3R - 431

DEC 2010
GWMR

04/04/2011

3R431

DECEMBER 2010 QUARTERLY GROUNDWATER MONITORING REPORT

CONOCOPHILLIPS

HOWELL K No. 1
NATURAL GAS PRODUCTION SITE
SAN JUAN COUNTY, NEW MEXICO

OCD # _____

API #300-045-09313

Prepared for:

ConocoPhillips

Risk Management and Remediation
420 South Keeler Avenue
Bartlesville, OK 74004

Prepared by:

TETRA TECH, INC.

6121 Indian School Rd. NE, Suite 200
Albuquerque, NM 87110
Tetra Tech Project No. 114-690185

March 2011

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

DECEMBER 2010 QUARTERLY GROUNDWATER MONITORING REPORT HOWELL K NO. 1, SAN JUAN COUNTY, NEW MEXICO

1.0 INTRODUCTION

This report presents the results of a quarterly groundwater monitoring event conducted by Tetra Tech, Inc. (Tetra Tech) on December 15, 2010, at the ConocoPhillips Howell K No. 1 site, located on BLM land, approximately ½ mile southeast of Navajo Lake State Park and 10 miles east of Aztec in Unit Letter K, Section 21, Township 30N, Range 8W of San Juan County, New Mexico (Site). The Site consists of a gas production well and associated equipment and installations. The location and general features of the Site are shown on **Figures 1** and **2**, respectively.

1.1 Site Background

The environmental investigation at the Site began in August 2005 with the excavation of approximately 4000 cubic yards of hydrocarbon impacted soil from an area southwest of the wellhead at the Howell K No. 1 site. The hydrocarbon impacted soils were discovered in the area during below grade tank removal activities. The final dimensions of the excavation were 70 feet by 50 feet by 36 feet deep (groundwater was encountered at a depth of approximately 34 feet below ground surface (bgs). Once this extent had been reached, the excavation was stopped due to the inability of the equipment to operate safely at this depth; however, the limits of the hydrocarbon impact had not been delineated. The excavation was backfilled with clean soil. In March 2006, one groundwater monitoring well (MW-1) was installed in the general area of the backfilled excavation by Envirotech. The location of this well is shown on **Figure 2**.

Due to the transition of Site consulting responsibilities from Lode Star LLC of Farmington, NM, to Tetra Tech following the acquisition of Burlington Resources by ConocoPhillips Company in March 2006, groundwater monitoring was not performed at the Site in March and June 2007. Tetra Tech began sampling groundwater at the Howell K No. 1 site in November of 2007 using MW-1 and continued to do so until August of 2008, when 3 additional monitoring wells were installed at the Site by WDC Exploration and Wells of Peralta, NM and under Tetra Tech supervision. Additional wells were installed in response to a request by the New Mexico Oil Conservation Division (OCD) for Site characterization and enhanced laboratory analyses. This request was communicated to Tetra Tech during an April 2008 meeting conducted in Santa Fe, New Mexico with Glenn Von Gonten, OCD Environmental Bureau Hydrologist. Groundwater Monitoring Well MW-2 was installed upgradient of MW-1 and Monitoring Wells MW-3 and MW-4 were installed down-gradient of MW-1 (**Figure 2**). A generalized geologic cross-section was compiled using subsurface data collected from each boring location during installation of Monitoring Wells; MW-2, MW-3 and

MW-4. Monitoring Wells MW-2 and MW-4 are represented on the cross-section which can be seen as **Figure 3**. October 2008 marked the first quarterly groundwater monitoring event to include all 4 monitoring wells for analysis at the Site. A summary of the Howell K No. 1 site history can be seen in **Table 1**.

2.0 MONITORING SUMMARY, SAMPLING METHODOLOGY, AND ANALYTICAL RESULTS

2.1 Monitoring Summary

Quarterly groundwater sampling was conducted by Tetra Tech on December 15, 2010. The groundwater sampling event included samples from Monitoring Wells; MW-1, MW-2, and MW-4. Groundwater levels were measured in each site monitoring well prior to sampling and can be found in **Table 2**. Groundwater elevations for MW-1, however, can not be calculated or included on the groundwater contour map due to the gradual, continuous, upward shifting of the PVC well casing. The continual shifting of the PVC casing of MW-1 is likely due to the proximity of MW-1 to the 2005, below-grade tank removal excavation and the settling and shifting of the fill material in this area. Groundwater elevations are calculated from top of casing elevations which were derived from survey data collected from each site monitoring well by Tetra Tech on August 14, 2008. The groundwater flow direction is to the west based on groundwater elevation data collected on December 15, 2010 from MW-2 and MW-4, and as seen on **Figure 4**.

2.2 Groundwater Sampling Methodology

During the sampling event, each monitoring well was purged either of three casing volumes of water or was purged until groundwater parameters had stabilized. Measured groundwater parameters included; temperature, pH, conductivity, total dissolved solids (TDS), oxidation-reduction potential (ORP) and dissolved oxygen (DO), and were collected using a YSI 556 multi-parameter sonde. A 1.5-inch clear, polyethylene, dedicated bailer was used to purge and to collect the groundwater samples from MW-2, MW-3 and MW-4. A 0.5 inch clear, polyethylene, dedicated bailer was used to purge and collect a groundwater sample from MW-1. The purge water generated during the event was disposed of in the produced water tank located on site (**Figure 2**). The groundwater samples were placed in laboratory prepared bottles, packed on ice, and shipped with chain-of-custody documentation to Southern Petroleum Laboratory (SPL) in Houston, Texas. All groundwater samples collected were analyzed for the presence of benzene, toluene, ethylbenezene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8260B, dissolved iron and manganese by EPA Method 6010B, as well as fluoride and sulfate by EPA method 300.0. The dissolved metals samples were collected in unpreserved containers supplied by the laboratory, to be filtered and preserved by laboratory personnel prior to analysis for dissolved

metals. Dissolved metals testing will continue for metals exceeding NMWQCC drinking water standards.

2.3 Groundwater Sampling Analytical Results

Samples collected from MW-1 and MW-2, and MW-4 on December 15, 2010 indicate that groundwater concentrations for BTEX were below laboratory method detection limits (MDL). Monitoring well MW-3 was found to be dry during this sampling event. Although BTEX constituents were found to be below NMWQCC standards during the December 2010 quarterly analysis, other constituents were found to be above standards. Analyses of samples collected from all three sampled wells on Site were found to be above the NMWQCC standard for sulfate. MW-1 and MW-4 were also above standard for dissolved manganese and dissolved iron. MW-4 was also found to be above the standard for fluoride. **Table 3** lists the analytical results from groundwater sampling completed during December 2010. Groundwater sampling field forms showing field parameters can be found in **Appendix A** and the corresponding laboratory analytical reports including quality control summaries can be found in **Appendix B**.

3.0 CONCLUSIONS

Based on the historical groundwater quality data, groundwater samples collected from MW-1 have never exceeded NMWQCC groundwater quality standards for BTEX constituents during sampling conducted from March 2006 to December 2010. BTEX concentrations were found to be below the minimum laboratory detection limits for these constituents consistently since October 2006. In addition, groundwater samples collected from MW-2 and MW-4 have also not exceeded NMWQCC groundwater quality standards for BTEX constituents from October 2008 to December 2010. As noted in the September 2010 Howell K No. 1 Groundwater Monitoring Report, Tetra Tech recommended discontinuation of BTEX analysis. The December 2010 monitoring event will mark the final quarter of analysis for BTEX constituents. Tetra Tech will, however, continue quarterly groundwater monitoring of fluoride, sulfate, dissolved manganese, and dissolved iron until concentrations of these constituents are below NMWQCC standards, appear stable or reach regional background levels. Please contact Kelly Blanchard at 505-237-8440 or kelly.blanchard@tetratech.com if you have any questions or require additional information.

