3R - 084

2013 AGWMR

03 / 21 / 2014

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ConocoPhillips

Mr. Glenn von Gonten
New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

March 21, 2014

Re: NMOCD Case No. 3RP-084, 2013 Annual Groundwater Monitoring Report

Dear Mr. von Gonten:

Enclosed is the 2013 Annual Groundwater Monitoring Report for the Farmington B Com No. 1E site. This report, prepared by Conestoga-Rovers & Associates (CRA), contains the results of groundwater monitoring conducted during April and September 2013.

Please let me know if you have any questions.

Sincerely,

Terry S. Lauck

Enc

CONESTOGA-ROVERS & ASSOCIATES

www.CRAworld.com

2013 Annual Groundwater Monitoring Report

ConocoPhillips Farmington B Com No. 1E
San Juan County, New Mexico
API# 30-045-24774
NMOCD# 3R0084

Prepared for: ConocoPhillips Company

Conestoga-Rovers & Associates
6121 Indian School Road, NE Suite 200
Albuquerque, New Mexico 87110

January 2014 • 074938 • Report No. 4

Partners in Sustainability

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Section 1.0 Introduction

This report presents the results of the April 4, 2013 semi-annual groundwater monitoring event, and the September 30, 2013 semi-annual groundwater monitoring and supplemental metals treatability study sampling events completed by Conestoga-Rovers & Associates, Inc. (CRA) at the Farmington B Com No. 1E remediation site in Farmington, New Mexico (Site). The Site is located on private property in southeast Farmington, New Mexico, near the corner of East Murray Drive and South Carlton Avenue. Geographical coordinates for the Site are 36.721137° North and 108.190501° West. The Site consists of a natural gas well and associated equipment and installations. The location and general features of the Site are presented as **Figures 1 and 2**, respectively. A generalized geological cross section of the Site is included as **Figure 3**.

1.1 Background

Conoco Inc., predecessor to ConocoPhillips Company (ConocoPhillips), 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 the 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 in situ 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 benzene, toluene, ethylbenzene, and xylenes (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 (SMA) 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. SMA determined that an active skimmer was not a viable method of LNAPL recovery in MW-1 and proposed passive skimming or periodic hand bailing.

Tetra Tech, Inc. (Tetra Tech) began groundwater quality monitoring at the Site in May 2005. Tetra Tech monitored MW-1 and MW-6, which is located downgradient of MW-1. Quarterly groundwater pumping events were conducted at MW-1 from October 2004 to March 2008.

On June 15, 2011, Site consulting responsibilities were transferred from Tetra Tech to CRA of Albuquerque, NM. Quarterly groundwater sampling of MW-1 and MW-6 was continued by CRA. After 12 consecutive quarters of sampling with BTEX constituents below NMWQCC standards, BTEX analysis was discontinued following the December 2011 sampling event and annual sampling for dissolved iron and dissolved manganese, the two remaining constituents of concern above standards, was initiated. A summary of the Farmington B Com No. 1E Site history can be seen in **Table 1**.

Section 2.0 Groundwater Monitoring Methodology and Analytical Results

2.1 Groundwater Monitoring Summary

Groundwater sampling events were conducted by CRA on April 4 and September 30, 2013. Groundwater elevation measurements were collected from all Site monitor wells. An LNAPL sheen was present in the purged water from MW-1 prior to sampling during both the April and September events. As a result, no field groundwater quality parameters were collected for MW-1. Groundwater samples were collected from Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6 during the sampling events.

In addition to routine activities, a groundwater sample collected from Monitor Well MW-1 during the September 30, 2013 event was submitted to CRA's Innovative Technology Group (ITG) to assess potential in situ technologies to address solubilization of iron and manganese in the reducing groundwater of the Site.

2.2 Groundwater Monitoring Methodology

Groundwater Elevation Measurements

During each sampling event groundwater elevation measurements were recorded for Monitor Wells MW-1 through MW-6 using an oil/water interface probe. Groundwater elevations are detailed in **Table 2**. Groundwater potentiometric surface maps are presented as **Figures 4 and 5**. Based on monitoring data, groundwater flow during the April and September 2013 events was southwest to west-southwest. The data are consistent with recent and historical records at this Site. An irrigation canal is located immediately south of the Site, comprising a portion of its southern boundary.

The Animas River is approximately ¾ miles northwest of the Site and flows west. Flow in both of these surface water features likely affects seasonal groundwater elevations and flow direction as measured in Site monitor wells.

Groundwater sampling

The April and September 2013 sampling events represent the second and third, sampling events, respectively, with BTEX analysis discontinued. For each event, approximately three well volumes were purged from each monitor well with a dedicated polyethylene 1.5-inch disposable bailer. During purging, field parameters including pH, conductivity, dissolved oxygen, temperature and oxidation/reduction potential were measured periodically and recorded on field sampling forms. Collected groundwater samples were placed in laboratory prepared bottles, packed on ice, and shipped under chain-of-custody documentation to Pace Analytical Services, Inc. of Lenexa, Kansas. The samples were analyzed for the presence of dissolved iron and manganese according to EPA Method 6010. Groundwater sampling field forms are included as **Appendix A**.

The metals treatability sample collected from Monitor Well MW-1 was submitted to CRA's ITG for evaluation for potential groundwater treatment by pH adjustment, biosparging and oxidant injection.

2.3 Groundwater Monitoring Analytical Results

The New Mexico Water Quality Control Commission (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). Groundwater quality standards have been set for the protection of human health, domestic water supply, and irrigation use. Above-standard results of the April and September 2013 semi-annual sampling events are discussed below:

- Dissolved Manganese
    - The groundwater quality standard for dissolved manganese is 0.2 mg/L. The groundwater samples collected from Monitor Well MW-1 during the April and September 2013 sampling events were found to contain dissolved manganese at concentrations of 0.47 mg/L and 0.29 mg/L respectively. The groundwater samples collected from Monitor Wells MW-3 and MW-6 during the April 2013 sampling event were found to contain dissolved manganese at concentrations of 0.28 mg/L and 0.33 mg/L, respectively.

- Dissolved Iron
    - The groundwater quality standard for dissolved iron is 1.0 mg/L. Groundwater analysis of the sample collected from Monitor Well MW-1 during the April and September 2013 sampling event indicated dissolved iron concentrations of 1.8 mg/L, and 1.7 mg/L, respectively.

Laboratory analytical results are summarized in **Table 3**. The laboratory analytical report is included in **Appendix B**. A table of the SMA historical analytical data is attached as **Appendix C**.

Section 3.0 Conclusions and Recommendations

BTEX in Site groundwater have naturally attenuated and have not been detected above NMWQCC standards since 2006. Analysis of these constituents at the Site was discontinued following the December 2011 sampling event. The anaerobic conditions caused by the biodegradation of hydrocarbons in groundwater may have led to the solubilization of iron and manganese. These constituents presently occur in Site groundwater at concentrations above NMWQCC standards in the vicinity of Monitor Well MW-1. The groundwater treatability study conducted by the ITG determined that pH adjustment would be the most cost-effective method for dissolved metals remediation. Evaluation of the available oxidant injection technologies is recommended to address both dissolved metals and the residual hydrocarbon sheen on the groundwater in the vicinity of MW-1.

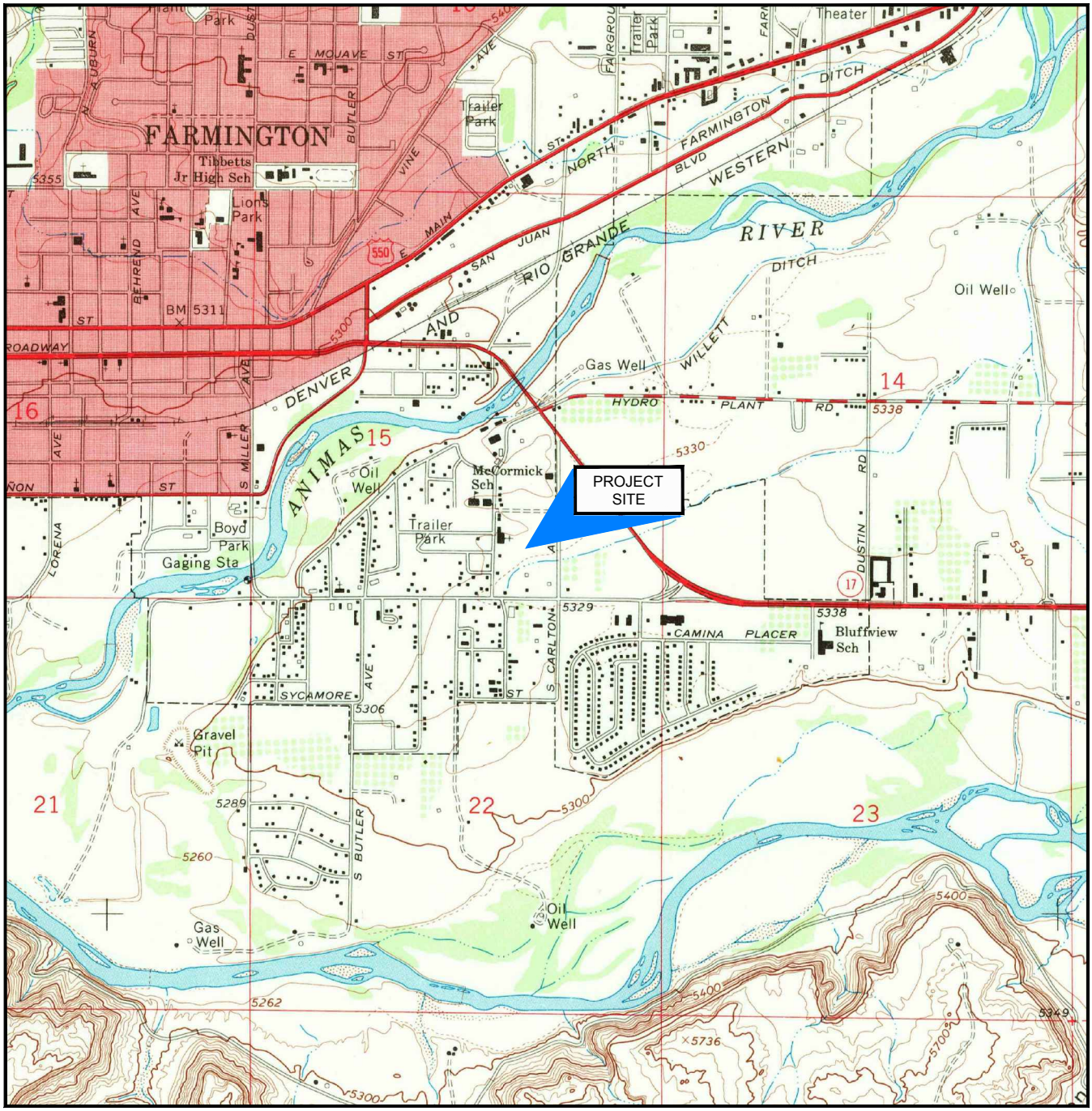
If one of the recommended in situ technologies is implemented, CRA recommends groundwater monitoring and laboratory analysis of dissolved iron and manganese concentrations be conducted on a quarterly basis to monitor effectiveness of the remedial action. In the absence of a remedial action at the Site, continuation of annual monitoring is recommended. The next annual sampling event is scheduled for September 2014.

Section 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.



