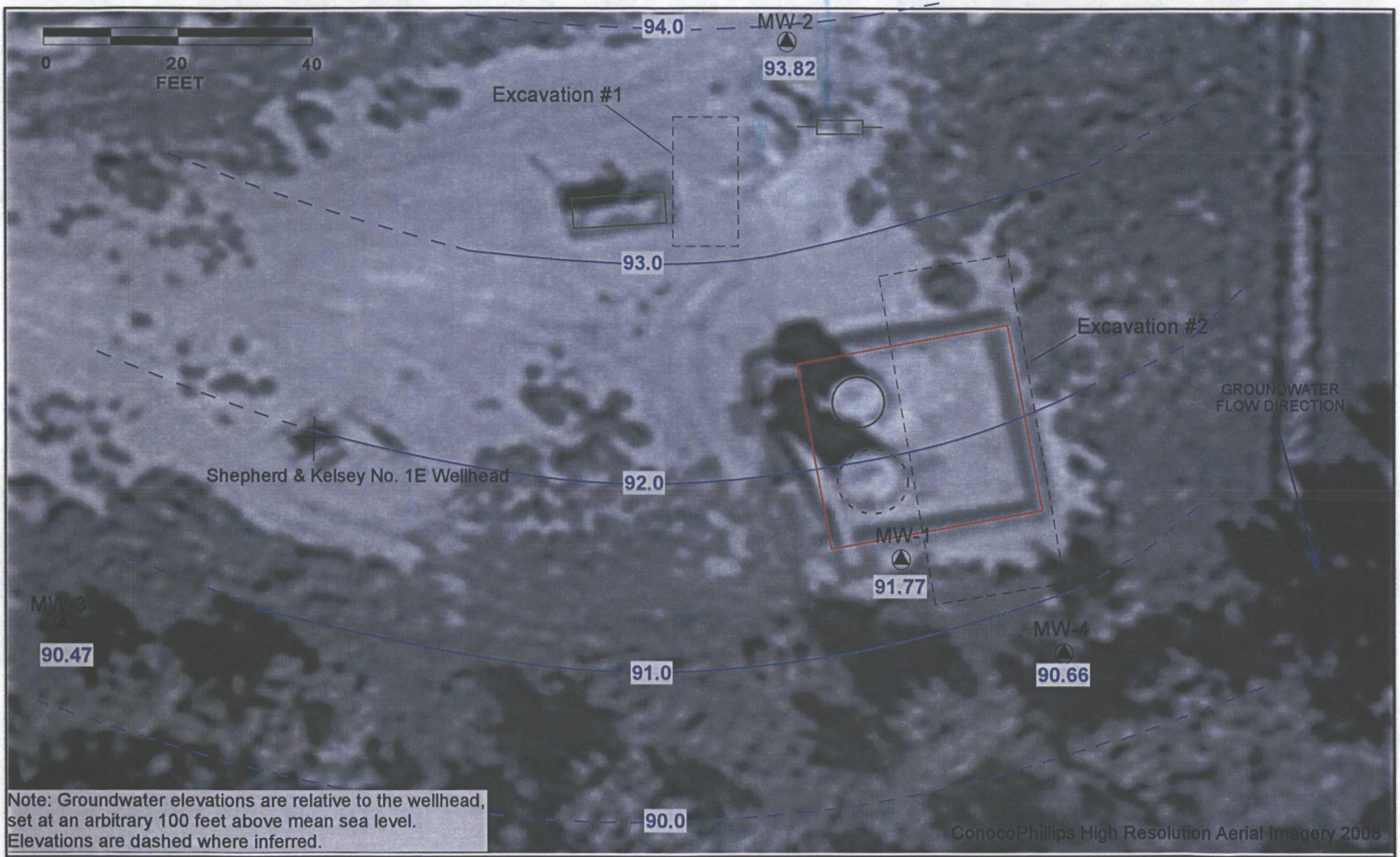


**FIGURE 4:**
**GROUNDWATER CONTOUR MAP**
**December 2010**
**CONOCOPHILLIPS COMPANY**
**SHEPHERD & KELSEY No.1E**
**Section 29 of T29N, R11W**
**Bloomfield, New Mexico**

**LEGEND**

- WELLHEAD
- BERM
- EQUIPMENT
- CONDENSATE TANK
- PRODUCED WATER TANK
- GROUNDWATER CONTOUR LINE
- INFERRED GROUNDWATER CONTOUR LINE