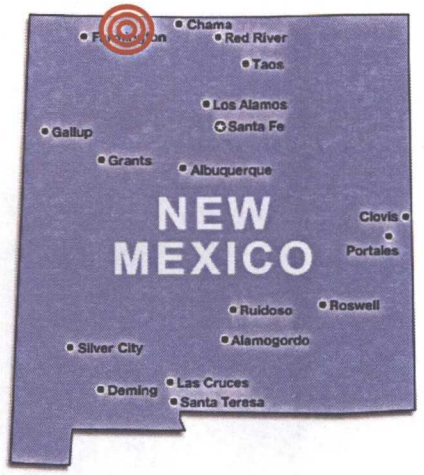
FIGURES

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

ConocoPhillips - High Resolution Aerial Imagery 2008

FIGURE 1.

Site Location Map
ConocoPhillips
Howell K No. 1
Aztec, NM



Approximate ConocoPhillips Howell K No. 1 Site location

Latitude = 36.79505 deg N
Longitude = -107.68474 deg W

N

TETRA TECH, INC.

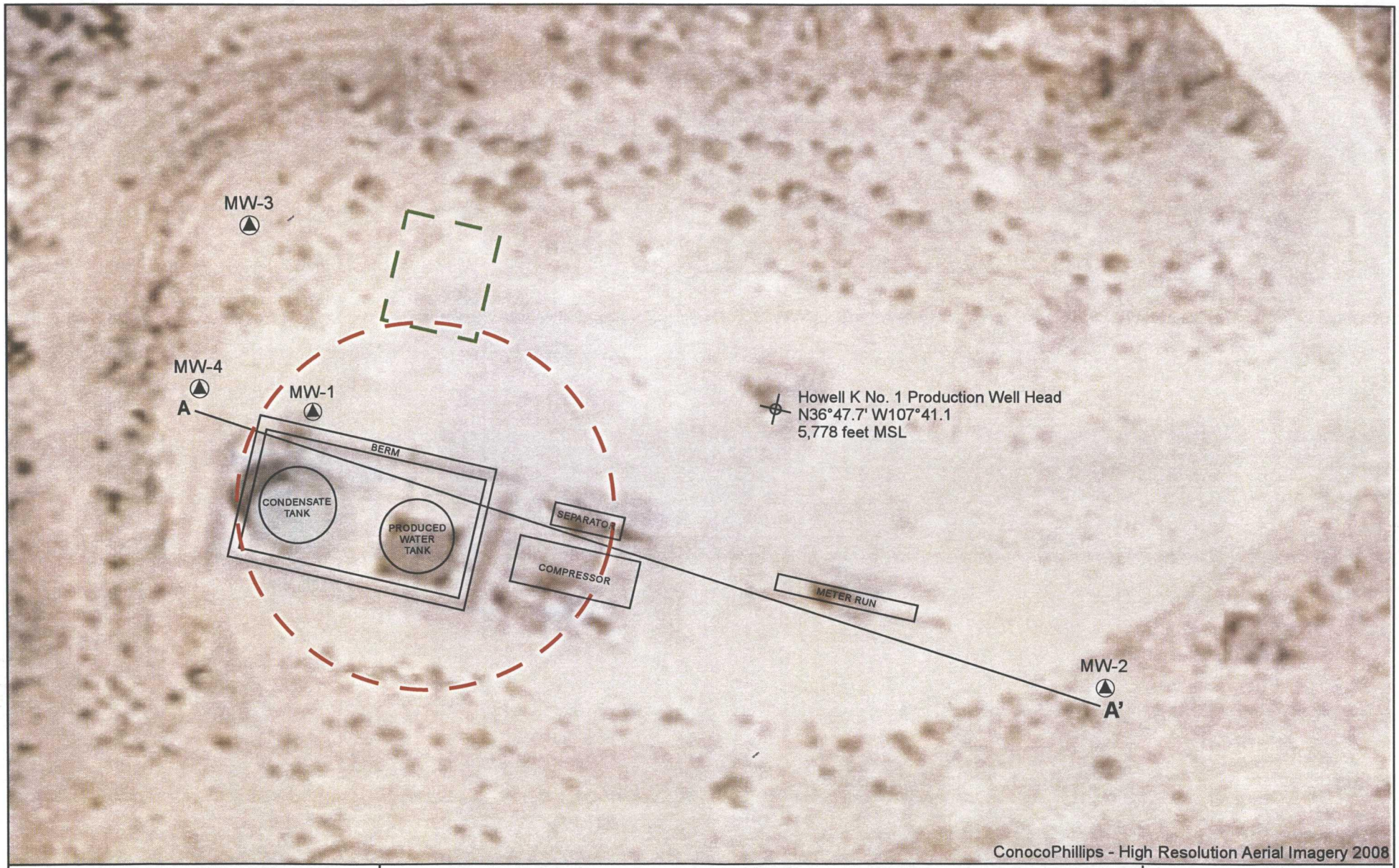


FIGURE 2:
SITE DETAILS MAP
CONOCOPHILLIPS COMPANY
HOWELL K No. 1
Unit K, Sec 21, Twp 30N, Rng 8W
San Juan County, New Mexico
Revised by CFM 03/11

LEGEND

- WELLHEAD
- MONITORING WELL
- GENERAL AREA OF BELOW-GRADE TANK REMOVAL EXCAVATION
- GENERAL AREA OF UNLINED EARTHEN PIT EXCAVATION
- A — A' CROSS SECTION LAYOUT