SOURCE: USGS 7.5 MINUTE QUAD
"FARMINGTON, NEW MEXICO"

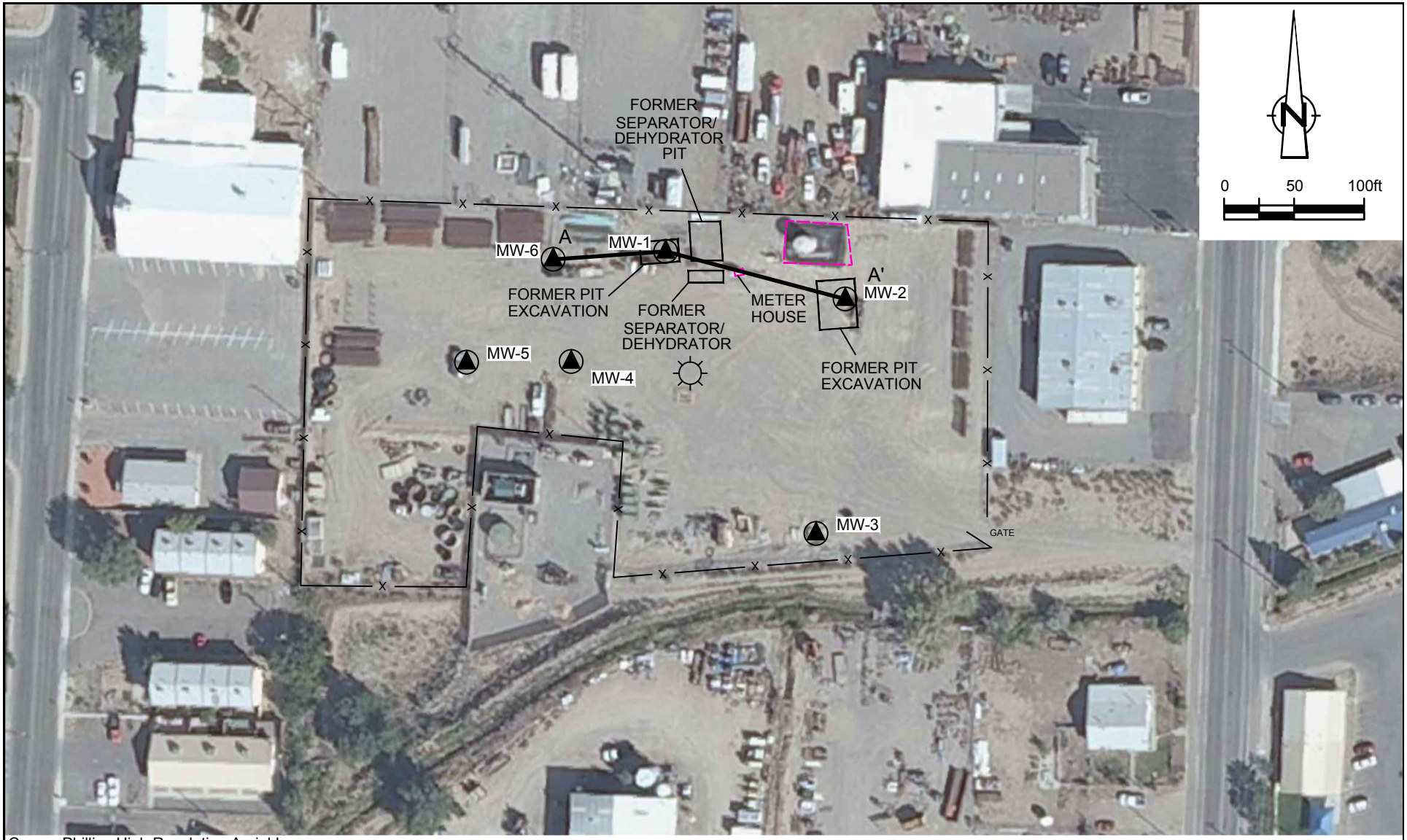
N

0 1000 2000ft

Figure 1

SITE VICINITY MAP
FARMINGTON B-COM No. 1E
FARMINGTON, NEW MEXICO
ConocoPhillips Company

074938-95(004)GN-DL001_TOPO DEC 17/2013



ConocoPhillips High Resolution Aerial Imagery

LEGEND

WELLHEAD

MONITORING WELL

FENCE

EXISTING MERRION OIL EQUIPMENT

Figure 2

SITE PLAN
FARMINGTON B-COM No. 1E
FARMINGTON, NEW MEXICO
ConocoPhillips Company

074938-95(004)GN-DL002_SD DEC 17/2013

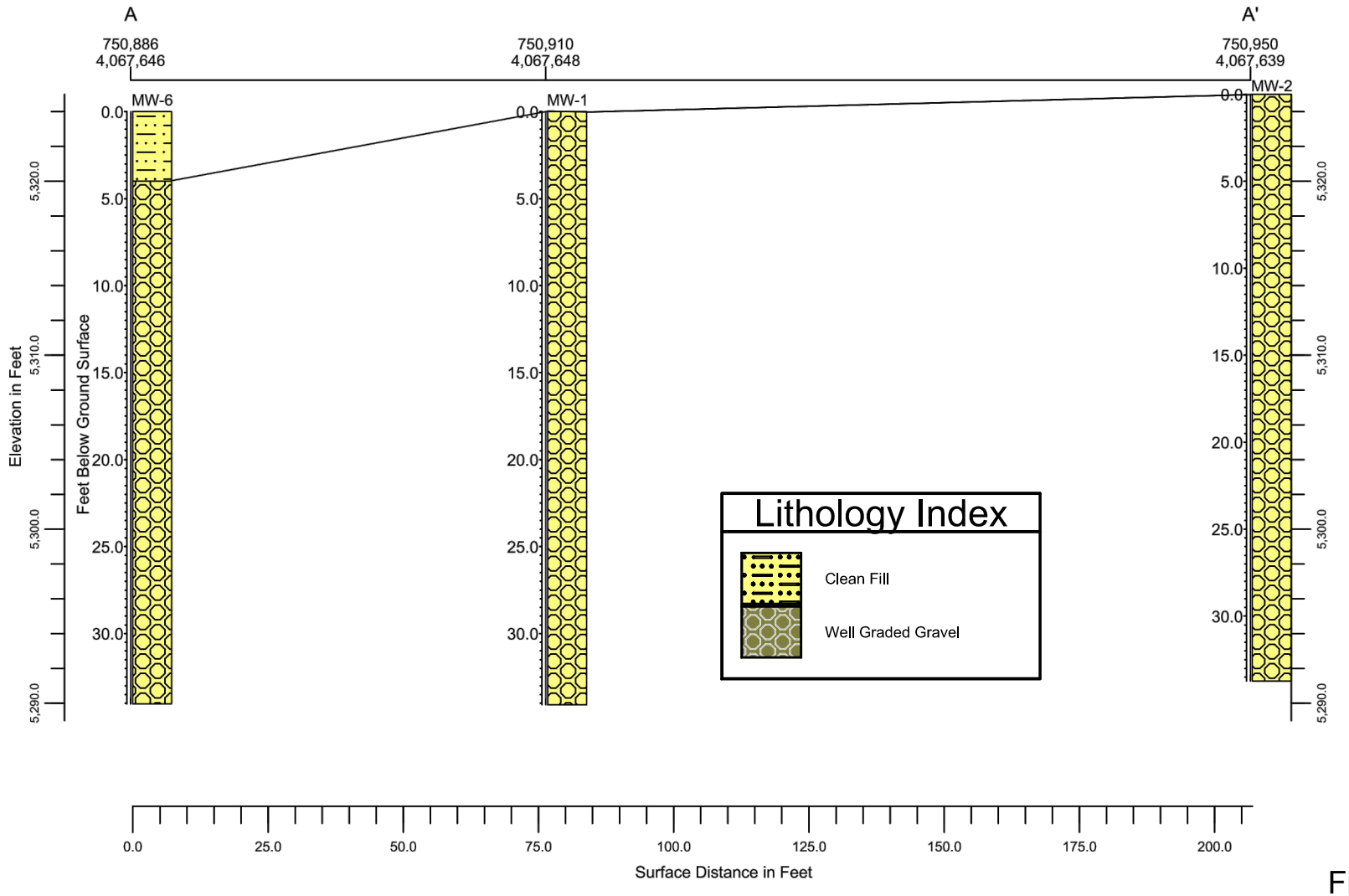
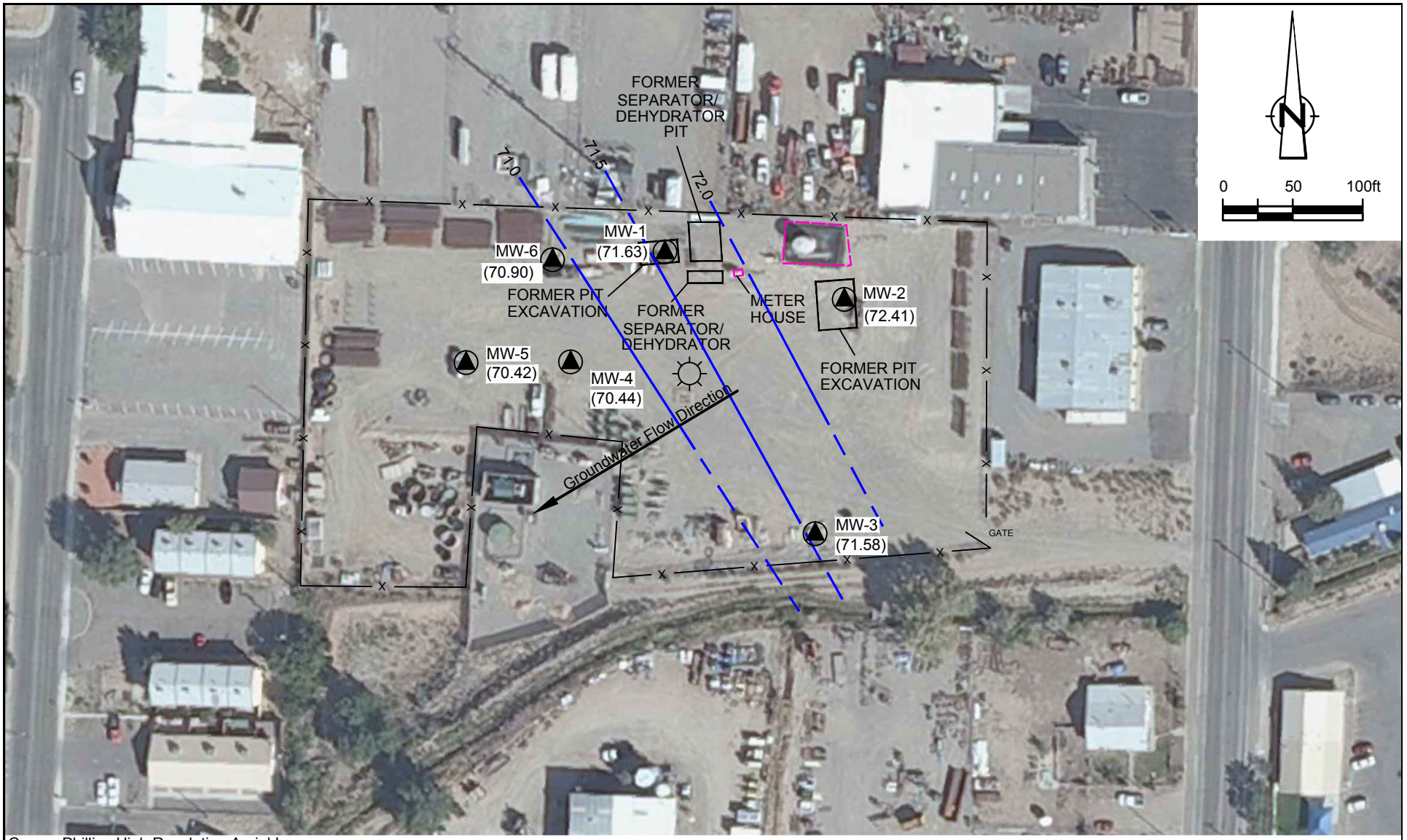


Figure 3

GENERALIZED GEOLOGIC CROSS SECTION
FARMINGTON B-COM No. 1E
FARMINGTON, NEW MEXICO
ConocoPhillips Company