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# TABLES

## Table 1. Site History Timeline - ConocoPhillips Company Shepherd and Kelsey No. 1E

| DATE | ACTIVITY |
|---|---|
| 5-Jun-07 | Hydrocarbon-impacted soil discovered during routine maintenance at the Site. Soil excavation was performed at the Site, and three soil samples were obtained. Sample results showed total petroleum hydrocarbon (TPH) concentrations below the NMOCD regulations of 100 parts per million (ppm). Original source of contamination is unknown. |
| 12-Jun-07 | A separate area of TPH soil contamination discovered. |
| June 15-18, 2007 | A 50 foot by 20 foot by 4 foot excavation was completed. Soil samples taken from the second excavation show TPH at 992 ppm. Water samples obtained show benzene and total xylenes above State of New Mexico drinking water standards. |
| 26-Sep-07 | Ground water monitoring well installed to a depth of ten (10) feet below ground surface (bgs) by Envirotech Inc. of Farmington, NM (Envirotech). Depth to groundwater recorded at four (4) feet bgs. Soil and groundwater samples obtained for TPH, benzene, and benzene, toluene, ethylbenzene and total xylenes (BTEX) were below the respective NMOCD regulations of 100 ppm, 10 ppm and 50 ppm. |
| Nov-07 | Envirotech report recommends plugging and abandonment of the temporary ground water monitoring well and no further action for the Site (Envirotech, 2007). |
| Apr-08 | Oil Conservation Division of NM Energy, Minerals, and Resources Dept. indicates additional investigation and sampling is necessary for closure consideration during a meeting with Glenn von Gonten. |
| 23-Oct-08 | 1st quarter sampling of MW-1 by Tetra Tech. |
| Jan-09 | Installed additional monitoring wells MW-2, MW-3 and MW-4. |
| 30-Jan-09 | 2nd quarter sampling of MW-1 by Tetra Tech; initial sampling of MW-2, MW-3, and MW-4. |
| 1-Apr-09 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 18-Jun-09 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 21-Sep-09 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. Dissolved metals analysis initated at the Site for metals with elevated *total* metal concentrations. |
| 14-Dec-09 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 31-Mar-10 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 7-Jun-10 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 29-Sep-10 | Quarterly sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. |
| 14-Dec-10 | Tetra Tech conducted the ninth quarterly groundwater monitoring event at the Site (sampling of monitor wells MW-1, MW-2, MW-3, and MW-4.) |

**Table 2. Groundwater Elevation Data Summary - ConocoPhillips Company Shepherd & Kelsey No. 1E**

| Well ID | Total Depth (ft bgs) | Screen Interval (ft) | *Elevation (ft) (TOC) | Date Measured | Depth to Groundwater (ft below TOC) | Relative Groundwater Elevation |
|---|---|---|---|---|---|---|
| MW-1 | 12 | 2.5-10.0 | 96.53 | 10/23/2008 | 4.02 | 92.51 |
| | | | | 1/30/2009 | 5.70 | 90.83 |
| | | | | 4/1/2009 | 5.90 | 90.63 |
| | | | | 6/18/2009 | 4.01 | 92.52 |
| | | | | 9/21/2009 | 5.62 | 90.91 |
| | | | | 12/14/2009 | 5.51 | 91.02 |
| | | | | 3/31/2010 | 5.72 | 90.81 |
| | | | | 6/7/2010 | 4.74 | 91.79 |
| | | | | 9/26/2010 | 5.10 | 91.43 |
| | | | | 12/14/2010 | 4.76 | 91.77 |
| MW-2 | 20.30 | 3.0 - 18.0 | 98.05 | 1/30/2009 | 5.41 | 92.64 |
| | | | | 4/1/2009 | 5.78 | 92.27 |
| | | | | 6/18/2009 | 2.50 | 95.55 |
| | | | | 9/21/2009 | 4.60 | 93.45 |
| | | | | 12/14/2009 | 4.99 | 93.06 |
| | | | | 3/31/2010 | 5.53 | 92.52 |
| | | | | 6/7/2010 | 2.70 | 95.35 |
| | | | | 9/29/2010 | 3.56 | 94.49 |
| | | | | 12/14/2010 | 4.23 | 93.82 |
| MW-3 | 20.10 | 3.0 - 18.0 | 95.60 | 1/30/2009 | 5.29 | 90.31 |
| | | | | 4/1/2009 | 5.46 | 90.14 |
| | | | | 6/18/2009 | 3.64 | 91.96 |
| | | | | 9/21/2009 | 5.25 | 90.35 |
| | | | | 12/14/2009 | 5.19 | 90.41 |
| | | | | 3/31/2010 | 5.30 | 90.30 |
| | | | | 6/7/2010 | 5.52 | 90.08 |
| | | | | 9/29/2010 | 4.81 | 90.79 |
| | | | | 12/14/2010 | 5.13 | 90.47 |
| MW-4 | 20.70 | 3.7 - 18.7 | 96.23 | 1/30/2009 | 6.33 | 89.90 |
| | | | | 4/1/2009 | 6.40 | 89.83 |
| | | | | 6/18/2009 | 5.51 | 90.72 |
| | | | | 9/21/2009 | 6.13 | 90.10 |
| | | | | 12/14/2009 | 5.91 | 90.32 |
| | | | | 3/31/2010 | 6.10 | 90.13 |
| | | | | 6/7/2010 | 5.31 | 90.92 |
| | | | | 9/29/2010 | 5.59 | 90.64 |
| | | | | 12/14/2010 | 5.57 | 90.66 |