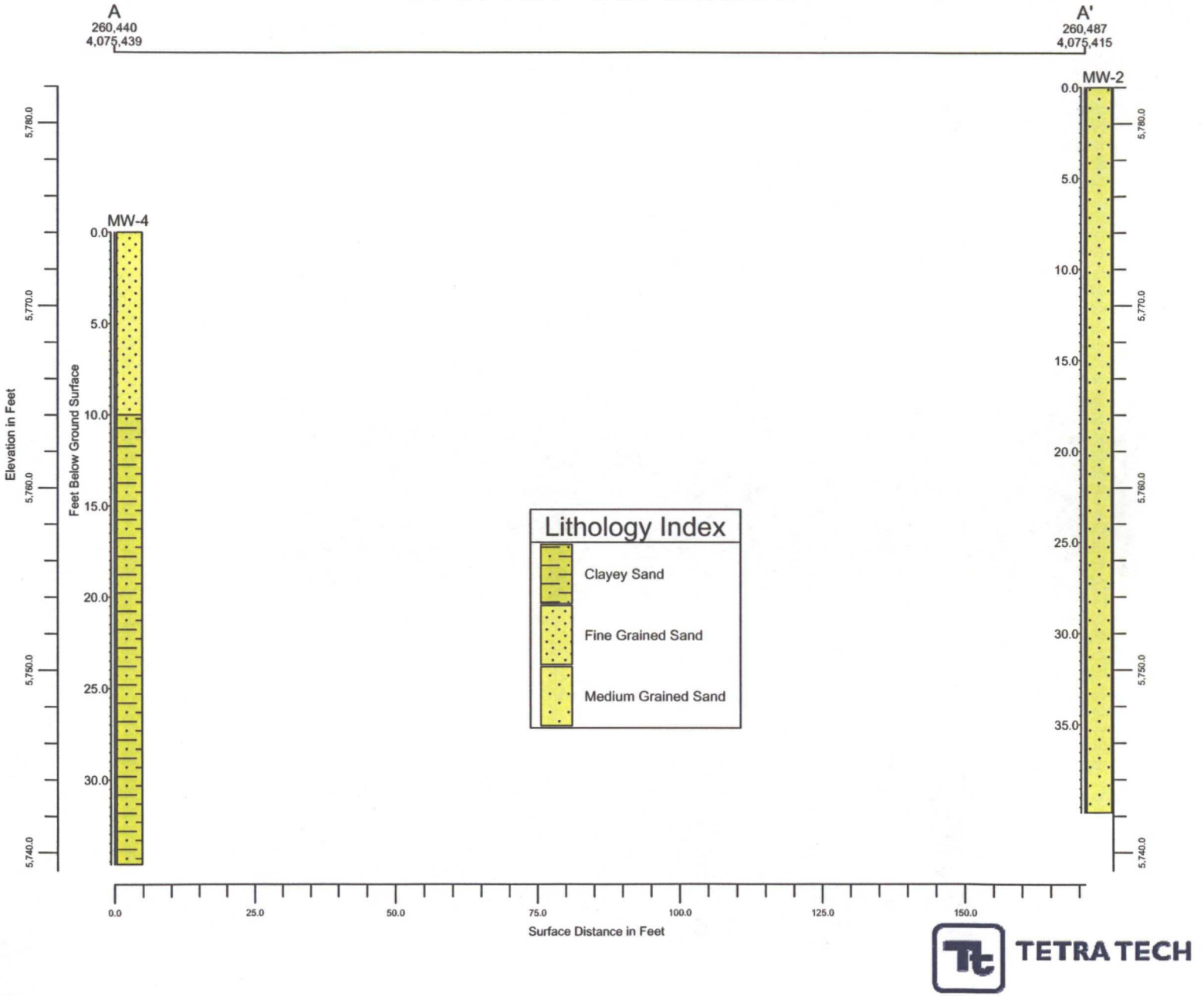
0 15 30
FEET

N

TETRA TECH, INC.

Figure 3.

Howell K No. 1 - Cross-Section A-A'



1/26/2011

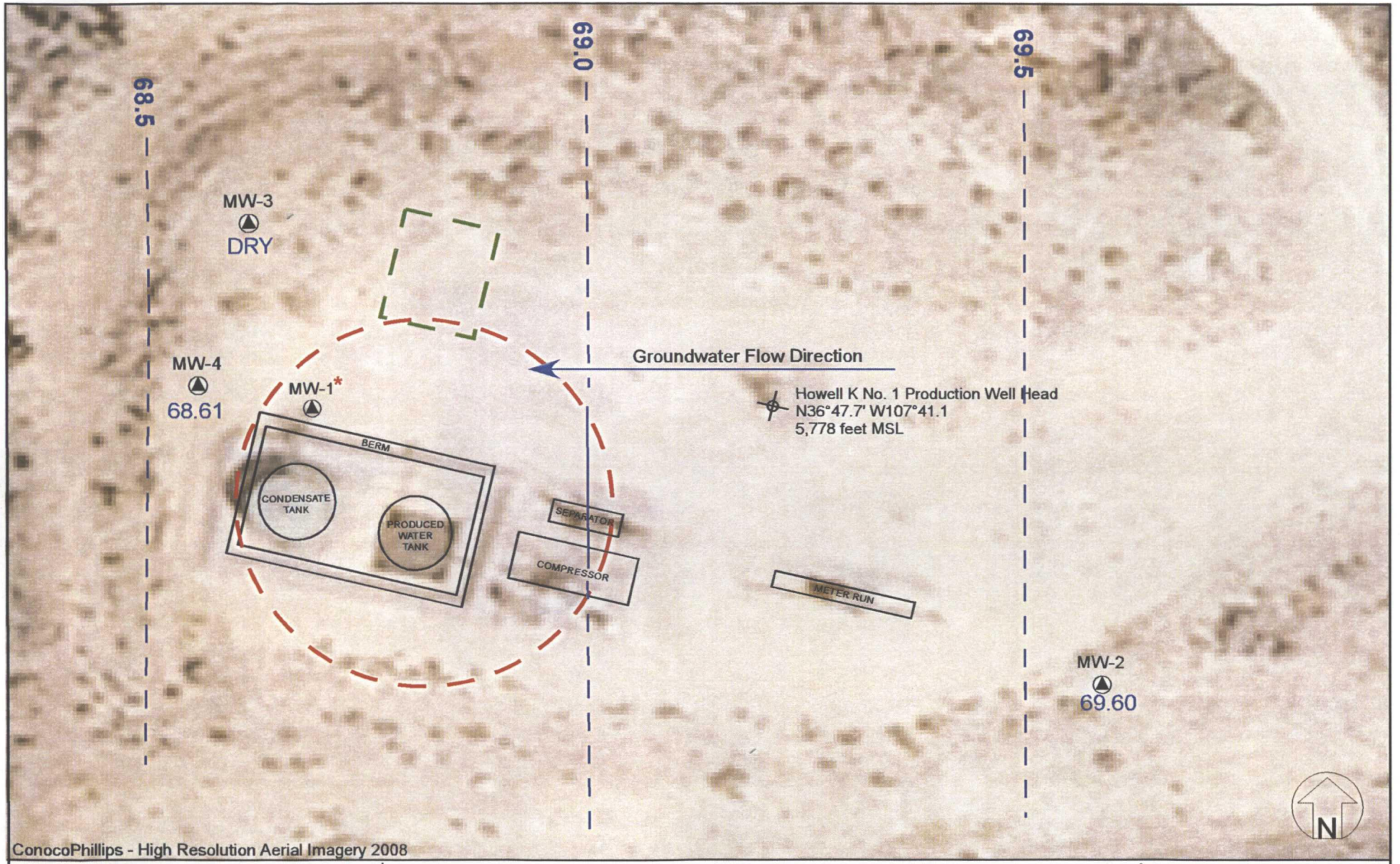


FIGURE 4:
DECEMBER 2010 GROUNDWATER ELEVATION CONTOUR MAP
CONOCOPHILLIPS COMPANY
HOWELL K No. 1
Unit K - T30N, R8W, Section 21
San Juan County, New Mexico
Revised by CFM 06/10

LEGEND

- WELLHEAD
- MONITORING WELL
- GENERAL AREA OF BELOW-GRADE TANK REMOVAL EXCAVATION
- GENERAL AREA OF UNLINED EARTHEN PIT EXCAVATION
- GROUNDWATER ELEVATION IN FEET (dashed where inferred)
- * Groundwater elevations can not be calculated accurately due to continual upward shifting of the PVC casing (see text of section 2.1, Monitoring Summary, for more information)

0 15 30
FEET

TETRA TECH, INC.