074938-95(004)GN-DL003_XSEC DEC 17/2013



ConocoPhillips High Resolution Aerial Imagery

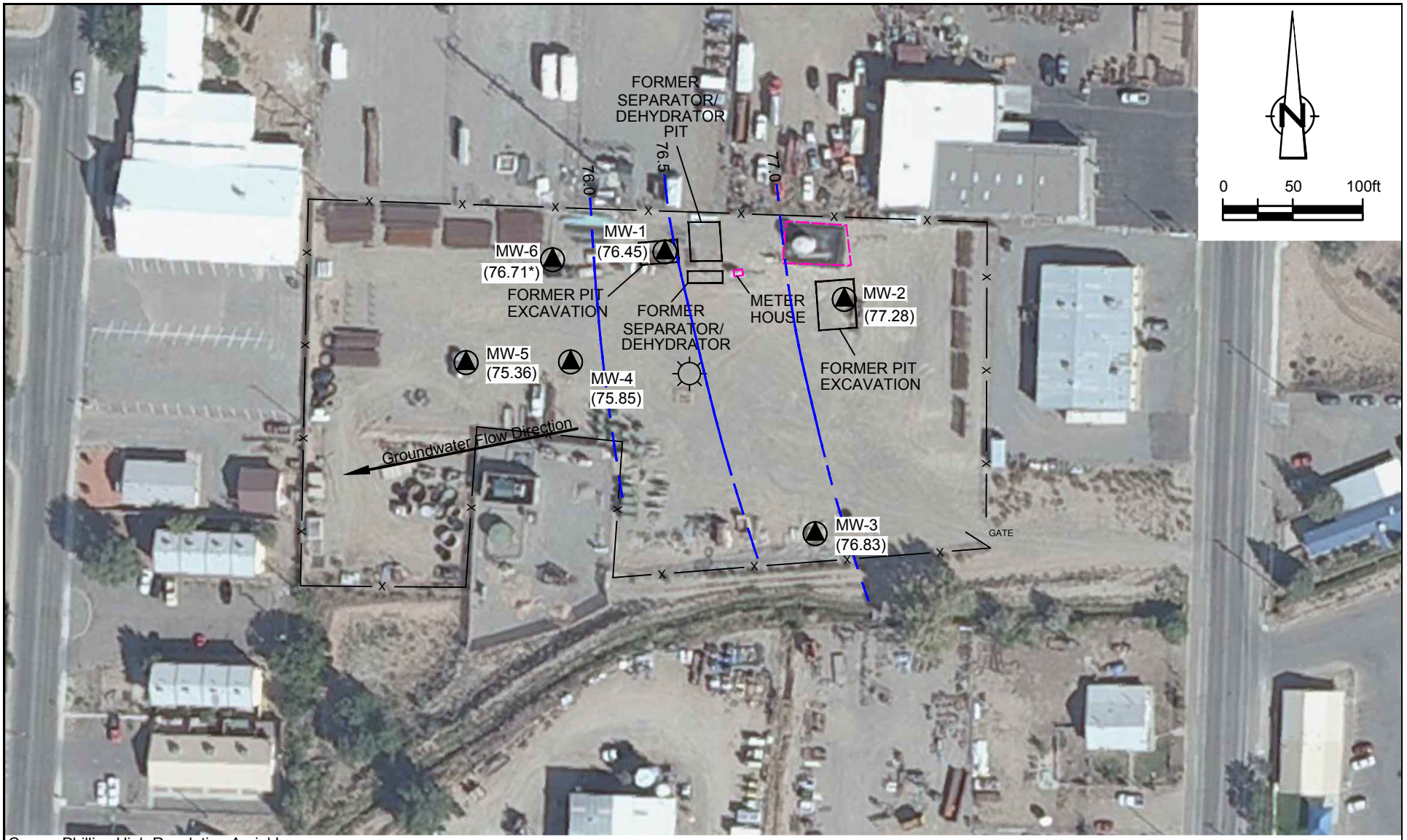
LEGEND

- NATURAL GAS WELLHEAD
- MONITORING WELL
- FENCE
- EXISTING MERRION OIL EQUIPMENT
- (77.55) GROUNDWATER ELEVATION, Ft
- 72.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

Figure 4

APRIL 2013 GROUNDWATER POTENTIOMETRIC SURFACE MAP
FARMINGTON B-COM No. 1E
FARMINGTON, NEW MEXICO
ConocoPhillips Company

074938-95(004)GN-DL005 JAN 9/2014



ConocoPhillips High Resolution Aerial Imagery

LEGEND

- NATURAL GAS WELLHEAD
- MONITORING WELL
- FENCE
- EXISTING MERRION OIL EQUIPMENT
- (77.55) GROUNDWATER ELEVATION, Ft
- (76.71*) NOT USED IN CONTOURING
- 72.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

Figure 5

SEPTEMBER 2013 GROUNDWATER POTENTIOMETRIC SURFACE MAP
FARMINGTON B-COM No. 1E
FARMINGTON, NEW MEXICO
ConocoPhillips Company

074938-95(004)GN-DL004_GG DEC 20/2013

TABLE 1

SITE HISTORY TIMELINE
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

DATE	*Event/Action*	*ACTIVITY*
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 by 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.

TABLE 1

SITE HISTORY TIMELINE
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

DATE	*Event/Action*	*ACTIVITY*
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-1 and MW-6.
October 22, 2008	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6.
January 21, 2009	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6. MW-1 not sampled due to presence of free product. 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. First quarter of compliance for all BTEX constituents.
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. Second quarter of compliance for all BTEX constituents.
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. Third quarter of compliance for all BTEX constituents.
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. Fourth quarter of compliance for all BTEX constituents.
March 29, 2010	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6. A thin hydrocarbon sheen is detected in MW-1. Fifth quarter of compliance for all BTEX constituents.
June 11, 2010	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6. A thin hydrocarbon sheen is detected in MW-1. Sixth quarter of compliance for all BTEX constituents.
September 24, 2010	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6. A thin hydrocarbon sheen is detected in MW-1. Seventh quarter of compliance for all BTEX constituents.
February 7, 2011	Monitor Well Sampling	Continuation of quarterly sampling for monitor wells MW-1 and MW-6. A thin hydrocarbon sheen is detected in MW-1. Eighth quarter of compliance with NMWQCC standards for BTEX; however, dissolved manganese concentrations in MW-1 and MW-6 were above standards.
March 18, 2011	Monitor Well Sampling	Continuation of quarterly groundwater sampling for monitor wells MW-1 and MW-6. Nineth quarter of compliance with NMWQCC standards for BTEX; however, dissolved manganese concentration in MW-1 was above standard.
June 15, 2011	Transfer of Site Consulting Responsibilities	Site consulting responsibilities were transferred from Tetra Tech of Albuquerque, NM to Conestoga-Rovers & Associates of Albuquerque, NM.
June 20, 2011	Monitor Well Sampling	Continuation of quarterly groundwater sampling for monitor wells MW-1 and MW-6. Tenth quarter of compliance with NMWQCC standards for BTEX; however, dissolved manganese concentration in both MW-1 and MW-6 were above standard. LNAPL sheen present in MW-1.
September 30, 2011	Monitor Well Sampling	Continuation of quarterly groundwater sampling for monitor wells MW-1 and MW-6. 11th quarter of compliance with NMWQCC standards for BTEX; however, dissolved manganese and dissolved iron concentrations were above standards in MW-1. LNAPL sheen present in MW-1.
December 15, 2011	Monitor Well Sampling	Continuation of quarterly groundwater sampling for monitor wells MW-1 and MW-6. 12th quarter of compliance with NMWQCC standards for BTEX; however, dissolved manganese and dissolved iron concentrations were above standards in MW-1 and dissolved manganese concentration was above standard in MW-6. LNAPL sheen present in MW-1.

TABLE 1

SITE HISTORY TIMELINE
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

DATE	*Event/Action*	*ACTIVITY*
September 21, 2012	Monitor Well Sampling	Analysis for BTEX discontinued. Monitor Wells MW-1 and MW-6 sampled and analyzed for dissolved manganese and dissolved iron. LNAPL sheen present in MW-1.
April 4, 2013	Monitor Well Sampling	Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6 sampled and analyzed for dissolved manganese and dissolved iron. LNAPL sheen present in MW-1.
September 30, 2013	Monitor Well Sampling	Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6 sampled and analyzed for dissolved manganese and dissolved iron. LNAPL sheen present in MW-1. Monitor Well MW-1 also sampled and analyzed for metals treatability study.

TABLE 2

MONITOR WELL SPECIFICATIONS AND GROUNDWATER ELEVATIONS
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

Well ID	*Total Depth (ft)*	*Surface Elevation**	*Screen Interval (ft bgs)*	*Date Measured*	*Depth to Product (ft below TOC)*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level**
MW-1	34.09	101.37	19.09 - 34.09	5/9/2005	Sheen	28.30	73.07
				7/6/2005	-	26.50	74.87
				10/19/2005	Sheen	25.12	76.25
				2/16/2006	-	28.23	73.14
				5/15/2006	-	27.02	74.35
				8/2/2006	-	24.37	77.00
				11/14/2006	Sheen	26.48	74.89
				2/20/2007	Sheen	29.03	72.34
				5/15/2007	-	26.97	74.40
				8/21/2007	Sheen	25.20	76.17
				11/7/2007	26.1	26.30	75.07
				1/16/2008	27.88	29.24	72.13
				3/18/2008	29.27	29.27	72.10
				7/24/2008	Sheen	25.73	75.64
				10/22/2008	Sheen	25.35	76.02
				1/21/2009	27.9	28.25	73.12
				4/1/2009	-	29.47	71.90
				6/10/2009	-	26.75	74.62
				10/1/2009	-	23.14	78.23
				12/17/2009	-	26.31	75.06
				3/29/2010	28.68	28.71	72.66
				6/11/2010	Sheen	25.98	75.39
				9/24/2010	Sheen	25.26	76.11
				2/7/2011	Sheen	28.83	72.54
				3/18/2011	29.71	29.73	71.64
				6/20/2011	Sheen	27.00	74.37
				9/30/2011	Sheen	24.32	77.05
				12/15/2011	Sheen	26.90	74.47
				9/21/2012	Sheen	24.52	76.85
				4/4/2013	Sheen	29.74	71.63
				9/30/2013	Sheen	24.92	76.45
MW-2	33.72	101.57	18.72 - 33.72	5/9/2005	-	27.28	74.29
				7/6/2005	-	25.52	76.05
				10/19/2005	-	24.30	77.27
				2/16/2006	-	27.38	74.19
				5/15/2006	-	25.62	75.95
				8/2/2006	-	23.51	78.06
				11/14/2006	-	26.08	75.49
				2/20/2007	-	28.13	73.44
				5/15/2007	-	25.86	75.71
				8/21/2007	-	24.45	77.12
				11/7/2007	-	25.31	76.26
				1/16/2008	-	27.27	74.30
				3/18/2008	-	28.68	72.89
				7/24/2008	-	24.77	76.80
				10/22/2008	-	24.55	77.02
				1/21/2009	-	27.23	74.34
				4/1/2009	-	28.76	72.81
				6/10/2009	-	25.76	75.81
				10/1/2009	-	22.22	79.35
				12/17/2009	-	25.62	75.95
				3/29/2010	-	27.96	73.61
				6/11/2010	-	24.99	76.58
				9/24/2010	-	24.54	77.03
				2/7/2011	-	28.22	73.35
				3/18/2011	-	29.14	72.43
				6/20/2011	-	26.20	75.37
				9/30/2011	-	23.51	78.06
				12/15/2011	-	26.22	75.35
				9/21/2012	-	23.81	77.76
				4/4/2013	-	29.16	72.41
				9/30/2013	-	24.29	77.28

TABLE 2

MONITOR WELL SPECIFICATIONS AND GROUNDWATER ELEVATIONS
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

Well ID	*Total Depth (ft)*	*Surface Elevation**	*Screen Interval (ft bgs)*	*Date Measured*	*Depth to Product (ft below TOC)*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level**
MW-3	32.44	102.1	17.44 - 32.44	5/9/2005	-	27.81	74.29
				7/6/2005	-	26.03	76.07
				10/19/2005	-	25.06	77.04
				2/16/2006	-	28.57	73.53
				5/15/2006	-	26.15	75.95
				8/2/2006	-	23.83	78.27
				11/14/2006	-	26.75	75.35
				2/20/2007	-	29.31	72.79
				5/15/2007	-	26.23	75.87
				8/21/2007	-	25.00	77.10
				11/7/2007	-	26.12	75.98
				1/16/2008	-	28.46	73.64
				3/18/2008	-	29.97	72.13
				7/24/2008	-	25.27	76.83
				10/22/2008	-	25.35	76.75
				1/21/2009	-	28.56	73.54
				4/1/2009	-	30.20	71.90
				6/10/2009	-	26.55	75.55
				10/1/2009	-	23.00	79.10
				12/17/2009	-	26.86	75.24
				3/29/2010	-	29.41	72.69
				6/11/2010	-	25.62	76.48
				9/24/2010	-	25.23	76.87
				2/7/2011	-	29.47	72.63
				3/18/2011	-	30.40	71.70
				6/20/2011	-	26.83	75.27
				9/30/2011	-	23.95	78.15
				12/15/2011	-	27.41	74.69
				9/21/2012	-	24.55	77.55
				4/4/2013	-	30.52	71.58
				9/30/2013	-	25.27	76.83
MW-4	32.72	101.4	17.72 - 32.72	5/9/2005	-	28.73	72.67
				7/6/2005	-	26.66	74.74
				10/19/2005	-	25.62	75.78
				2/16/2006	-	28.91	72.49
				5/15/2006	-	26.86	74.54
				8/2/2006	-	24.59	76.81
				11/14/2006	-	27.02	74.38
				2/20/2007	-	29.61	71.79
				5/15/2007	-	27.25	74.15
				8/21/2007	-	25.56	75.84
				11/7/2007	-	26.50	74.90
				1/16/2008	-	28.55	72.85
				3/18/2008	-	29.99	71.41
				7/24/2008	-	26.02	75.38
				10/22/2008	-	25.84	75.56
				1/21/2009	-	28.69	72.71
				4/1/2009	-	30.22	71.18
				6/10/2009	-	27.31	74.09
				10/1/2009	-	23.80	77.60
				12/17/2009	-	27.07	74.33
				3/29/2010	-	29.51	71.89
				6/11/2010	-	26.43	74.97
				9/24/2010	-	25.70	75.70
				2/7/2011	-	29.49	71.91
				3/18/2011	-	30.38	71.02
				6/20/2011	-	27.34	74.06
				9/30/2011	-	24.68	76.72
				12/15/2011	-	27.58	73.82
				9/21/2012	-	25.01	76.39
				4/4/2013	-	30.46	70.94
				9/30/2013	-	25.55	75.85