ft = Feet

TOC = Top of casing

bgs = below ground surface

* Elevation relative to wellhead

**Table 3. Groundwater Laboratory Analytical Results - ConocoPhillips Company Shepherd & Kelsey No. 1E**

| Well ID | Date | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Xylenes (µg/L) | Sulfate (mg/L) | Aluminum (mg/L) | Iron (mg/L) | Manganese (mg/L) | Total Dissolved Solids (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 9/26/2007 | 0.4 | 0.4 | 0.5 | 1.1 | NA | NA | NA | NA | NA |
| | 10/23/2008 | < 5 | < 5 | < 5 | < 5 | 438 | NA | 2.59* | 0.417* | NA |
| | 1/30/2009 | < 5 | < 5 | < 5 | < 5 | 303 | 0.658* | 1.45* | 0.276* | 692 |
| | 4/1/2009 | < 5 | < 5 | < 5 | < 5 | 258 | 1.19* | 1.9* | 0.416* | **1,340** |
| | 6/18/2009 | < 5 | < 5 | < 5 | < 5 | NA | 0.187* | 0.209* | NA** | NA |
| | 9/21/2009 | < 1 | < 1 | < 1 | < 2 | 324 | < 0.1 | 0.0458 | 0.0356 | 700 |
| | 12/14/2009 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.0539 | 661 |
| | 3/31/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.0662 | 697 |
| | 6/7/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.0599 | 778 |
| | 9/29/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | 0.117 | 853 |
| | 12/14/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | 0.102 | 770 |
| MW-2 | 1/30/2009 | < 5 | < 5 | < 5 | < 5 | **706** | 11.3* | 22.4* | 2.06* | **1,130** |
| | 4/1/2009 | < 5 | < 5 | < 5 | < 5 | **613** | 4.39* | 11.3* | 0.964* | **1,420** |
| | 6/18/2009 | < 5 | < 5 | < 5 | < 5 | NA | 2.38* | 4.01* | NA** | NA |
| | 9/21/2009 | < 1 | < 1 | < 1 | < 2 | 421 | < 0.1 | < 0.02 | 0.158 | 740 |
| | 12/14/2009 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.106 | 764 |
| | 3/31/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.144 | 804 |
| | 6/7/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.152 | 826 |
| | 9/29/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | **0.212** | **1090** |
| | 12/14/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | 0.194 | **1120** |
| MW-3 | 1/30/2009 | < 5 | < 5 | < 5 | < 5 | 427 | 4.34* | 5.77* | 0.675* | 918 |
| | 4/1/2009 | < 5 | < 5 | < 5 | < 5 | 416 | 1.45* | 3.0* | 0.615* | **1,010** |
| | 6/18/2009 | < 5 | < 5 | < 5 | < 5 | NA | 0.67* | 1.57* | NA** | NA |
| | 9/21/2009 | < 1 | < 1 | < 1 | < 2 | 359 | < 0.1 | < 0.02 | 0.115 | 733 |
| | 12/14/2009 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.154 | 712 |
| | 3/31/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | **0.219** | 898 |
| | 6/7/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | 0.132 | 841 |
| | 9/29/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | 0.147 | 849 |
| | 12/14/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | 0.161 | 835 |
| MW-4 | 1/30/2009 | < 5 | < 5 | < 5 | < 5 | 539 | 7.29* | 19.4* | 16.7* | **1,000** |
| | 4/1/2009 | < 5 | < 5 | < 5 | < 5 | 512 | 11.4* | 23.4* | 3.36* | **1,010** |
| | 6/18/2009 | < 5 | < 5 | < 5 | < 5 | NA | 0.344* | 0.362* | NA** | NA |
| | 9/21/2009 | < 1 | < 1 | < 1 | < 2 | 472 | < 0.1 | 0.0376 | **0.286** | 963 |
| | 12/14/2009 | < 1 | < 1 | < 1 | <1 | NA | NA | NA | **0.283** | 861 |
| | 3/31/2010 | < 1 | < 1 | < 1 | <1 | NA | NA | NA | **0.336** | **1000** |
| | 6/7/2010 | < 1 | < 1 | < 1 | < 1 | NA | NA | NA | **0.373** | **1300** |
| | 9/29/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | **0.571** | **1720** |
| | 12/14/2010 | <1 | <1 | <1 | <1 | NA | NA | NA | **0.514** | **1580** |
| **NMWQCC Groundwater Quality Standard** | | **10 (µg/L)** | **750 (µg/L)** | **750 (µg/L)** | **620 (µg/L)** | **600 (mg/L)** | **5 (mg/L)** | **1 (mg/L)** | **0.2 (mg/L)** | **1000 (mg/L)** |

**Notes:**

MW = monitor well
NMWQCC = New Mexico Water Quality Control Commission
Constituents in **BOLD** exceed NMWQCC Groundwater Quality Standards
VOCs = volatile organic compounds
mg/L = milligrams per liter
µg/L = micrograms per liter
NA** = not analyzed due to lab error
NA = not analyzed
NE = not established
TDS - total dissolved solids
Total Xylenes = the sum of m,p-xylene and o-xylene.
* = Results reported for total metals analysis, results can not be compared to NMWQCC Standards for dissolved metals
Analytical results for 9/26/2007 are presented as reported by Envirotech Inc.

# APPENDIX A

TETRA TECH, INC.

# WATER SAMPLING FIELD FORM

Project Name Shepherd & Kelsey 1E

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Project No. 114-690172

Site Location Bloomfield, NM

Site/Well No. ~~MW-3~~ MW-4

Coded/ Replicate No. 1643

Date 12/14/10

Weather Sunny, cool 50°

Time Sampling Began 1630

Time Sampling Completed 1640

## 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 20.11

Water-Level Elevation

Held ____ Depth to Water Below MP 4.76

Diameter of Casing 2"

Wet ____ Water Column in Well 15.35

Gallons Pumped/Bailed Prior to Sampling 3.5

Gallons per Foot 0.16

Gallons in Well 2.45 x 3 = ~~7.36~~ 3.27

Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm³) | TDS (g/L) | DO (mg/L) | DO % | ORP (mV) | Volume (gal.) |
|---|---|---|---|---|---|---|---|---|
| 1634 | 10.71 | 7.17 | 493 | 0.441 | 2.42 | 19.6 | -32.8 | 2.5 |
| 1635 | 10.75 | 7.20 | 493 | 0.440 | 1.26 | 11.3 | -335 | 3.0 |
| 1636 | 10.73 | 7.23 | 493 | 0.440 | 1.38 | 12.5 | -331 | 3.25 |
| | | | | | | | | |
| | | | | | | | | |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Dissolved Mn | 16 oz Plastic | None |
| TDS | 16 oz Plastic | None |