TABLES

Table 1. ConocoPhillips Company, Howell K No. 1 - Site History Timeline

Date/Time Period	Event/Action	Description/Comments
July 26, through August 18, 2005	Initial Site Assessment	Environmental investigation began with the excavation of approximately 4000 cubic yards of impacted soil from an area southwest of the Howell K No.1 well head. Impacted soils were discovered during the removal activities of a below grade tank. Dimensions of the excavation were approximately 70 feet long by 50 feet wide by 36 feet deep. Groundwater was encountered at approximately 34 feet and soils were still impacted at 36 feet deep, the point at which excavation machinery was stopped at the practical limit for safe operation. The total verticle extent of hydrocarbon impacts were not completely deliniated. Soil was treated with 600 total gallons of potassium permanganate solution. The excavation area was backfilled with clean soil.
March 10, 2006	Groundwater monitoring well installation	One ground water monitoring well, MW-1, was installed in the center of the backfilled excavation by Envirotech. Total depth of well was set at 35 feet.
March 31, 2006	Site Transfer	ConocoPhillips Company completed acquisition of Burlington Resources.
March and June 2007	Groundwater monitoring not performed	After the acquisition of Burlington Resources by ConocoPhillips, consulting responsibilities were transferred from Lode Star LLC of Farmington New Mexico to Tetra Tech of Albuquerque. Due to the transition, first and second quarter sampling of 2007 was not performed.
November 9, 2007 through March 19, 2008	Groundwater monitoring	Tetra Tech began sampling the Howell K No. 1 site quarterly in November of 2007. Groundwater was sampled from MW-1 and was analyzed for BTEX constituents. No constituents were detected at levels that exceeded the NMWQCC standards at any point during this period.
April 1, 2008	Additional Monitoring Requested by OCD	Oil Conservation Division of NM Energy, Minerals, and Resources Dept. indicates additional investigation and sampling is necessary for closure consideration during a meeting with Glenn Von Gonten.
July 23, 2008	Groundwater monitoring postponed	Groundwater monitoring of MW-1 was postponed after it was found that there was an obstruction caused by settling and shifting of the MW-1 casing. It was determined that the obstruction could be avoided by using a smaller bailer to collect samples. Sampling was postponed and was set to follow upcoming monitoring well installation so that proper sampling materials could be used.
August 13 and 14, 2008	Groundwater monitoring well installation and groundwater monitoring	Three additional groundwater monitoring wells (MW-2, MW-3 and MW-4) were installed by WDC and overseen by Tetra Tech. MW-2 was installed up-gradient of MW-1. Both MW-3 and MW-4 were installed down-gradient of MW-1. All wells were developed by purging approximately 80 gallons of fluid using a surge block and a purge pump. A sample was collected from MW-1 on August 14th since sampling could not be done in July of 2008. A 3/4 inch disposable bailer was used to avoid obstruction in MW-1. Sample was analyzed for BTEX constituents. All constituents were below NMWQCC standards.
October 24, 2008	Groundwater monitoring	Third quarter 2008 groundwater monitoring was completed and was the first quarter of sampling to include all four monitoring wells on site. A baseline suite was completed including major ions, total metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs) including BTEX, diesel range organics, and gasoline range organics. All BTEX constituents were below NMWQCC standards. All four wells were above standard for sulfate, and showed elevated total iron and total manganese concentrations. MW-4 was also above the NMWWCC standard for fluoride.
January 30, 2009	4th quarter 2008 groundwater monitoring	Tetra Tech conducted forth quarter 2008 groundwater monitoring at the site for BTEX constituents in all four monitoring wells. All wells are below NMWQCC standards for BTEX .
September 25,2009	2009 annual groundwater monitoring	Tetra Tech conducted 2009 annual groundwater monitoring of MW-2, MW-3 and MW-4 for BTEX, dissoved iron, dissolved manganese, sulfate, and fluoride. All three wells were below NMWQCC standards for BTEX. All three wells were above standard for sulfate. Dissolved manganese was above standard in MW-3 and MW-4 and flouride was above standard in MW-4. Dissolved metals analyses conducted for the first time since standards are based on dissolved metals testing. OCD concurred, allowing total metals testing to be discontinued.

Table 1. ConocoPhillips Company, Howell K No. 1 - Site History Timeline

Date/Time Period	Event/Action	Description/Comments
October 18, 2009	Groundwater monitoring	Tetra Tech conducted 2009 annual groundwater monitoring of MW-1 for BTEX, dissoved iron, dissolved manganese, sulfate, and fluoride. MW-1 was below NMWQCC standards for BTEX. Sulfate, dissolved manganese and dissolved iron were above standard in MW-1.
December 15, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, sulfate and flouride. All four monitoring wells are below NMWQCC standards for BTEX . All four monitoring wells were above standard for sulfate. MW-1, MW-3 and MW-4 were above standard for dissolved manganese and MW-3 and MW-1 were also above standard for dissolved iron.
March 30, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, and sulfate. All four monitoring wells are below NMWQCC standards for BTEX . All four monitoring wells were above standard for sulfate. MW-1, MW-3 and MW-4 were also above standard for dissolved manganese .
June 8, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, and sulfate. All four monitoring wells are below NMWQCC standards for BTEX . All four monitoring wells were above standard for sulfate. MW-1, MW-3 and MW-4 were also above standard for dissolved manganese . MW-1 was also above standard for iron.
September 23,2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, fluoride and sulfate. All four monitoring wells are below NMWQCC standards for BTEX . All four monitoring wells were above standard for sulfate. MW-1, MW-3 and MW-4 were also above standard for dissolved manganese . MW-1 was also above standard for iron.
December 15,2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, fluoride and sulfate. MW-3 was observed to be dry during this monitoring event. MW-1, MW-2 and MW-4 were sampled. All three sampled monitoring wells are below NMWQCC standards for BTEX . MW-1and MW-4 were above standard for sulfate, dissolved manganese, and dissolved iron. Monitoring well MW-4 was also found to be above the standard for fluoride.

Table 2. Groundwater Elevation Data Summary

Well ID	Total Depth (ft bgs)	Screen Interval (ft)	*Elevation (ft) (TOC)	Date Measured	Depth to Groundwater (ft below TOC)	Relative Groundwater Elevation
MW-1	37.47	21.0 - 36.0	97.84	3/22/2006	28.54	69.30
				6/21/2006	29.15	68.69
				10/19/2006	27.83	70.01
				12/12/2006	28.22	69.62
				March 2006	NS	--
				June 2006	NS	--
				11/9/2007	29.03	68.81
				1/15/2008	28.34	69.5
				3/19/2008	NM	NM
				7/23/2008	28.46	69.38
				10/24/2008	29.91	67.93
				1/30/2009	28.37	69.47
				9/25/2009	29.95	67.89
				10/18/2009	29.97	67.87
				12/15/2009	29.51	--(1)
				3/30/2010	28.18	--(1)
				6/8/2010	28.38	--(1)
				9/23/2010	29.51	--(1)
				12/15/2010	28.82	--(1)
MW-2	39.81	21.0 - 36.0	95.28	10/24/2008	25.74	69.54
				1/30/2009	24.74	70.54
				9/25/2009	26.48	68.80
				12/15/2009	25.97	69.31
				3/30/2010	24.67	70.61
				6/8/2010	24.84	70.44
				9/23/2010	26.38	68.90
				12/15/2010	25.68	69.60
MW-3	37.47	19.0 - 34.0	95.44	10/24/2008	26.95	68.49
				1/30/2009	25.92	69.52
				9/25/2009	27.57	67.87
				12/15/2009	27.05	68.39
				3/30/2010	25.79	69.65
				6/8/2010	26.02	69.42
				9/23/2010	27.35	68.09
				12/15/2010	DRY	NM
MW-4	34.66	17.0 - 32.0	95.36	10/24/2008	NM	NM
				1/30/2009	26.00	69.36
				9/25/2009	27.64	67.72
				12/15/2009	27.14	68.22
				3/30/2010	25.87	69.49
				6/8/2010	26.09	69.27
				9/23/2010	27.31	68.05
				12/15/2010	26.75	68.61

ft = Feet

TOC = Top of casing

bgs = below ground surface

* = Elevation relative to wellhead

(1) = Groundwater elevations can not be calculated accurately due to continual upward shifting of the PVC casing (see text of section 2.1, Monitoring Summary, of this report for more information)

NS = Not Sampled (quarters not sampled due to change in consulting responsibilities from Lodestar LLC to Tetra Tech Inc.)