TABLE 2

MONITOR WELL SPECIFICATIONS AND GROUNDWATER ELEVATIONS
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

Well ID	*Total Depth (ft)*	*Surface Elevation**	*Screen Interval (ft bgs)*	*Date Measured*	*Depth to Product (ft below TOC)*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level**
MW-5	34.09	100.52	19.09 - 34.09	5/9/2005	-	28.50	72.02
				7/6/2005	-	26.32	74.20
				10/19/2005	-	25.30	75.22
				2/16/2006	-	28.62	71.90
				5/15/2006	-	26.55	73.97
				8/2/2006	-	24.23	76.29
				11/14/2006	-	27.67	72.85
				2/20/2007	-	29.34	71.18
				5/15/2007	-	27.04	73.48
				8/21/2007	-	25.21	75.31
				11/7/2007	-	26.13	74.39
				1/16/2008	-	28.18	72.34
				3/18/2008	-	29.65	70.87
				7/24/2008	-	25.73	74.79
				10/22/2008	-	25.49	75.03
				1/21/2009	-	28.38	72.14
				4/1/2009	-	29.92	70.60
				6/10/2009	-	27.09	73.43
				10/1/2009	-	23.50	77.02
				12/17/2009	-	26.77	73.75
				3/29/2010	-	29.21	71.31
				6/11/2010	-	26.16	74.36
				9/24/2010	-	25.31	75.21
				2/7/2011	-	29.13	71.39
				3/18/2011	-	30.10	70.42
				6/20/2011	-	27.03	73.49
				9/30/2011	-	24.35	76.17
				12/15/2011	-	27.25	73.27
				9/21/2012	-	24.65	75.87
				4/4/2013	-	30.10	70.42
				9/30/2013	-	25.16	75.36
MW-6	34.02	102.14	19.02 - 34.02	5/9/2005	-	29.94	72.20
				7/6/2005	-	27.89	74.25
				10/19/2005	-	26.70	75.44
				2/16/2006	-	29.85	72.29
				5/15/2006	-	28.11	74.03
				8/2/2006	-	25.83	76.31
				11/14/2006	-	27.91	74.23
				2/20/2007	-	30.52	71.62
				5/15/2007	-	28.61	73.53
				8/21/2007	-	26.67	75.47
				11/7/2007	-	27.52	74.62
				1/16/2008	-	29.43	72.71
				3/18/2008	-	30.85	71.29
				7/24/2008	-	27.26	74.88
				10/22/2008	-	26.85	75.29
				1/21/2009	-	29.52	72.62
				4/1/2009	-	31.00	71.14
				6/10/2009	-	28.44	73.70
				10/1/2009	-	24.75	77.39
				12/17/2009	-	27.90	74.24
				3/29/2010	-	30.29	71.85
				6/11/2010	-	27.58	74.56
				9/24/2010	-	26.74	75.40
				2/7/2011	-	30.35	71.79
				3/18/2011	-	31.21	70.93
				6/20/2011	-	28.50	73.64
				9/30/2011	-	25.85	76.29
				12/15/2011	-	28.41	73.73
				9/21/2012	-	26.03	76.11
				4/4/2013	-	31.24	70.90
				9/30/2013	-	25.43	76.71

Notes:

1. bgs = feet below ground surface
2. ft = Feet
3. TOC = Top of casing
4. * Elevations relative to an arbitrary point set at 100 feet

TABLE 3

GROUNDWATER LABORATORY ANALYTICAL RESULTS SUMMARY
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Iron (dissolved) (mg/L)*	*Manganese (dissolved) (mg/L)*	*Nitrate (as N) (mg/L)*	*Sulfate (mg/L)*
MW-1	MW-1	2/19/1998	(orig)	**0.21**	0.034	0.37	**2.044**	--	--	--	--
	MW-1	12/29/1998	(orig)	**0.35**	ND	0.42	**2.8**	--	--	--	--
	MW-1	5/9/2005	(orig)	**0.017**	< 0.0007	0.074	0.25	--	--	< 0.40	77.8
	MW-1	10/19/2005	(orig)	**0.034**	< 0.001	0.17	**1.4**	--	--	0.15	39.9
	MW-1	11/14/2006	(orig)	**0.018**	< 0.0007	0.19	**1.6**	--	--	< 0.015	145
	MW-1	11/7/2007	(orig)	0.007	< 0.0007	0.12	0.25	--	--	< 0.015	38.4
	MW-1	7/24/2008	(orig)	< 0.005	< 0.005	0.09	0.035	--	--	< 0.5	4.76
	MW-1 Duplicate	7/24/2008	(orig)	< 0.005	< 0.005	0.11	0.059	--	--	--	--
	MW-1	10/22/2008	(orig)	< 0.005	< 0.005	0.088	0.165	--	--	< 0.5	17
	MW-1 Duplicate	10/22/2008	(orig)	< 0.005	< 0.005	0.095	0.186	--	--	--	--
	MW-1	1/21/2009	Free Product - Not Sampled								
	MW-1	4/1/2009	(orig)	< 0.005	< 0.005	0.011	< 0.005	--	--	--	--
	MW-1	6/10/2009	(orig)	< 0.005	< 0.005	0.096	< 0.005	--	--	--	--
	MW-1	10/1/2009	(orig)	0.0013	< 0.001	0.058	0.142	0.233	--	--	--
	MW-1	12/17/2009	(orig)	0.0014	< 0.001	0.1	0.0028	0.521	--	--	--
	MW-1	3/29/2010	(orig)	< 0.001	< 0.001	0.051	< 0.001	0.0803	--	--	--
	MW-1	6/11/2010	(orig)	0.0011	< 0.001	0.098	0.0018	0.0217	--	--	--
	MW-1	9/24/2010	(orig)	< 0.001	< 0.001	0.092	0.0278	0.0285	--	--	--
	MW-1	2/7/2011	(orig)	< 0.001	< 0.001	0.026	< 0.001	--	**0.459**	--	--
	MW-1	3/18/2011	(orig)	< 0.001	< 0.001	0.01	< 0.001	< 0.02	**0.477**	--	--
	GW-BCOM-062011-CMB-002	6/20/2011	(orig)	< 0.0010	< 0.0010	0.0912	0.0018	0.157	**0.424**	--	--
	GW-BCOM-062011-CMB-003	6/20/2011	(Duplicate)	< 0.0010	< 0.0010	0.0952	< 0.0030	--	--	--	--
	GW-074938-093011-CM-005	9/30/2011	(orig)	< 0.001	< 0.001	0.058	0.0048	**4.1**	**0.268**	--	--
	GW-074938-093011-CM-006	9/30/2011	(Duplicate)	< 0.001	< 0.001	0.0618	0.0052	--	--	--	--
	GW-074938-121511-CB-MW-1	12/15/2011	(orig)	< 0.001	< 0.001	0.0848	0.0095	**1.91**	**0.35**	--	--
	GW-074938-121511-CB-DUP	12/15/2011	(Duplicate)	< 0.001	< 0.001	0.0807	0.0092	**--**	**--**	--	--
	GW-074938-092112-JP-MW-1	9/21/2012	(orig)	--	--	--	--	**2.9**	**0.27**	--	--
	GW-074938-040413-CM-MW-1	4/4/2013	(orig)	--	--	--	--	**1.8**	**0.47**	--	--
	GW-074938-093013-CM-MW-1	9/30/2013	(orig)	--	--	--	--	**1.7**	**0.29**	--	--
MW-2	GW-074938-040413-CM-MW-2	4/4/2013	(orig)	--	--	--	--	< 0.05	0.046	--	--
	GW-074938-093013-CM-MW-2	9/30/2013	(orig)	--	--	--	--	<0.05	0.0077	--	--

TABLE 3

GROUNDWATER LABORATORY ANALYTICAL RESULTS SUMMARY
CONOCOPHILLIPS COMPANY
FARMINGTON B COM No. 1E
SAN JUAN COUNTY, NEW MEXICO

Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Iron (dissolved) (mg/L)*	*Manganese (dissolved) (mg/L)*	*Nitrate (as N) (mg/L)*	*Sulfate (mg/L)*
MW-3	GW-074938-121511-CB-MW-3	12/15/2011	(orig)	--	--	--	--	0.246	0.112	--	--
	GW-074938-040413-CM-MW-3	4/4/2013	(orig)	--	--	--	--	0.34	**0.28**	--	--
	GW-074938-093013-CM-MW-3	9/30/2013	(orig)	--	--	--	--	<0.05	0.047	--	--
MW-4	GW-074938-040413-CM-MW-4	4/4/2013	(orig)	--	--	--	--	< 0.05	0.069	--	--
	GW-074938-093013-CM-MW-4	9/30/2013	(orig)	--	--	--	--	<0.05	<0.005	--	--
MW-5	GW-074938-040413-CM-MW-5	4/4/2013	(orig)	--	--	--	--	< 0.05	< 0.005	--	--
	GW-074938-040413-CM-DUP	4/4/2013	(Duplicate)	--	--	--	--	0.62*	0.025*	--	--
	GW-074938-093013-CM-MW-5	9/30/2013	(orig)	--	--	--	--	<0.05	<0.005	--	--
MW-6	MW-6	9/15/1998	(orig)	ND	ND	ND	ND	--	--	--	--
	MW-6	12/29/1998	(orig)	ND	ND	ND	ND	--	--	--	--
	MW-6	3/3/1999	(orig)	ND	ND	ND	ND	--	--	--	--
	MW-6	6/15/1999	(orig)	ND	ND	ND	ND	--	--	--	--
	MW-6	9/15/1999	(orig)	ND	0.0007	0.0011	ND	--	--	--	--
	MW-6	12/14/1999	(orig)	ND	0.0018	0.0007	0.0019	--	--	--	--
	MW-6	1/22/2004	(orig)	ND	ND	ND	ND	--	--	--	--
	MW-6	5/9/2005	(orig)	< 0.0005	< 0.0007	< 0.0008	< 0.0008	--	--	< 0.4	97
	MW-6	10/19/2005	(orig)	< 0.0005	< 0.0007	< 0.0008	< 0.0008	--	--	5.4	52.6
	MW-6	11/14/2006	(orig)	< 0.0005	< 0.0007	< 0.0008	0.001	--	--	< 0.015	159
	MW-6	11/7/2007	(orig)	< 0.0005	< 0.0007	< 0.0008	< 0.0008	--	--	< 0.015	112
	MW-6	7/24/2008	(orig)	< 0.005	< 0.005	< 0.005	< 0.005	--	--	< 0.5	44.4
	MW-6	10/22/2008	(orig)	< 0.005	< 0.005	< 0.005	< 0.005	--	--	< 0.5	43.7
	MW-6	1/21/2009	(orig)	< 0.005	< 0.005	< 0.005	< 0.005	--	--	< 0.5	31.1
	MW-6	4/1/2009	(orig)	< 0.005	< 0.005	< 0.005	< 0.005	--	--	--	--
	MW-6	6/10/2009	(orig)	< 0.005	< 0.005	< 0.005	< 0.005	--	--	--	--
	MW-6	10/1/2009	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.02	--	--	--
	MW-6	12/17/2009	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	0.0511	--	--	--
	MW-6	3/29/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0200	--	--	--
	MW-6	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0200	--	--	--
	MW-6	9/24/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0200	--	--	--
	MW-6	2/7/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	--	**0.543**	--	--
	MW-6	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.02	0.0679	--	--
	GW-BCOM-062011-CMB-001	6/20/2011	(orig)	< 0.0010	< 0.0010	< 0.0010	< 0.0030	< 0.1	**0.43**	--	--
	GW-074938-093011-CM-004	9/30/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.05	0.0261	--	--
	GW-074938-121511-CB-MW-6	12/15/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.429	**1.06**	--	--
	GW-074938-092112-JP-MW-6	9/21/2012	(orig)	--	--	--	--	< 0.05	0.058	--	--
	GW-074938-092112-JP-DUP	9/21/2012	(Duplicate)	--	--	--	--	< 0.06	0.055	--	--
	GW-074938-040413-CM-MW-6	4/4/2013	(orig)	--	--	--	--	0.056	**0.33**	--	--
	GW-074938-093013-CM-MW-6	9/30/2013	(orig)	--	--	--	--	<0.05	0.17	--	--
	GW-074938-093013-CM-DUP	9/30/2013	(Duplicate)	--	--	--	--	<0.05	0.17	--	--
NMWQCC Groundwater Quality Standards				**0.01**	**0.75**	**0.75**	**0.62**	**1.0**	**0.2**	**10**	**600**