Remarks $H_2O$ is clear; No odor or sheen

Sampling Personnel ~~Christine Mathews,~~ Cassie Brown CBraig Brown

### 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

Project Name Shepherd & Kelsey 1E — Page 2 of 4

ect No. 114-090172

Site Location Bloomfield, NM

Site/Well No. MW-2 — Coded/ Replicate No. — Date 12/14/10

Weather 60's, cool, 50° — Time Sampling Began 1605 — Time Sampling Completed 16:27

## 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 20.2 — Water-Level Elevation

Held — Depth to Water Below MP 4.23 — Diameter of Casing 2"

Wet — Water Column in Well 15.97 — Gallons Pumped/Bailed Prior to Sampling 7.0

Gallons per Foot 0.16

Gallons in Well 2.55 x 3 = 7.66 — Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm³) | TDS (g/L) | DO (mg/L) | DO % | ORP (mV) | Volume (gal.) |
|---|---|---|---|---|---|---|---|---|
| 16:22 | 13.26 | 7.34 | 697 | .584 | 2.47 | 23.5 | -52.6 | 6.5 |
| 16:23 | 13.35 | 7.39 | 699 | .584 | 2.20 | 21.0 | -59.4 | 6.75 |
| 16:24 | 13.47 | 7.38 | 701 | .585 | 1.64 | 15.7 | -62.8 | 7.0 |
| | | | | | | | | |
| | | | | | | | | |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Dissolved Mn | 16 oz Plastic | None |
| TDS | 16 oz Plastic | None |

Remarks $H_2O$ SLIGHTLY GRAY

Sampling Personnel ~~Christine Matthews~~, Cassie Brown & Craig Brown

### 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

Project Name Shepherd & Kelsey 1E

Page 3 of 4

Project No. 114-690172

Site Location Bloomfield, NM

Site/Well No. MW-3

Coded/ Replicate No.

Date 12/14/10

Weather Sunny, cool

Time Sampling Began 1605

Time Sampling Completed 16:21

## 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 11.96

Water-Level Elevation

Held ____ Depth to Water Below MP 5.13

Diameter of Casing 2"

Wet ____ Water Column in Well 6.83

Gallons Pumped/Bailed Prior to Sampling 7.5

Gallons per Foot 0.16

Gallons in Well 2.18 x 3 = ~~3.27~~ 7.30

Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm³) | TDS (g/L) | DO (mg/L) | DO % | ORP (mV) | Volume (gal.) |
|---|---|---|---|---|---|---|---|---|
| 16:15 | 10.90 | 7.54 | 535 | .472 | 4.80 | 38.3 | -66.6 | 6.5 |
| 16:18 | 11.28 | 7.34 | 535 | .471 | 2.23 | 20.9 | -56.9 | 6.75 |
| 16:20 | 11.27 | 7.21 | 536 | .471 | 2.05 | 18.5 | -54.3 | 7.5 |
| | | | | | | | | |
| | | | | | | | | |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Dissolved Mn | 16 oz Plastic | None |
| TDS | 16 oz Plastic | None |

Remarks

Sampling Personnel ~~Christine Mathews~~, Cassie Brown & Craig Boren

**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

Project Name Shepherd & Kelsey 1E

Page 4 of 4

Project No. 114-690172

Site Location Bloomfield, NM

Site/Well No. MW-4

Coded/ Replicate No.

Date 12/14/10

Weather Sunny, cool 50°

Time Sampling Began 1640

Time Sampling Completed 1653

## 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 20.37

Water-Level Elevation

Held ____ Depth to Water Below MP 5.57

Diameter of Casing 2"

Wet ____ Water Column in Well 14.8

Gallons Pumped/Bailed Prior to Sampling 7.25

Gallons per Foot 0.16

Gallons in Well 2.36 x 3 = (7.10)

Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

## SAMPLING DATA/FIELD PARAMETERS

| Time | Temperature (°C) | pH | Conductivity (µS/cm³) | TDS (g/L) | DO (mg/L) | DO % | ORP (mV) | Volume (gal.) |
|---|---|---|---|---|---|---|---|---|
| 16:46 | 13.84 | 7.31 | 993 | .820 | 2.50 | 23.3 | -44.7 | 5.5 |
| | | | | | | | | 6 |
| | | | | | | | | 6.5 |
| 16:49 | 13.84 | 7.32 | 992 | .820 | 1.64 | 15.7 | -45.6 | 6.5 |
| 1651 | 13.79 | 7.30 | 991 | .817 | 1.68 | 15.4 | -45.7 | 7.25 |

Sampling Equipment Purge Pump/Bailer

| Constituents Sampled | Container Description | Preservative |
|---|---|---|
| BTEX | 3 40mL VOA's | HCl |
| Dissolved Mn | 16 oz Plastic | None |
| TDS | 16 oz Plastic | None |

# APPENDIX B

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

## Conoco Phillips

**Certificate of Analysis Number:**

**10120589**

| Report To: | | Project Name: | COP Shepherd Kelsey1E |
|---|---|---|---|
| Tetra Tech, Inc. | | Site: | Bloomfield, NM |
| Kelly Blanchard | | Site Address: | |
| 6121 Indian School Road, N.E. | | | |
| Suite 200 | | PO Number: | |
| Albuquerque | | State: | New Mexico |
| NM | | State Cert. No.: | |
| 87110- | | Date Reported: | 12/27/2010 |
| ph: (505) 237-8440 | fax: | | |

This Report Contains A Total Of 15 Pages

Excluding This Page, Chain Of Custody

And

Any Attachments

12/27/2010

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:

## 10120589

| Report To: | | Project Name: | COP Shepherd Kelsey1E |
|---|---|---|---|
| Tetra Tech, Inc. | | Site: | Bloomfield, NM |
| Kelly Blanchard | | Site Address: | |
| 6121 Indian School Road, N.E. | | | |
| Suite 200 | | PO Number: | |
| Albuquerque | | State: | New Mexico |
| NM | | State Cert. No.: | |
| 87110- | | Date Reported: | 12/27/2010 |
| 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.