NM = Not measured

Table 3. ConocoPhillips Company, Howell K No. 1 - Groundwater Analytical Results Summary

Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)
MW-1	3/22/2006	ND	ND	1.00	2.00	NA	NA	NA	NA
	6/21/2006	1.40	1.40	ND	10.60	NA	NA	NA	NA
	10/19/2006	ND	ND	ND	1.10	NA	NA	NA	NA
	12/12/2006	ND	0.50	0.40	2.10	NA	NA	NA	NA
	11/9/2007	<0.5 U	<0.7 U	<0.8 U	<0.9 J	NA	NA	NA	NA
	1/15/2008	<0.5 U	<0.7 U	<0.8 U	<0.8 U	NA	NA	NA	NA
	3/19/2008	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
	8/14/2008	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
	10/24/2008	<0.5	<0.5	<0.5	<0.5	< 2.0	2390	32.1*	13.4*
	1/30/2009	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	NA	NA	NA
	10/18/2009	<0.5	<0.5	<0.5	<0.5	0.88	3840	2.24	17.40
	12/15/2009	<0.5	<0.5	<0.5	<0.5	< 50	3290	1.70	16.50
	3/30/2010	<0.5	<0.5	<0.5	<0.5	NA	2950	0.87	14.90
	6/8/2010	<0.5	<0.5	<0.5	<0.5	NA	2570	11.20	14.70
	9/23/2010	<1.0	<1.0	<1.0	<1.0	<0.5	2740	4.43	13.4
	12/15/2010	<1.0	<1.0	<1.0	<1.0	<0.5	2230	9.72	11.1
MW-2	10/24/2008	<0.5 U	<0.5 U	<0.5 U	<0.5 U	< 2	1480	3.28*	0.231*
	1/30/2009	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	NA	NA	NA
	9/25/2009	<0.5	<0.5	<0.5	<0.5	1.09	1700	<0.02	<0.005
	12/15/2009	<0.5	<0.5	<0.5	<0.5	<100	1570	<0.02	<0.005
	3/30/2010	<0.5	<0.5	<0.5	<0.5	NA	1410	<0.02	0.14
	6/8/2010	<0.5	<0.5	<0.5	<0.5	NA	1460	0.0544	0.00930
	9/23/2010	<1.0	<1.0	<1.0	<1.0	<0.5	1760	<0.02	<0.005
	12/15/2010	<1.0	<1.0	<1.0	<1.0	1.01	1890	<0.02	<0.005
MW-3	10/24/2008	<0.5 U	<0.5 U	<0.5 U	<0.5 U	< 2	1480	3.38*	1.31*
	1/30/2009	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	NA	NA	NA
	9/25/2009	<0.5	<0.5	<0.5	<0.5	1.00	1840	<0.02	0.38
	12/15/2009	<0.5	<0.5	<0.5	<0.5	<50	2500	1.35	0.32
	3/30/2010	<0.5	<0.5	<0.5	<0.5	NA	1890	<0.02	0.43
	6/8/2010	<0.5	<0.5	<0.5	<0.5	NA	1630	0.0573	0.383
	9/23/2010	<1.0	<1.0	<1.0	<1.0	0.751	1960	<0.02	0.35
	12/15/2010	NA	NA	NA	NA	NA	NA	NA	NA

Table 3. ConocoPhillips Company, Howell K No. 1 - Groundwater Analytical Results Summary

Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)
MW-4	10/24/2008	<0.5 U	<0.5 U	<0.5 U	<0.5 U	**2.43**	**3400**	2.7*	7.79*
	1/30/2009	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	NA	NA	NA
	9/25/2009	<1.0	<1.0	<1.0	<1.0	**2.47**	**3860**	<0.02	**7.80**
	12/15/2009	<1.0	<1.0	<1.0	<1.0	<50	**4540**	0.03	**7.40**
	3/30/2010	<1.0	<1.0	<1.0	<1.0	ND	**3970**	<0.02	**7.83**
	6/8/2010	<1.0	<1.0	<1.0	<1.0	ND	**3490**	0.0607	**7.97**
	9/23/2010	<1.0	<1.0	<1.0	<1.0	**1.81**	**3750**	<0.02	**9.73**
	12/15/2010	**1.1**	<1.0	<1.0	<1.0	**2.47**	**4310**	**0.223**	**8.64**
NMWQCC Standards		**10 (µg/L)**	**750 (µg/L)**	**750 (µg/L)**	**620 (µg/L)**	**1.6 (mg/L)**	**600 (mg/L)**	**1 (mg/L)**	**0.2 (mg/L)**

Explanation

ND = Not Detected
NMWQCC = New Mexico Water Quality Control Commission
mg/L = milligrams per liter (parts per million)
µg/L = micrograms per liter (parts per billion)
NA = Not Analyzed
<0.7 = Below laboratory detection limit of 0.7 ug/L
U = Analyte was analyzed for but not detected at the indicated MDL
Bold = concentrations that exceed the NMWQCC limits
* = Results recorded by total metals analysis, not comparable to NMWQCC standards which are based on dissolved metals concentrations

APPENDIX A

December 2010 Quarterly Groundwater Sampling Field Forms

TETRA TECH, INC.

WATER SAMPLING FIELD FORM

Project Name Howell K1 Page 1 of 4

Project No.

Site Location San Juan County, NM

Site/Well No. MW-1 Coded/ Replicate No. Date 12.15.10

Weather Overcast, 40° Time Sampling Began 1340 Time Sampling Completed 1510

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP 37.47 Water-Level Elevation

Held Depth to Water Below MP 28.82 Diameter of Casing 2"

Wet Water Column in Well 8.65 Gallons Pumped/Bailed Prior to Sampling 5 ~2

Gallons per Foot 0.16

Gallons in Well 1.384 x 3 = 4.152 Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

SAMPLING DATA/FIELD PARAMETERS

Time	Temperature (°C)	pH	Conductivity (µS/cm³)	TDS (g/L)	DO (mg/L)	DO %	ORP (mV)	Volume (gal.)

Sampling Equipment Purge Pump/Bailer

Constituents Sampled	Container Description	Preservative
BTEX	3 40mL VOA's	HCl
Sulfate	16 oz. Plastic	None
Dissolved Metals	16 oz. Plastic	None

Remarks No parameters due to small bailer

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

Well Casing Volumes

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

TETRA TECH, INC.

WATER SAMPLING FIELD FORM

Project Name Howell K1 Page 2 of 4

ect No.

Site Location San Juan County, NM

Site/Well No. MW-2 Coded/ Replicate No. Date 12.15.10

Weather Overcast 40° Time Sampling Began 1340 Time Sampling Completed 1415

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP 39.81 Water-Level Elevation

Held ____ Depth to Water Below MP 25.68 Diameter of Casing 2"

Wet ____ Water Column in Well 14.13 Gallons Pumped/Bailed Prior to Sampling 7.0

Gallons per Foot 0.16

Gallons in Well 2.26 X 3 = 6.78 Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

SAMPLING DATA/FIELD PARAMETERS

Time	Temperature (°C)	pH	Conductivity (µS/cm³)	TDS (g/L)	DO (mg/L)	DO %	ORP (mV)	Volume (gal.)
1405	13.98	7.17	1412	1.162	4.30	45.4	31.8	5.75
1407	14.05	7.14	1416	1.164	2.06	20.0	36.7	6.25
1409	14.13	7.13	1422	1.167	2.24	21.9	40.0	6.75

Sampling Equipment Purge Pump/Bailer

Constituents Sampled	Container Description	Preservative
BTEX	3 40mL VOA's	HCl
Sulfate	16 oz. Plastic	None
Dissolved Metals	16 oz. Plastic	None

Remarks H2O is light brown w/ high clay content

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

Well Casing Volumes

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

TETRA TECH, INC.