Notes:
1. MW = monitoring well
2. NMWQCC = New Mexico Water Quality Control Commission
3. Constituents in **BOLD** are in excess of NMWQCC groundwater quality standards
4. mg/L = milligrams per liter (parts per million)
5. < 1.0 = Below laboratory detection limit of 1.0 mg/L
6. ND = Below laboratory detection limit
7. -- = not sampled
8. * = anomolous data

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B. Com #1E JOB# 074938

SAMPLE ID: GW-074938-040413-Com-MW-1 WELL# MW-1

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
4/4/13	4/4/13	1055	0.696	2.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED Y (N) (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 29.74 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.09 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY SC	ORP	VOLUME	
16.75 (°C)	7.80 (std)	0.730 (g/L)	1124 (µS/cm)	-88.7 (mV)	1.25 (gal)	DONE 0.80
16.78 (°C)	7.33 (std)	0.733 (g/L)	1129 (µS/cm)	-108.9 (mV)	1.75 (gal)	0.85
16.76 (°C)	7.31 (std)	0.731 (g/L)	1125 (µS/cm)	-119.4 (mV)	2.25 (gal)	1.36
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	

FIELD COMMENTS

SAMPLE APPEARANCE: dark brown/black ODOR: slight COLOR: dark brown/black SHEEN Y/N slight/spotted

WEATHER CONDITIONS: TEMPERATURE 45-50 WINDY Y/N No PRECIPITATION Y/N (IF Y TYPE) No

SPECIFIC COMMENTS:

0.696 x 3 = 2.088

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

4/4/13 DATE | Cassie Brum PRINT | Cassie Brum SIGNATURE

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B-Com#1E JOB# 074938

SAMPLE ID: GW-074938-040413-CM-MW-6 WELL# MW-6

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
4/4/13	4/4/13	1035	0.445	1.5

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X= PURGING DEVICE OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON	D - PVC		X= PURGING MATERIAL OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON	D - POLYPROPYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE		
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 31.24 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.02 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY SC	ORP	VOLUME	DO mg/L
16.47 (°C)	7.37 (std)	0.648 (g/L)	997 (µS/cm)	115.4 (mV)	0.5 (gal)	2.30
16.51 (°C)	7.39 (std)	0.649 (g/L)	999 (µS/cm)	107.0 (mV)	1.0 (gal)	1.55
16.40 (°C)	7.36 (std)	0.649 (g/L)	999 (µS/cm)	80.7 (mV)	1.5 (gal)	1.53
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: none COLOR: light brown/orange SHEEN Y/N none

WEATHER CONDITIONS: TEMPERATURE 50° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) none

SPECIFIC COMMENTS: - no recharge issues bailers 3/4 to full throughout purging

0.445 x 3 = 1.334

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

4/4/13 (DATE) Christine Mathews (PRINT) (SIGNATURE)

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B-Cam #1E JOB# 074938

SAMPLE ID: GW-074938-040413-CAMW-5 WELL# MW-5

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
4/4/13	4/4/13	1015	0.638	2.0

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 30.10 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.09 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY SC	ORP	VOLUME	DO mg/L
16.16 (°C)	7.38 (std)	0.735 (g/L)	1131 (µS/cm)	137.5 (mV)	1.0 (gal)	3.83
15.98 (°C)	7.28 (std)	0.741 (g/L)	1138 (µS/cm)	164.1 (mV)	1.5 (gal)	4.32
16.19 (°C)	7.44 (std)	0.736 (g/L)	1133 (µS/cm)	115.1 (mV)	2.0 (gal)	4.0
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	

FIELD COMMENTS

SAMPLE APPEARANCE: silty ODOR: None COLOR: brown SHEEN Y/N No

WEATHER CONDITIONS: TEMPERATURE 45-50 WINDY Y/N No PRECIPITATION Y/N (IF Y TYPE) No

SPECIFIC COMMENTS: 3/4 full bailers for duration of purging

0.638 x 3 = 1.915

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

4/4/13 DATE — Cassie Brown PRINT — Cassie Brown SIGNATURE

Dup at 1020

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B-Com #1E JOB# 074938

SAMPLE ID: GW-074938-040413-CM-mw-4 WELL# MW-4

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
4/4/13	4/4/13	0955	0.362	1.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 30.46 (feet) WELL ELEVATION (feet)

WELL DEPTH 32.72 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY	ORP	VOLUME	Do mg/L
16.19 (°C)	7.24 (std)	~~1040~~ 0.675 (g/L)	1039 (µS/cm)	200.3 (mV)	0.5 (gal)	3.86
16.54 (°C)	7.30 (std)	0.677 (g/L)	1041 (µS/cm)	175.2 (mV)	0.75 (gal)	3.01
16.55 (°C)	7.33 (std)	0.676 (g/L)	1041 (µS/cm)	158.7 (mV)	1.0 (gal)	2.65
~~16.44~~ (°C)	~~7.33~~ (std)	~~0.679~~ (g/L)	~~1044~~ (µS/cm)	~~135.3~~ (mV)	~~1.25~~ (gal)	~~2.54~~
16.38 (°C)	7.31 (std)	0.673 (g/L)	1038 (µS/cm)	130.1 (mV)	1.25 (gal)	2.34

FIELD COMMENTS

SAMPLE APPEARANCE: Cloudy ODOR: none COLOR: brown/gray SHEEN Y/N no

WEATHER CONDITIONS: TEMPERATURE 45° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) none

SPECIFIC COMMENTS: ~¼-½ fuel bubbles while purging

0.362 x 3 = 1.085

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 4/4/13 PRINT Cassie Brown SIGNATURE Cassie Brown

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B-Com #1E JOB# 074938

SAMPLE ID: GW-074938-040413-cm-mw-3 WELL# MW-3

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
4/4/13	4/4/13	926	0.3072	1.0

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 30.52 (feet) WELL ELEVATION (feet)

WELL DEPTH 32.44 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY SC	ORP	VOLUME	
15.51 (°C)	7.35 (std)	0.1653 (g/L)	1006 (µS/cm)	219.8 (mV)	0.25 (gal)	DO mg/L 1.87
15.72 (°C)	7.32 (std)	0.1648 (g/L)	1029 (µS/cm)	181.5 (mV)	0.5 (gal)	1.84
15.71 (°C)	7.30 (std)	0.1676 (g/L)	1040 (µS/cm)	140.0 (mV)	0.75 (gal)	2.45
15.59 (°C)	7.38 (std)	0.700 (g/L)	1077 (µS/cm)	75.1 (mV)	1.0 (gal)	0.0
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	

FIELD COMMENTS

SAMPLE APPEARANCE: red/brown/blk ODOR: None COLOR: red/brown SHEEN Y/N No

WEATHER CONDITIONS: TEMPERATURE 45 WINDY Y/N breeze PRECIPITATION Y/N (IF Y TYPE) N

SPECIFIC COMMENTS: first bailer half full, remainder 1/4 or less for duration of purge.

0.3072 x 3 = 0.9216

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE	PRINT	SIGNATURE
4/4/13	Cassie Brown	(Cassie) Brown

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: B-Com #1 JOB# 074938

SAMPLE ID: GW-074938-040413-COM-MW-2 WELL# MW-2

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
04/04/13	4/4/13	0905	0.7296	2.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

DEPTH TO WATER 29.16 (feet) WELL ELEVATION (feet)

WELL DEPTH 33.72 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	CONDUCTIVITY SC	ORP	VOLUME	DO mg/L
16.20 (°C)	6.94 (std)	0.645 (g/L)	992 (µS/cm)	295.9 (mV)	1.25 (gal)	5.16
16.00 (°C)	7.09 (std)	0.645 (g/L)	994 (µS/cm)	253.2 (mV)	1.75 (gal)	4.49
16.12 (°C)	7.21 (std)	0.645 (g/L)	992 (µS/cm)	182.6 (mV)	2.25 (gal)	4.04
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	
(°C)	(std)	(g/L)	(µS/cm)	(mV)	(gal)	

FIELD COMMENTS

SAMPLE APPEARANCE: brown silty / sediment ODOR: None COLOR: brown SHEEN Y/N N

WEATHER CONDITIONS: TEMPERATURE 45 WINDY Y/N No PRECIPITATION Y/N (IF Y TYPE) N

SPECIFIC COMMENTS:

Noticable drawdown in well @ 1.25 gallons. half to 1/4 bailers for remainder of purge.

0.7296 x 3 = 2.19

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE	PRINT	SIGNATURE
4/4/13	Cassie Brown	Cassie Brown

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-1 WELL# MW-1

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1825	1.459	4.5

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®	X= ____ PURGING DEVICE OTHER (SPECIFY)
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= ____ SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X= ____ PURGING MATERIAL OTHER (SPECIFY)
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= ____ SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= ____ PURGE TUBING OTHER (SPECIFY)
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= ____ SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron	

FIELD MEASUREMENTS

DEPTH TO WATER 24.92 (feet) WELL ELEVATION ____ (feet)

WELL DEPTH 34.04 (feet) GROUNDWATER ELEVATION ____ (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
18.70 (°C)	6.25 (std)	0.621 (g/L)	956 (µS/cm)	0.82 (mg/L)	-147.4 (mV)	3.5 (gal)
19.04 (°C)	7.14 (std)	0.639 (g/L)	984 (µS/cm)	0.58 (mg/L)	-196.8 (mV)	4.0 (gal)
19.17 (°C)	7.29 (std)	0.649 (g/L)	999 (µS/cm)	0.65 (mg/L)	-210.4 (mV)	4.5 (gal)
____ (°C)	____ (std)	____ (g/L)	____ (µS/cm)	____ (mg/L)	____ (mV)	____ (gal)
____ (°C)	____ (std)	____ (g/L)	____ (µS/cm)	____ (mg/L)	____ (mV)	____ (gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: hydrocarbon COLOR: yellow SHEEN Y/N Yes

WEATHER CONDITIONS: TEMPERATURE 75° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) no

SPECIFIC COMMENTS:

1.459 x 3 = 4.377

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE Christine Mathews

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-2 WELL# MW-2

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1800	1.688	5.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X= PURGING DEVICE OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON	D - PVC		X= PURGING MATERIAL OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON	D - POLYPROPYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE		
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron	

FIELD MEASUREMENTS

DEPTH TO WATER 24.29 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.84 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
20.18 (°C)	6.75 (std)	0.450 (g/L)	691 (µS/cm)	5.26 (mg/L)	68.9 (mV)	4.25 (gal)
19.90 (°C)	6.76 (std)	0505 (g/L)	776 (µS/cm)	3.85 (mg/L)	73.9 (mV)	4.75 (gal)
19.97 (°C)	6.77 (std)	0.496 (g/L)	763 (µS/cm)	3.62 (mg/L)	78.1 (mV)	5.25 (gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: none COLOR: light brown SHEEN Y/N no

WEATHER CONDITIONS: TEMPERATURE 75° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) no

SPECIFIC COMMENTS:

1.688 x 3 = 5.064

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE Christine Mathews

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-3 WELL# MW-3

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1812	1.40	4.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X= PURGING DEVICE OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON	D - PVC		X= PURGING MATERIAL OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON	D - POLYPROPYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE		
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron	

FIELD MEASUREMENTS

DEPTH TO WATER 25.27 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.02 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
17.07 (°C)	6.87 (std)	0.477 (g/L)	734 (µS/cm)	4.12 (mg/L)	88.5 (mV)	3.25 (gal)
17.06 (°C)	6.82 (std)	0.458 (g/L)	705 (µS/cm)	4.33 (mg/L)	92.6 (mV)	3.75 (gal)
17.02 (°C)	6.79 (std)	0.455 (g/L)	699 (µS/cm)	4.25 (mg/L)	93.5 (mV)	4.25 (gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: none COLOR: light brown SHEEN Y/N no

WEATHER CONDITIONS: TEMPERATURE ~75° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) no

SPECIFIC COMMENTS:

1.40 x 3 = 4.2

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE Christine Mathews

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-4 WELL# MW-4

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1900	1.136	3.5

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X= ____ PURGING DEVICE OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= ____ SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON	D - PVC		X= ____ PURGING MATERIAL OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= ____ SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON	D - POLYPROPYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= ____ PURGE TUBING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE		
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= ____ SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron	