This report shall not be reproduced except in full, without the written approval of the laboratory. The reported results are only representative of the samples submitted for testing.

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:

## 10120589

**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 Shepherd Kelsey1E
**Site:** Bloomfield, NM
**Site Address:**
**PO Number:**
**State:** New Mexico
**State Cert. No.:**
**Date Reported:** 12/27/2010

| Client Sample ID | Lab Sample ID | Matrix | Date Collected | Date Received | COC ID | HOLD |
|---|---|---|---|---|---|---|
| MW-1 | 10120589-01 | Water | 12/14/2010 16:40 | 12/17/2010 9:05:00 AM | 303427 | ☐ |
| MW-2 | 10120589-02 | Water | 12/14/2010 16:27 | 12/17/2010 9:05:00 AM | 303427 | ☐ |
| MW-3 | 10120589-03 | Water | 12/14/2010 16:21 | 12/17/2010 9:05:00 AM | 303427 | ☐ |
| MW-4 | 10120589-04 | Water | 12/14/2010 16:53 | 12/17/2010 9:05:00 AM | 303427 | ☐ |
| Duplicate | 10120589-05 | Water | 12/14/2010 16:43 | 12/17/2010 9:05:00 AM | 303428 | ☐ |
| Trip Blank | 10120589-06 | Water | 12/15/2010 21:40 | 12/17/2010 9:05:00 AM | 303428 | ☐ |

Erica Cardenas 12/27/2010
Erica Cardenas Date
Project Manager

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-1 **Collected:** 12/14/2010 16:40 **SPL Sample ID:** 10120589-01

**Site:** Bloomfield, NM

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | **MCL** | **SW6010B** | **Units: mg/L** | | |
| Manganese | 0.102 | | 0.005 | 1 | 12/22/10 1:02 | EG | 5680501 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/17/2010 12:45 | M_W | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL DISSOLVED SOLIDS** | | | **MCL** | **SM2540 C** | **Units: mg/L** | | |
| Total Dissolved Solids (Residue,Filterable) | 770 | | 10 | 1 | 12/17/10 16:00 | MM1 | 5677489 |
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | ND | | 1 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Ethylbenzene | ND | | 1 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Toluene | ND | | 1 | 1 | 12/21/10 8:34 | JC | 5679822 |
| m,p-Xylene | ND | | 2 | 1 | 12/21/10 8:34 | JC | 5679822 |
| o-Xylene | ND | | 1 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Xylenes,Total | ND | | 1 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Surr: 1,2-Dichloroethane-d4 | 95.7 | % | 70-130 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Surr: 4-Bromofluorobenzene | 89.8 | % | 74-125 | 1 | 12/21/10 8:34 | JC | 5679822 |
| Surr: Toluene-d8 | 102 | % | 82-118 | 1 | 12/21/10 8:34 | JC | 5679822 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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

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**Client Sample ID:** MW-2 **Collected:** 12/14/2010 16:27 **SPL Sample ID:** 10120589-02

**Site:** Bloomfield, NM

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | **MCL** | **SW6010B** | **Units: mg/L** | | |
| Manganese | 0.194 | | 0.005 | 1 | 12/22/10 1:08 | EG | 5680502 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/17/2010 12:45 | M_W | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL DISSOLVED SOLIDS** | | | **MCL** | **SM2540 C** | **Units: mg/L** | | |
| Total Dissolved Solids (Residue,Filterable) | 1120 | | 50 | 5 | 12/17/10 16:00 | MM1 | 5677491 |
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | ND | | 1 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Ethylbenzene | ND | | 1 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Toluene | ND | | 1 | 1 | 12/21/10 9:03 | JC | 5679823 |
| m,p-Xylene | ND | | 2 | 1 | 12/21/10 9:03 | JC | 5679823 |
| o-Xylene | ND | | 1 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Xylenes,Total | ND | | 1 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Surr: 1,2-Dichloroethane-d4 | 95.9 | % | 70-130 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Surr: 4-Bromofluorobenzene | 92.6 | % | 74-125 | 1 | 12/21/10 9:03 | JC | 5679823 |
| Surr: Toluene-d8 | 97.8 | % | 82-118 | 1 | 12/21/10 9:03 | JC | 5679823 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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

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**Client Sample ID:** MW-3 **Collected:** 12/14/2010 16:21 **SPL Sample ID:** 10120589-03