WATER SAMPLING FIELD FORM

Project Name Howell K1 Page 3 of 4

Project No.

Site Location San Juan County, NM

Site/Well No. MW-3 Coded/ Replicate No. Date 12.15.10

Weather Overcast 40° Time Sampling Began DRY Time Sampling Completed

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP 37.47 Water-Level Elevation

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

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

Gallons per Foot 0.16

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

Purging Equipment Purge pump / Bailer

SAMPLING DATA/FIELD PARAMETERS

Time	Temperature (°C)	pH	Conductivity (µS/cm³)	TDS (g/L)	DO (mg/L)	DO %	ORP (mV)	Volume (gal.)

Sampling Equipment Purge Pump/Bailer

Constituents Sampled	Container Description	Preservative
BTEX	3 40mL VOA's	HCl
Sulfate	16 oz. Plastic	None
Dissolved Metals	16 oz. Plastic	None

Remarks Well is DRY

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

Well Casing Volumes

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

TETRA TECH, INC.

WATER SAMPLING FIELD FORM

Project Name Howell K1 Page 4 of 4

Project No.

Site Location San Juan County, NM

Site/Well No. MW-4 Coded/Replicate No. ~~[illegible]~~ 1440 Date 12-15-10

Weather overcast 40° Time Sampling Began 1425 Time Sampling Completed ~~[illegible]~~ 1438

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP 34.66 Water-Level Elevation

Held ___ Depth to Water Below MP 26.75 Diameter of Casing 2"

Wet ___ Water Column in Well 7.91 Gallons Pumped/Bailed Prior to Sampling 4.0

Gallons per Foot 0.16

Gallons in Well 1.26 x 3 = 3.79 Sampling Pump Intake Setting (feet below land surface)

Purging Equipment Purge pump / Bailer

SAMPLING DATA/FIELD PARAMETERS

Time	Temperature (°C)	pH	Conductivity (µS/cm³)	TDS (g/L)	DO (mg/L)	DO %	ORP (mV)	Volume (gal.)
1434	15.02	6.91	3499	2.812	2.11	21.2	-59.9	3.0
1436	15.23	6.91	3467	2.770	1.94	19.5	-61.4	3.5
1438	15.25	6.90	3531	2.821	1.59	15.9	-61.7	3.75

Sampling Equipment Purge Pump/Bailer

Constituents Sampled	Container Description	Preservative
BTEX	3 40mL VOA's	HCl
Sulfate	16 oz. Plastic	None
Dissolved Metals	16 oz. Plastic	None

Remarks H2O is light brown w/clay content.

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

Well Casing Volumes

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

APPENDIX B

December 2010 Quarterly Groundwater Laboratory Analytical Report

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

Conoco Phillips

Certificate of Analysis Number:

10120587

Report To:		Project Name:	COP Howell K-1
Tetra Tech, Inc. Kelly Blanchard 6121 Indian School Road, N.E. Suite 200 Albuquerque NM 87110- ph (505) 237-8440 fax:		Site:	Blanco, NM
		Site Address:	
		PO Number:	
		State:	New Mexico
		State Cert. No.:	
		Date Reported:	12/27/2010

This Report Contains A Total Of 15 Pages

Excluding This Page, Chain Of Custody

And

Any Attachments

12/27/2010

Date

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

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

Case Narrative for:

Conoco Phillips

Certificate of Analysis Number:

10120587

Report To:		Project Name:	COP Howell K-1
Tetra Tech, Inc.		Site:	Blanco, NM
Kelly Blanchard		Site Address:	
6121 Indian School Road, N.E.			
Suite 200		PO Number:	
Albuquerque		State:	New Mexico
NM		State Cert. No.:	
87110-		Date Reported:	12/27/2010
ph (505) 237-8440	fax:		

I. SAMPLE RECEIPT:

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

II: ANALYSES AND EXCEPTIONS:

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

III. GENERAL REPORTING COMMENTS:

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

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

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

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

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

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

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

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

Erica Cardenas

12/27/2010

Erica Cardenas
Project Manager

Date

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

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

Conoco Phillips

Certificate of Analysis Number:

10120587

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

Fax To:

Project Name: COP Howell K-1
Site: Blanco, NM
Site Address:
PO Number:
State: New Mexico
State Cert. No.:
Date Reported: 12/27/2010

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
MW-1	10120587-01	Water	12/15/2010 15:10	12/17/2010 9:05:00 AM	303445	☐
MW-2	10120587-02	Water	12/15/2010 14:15	12/17/2010 9:05:00 AM	303445	☐
MW-4	10120587-03	Water	12/15/2010 14:38	12/17/2010 9:05:00 AM	303445	☐
Duplicate	10120587-04	Water	12/15/2010 14:40	12/17/2010 9:05:00 AM	303445	☐
Trip Blank	10120587-05	Water	12/15/2010 21:50	12/17/2010 9:05:00 AM	303446	☐

E Cardenas

12/27/2010

Erica Cardenas
Project Manager

Date

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

Ted Yen
Quality Assurance Officer

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

Client Sample ID MW-1 **Collected:** 12/15/2010 15:10 **SPL Sample ID:** 10120587-01

Site: Blanco, NM

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ION CHROMATOGRAPHY				**MCL**	**E300.0**	**Units: mg/L**	
Fluoride	ND		0.5	1	12/17/10 23:35	ESK	5677654
Sulfate	2230		250	500	12/19/10 16:06	ESK	5678088
METALS BY METHOD 6010B, DISSOLVED				**MCL**	**SW6010B**	**Units: mg/L**	
Iron	9.72		0.02	1	12/21/10 23:49	EG	5680489
Manganese	11.1		0.005	1	12/21/10 23:49	EG	5680489

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

VOLATILE ORGANICS BY METHOD 8260B				MCL	SW8260B	Units: ug/L	
Benzene	ND		1	1	12/23/10 12:49	LU_L	5683550
Ethylbenzene	ND		1	1	12/23/10 12:49	LU_L	5683550
Toluene	ND		1	1	12/23/10 12:49	LU_L	5683550
m,p-Xylene	ND		2	1	12/23/10 12:49	LU_L	5683550
o-Xylene	ND		1	1	12/23/10 12:49	LU_L	5683550
Xylenes,Total	ND		1	1	12/23/10 12:49	LU_L	5683550
Surr: 1,2-Dichloroethane-d4	84.2	%	70-130	1	12/23/10 12:49	LU_L	5683550
Surr: 4-Bromofluorobenzene	94.7	%	74-125	1	12/23/10 12:49	LU_L	5683550
Surr: Toluene-d8	97.6	%	82-118	1	12/23/10 12:49	LU_L	5683550

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

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

Client Sample ID MW-2 **Collected:** 12/15/2010 14:15 **SPL Sample ID:** 10120587-02

Site: Blanco, NM

Analyses/Method	Result	QUAL		Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ION CHROMATOGRAPHY					**MCL**	**E300.0**	**Units: mg/L**	
Fluoride	1.01			0.5	1	12/18/10 0:24	ESK	5677657
Sulfate	1890			500	1000	12/19/10 16:22	ESK	5678089
METALS BY METHOD 6010B, DISSOLVED					**MCL**	**SW6010B**	**Units: mg/L**	
Iron	ND			0.02	1	12/21/10 23:55	EG	5680490
Manganese	ND			0.005	1	12/21/10 23:55	EG	5680490