FIELD MEASUREMENTS

DEPTH TO WATER 25.55 (feet) WELL ELEVATION ____ (feet)

WELL DEPTH 32.65 (feet) GROUNDWATER ELEVATION ____ (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
17.75 (°C)	6.74 (std)	0.659 (g/L)	1013 (µS/cm)	2.59 (mg/L)	3.0 (mV)	2.5 (gal)
17.93 (°C)	7.07 (std)	0.666 (g/L)	1025 (µS/cm)	2.25 (mg/L)	-8.3 (mV)	3.0 (gal)
18.00 (°C)	7.13 (std)	0.671 (g/L)	1032 (µS/cm)	2.60 (mg/L)	-6.1 (mV)	3.5 (gal)
____ (°C)	____ (std)	____ (g/L)	____ (µS/cm)	____ (mg/L)	____ (mV)	____ (gal)
____ (°C)	____ (std)	____ (g/L)	____ (µS/cm)	____ (mg/L)	____ (mV)	____ (gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: none COLOR: brown SHEEN Y/N none

WEATHER CONDITIONS: TEMPERATURE 70° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) no

SPECIFIC COMMENTS:

1.136 x 3 = 3.408

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE Christine Mathews

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-5 WELL# MW-5

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1840	1.146	3.5

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP B - PERISTALTIC PUMP	D - GAS LIFT PUMP E - PURGE PUMP	G - BAILER H - WATERRA®
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER
PURGING MATERIAL	E	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE	
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER	
PURGE TUBING	C	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron

X= _____ PURGING DEVICE OTHER (SPECIFY)

X= _____ SAMPLING DEVICE OTHER (SPECIFY)

X= _____ PURGING MATERIAL OTHER (SPECIFY)

X= _____ SAMPLING MATERIAL OTHER (SPECIFY)

X= _____ PURGE TUBING OTHER (SPECIFY)

X= _____ SAMPLING TUBING OTHER (SPECIFY)

FIELD MEASUREMENTS

DEPTH TO WATER: 25.16 (feet) WELL ELEVATION: _____ (feet)

WELL DEPTH: 32.32 (feet) GROUNDWATER ELEVATION: _____ (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
18.06 (°C)	7.21 (std)	0.524 (g/L)	807 (µS/cm)	6.59 (mg/L)	-30.0 (mV)	2.5 (gal)
18.18 (°C)	7.17 (std)	0.497 (g/L)	764 (µS/cm)	6.80 (mg/L)	-73.0 (mV)	3.0 (gal)
18.14 (°C)	7.21 (std)	0.498 (g/L)	766 (µS/cm)	6.81 (mg/L)	-3.2 (mV)	3.5 (gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cloudy ODOR: none COLOR: brown SHEEN Y/N: no

WEATHER CONDITIONS: TEMPERATURE: 75° WINDY Y/N: no PRECIPITATION Y/N (IF Y TYPE): no

SPECIFIC COMMENTS:

1.146 x 3 = 3.437

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE Christine Mathews

WELL SAMPLING FIELD INFORMATION FORM

SITE/PROJECT NAME: Farmington B-Com 1E JOB# 074938

SAMPLE ID: GW-074938-093013-CM-MW-6 WELL# MW-6

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	SAMPLE TIME (24 HOUR)	WATER VOL. IN CASING (GALLONS)	ACTUAL VOL. PURGED (GALLONS)
9/30/13	9/30/13	1910	1.373	4.25

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	G	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X= PURGING DEVICE OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE	G	C - BLADDER PUMP	F - DIPPER BOTTLE	X - OTHER	X= SAMPLING DEVICE OTHER (SPECIFY)
PURGING MATERIAL	E	A - TEFLON	D - PVC		X= PURGING MATERIAL OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL	E	C - POLYPROPYLENE	X - OTHER		X= SAMPLING MATERIAL OTHER (SPECIFY)
PURGE TUBING	C	A - TEFLON	D - POLYPROPYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X= PURGE TUBING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE		
SAMPLING TUBING	C	C - ROPE	F - SILICONE	X - OTHER	X= SAMPLING TUBING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	0.45 micron	

FIELD MEASUREMENTS

DEPTH TO WATER 25.43 (feet) WELL ELEVATION (feet)

WELL DEPTH 34.01 (feet) GROUNDWATER ELEVATION (feet)

TEMPERATURE	pH	TDS	SC	DO	ORP	VOLUME
18.02 (°C)	6.99 (std)	0.726 (g/L)	1117 (µS/cm)	1.60 (mg/L)	6.8 (mV)	3.25 (gal)
17.98 (°C)	7.01 (std)	0.722 (g/L)	1111 (µS/cm)	1.67 (mg/L)	0.3 (mV)	3.75 (gal)
18.03 (°C)	7.03 (std)	0.722 (g/L)	1111 (µS/cm)	2.17 (mg/L)	0.8 (mV)	4.25 (gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)
(°C)	(std)	(g/L)	(µS/cm)	(mg/L)	(mV)	(gal)

FIELD COMMENTS

SAMPLE APPEARANCE: cldy ODOR: No COLOR: lt brn SHEEN Y/N N

WEATHER CONDITIONS: TEMPERATURE 75° WINDY Y/N no PRECIPITATION Y/N (IF Y TYPE) no

SPECIFIC COMMENTS:

1.373 x 3 = 4.118 Duplicate @ 1915

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE CRA PROTOCOLS

DATE 9/30/13 PRINT Christine Mathews SIGNATURE [signature]

Appendix B

APRIL and SEPTEMBER 2013
SEMI-ANNUAL GROUNDWATER LABORATORY ANALYTICAL REPORTS

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

April 22, 2013

Christine Matthews
CRA
6121 Indian School Rd NE
Suite 200
Albuquerque, NM 87110

RE: Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Dear Christine Matthews:
Enclosed are the analytical results for sample(s) received by the laboratory on April 06, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Flanagan

alice.flanagan@pacelabs.com
Project Manager

Enclosures

cc: Kelly Blanchard, COP Conestoga-Rovers & Associa
Angela Bown, COP Conestoga-Rovers & Associa
Cassie Brown, COP Conestoga-Rovers & Associa
Jason Ploss, COP Conestoga-Rovers & Associa

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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CERTIFICATIONS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
A2LA Certification #: 2456.01
Arkansas Certification #: 12-019-0
Illinois Certification #: 002885
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407-12-3
Utah Certification #: KS000212012-2
Illinois Certification #: 003097

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60141975001	**GW-074938-040413-CM-MW-1**	Water	04/04/13 10:55	04/06/13 08:40
60141975002	**GW-074938-040413-CM-MW-2**	Water	04/04/13 09:05	04/06/13 08:40
60141975003	**GW-074938-040413-CM-MW-3**	Water	04/04/13 09:25	04/06/13 08:40
60141975004	**GW-074938-040413-CM-MW-4**	Water	04/04/13 09:55	04/06/13 08:40
60141975005	**GW-074938-040413-CM-MW-5**	Water	04/04/13 10:10	04/06/13 08:40
60141975006	**GW-074938-040413-CM-MW-6**	Water	04/04/13 10:35	04/06/13 08:40
60141975007	**GW-074938-040413-CM-MW-DUP**	Water	04/04/13 10:20	04/06/13 08:40

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SAMPLE ANALYTE COUNT

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60141975001	**GW-074938-040413-CM-MW-1**	EPA 6010	SMW	2
60141975002	**GW-074938-040413-CM-MW-2**	EPA 6010	SMW	2
60141975003	**GW-074938-040413-CM-MW-3**	EPA 6010	SMW	2
60141975004	**GW-074938-040413-CM-MW-4**	EPA 6010	SMW	2
60141975005	**GW-074938-040413-CM-MW-5**	EPA 6010	SMW	2
60141975006	**GW-074938-040413-CM-MW-6**	EPA 6010	SMW	2
60141975007	**GW-074938-040413-CM-MW-DUP**	EPA 6010	SMW	2

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PROJECT NARRATIVE

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: COP Conestoga-Rovers & Associates, Inc. NM
Date: April 22, 2013

General Information:
7 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-1 **Lab ID: 60141975001** Collected: 04/04/13 10:55 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	**1.8**	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:21	7439-89-6	
Manganese, Dissolved	**0.47**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:21	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-2 **Lab ID: 60141975002** Collected: 04/04/13 09:05 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:29	7439-89-6	
Manganese, Dissolved	**0.046**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:29	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-3 **Lab ID: 60141975003** Collected: 04/04/13 09:25 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	**0.34**	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:30	7439-89-6	
Manganese, Dissolved	**0.28**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:30	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-4 **Lab ID: 60141975004** Collected: 04/04/13 09:55 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:32	7439-89-6	
Manganese, Dissolved	**0.069**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:32	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-5 **Lab ID: 60141975005** Collected: 04/04/13 10:10 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:34	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:34	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-6 **Lab ID: 60141975006** Collected: 04/04/13 10:35 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	**0.056**	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:40	7439-89-6	
Manganese, Dissolved	**0.33**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:40	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Sample: GW-074938-040413-CM-MW-DUP **Lab ID: 60141975007** Collected: 04/04/13 10:20 Received: 04/06/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	**0.62**	mg/L	0.050	0.012	1	04/10/13 15:30	04/17/13 11:42	7439-89-6	
Manganese, Dissolved	**0.025**	mg/L	0.0050	0.00049	1	04/10/13 15:30	04/17/13 11:42	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

QC Batch: MPRP/22239 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60141975001, 60141975002, 60141975003, 60141975004, 60141975005, 60141975006, 60141975007

METHOD BLANK: 1167682 Matrix: Water
Associated Lab Samples: 60141975001, 60141975002, 60141975003, 60141975004, 60141975005, 60141975006, 60141975007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.050	04/17/13 11:18	
Manganese, Dissolved	mg/L	ND	0.0050	04/17/13 11:18	

LABORATORY CONTROL SAMPLE: 1167683

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	10	10.3	103	80-120	
Manganese, Dissolved	mg/L	1	1.1	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1167684 1167685

Parameter	Units	60141975001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	1.8	10	10	12.1	11.9	103	101	75-125	1	20	
Manganese, Dissolved	mg/L	0.47	1	1	1.5	1.5	104	105	75-125	0	20	

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074938 BCOM NO.1 E FARMINGTON
Pace Project No.: 60141975

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60141975001	**GW-074938-040413-CM-MW-1**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975002	**GW-074938-040413-CM-MW-2**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975003	**GW-074938-040413-CM-MW-3**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975004	**GW-074938-040413-CM-MW-4**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975005	**GW-074938-040413-CM-MW-5**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975006	**GW-074938-040413-CM-MW-6**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724
60141975007	**GW-074938-040413-CM-MW-DUP**	EPA 3010	MPRP/22239	EPA 6010	ICP/17724

Pace Analytical
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Sample Condition Upon Receipt
ESI Tech Spec Client

WO# : 60141975

60141975

Client Name: CCP CRA

Optional
Proj Due Date:
Proj Name: 4/22

Courier: Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other ☐

Tracking #: 7994 6024 8596 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ zip

Thermometer Used: (T-112) / T-194 **Type of Ice:** (Wet) Blue None ☐ Samples received on ice, cooling process has begun.
(circle one)

Cooler Temperature: 3.4

Date and initials of person examining contents: PV 4-6-13

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	1. 1055
Chain of Custody filled out:	☑Yes ☐No ☐N/A	2. 0905
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	3. 0925
Sampler name & signature on COC:	☑Yes ☐No ☐N/A	4. 0955
Samples arrived within holding time:	☑Yes ☐No ☐N/A	5. 1010
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	6. 1035
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	7. 1020
Sufficient volume:	☑Yes ☐No ☐N/A	8.
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	9.
Containers intact:	☑Yes ☐No ☐N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	☐Yes ☐No ☑N/A	11.
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	12.
Sample labels match COC: Includes date/time/ID/analyses Matrix: WT	☑Yes ☐No ☐N/A	13.
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	14.
Exceptions: VOA, coliform, TOC, O&G, WI-DRO (water), Phenolics	☐Yes ☑No	Initial when completed / Lot # of added preservative
Trip Blank present: Pace Trip Blank lot # (if purchased):	☐Yes ☐No ☑N/A	15.
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	16.
Project sampled in USDA Regulated Area:	☐Yes ☐No ☑N/A	17. List State: AFT

Client Notification/ Resolution: Copy COC to Client? Y / (N) Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: AMT Date: 4/8/13

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start: 925	Start:
End: 927	End:
Temp:	Temp:

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A Required Client Information:

Company:	COP CRA NM
Address:	6121 Indian School Rd NE, Ste 200
	Albequerque, NM 87110
Email To:	cmathews@craworld.com
Phone: (505)884-0672	Fax: (505)884-4932
Requested Due Date/TAT:	standard

Section B Required Project Information:

Report To:	Christine Mathews
Copy To:	Kelly Blanchard, Angela Bown, Cassie Brown
Purchase Order No.:	4517680460
Project Name:	B Com No. 1 E Farmington
Project Number:	074938

Section C Invoice Information:

Attention:	COP epayables
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	Alice Flanagan
Pace Profile #:	5514, 19

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: NM

Requested Analysis Filtered (Y/N)

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	6010 Dissolved Fe & Mn	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	GW-074938-040413-CM-MW-1	WT	G			4.4.13			1			X						X	X		001
2	GW-074938-040413-CM-MW-2	WT	G			4.4.13			1			X						X	X		002
3	GW-074938-040413-CM-MW-3	WT	G			4.4.13			1			X						X	X		003
4	GW-074938-040413-CM-MW-4	WT	G			4.4.13			1			X						X	X		004
5	GW-074938-040413-CM-MW-5	WT	G			4.4.13			1			X						X	X		005
6	GW-074938-040413-CM-MW-6	WT	G			4.4.13			1			X						X	X		006
7	~~GW-074938-040413-CM-MW~~	~~WT~~	~~G~~			~~4.4.13~~			~~1~~												
8	GW-074938-040413-CM-DUP	WT	G			4.4.13			1			X						X	X		007
9																					
10																					
11																					
12																					

Lab 41975

18P3F1:5

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	[signature] / CRA	4.5.13	1700	[signature]	4/6/13	0840	3.4	Y	X	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Christine Mathews

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 4/5/13

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

October 11, 2013

Christine Matthews
CRA
6121 Indian School Rd NE
Suite 200
Albuquerque, NM 87110

RE: Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Dear Christine Matthews:
Enclosed are the analytical results for sample(s) received by the laboratory on October 02, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Flanagan

alice.flanagan@pacelabs.com
Project Manager

Enclosures

cc: Angela Bown, COP Conestoga-Rovers & Associa
Jeff Walker, COP Conestoga-Rovers & Associa

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
WY STR Certification #: 2456.01
Arkansas Certification #: 13-012-0
Illinois Certification #: 003097
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407-13-4
Utah Certification #: KS000212013-3
Illinois Certification #: 003097

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(913)599-5665

SAMPLE SUMMARY

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60154515001	**GW-074938-093013-CM-MW-1**	Water	09/30/13 18:25	10/02/13 08:45
60154515002	**GW-074938-093013-CM-MW-2**	Water	09/30/13 18:00	10/02/13 08:45
60154515003	**GW-074938-093013-CM-MW-3**	Water	09/30/13 18:12	10/02/13 08:45
60154515004	**GW-074938-093013-CM-MW-4**	Water	09/30/13 19:00	10/02/13 08:45
60154515005	**GW-074938-093013-CM-MW-5**	Water	09/30/13 18:40	10/02/13 08:45
60154515006	**GW-074938-093013-CM-MW-6**	Water	09/30/13 19:10	10/02/13 08:45
60154515007	**GW-074938-093013-CM-MW-DUP**	Water	09/30/13 19:15	10/02/13 08:45

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(913)599-5665

SAMPLE ANALYTE COUNT

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60154515001	**GW-074938-093013-CM-MW-1**	EPA 6010	NDJ	2
60154515002	**GW-074938-093013-CM-MW-2**	EPA 6010	NDJ	2
60154515003	**GW-074938-093013-CM-MW-3**	EPA 6010	NDJ	2
60154515004	**GW-074938-093013-CM-MW-4**	EPA 6010	NDJ	2
60154515005	**GW-074938-093013-CM-MW-5**	EPA 6010	NDJ	2
60154515006	**GW-074938-093013-CM-MW-6**	EPA 6010	NDJ	2
60154515007	**GW-074938-093013-CM-MW-DUP**	EPA 6010	NDJ	2

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PROJECT NARRATIVE

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: COP Conestoga-Rovers & Associates, Inc. NM
Date: October 11, 2013

General Information:
7 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-1 **Lab ID: 60154515001** Collected: 09/30/13 18:25 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	**1.7**	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:05	7439-89-6	
Manganese, Dissolved	**0.29**	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:05	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-2 **Lab ID: 60154515002** Collected: 09/30/13 18:00 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:07	7439-89-6	
Manganese, Dissolved	**0.0077**	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:07	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-3 **Lab ID: 60154515003** Collected: 09/30/13 18:12 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:09	7439-89-6	
Manganese, Dissolved	**0.047**	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:09	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-4 **Lab ID: 60154515004** Collected: 09/30/13 19:00 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:16	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:16	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-5 **Lab ID: 60154515005** Collected: 09/30/13 18:40 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:18	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:18	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-6 **Lab ID: 60154515006** Collected: 09/30/13 19:10 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:20	7439-89-6	
Manganese, Dissolved	**0.17**	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:20	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Sample: GW-074938-093013-CM-MW-DUP **Lab ID: 60154515007** Collected: 09/30/13 19:15 Received: 10/02/13 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Iron, Dissolved	ND	mg/L	0.050	0.012	1	10/03/13 17:10	10/04/13 13:22	7439-89-6	
Manganese, Dissolved	**0.17**	mg/L	0.0050	0.00049	1	10/03/13 17:10	10/04/13 13:22	7439-96-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(913)599-5665

QUALITY CONTROL DATA

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

QC Batch: MPRP/24558 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60154515001, 60154515002, 60154515003, 60154515004, 60154515005, 60154515006, 60154515007

METHOD BLANK: 1265504 Matrix: Water
Associated Lab Samples: 60154515001, 60154515002, 60154515003, 60154515004, 60154515005, 60154515006, 60154515007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.050	10/04/13 12:34	
Manganese, Dissolved	mg/L	ND	0.0050	10/04/13 12:34	

LABORATORY CONTROL SAMPLE: 1265505

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	10	9.4	94	80-120	
Manganese, Dissolved	mg/L	1	0.97	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1265506 1265507

Parameter	Units	60154273001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	467 ug/L	10	10	9.6	9.7	91	93	75-125	2	20	
Manganese, Dissolved	mg/L	1160 ug/L	1	1	2.1	2.1	94	93	75-125	0	20	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Pace Analytical Services, Inc.
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(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074938 B COM NO. 1 E FARMING
Pace Project No.: 60154515

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60154515001	**GW-074938-093013-CM-MW-1**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515002	**GW-074938-093013-CM-MW-2**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515003	**GW-074938-093013-CM-MW-3**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515004	**GW-074938-093013-CM-MW-4**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515005	**GW-074938-093013-CM-MW-5**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515006	**GW-074938-093013-CM-MW-6**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111
60154515007	**GW-074938-093013-CM-MW-DUP**	EPA 3010	MPRP/24558	EPA 6010	ICP/19111

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt
ESI Tech Spec Client

WO#: 60154515

60154515

Client Name: COP CRA

Optional
Proj Due Date:
Proj Name:

Courier: Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other ☐

Tracking #: 8023682794 87 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ ZPIC

Thermometer Used: T-112 / T-194 **Type of Ice:** (Wet) Blue None ☐ Samples received on ice, cooling process has begun.
(circle one)

Cooler Temperature: 7.9

Temperature should be above freezing to 6°C

Date and initials of person examining contents: 10/2/13

Chain of Custody present:	☑Yes ☐No ☐N/A	1.
Chain of Custody filled out:	☑Yes ☐No ☐N/A	2.
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	3.
Sampler name & signature on COC:	☑Yes ☐No ☐N/A	4.
Samples arrived within holding time:	☑Yes ☐No ☐N/A	5.
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	7.
Sufficient volume:	☑Yes ☐No ☐N/A	8.
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	9.
Containers intact:	☑Yes ☐No ☐N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	☐Yes ☐No ☑N/A	11.
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	12.
Sample labels match COC:	☑Yes ☐No ☐N/A	
Includes date/time/ID/analyses Matrix: WT		13.
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	14.
Exceptions: VOA, coliform, TOC, O&G, WI-DRO (water), Phenolics	☐Yes ☑No	Initial when completed / Lot # of added preservative
Trip Blank present:	☐Yes ☐No ☑N/A	
Pace Trip Blank lot # (if purchased):		15.
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	16.
Project sampled in USDA Regulated Area:	☐Yes ☐No ☑N/A	17. List State:

Client Notification/ Resolution: Copy COC to Client? Y / (N) Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.	
Start: 1250	Start:
End: 1252	End:
Temp:	Temp:

Project Manager Review: [signature] Date: 10/2/13

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: | of

Section A Required Client Information:

Company:	COP CRA NM
Address:	6121 Indian School Rd NE, Ste 200
	Albequerque, NM 87110
Email To:	cmathews@craworld.com
Phone: (505)884-0672	Fax: (505)884-4932
Requested Due Date/TAT:	standard

Section B Required Project Information:

Report To:	Christine Mathews
Copy To:	Jeff Walker, Angela Bown
Purchase Order No.:	4517680460
Project Name:	B Com No. 1 E Farmington
Project Number:	074938

Section C Invoice Information:

Attention:	COP epayables
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager	Alice Flanagan
Pace Profile #:	5514, 19

REGULATORY AGENCY

☐ NPDES ☒ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: NM

Requested Analysis Filtered (Y/N)

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

ITEM #	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START / GRAB DATE	COLLECTED TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N: 6010 Dissolved Fe & Mn	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	GW-074938-093013-CM-MW-1	WT G	9/30/13	1825				1			X						X		601545 15 001
2	GW-074938-093013-CM-MW-2	WT G	9/30/13	1800				1			X						X		002
3	GW-074938-093013-CM-MW-3	WT G	9/30/13	1812				1			X						X		003
4	GW-074938-093013-CM-MW-4	WT G	9/30/13	1900				1			X						X		004
5	GW-074938-093013-CM-MW-5	WT G	9/30/13	1640				1			X						X		005
6	GW-074938-093013-CM-MW-6	WT G	9/30/13	1910				1			X						X		006
7	GW-074938-093013-CM-DUP	WT G	9/30/13	1915				1			X						X		007
8																			
9																			
10																			
11																			
12																			

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Metals were field filtered	~~Christine Mathews/CRA~~	~~9/30/13~~								
	~~Christine Mathews/CRA~~	~~10/1/13~~	~~0930~~							
	Christine Mathews/CRA	10/1/13	0930	PACE	10/2/13	0845	7.9	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Christine Mathews

SIGNATURE of SAMPLER: Christine Mathews DATE Signed (MM/DD/YY): ~~9/30/13~~ 10/1/13

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev 08, 12-Oct-2007

Appendix C

SOUDER MILLER & ASSOCIATES 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		lina 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		lina 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		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	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		

Appendix D

CONESTOGA-ROVERS & ASSOCIATES REMEDIAL TECHNOLOGY ASSESSMENT AND TREATABILITY STUDY MEMO

CONESTOGA-ROVERS & ASSOCIATES

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Plymouth, Michigan 48170
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www.CRAworld.com

DRAFT MEMORANDUM

Sent via email

TO:	Jeffrey Walker	REF. NO.:	074928, 074929, 074932, 074933, 074934, 074938
FROM:	Alan Weston/Sophia Dore/cs/1	DATE:	September 12, 2013
CC:	Bernie Bockisch		
RE:	**Remedial Technology Assessment** **Six ConocoPhillips Company Sites in New Mexico**		

INTRODUCTION

At six ConocoPhillips Company Sites located in New Mexico, historic benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbon contamination has been remediated such that these compounds are no longer detected in groundwater. However, the anaerobic conditions caused by the presence of these compounds in groundwater has potentially lead to the solubilization of iron and manganese and; therefore, while the organic compounds are no longer an issue at the Sites, the Sites cannot be closed because these metals exceed New Mexico Water Quality Control Commission (NMWQCC) criteria. Both iron and manganese are more soluble in their reduced forms. When they are oxidized they tend to form ferric or manganese oxides which are not soluble and precipitate out of groundwater. Information for the six sites is summarized in the table below:

Site	*Howell K No. 1*	*Faye Burdette No. 1*	*Sategna No. 2E*	*Randleman No. 1*	*San Juan 27-5 No. 34A*	*Farmington B Com No. 1E*
Full name and location	Howell K No. 1 Natural Gas Well Site, San Juan County, NM	Faye Burdette No. 1 Gas Well Site, San Juan County, NM	Sategna No. 2E Natural Gas Well Site, Bloomfield, NM	Randleman No. 1 Natural Gas Well Site, San Juan County, NM	San Juan 27-5 No. 34A Natural Gas Well Site, Rio Arriba County, NM	Farmington B-Com No. 1E Natural Gas Well Site, Farmington, NM
NMOCD No.	3R-431	3R-434	3R-428	3R-340	3R-426	3R-084
CRA Project No.	074928	074929	074932	074933	074934	074938
Wells with Fe above criteria	MW-1, MW-4	None	None	None	None	MW-1
Wells with Mn above criteria	MW-1, MW-3, MW-4	MW-1	MW-1, MW-2, MW-3	MW-2, MW-3, MW-4, MW-5	MW-1, MW-3	MW-1
pH/ORP	n/a	pH 6.85 S.U. ORP -2.7 mV	pH 5.6-6.5 S.U. ORP 6.4-49.9 mV	pH 6.3-8.3 S.U. ORP -262 – -209 mV	pH 6.2 – 6.4 S.U. ORP -109 - -96	pH 7.3 S.U. ORP -119 mV
Depth to Groundwater	25-30 feet	8-9 feet	6-9 feet	13-16 feet	21 feet	28 feet
Lithology	Sand/clayey sand	Sand/silty sand	Clay; sand/cobbles	Sand/cobbles	Clay; sand	Gravel
Other issues	Sulfate exceeds criteria	n/a	Sulfate, TDS exceed criteria	Sulfate, TDS exceed criteria	n/a	n/a

Notes: S.U. – standard units
ORP – oxidation reduction potential
mV – millivolts

Conestoga-Rovers & Associates' (CRA's) Innovative Technology Group (ITG) was requested to review the Site data and identify potential technologies to reduce concentrations of iron and manganese in groundwater. The following sections provide a brief description of potential remedial technologies and conceptual designs for treatment options at the Site.