**Site: Bloomfield, NM**

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | | **MCL** | **SW6010B** | **Units: mg/L** | |
| Manganese | 0.161 | | 0.005 | 1 | 12/22/10 1:14 | EG | 5680503 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/17/2010 12:45 | M_W | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL DISSOLVED SOLIDS** | | | | **MCL** | **SM2540 C** | **Units: mg/L** | |
| Total Dissolved Solids (Residue,Filterable) | 835 | | 10 | 1 | 12/17/10 16:00 | MM1 | 5677492 |
| **VOLATILE ORGANICS BY METHOD 8260B** | | | | **MCL** | **SW8260B** | **Units: ug/L** | |
| Benzene | ND | | 1 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Ethylbenzene | ND | | 1 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Toluene | ND | | 1 | 1 | 12/21/10 9:32 | JC | 5679824 |
| m,p-Xylene | ND | | 2 | 1 | 12/21/10 9:32 | JC | 5679824 |
| o-Xylene | ND | | 1 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Xylenes,Total | ND | | 1 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Surr: 1,2-Dichloroethane-d4 | 92.2 | % | 70-130 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Surr: 4-Bromofluorobenzene | 91.9 | % | 74-125 | 1 | 12/21/10 9:32 | JC | 5679824 |
| Surr: Toluene-d8 | 103 | % | 82-118 | 1 | 12/21/10 9:32 | JC | 5679824 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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

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**Client Sample ID:** MW-4 **Collected:** 12/14/2010 16:53 **SPL Sample ID:** 10120589-04

**Site:** Bloomfield, NM

| Analyses/Method | Result | QUAL | Rep.Limit | Dil. Factor | Date Analyzed | Analyst | Seq. # |
|---|---|---|---|---|---|---|---|
| **METALS BY METHOD 6010B, DISSOLVED** | | | **MCL** | **SW6010B** | **Units: mg/L** | | |
| Manganese | 0.514 | | 0.005 | 1 | 12/22/10 1:20 | EG | 5680504 |

| Prep Method | Prep Date | Prep Initials | Prep Factor |
|---|---|---|---|
| SW3005A | 12/17/2010 12:45 | M_W | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL DISSOLVED SOLIDS** | | | **MCL** | **SM2540 C** | **Units: mg/L** | | |
| Total Dissolved Solids (Residue,Filterable) | 1580 | | 10 | 1 | 12/17/10 16:00 | MM1 | 5677493 |
| **VOLATILE ORGANICS BY METHOD 8260B** | | | **MCL** | **SW8260B** | **Units: ug/L** | | |
| Benzene | ND | | 1 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Ethylbenzene | ND | | 1 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Toluene | ND | | 1 | 1 | 12/21/10 10:00 | JC | 5679825 |
| m,p-Xylene | ND | | 2 | 1 | 12/21/10 10:00 | JC | 5679825 |
| o-Xylene | ND | | 1 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Xylenes,Total | ND | | 1 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Surr: 1,2-Dichloroethane-d4 | 92.0 | % | 70-130 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Surr: 4-Bromofluorobenzene | 93.9 | % | 74-125 | 1 | 12/21/10 10:00 | JC | 5679825 |
| Surr: Toluene-d8 | 101 | % | 82-118 | 1 | 12/21/10 10:00 | JC | 5679825 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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

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**Client Sample ID:** Duplicate **Collected:** 12/14/2010 16:43 **SPL Sample ID:** 10120589-05

**Site:** Bloomfield, 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 | 12/21/10 10:30 | JC | 5679826 |
| Ethylbenzene | ND | | | 1 | 1 | 12/21/10 10:30 | JC | 5679826 |
| Toluene | ND | | | 1 | 1 | 12/21/10 10:30 | JC | 5679826 |
| m,p-Xylene | ND | | | 2 | 1 | 12/21/10 10:30 | JC | 5679826 |
| o-Xylene | ND | | | 1 | 1 | 12/21/10 10:30 | JC | 5679826 |
| Xylenes,Total | ND | | | 1 | 1 | 12/21/10 10:30 | JC | 5679826 |
| Surr: 1,2-Dichloroethane-d4 | 90.5 | | % | 70-130 | 1 | 12/21/10 10:30 | JC | 5679826 |
| Surr: 4-Bromofluorobenzene | 85.6 | | % | 74-125 | 1 | 12/21/10 10:30 | JC | 5679826 |
| Surr: Toluene-d8 | 104 | | % | 82-118 | 1 | 12/21/10 10:30 | JC | 5679826 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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

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

**Client Sample ID:** Trip Blank **Collected:** 12/15/2010 21:40 **SPL Sample ID:** 10120589-06

**Site:** Bloomfield, 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 | 12/21/10 8:05 | JC | 5679821 |
| Ethylbenzene | ND | | | 1 | 1 | 12/21/10 8:05 | JC | 5679821 |
| Toluene | ND | | | 1 | 1 | 12/21/10 8:05 | JC | 5679821 |
| m,p-Xylene | ND | | | 2 | 1 | 12/21/10 8:05 | JC | 5679821 |
| o-Xylene | ND | | | 1 | 1 | 12/21/10 8:05 | JC | 5679821 |
| Xylenes,Total | ND | | | 1 | 1 | 12/21/10 8:05 | JC | 5679821 |
| Surr: 1,2-Dichloroethane-d4 | 97.3 | | % | 70-130 | 1 | 12/21/10 8:05 | JC | 5679821 |
| Surr: 4-Bromofluorobenzene | 91.0 | | % | 74-125 | 1 | 12/21/10 8:05 | JC | 5679821 |
| Surr: Toluene-d8 | 105 | | % | 82-118 | 1 | 12/21/10 8:05 | JC | 5679821 |

**Qualifiers:**

ND/U - Not Detected at the Reporting Limit
B - 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 Shepherd Kelsey1E**

**Analysis:** Metals by Method 6010B, Dissolved
**Method:** SW6010B
**WorkOrder:** 10120589
**Lab Batch ID:** 103991

### Method Blank

RunID: ICP2_101221C-5680478 Units: mg/L
Analysis Date: 12/21/2010 22:43 Analyst: EG
Preparation Date: 12/17/2010 12:45 Prep By: M_W Method SW3005A

| Analyte | Result | Rep Limit |
|---|---|---|
| Manganese | ND | 0.005 |

**Samples in Analytical Batch:**

| Lab Sample ID | Client Sample ID |
|---|---|
| 10120589-01B | MW-1 |
| 10120589-02B | MW-2 |
| 10120589-03B | MW-3 |
| 10120589-04B | MW-4 |