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

VOLATILE ORGANICS BY METHOD 8260B					**MCL**	**SW8260B**	**Units: ug/L**	
Benzene	ND			1	1	12/23/10 14:08	LU_L	5683553
Ethylbenzene	ND			1	1	12/23/10 14:08	LU_L	5683553
Toluene	ND			1	1	12/23/10 14:08	LU_L	5683553
m,p-Xylene	ND			2	1	12/23/10 14:08	LU_L	5683553
o-Xylene	ND			1	1	12/23/10 14:08	LU_L	5683553
Xylenes,Total	ND			1	1	12/23/10 14:08	LU_L	5683553
Surr: 1,2-Dichloroethane-d4	79.6		%	70-130	1	12/23/10 14:08	LU_L	5683553
Surr: 4-Bromofluorobenzene	96.4		%	74-125	1	12/23/10 14:08	LU_L	5683553
Surr: Toluene-d8	99.1		%	82-118	1	12/23/10 14:08	LU_L	5683553

Qualifiers:

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

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

Client Sample ID MW-4 **Collected:** 12/15/2010 14:38 **SPL Sample ID:** 10120587-03

Site: Blanco, NM

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ION CHROMATOGRAPHY				**MCL**	**E300.0**	**Units: mg/L**	
Fluoride	2.47		0.5	1	12/18/10 0:40	ESK	5677658
Sulfate	4310		500	1000	12/19/10 16:38	ESK	5678090
METALS BY METHOD 6010B, DISSOLVED				**MCL**	**SW6010B**	**Units: mg/L**	
Iron	0.223		0.02	1	12/21/10 22:55	EG	5680480
Manganese	8.64		0.005	1	12/21/10 22:55	EG	5680480

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

VOLATILE ORGANICS BY METHOD 8260B				MCL	SW8260B	Units: ug/L	
Benzene	1.1		1	1	12/23/10 14:35	LU_L	5683554
Ethylbenzene	ND		1	1	12/23/10 14:35	LU_L	5683554
Toluene	ND		1	1	12/23/10 14:35	LU_L	5683554
m,p-Xylene	ND		2	1	12/23/10 14:35	LU_L	5683554
o-Xylene	ND		1	1	12/23/10 14:35	LU_L	5683554
Xylenes,Total	ND		1	1	12/23/10 14:35	LU_L	5683554
Surr: 1,2-Dichloroethane-d4	87.8	%	70-130	1	12/23/10 14:35	LU_L	5683554
Surr: 4-Bromofluorobenzene	112	%	74-125	1	12/23/10 14:35	LU_L	5683554
Surr: Toluene-d8	103	%	82-118	1	12/23/10 14:35	LU_L	5683554

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

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

Client Sample ID Duplicate **Collected:** 12/15/2010 14:40 **SPL Sample ID:** 10120587-04

Site: Blanco, NM

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
VOLATILE ORGANICS BY METHOD 8260B			**MCL**	**SW8260B**	**Units: ug/L**		
Benzene	1		1	1	12/23/10 15:02	LU_L	5683555
Ethylbenzene	ND		1	1	12/23/10 15:02	LU_L	5683555
Toluene	ND		1	1	12/23/10 15:02	LU_L	5683555
m,p-Xylene	ND		2	1	12/23/10 15:02	LU_L	5683555
o-Xylene	ND		1	1	12/23/10 15:02	LU_L	5683555
Xylenes,Total	ND		1	1	12/23/10 15:02	LU_L	5683555
Surr: 1,2-Dichloroethane-d4	76.3	%	70-130	1	12/23/10 15:02	LU_L	5683555
Surr: 4-Bromofluorobenzene	106	%	74-125	1	12/23/10 15:02	LU_L	5683555
Surr: Toluene-d8	96.9	%	82-118	1	12/23/10 15:02	LU_L	5683555

Qualifiers:

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

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

Client Sample ID Trip Blank **Collected:** 12/15/2010 21:50 **SPL Sample ID:** 10120587-05

Site: Blanco, NM

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
VOLATILE ORGANICS BY METHOD 8260B			**MCL**	**SW8260B**	**Units: ug/L**		
Benzene	ND		1	1	12/23/10 12:22	LU_L	5683549
Ethylbenzene	ND		1	1	12/23/10 12:22	LU_L	5683549
Toluene	ND		1	1	12/23/10 12:22	LU_L	5683549
m,p-Xylene	ND		2	1	12/23/10 12:22	LU_L	5683549
o-Xylene	ND		1	1	12/23/10 12:22	LU_L	5683549
Xylenes,Total	ND		1	1	12/23/10 12:22	LU_L	5683549
Surr: 1,2-Dichloroethane-d4	81.6		% 70-130	1	12/23/10 12:22	LU_L	5683549
Surr: 4-Bromofluorobenzene	92.3		% 74-125	1	12/23/10 12:22	LU_L	5683549
Surr: Toluene-d8	98.7		% 82-118	1	12/23/10 12:22	LU_L	5683549

Qualifiers:

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

Quality Control Documentation

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

Quality Control Report

Conoco Phillips

COP Howell K-1

Analysis: Metals by Method 6010B, Dissolved
Method: SW6010B
WorkOrder: 10120587
Lab Batch ID: 103991

Method Blank

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

Analyte	Result	Rep Limit
Iron	ND	0.02
Manganese	ND	0.005

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10120587-01B	MW-1
10120587-02B	MW-2
10120587-03B	MW-4

Laboratory Control Sample (LCS)

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

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Iron	1.000	0.9892	98.92	80	120
Manganese	0.1000	0.09500	95.00	80	120

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

Sample Spiked: 10120587-03
RunID: ICP2_101221C-5680481 Units: mg/L
Analysis Date: 12/21/2010 23:01 Analyst: EG
Preparation Date: 12/17/2010 12:45 Prep By: M_ Method SW3005A

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Iron	0.2229	1	1.129	90.61	1	1.163	94.01	2.967	20	75	125
Manganese	8.643	0.1	8.779	N/C	0.1	8.936	N/C	N/C	20	75	125

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

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

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

Quality Control Report

Conoco Phillips

COP Howell K-1

Analysis: Volatile Organics by Method 8260B **WorkOrder:** 10120587
Method: SW8260B **Lab Batch ID:** R313332

Method Blank

RunID: MSDVOA3_101223A-5683548 Units: ug/L
Analysis Date: 12/23/2010 11:55 Analyst: LU_L

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
m,p-Xylene	ND	2.0
o-Xylene	ND	1.0
Xylenes,Total	ND	1.0
Surr: 1,2-Dichloroethane-d4	86.4	70-130
Surr: 4-Bromofluorobenzene	99.1	74-125
Surr: Toluene-d8	104.5	82-118

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10120587-01A	MW-1
10120587-02A	MW-2
10120587-03A	MW-4
10120587-04A	Duplicate
10120587-05A	Trip Blank

Laboratory Control Sample (LCS)

RunID: MSDVOA3_101223A-56835 Units: ug/L
Analysis Date: 12/23/2010 11:02 Analyst: LU_L