POTENTIAL REMEDIAL TECHNOLOGIES

The following in situ technologies were considered for groundwater treatment:

- pH Adjustment
- Biosparging
- Oxidant Injection

TECHNOLOGY DESCRIPTIONS

pH Adjustment

One of the main variables in environmental systems that determine the solubility of most metals in water is their pH. Typically metals are less soluble at higher pH. However, some metals exhibit **amphoteric** (able to act as either an acid or a base) behavior causing the metal to be soluble at both high and low pH values. High rates of microbial activity can lower groundwater pH due to the production of organic acids and carbon dioxide. The cause of the low pH at these Sites was likely this biological activity associated with the biodegradation of BTEX and petroleum hydrocarbons. Both iron and manganese are more soluble under reducing conditions; however, at lower pH levels they are soluble under less reducing conditions. Iron and manganese will precipitate at a lower ORP if the pH is higher. pH can be adjusted using a base such as sodium hydroxide (NaOH) if the pH is too low or using an acid such as hydrochloric acid (HCl) if the pH is too high. Proprietary buffers specifically formulated for adjustment of groundwater pH are also commercially available. Increasing the pH could be performed by injecting NaOH or sodium bicarbonate ($NaHCO_3$) or by injecting a commercially available buffer such as CoBupH which is manufactured by EOS Remediation. Using CoBupH would increase the treatment cost by a factor of at least 5 as compared to NaOH or $NaHCO_3$; therefore, it will not be considered further. The use of NaOH could result in overtreatment to slightly basic conditions while the use of $NaHCO_3$ would not.

Applicability for Groundwater Treatment

The pH at all of the Sites is below 7 standard units (S.U.), and in most cases below 6.5 S.U. Typical groundwater pH levels in the state of New Mexico are around pH 8. Adjustment of pH would be effective for lowering the solubility of iron and manganese at the Site. Dilute solutions of NaOH or $NaHCO_3$ would be injected using existing monitoring wells if permitted or by direct push into the area at each Site where low pH groundwater has been detected. A series of injection events spaced at least 3 months apart would be conducted to increase pH until that the iron and manganese precipitate out of solution. The treatment would require one year. The effectiveness of this technology for precipitation of iron and manganese from groundwater from the Sites would be confirmed by a treatability study.

Biosparging

In situ biosparging involves injection of pressurized gases into the subsurface at very low flow rates to enhance biodegradation. Oxygen or air is injected to enhance aerobic conditions. Injection of oxygen is controlled such that vapors are not generated or accumulated in the vadose zone.

iSOC, or In situ Submerged Oxygen Curtain, is an innovative biosparging technique developed for oxygen injection that can be used to inject other gases. Super-saturated oxygen can be delivered to the subsurface at low flow rates such that the gases are infused into the groundwater without the formation of bubbles. The gases can be injected into the groundwater at a low flow rate using injection points or vertical wells.

Applicability for Groundwater Treatment

The injection of air/oxygen into the groundwater would create aerobic conditions in the groundwater that would lead to the oxidation of iron and manganese into their more oxidized and less soluble forms. In their oxidized forms iron and manganese will form oxides and precipitate out of groundwater. Air/oxygen injection would be performed using either air spargers or iSOC units installed in air sparge wells in the areas where iron and/or manganese exceed criteria. It may be possible to use some of the existing monitoring wells as air sparge wells. The biosparge units would sparge air into the groundwater while the iSOC units would inject dissolved oxygen. For iSOC, treatment for 1 year would likely be sufficient to reduce metals concentrations to criteria. For biosparging, treatment for 2 years would likely be required since lower concentrations of oxygen are introduced into the groundwater. The effectiveness of this technology for precipitation of iron and manganese from groundwater from the Sites would be confirmed by a treatability study.

Oxidant Injection

In situ chemical oxidation (ISCO) is an effective method for destroying localized high concentrations of a wide range of organic compounds, as well as oxidizing and precipitating metals such as iron and manganese. In an oxidation reaction, the oxidizing agent oxidizes iron and manganese to their insoluble forms. Commonly used oxidizing reagents include $KMnO_4$, Fenton's Reagent (hydrogen peroxide in a solution of ferrous salts), ozone, and sodium persulfate.

$KMnO_4$, sodium persulfate, and Fenton's Reagent are effective when delivered in an aqueous solution and react with a wide range of organic compounds. These oxidants are inexpensive and readily available in large quantities. ISCO is Site-specific, and successful treatment is typically a function of the effectiveness of the delivery system (being able to deliver sufficient amounts of oxidant to the impacted soil and groundwater and making sufficient "contact") and subsequent transport of the oxidant within the soil and groundwater. The treatment performance is dependent to a great extent on the soil and groundwater chemistry. A critical factor in the evaluation of ISCO treatment is determining the dosages of oxidant that are required to effectively oxidize the metals present (referred to as stoichiometric demand) as well as the competing reactions. The competing reactions are typically caused by the presence of natural organic materials such as humates and fulvates. The consumption of oxidants by these non-target compounds is defined as natural oxidant demand (NOD). In order to determine the optimum dosage, treatability studies are required. Large quantities of oxidizing chemicals require regulated handling and pose health and safety concerns. Chemical oxidation may cause mobilization of metals, possible formation of toxic by-products, heat, gas, and biological perturbation.

Applicability for Groundwater Treatment

Oxidant injection would be effective for creating oxidizing conditions in the groundwater so that iron and manganese would be oxidized into their more oxidized and less soluble forms. Potassium permanganate, Fenton's Reagent, hydrogen peroxide, sodium persulfate and ozone would all be effective oxidants for this application; however, the injection of potassium permanganate would introduce more soluble manganese into the groundwater which already contains excess manganese therefore this oxidant is not recommended. The injection of sodium persulfate would lead to increased sulfate concentrations and since sulfate exceeds criteria at some of the Sites, this oxidant is also not recommended. The use of ozone would involve the installation of an ozone sparge system, which given the minor nature of the contamination would not be cost effective; therefore, the injection of Fenton's reagent is recommended. A dilute solution of Fenton's reagent would be injected using existing monitoring wells if permitted or by direct push into the area where low pH groundwater has been detected. 2-3 injection events, spaced 3 months apart would be required to oxidize metals such that the iron and manganese precipitate out of solution. The effectiveness of this technology for precipitation of iron and manganese from groundwater from the Sites would be confirmed by a treatability study.

CONCEPTUAL DESIGNS

The following technologies were selected as effective treatments for iron and manganese in groundwater:

- pH Adjustment
- Biosparging
- Oxidant Injection

pH Adjustment

pH adjustment would involve the injection of either a 2 percent NaOH solution or a 5 percent solution of $NaHCO_3$. If permitted in the state of New Mexico, treatment would be performed using the monitoring wells as injection wells. At some sites additional injection points would also be required. If not permitted injections would be performed by direct push. Two injection events, spaced at least 3 months apart would be required for treatment of the Sites. The treatment areas, number of injection wells/points, and injection doses, volumes and frequencies are shown in the table below.

Biosparging

Biosparging would involve the injection of air at each Site. If permitted in the state of New Mexico, treatment would be performed using the monitoring wells as air injection wells. At some sites additional air sparge wells would also be required. If not permitted, 2-inch diameter polyvinyl chloride (PVC) air injection wells would be installed at each Site. iSOC treatment would involve installation of an iSOC unit into the wells. For traditional biosparging, sparge units consisting of 1/4-inch x 1/8-inch tubing and an air stone, would be installed in each well. The sparge units would be manifolded to an air compressor. Air sparging would be performed for approximately 10-12 hours per day. For iSOC treatment t treatment for 1 year would likely be sufficient to reduce metals concentrations. For biosparging treatment, at least two years may be required. The treatment areas and number of sparge wells proposed are shown in the table below.

Oxidant Injection

Oxidant injection would involve the injection of a low concentration of Fenton's reagent consisting of 5 percent hydrogen peroxide and a 7.5 percent solution of ferrous sulfate. The volume of ferrous sulfate solution would be small therefore this solution would not introduce a significant amount of sulfate into the groundwater. If permitted in the state of New Mexico, treatment would be performed using the monitoring wells as injection wells. At some sites additional injection points would also be required. If not, permitted injections would be performed by direct push. Two to three injection events, spaced at least 3 months apart would be required for treatment of the Sites. The treatment areas, number of injection wells/points, and estimated injection volumes and frequencies are shown in the table below.

Site	*Howell K No. 1*	*Faye Burdette No. 1*	*Sategna No. 2E*	*Randleman No. 1*	*San Juan 27-5 No. 34A*	*Farmington B Com No. 1E*
Treatment Area	1,650 sq ft encompassing wells MW-1, MW-3 and MW-4	700 sq ft encompassing well MW-1	6,050 sq ft encompassing wells MW-1, MW-2 and MW-3	7,850 sq ft encompassing wells MW-1, MW-2, MW-3 and MW-4	2,060 sq ft encompassing wells MW-1 and MW-3	700 sq ft encompassing well MW-1
Number of Injection Wells/Points Required	3	1	9	11	3	1
Monitoring Well to use for injection if permitted	MW-1, MW-3 and MW-4	MW-1	MW-1, MW-2 and MW-3	MW-1, MW-2, MW-3 and MW-4	MW-1 and MW-3	MW-1
Number of Additional Wells/Points Needed	None	None	6	7	1	None
Injection Interval	between 30 and 40 ft bgs	between 9 and 19 ft bgs	between 9 and 19 ft bgs	between 16 and 26 ft bgs	between 21 and 31 ft bgs	between 28 and 38 ft bgs
Volumes for pH adjustment	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$	1,600 gallons of 2% NaOH or 1,600 gallons of 5% $NaHCO_3$
Number of Injection Events for pH Adjustment	2	2	2	2	2	2
Biosparge Time	1 year for iSOC 1-2 years for biosparging	1 year for iSOC 1-2 years for biosparging	1 year for iSOC 1-2 years for biosparging	1 year for iSOC 1-2 years for biosparging	1 year for iSOC 1-2 years for biosparging	1 year for iSOC 1-2 years for biosparging
Volumes of Oxidant	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$	1,600 gallons of 5% H_2O_2 and 60 gallons of 7.5 % $FeSO_4$
Number of Injection Events for oxidant addition	2-3	2-3	2-3	2-3	2-3	2-3

Notes: S.U. – standard units ORP – oxidation reduction potential mV - millivolts

RECOMMENDATION

Based on the above assessment, pH adjustment would likely be the most cost effective method for metals precipitation; however, the effectiveness of this technology should be verified by a treatability study. If the study confirms that this treatment would be effective then pH adjustment would be the recommended technology. Since NaOH and $NaHCO_3$ treatment costs tend to be similar, treatment with $NaHCO_3$ is recommended since there is no risk of overtreatment. If the study shows that pH adjustment is not

effective for the precipitation of iron and manganese from groundwater then oxidant injection using dilute Fenton's reagent would be the recommended technology.