### Laboratory Control Sample (LCS)

RunID: ICP2_101221C-5680479 Units: mg/L
Analysis Date: 12/21/2010 22:49 Analyst: EG
Preparation Date: 12/17/2010 12:45 Prep By: M_W Method SW3005A

| Analyte | Spike Added | Result | Percent Recovery | Lower Limit | Upper Limit |
|---|---|---|---|---|---|
| Manganese | 0.1000 | 0.09500 | 95.00 | 80 | 120 |

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

Sample Spiked: 10120587-03
RunID: ICP2_101221C-5680481 Units: mg/L
Analysis Date: 12/21/2010 23:01 Analyst: EG
Preparation Date: 12/17/2010 12:45 Prep By: M_W 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manganese | 8.643 | 0.1 | 8.779 | N/C | 0.1 | 8.936 | N/C | N/C | 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 Shepherd Kelsey1E**

**Analysis:** Volatile Organics by Method 8260B
**Method:** SW8260B
**WorkOrder:** 10120589
**Lab Batch ID:** R313123

### Method Blank

RunID: Q_101221A-5679812 Units: ug/L
Analysis Date: 12/21/2010 3:17 Analyst: JC

| Analyte | Result | Rep Limit |
|---|---|---|
| Benzene | ND | 1.0 |
| Ethylbenzene | ND | 1.0 |
| Toluene | ND | 1.0 |
| m,p-Xylene | ND | 2.0 |
| o-Xylene | ND | 1.0 |
| Xylenes,Total | ND | 1.0 |
| Surr: 1,2-Dichloroethane-d4 | 94.8 | 70-130 |
| Surr: 4-Bromofluorobenzene | 90.5 | 74-125 |
| Surr: Toluene-d8 | 100.7 | 82-118 |

### Samples in Analytical Batch:

| Lab Sample ID | Client Sample ID |
|---|---|
| 10120589-01A | MW-1 |
| 10120589-02A | MW-2 |
| 10120589-03A | MW-3 |
| 10120589-04A | MW-4 |
| 10120589-05A | Duplicate |
| 10120589-06A | Trip Blank |

### Laboratory Control Sample (LCS)

RunID: Q_101221A-5679811 Units: ug/L
Analysis Date: 12/21/2010 2:48 Analyst: JC

| Analyte | Spike Added | Result | Percent Recovery | Lower Limit | Upper Limit |
|---|---|---|---|---|---|
| Benzene | 20.0 | 19.7 | 98.6 | 74 | 123 |
| Ethylbenzene | 20.0 | 20.4 | 102 | 72 | 127 |
| Toluene | 20.0 | 20.0 | 100 | 74 | 126 |
| m,p-Xylene | 40.0 | 39.3 | 98.3 | 71 | 129 |
| o-Xylene | 20.0 | 21.0 | 105 | 74 | 130 |
| Xylenes,Total | 60.0 | 60.3 | 101 | 71 | 130 |
| Surr: 1,2-Dichloroethane-d4 | 50.0 | 47.1 | 94.2 | 70 | 130 |
| Surr: 4-Bromofluorobenzene | 50.0 | 47.7 | 95.5 | 74 | 125 |
| Surr: Toluene-d8 | 50.0 | 48.8 | 97.6 | 82 | 118 |

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

Sample Spiked: 10120589-05
RunID: Q_101221A-5679827 Units: ug/L
Analysis Date: 12/21/2010 10:59 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.

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

## Quality Control Report

### Conoco Phillips

**COP Shepherd Kelsey1E**

**Analysis:** Volatile Organics by Method 8260B **WorkOrder:** 10120589
**Method:** SW8260B **Lab Batch ID:** R313123

| 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 | 19.2 | 96.1 | 20 | 17.9 | 89.4 | 7.26 | 22 | 70 | 124 |
| Ethylbenzene | ND | 20 | 19.9 | 99.6 | 20 | 20.3 | 101 | 1.71 | 20 | 76 | 122 |
| Toluene | ND | 20 | 19.5 | 97.6 | 20 | 20.3 | 102 | 4.10 | 24 | 80 | 117 |
| m,p-Xylene | ND | 40 | 39.4 | 98.5 | 40 | 40.7 | 102 | 3.35 | 20 | 69 | 127 |
| o-Xylene | ND | 20 | 20.7 | 103 | 20 | 20.6 | 103 | 0.392 | 20 | 84 | 114 |
| Xylenes,Total | ND | 60 | 60.1 | 100 | 60 | 61.3 | 102 | 2.07 | 20 | 69 | 127 |
| Surr: 1,2-Dichloroethane-d4 | ND | 50 | 46.5 | 93.0 | 50 | 46.8 | 93.6 | 0.648 | 30 | 70 | 130 |
| Surr: 4-Bromofluorobenzene | ND | 50 | 47 | 94.0 | 50 | 51.0 | 102 | 8.16 | 30 | 74 | 125 |
| Surr: Toluene-d8 | ND | 50 | 48.8 | 97.6 | 50 | 51.8 | 104 | 5.94 | 30 | 82 | 118 |