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	20.0	20.2	101	74	123
Ethylbenzene	20.0	20.1	101	72	127
Toluene	20.0	18.5	92.6	74	126
m,p-Xylene	40.0	40.7	102	71	129
o-Xylene	20.0	20.1	100	74	130
Xylenes,Total	60.0	60.8	101	71	130
Surr: 1,2-Dichloroethane-d4	50.0	42.6	85.2	70	130
Surr: 4-Bromofluorobenzene	50.0	51.5	103	74	125
Surr: Toluene-d8	50.0	46.7	93.5	82	118

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

Sample Spiked: 10120587-01
RunID: MSDVOA3_101223A-56835 Units: ug/L
Analysis Date: 12/23/2010 13:15 Analyst: LU_L

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

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

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

Quality Control Report

Conoco Phillips

COP Howell K-1

Analysis: Volatile Organics by Method 8260B **WorkOrder:** 10120587
Method: SW8260B **Lab Batch ID:** R313332

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	ND	20	19.1	95.6	20	18.8	94.0	1.77	22	70	124
Ethylbenzene	ND	20	18.2	91.1	20	19.0	94.9	4.09	20	76	122
Toluene	ND	20	16.9	84.6	20	18.1	90.3	6.53	24	80	117
m,p-Xylene	ND	40	37.5	93.7	40	38.8	97.0	3.49	20	69	127
o-Xylene	ND	20	18.6	93.1	20	18.7	93.5	0.466	20	84	114
Xylenes,Total	ND	60	56.1	93.5	60	57.5	95.9	2.49	20	69	127
Surr: 1,2-Dichloroethane-d4	ND	50	46.2	92.4	50	43.0	85.9	7.26	30	70	130
Surr: 4-Bromofluorobenzene	ND	50	52.8	106	50	54.3	109	2.77	30	74	125
Surr: Toluene-d8	ND	50	47.7	95.5	50	49.8	99.7	4.31	30	82	118

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

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

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

Quality Control Report

Conoco Phillips

COP Howell K-1

Analysis: Ion Chromatography
Method: E300.0

WorkOrder: 10120587
Lab Batch ID: R313006D

Method Blank

RunID: IC1_101217C-5677650 Units: mg/L
Analysis Date: 12/17/2010 22:31 Analyst: ESK

Analyte	Result	Rep Limit
Fluoride	ND	0.50

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10120587-01C	MW-1
10120587-02C	MW-2
10120587-03C	MW-4

Laboratory Control Sample (LCS)

RunID: IC1_101217C-5677651 Units: mg/L
Analysis Date: 12/17/2010 22:47 Analyst: ESK

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Fluoride	10.00	9.825	98.25	90	110

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

Sample Spiked: 10120587-01
RunID: IC1_101217C-5677655 Units: mg/L
Analysis Date: 12/17/2010 23:51 Analyst: ESK

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Fluoride	ND	5	5.140	102.8	5	5.260	105.2	2.308	15	80	120

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

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

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

Quality Control Report

Conoco Phillips

COP Howell K-1

Analysis: Ion Chromatography
Method: E300.0
WorkOrder: 10120587
Lab Batch ID: R313024B

Method Blank

RunID: IC1_101219A-5678068 Units: mg/L
Analysis Date: 12/19/2010 9:55 Analyst: ESK

Analyte	Result	Rep Limit
Sulfate	ND	0.50

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10120587-01C	MW-1
10120587-02C	MW-2
10120587-03C	MW-4

Laboratory Control Sample (LCS)

RunID: IC1_101219A-5678069 Units: mg/L
Analysis Date: 12/19/2010 10:11 Analyst: ESK

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Sulfate	10.00	9.924	99.24	90	110

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

Sample Spiked: 10120639-01
RunID: IC1_101219A-5678084 Units: mg/L
Analysis Date: 12/19/2010 15:01 Analyst: ESK

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Sulfate	2103	5000	7122	100.4	5000	7245	102.8	1.719	15	80	120

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

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

Sample Receipt Checklist

And

Chain of Custody

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

Sample Receipt Checklist

Workorder:	**10120587**	Received By:	**NB**
Date and Time Received:	**12/17/2010 9:05:00 AM**	Carrier name:	**Fedex-Standard Overnight**
Temperature:	**3.5/3.5/3.5/3.0/4.0/4.0**	Chilled by:	**Water Ice**

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

***VOA Preservation Checked After Sample Analysis**

SPL Representative: _____ **Contact Date & Time:** _____

Client Name Contacted: _____

Non Conformance Issues: _____

Client Instructions: _____

SPL, Inc.
Analysis Request & Chain of Custody Record

SPL Workorder No.: 1012058?

30 3445

page 1 of 2

Client Name: Tetratech, inc
Address: 6121 Indian School Rd NE #200
City: Albuquerque, State: NM Zip: 87110
Phone/Fax: 505-237-8440
Client Contact: Kelly Blanchard Email: Kelly.blanchard@tetratech
Project Name/No.: Howell K-1
Site Name:
Site Location: Blanco, NM
Invoice To: Ph:

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil O=oil A=air SL=sludge E=encore X=other)	bottle (P=plastic A=amber glass G=glass V=vial X=other)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz X=other)	pres. (1=HCl 2=HNO3 3=H2SO4 X=other)	Number of Containers	Requested Analysis: BTEX	dissolved Fe, Mn	Fluoride, Sulfate
MW-1	12.15.10	1510		X	W	V	40	1	3	X		
MW-1	12.15.10	1510		X	W	P	16	Na	1		X	
MW-1	12.15.10	1510		X	W	P	16	Na	1			X
MW-2	12.15.10	1415		X	W	V	40	1	3	X		
MW-2	12.15.10	1415		X	W	P	16	Na	1		X	
MW-2	12.15.10	1415		X	W	P	16	Na	1			X
MW-4	12.15.10	1438		X	W	V	40	1	3	X		
MW-4	12.15.10	1438		X	W	P	16	Na	1		X	
MW-4	12.15.10	1438		X	W	P	16	Na	1			X
duplicate	12.15.10	1440		X	W	V	40	1	3	X		

Client/Consultant Remarks: Please filter & preserve metals @ lab
* Fluoride detection limit - 1.16 mg/L

Laboratory remarks:

Intact? ☐ Y ☐ N
Ice? ☐ Y ☐ N
Temp: 3.5 °C

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

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

Special Detection Limits (specify):

PM review (initial):

	date	time		
1. Relinquished by Sampler:	12.16.10	830	2. Received by:	
3. Relinquished by:	date	time	4. Received by:	
5. Relinquished by:	date 12/17/10	time 0905	6. Received by Laboratory:	

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

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

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

SPL, Inc.
Analysis Request & Chain of Custody Record

SPL Workorder No. 1012987 — 303446 — page 2 of 2

Client Name: Tetratech, inc.
Address: 6121 Indian School Rd NE #200
City Albuquerque State NM Zip [redacted]
Phone/Fax: 505-237-8440
Client Contact: Kelly Blanchard Email: kelly.blanchard@tetratech
Project Name/No.: Howell K-1
Site Name:
Site Location: Blanco, NM
Invoice To: Ph:

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil O=oil A=air SL=sludge E=encore X=other)	bottle (P=plastic A=amber glass G=glass V=vial X=other)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz X=other)	pres. (1=HCl 2=HNO3 3=H2SO4 X=other)	Number of Containers	Requested Analysis: BTEX
trip blank	12/15/10	2160		X	W	V	40	1	2	X

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☐ Y ☐ N
Ice? ☐ Y ☐ N
Temp: 3.5 °C

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

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

Special Detection Limits (specify):

PM review (initial):

	date	time	
1. Relinquished by Sampler: [signature]	12/16/10	0800	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date 12/17/10	time 0910	6. Received by Laboratory: [signature]

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

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

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