**Qualifiers:**
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# Quality Control Report

## Conoco Phillips

**COP Shepherd Kelsey1E**

**Analysis:** Total Dissolved Solids
**Method:** SM2540 C

**WorkOrder:** 10120589
**Lab Batch ID:** R313000A

### Method Blank

RunID: WET_101217O-5677470 Units: mg/L
Analysis Date: 12/17/2010 16:00 Analyst: MM1

| Analyte | Result | Rep Limit |
|---|---|---|
| Total Dissolved Solids (Residue,Filterable) | ND | 10 |

**Samples in Analytical Batch:**

| Lab Sample ID | Client Sample ID |
|---|---|
| 10120589-01C | MW-1 |
| 10120589-02C | MW-2 |
| 10120589-03C | MW-3 |
| 10120589-04C | MW-4 |

### Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

RunID: WET_101217O-5677472 Units: mg/L
Analysis Date: 12/17/2010 16:00 Analyst: MM1

| Analyte | LCS Spike Added | LCS Result | LCS Percent Recovery | LCSD Spike Added | LCSD Result | LCSD Percent Recovery | RPD | RPD Limit | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Dissolved Solids (Residue,Filterab | 200.0 | 198.0 | 99.00 | 200.0 | 202.0 | 101.0 | 2.0 | 10 | 95 | 107 |

### Sample Duplicate

Original Sample: 10120589-01
RunID: WET_101217O-5677489 Units: mg/L
Analysis Date: 12/17/2010 16:00 Analyst: MM1

| Analyte | Sample Result | DUP Result | RPD | RPD Limit |
|---|---|---|---|---|
| Total Dissolved Solids (Residue,Filterab | 770 | 775 | 0.647 | 10 |

**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*

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HOUSTON, TX 77054
(713) 660-0901

# Sample Receipt Checklist

| | | | |
|---|---|---|---|
| Workorder: | **10120589** | Received By: | **NB** |
| Date and Time Received: | **12/17/2010 9:05:00 AM** | Carrier name: | **Fedex-Standard Overnight** |
| Temperature: | **3.5/3.5/3.5/3.0/4.0/4.0/** | 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. 303427
10120589 page 1 of 2

Client Name: Tetra Tech, Inc.
Address: 6121 Indian School Rd. NE #200
City: Albuquerque State: NM Zip: 87110
Phone/Fax: (505) 237-8440
Client Contact: Kelly Blanchard Email: Kelly.Blanchard@tetratech.com
Project Name/No.: Shepherd and Kelsey #1E
Site Name:
Site Location: Bloomfield, NM
Invoice To: 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) | Number of Containers | Requested Analysis: BTEX (8260B) | dissolved Mn (6010B) | TDS (2540C) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 12.14.10 | 1640 | | X | W | V | 40 | 1 | 3 | X | | | |
| MW-1 | 12.14.10 | 1640 | | X | W | P | 16 | X | 1 | | X | | |
| MW-1 | 12.14.10 | 1640 | | X | W | P | 16 | X | 1 | | | X | |
| MW-2 | 12.14.10 | 1627 | | X | W | V | 40 | 1 | 3 | X | | | |
| MW-2 | 12.14.10 | 1627 | | X | W | P | 16 | X | 1 | | X | | |
| MW-2 | 12.14.10 | 1627 | | X | W | P | 16 | X | 1 | | | X | |
| MW-3 | 12.14.10 | 1621 | | X | W | V | 40 | 1 | 3 | X | | | |
| MW-3 | 12.14.10 | 1621 | | X | W | P | 16 | X | 1 | | X | | |
| MW-3 | 12.14.10 | 1621 | | X | W | P | 16 | X | 1 | | | X | |
| MW-4 | 12.14.10 | 1653 | | X | W | V | 40 | 1 | 3 | X | | | |

Client/Consultant Remarks: Please filter and preserve metals @ lab.
Laboratory remarks:
Intact? Y N
Ice? Y N
Temp: 3.5°C

**Requested TAT**
- 1 Business Day
- 2 Business Days
- 3 Business Days
- Contract
- Standard
- 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: Chase Blair | 12.16.10 | 0800 | 2. Received by: | |
| 3. Relinquished by: | date | time | 4. Received by: | |
| 5. Relinquished by: | date 12/17/10 | time 0905 | 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

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

SPL Workorder No. 303428
101 0589
page 2 of 2

Client Name: Tetra Tech, Inc.
Address: 6121 Indian School Rd. NE #200
City: ABQ State: NM Zip: 87110
Phone/Fax: 505-237-8440
Client Contact: Kelly Blanchard Email:
Project Name/No.: Shepherd #Kelsey #1E
Site Name:
Site Location: Bloomfield, NM
Invoice To: 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) | Number of Containers | Requested Analysis: BTEX (8260) | Dissolved Mn (6010) | TDS (2540C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-4 | 12.14.10 | 1663 | | X | W | P | 16 | X | 1 | | X | |
| MW-4 | 12.14.10 | 1663 | | X | W | P | 16 | X | 1 | | | X |
| Duplicate | 12.14.10 | 1643 | | X | W | V | 40 | 1 | 3 | X | | |
| Trip Blank | 12.15.10 | 2140 | | X | W | V | 40 | 1 | 2 | X | | |

Client/Consultant Remarks: Please filter & Preserve metals @ lab.
Laboratory remarks:
Intact? Y N
Ice? Y N
Temp 3.5c

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

Special Reporting Requirements Results: Fax Email X PDF X
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: | 12.16.10 | 0800 | 2. Received by: | |
| 3. Relinquished by: | date | time | 4. Received by: | |
| 5. Relinquished by: | date 12/17/10 | time 0905 | 6. Received by Laboratory: | |

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