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WORKPLAN

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Environmental Work Plan for Monitoring Well Installation, Groundwater Sampling and Preliminary Exposure Pathway Assessment (PEPA)

Shepherd and Kelsey 1E
San Juan Basin, Bloomfield, New Mexico

Prepared for:

ConocoPhillips Company

Risk Management and Remediation
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January 2009

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1.0 PURPOSE AND NEED

This document presents the scope of work to be performed at the Shepherd and Kelsey 1E petroleum hydrocarbon release site (Site) associated with ConocoPhillips Company exploration and production operations in the San Juan Basin area of New Mexico. The surface owner of the Site is the Gomez Feliciano Estate.

This work is being conducted 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 Incorporated (Tetra Tech) during an April 2008 meeting conducted in Santa Fe, New Mexico with Glen Von Gonten, OCD Environmental Bureau Hydrologist. The OCD is located at 1220 South St. Francis Drive, Santa Fe, NM 87505.

This document does not describe the preparation of risk analyses or the implementation of remedial activities that could potentially occur simultaneously with monitoring efforts at the sites in the future. Specific plans covering those potential activities will be prepared separately.

2.0 SITE HISTORY

Chronologies of activities previously performed at the Site are presented below. The proposed scope of work for the Site is presented following the chronology section.

2.1 Site Activities

The following table summarizes activities that have occurred at the Site regarding the response to the 2007 release discovery.

DATE	ACTIVITY
June 5, 2007	Contaminated soil discovered during routine maintenance of the Site. Soil excavation was performed at the Site, and three soil samples were obtained. Sample results showed total petroleum hydrocarbon (TPH) concentrations below the NMOCD regulations of 100 parts per million (ppm). Original source of contamination is unknown.
June 12, 2007	A separate area of TPH soil contamination discovered.
June 15-18, 2007	A 50 foot by 20 foot by 4 foot excavation completed. Soil samples taken from the second excavation show TPH at 992 ppm, and water samples obtained show benzene and total xylenes above State of New Mexico drinking water standards.
September 26, 2007	Ground water monitoring well installed to a depth of ten (10) feet below ground surface (bgs) by Envirotech Inc. of Farmington, NM (Envirotech). Depth to groundwater recorded at four (4) feet bgs. Soil and groundwater samples obtained for TPH, benzene, and benzene, toluene, ethylbenzene and total xylenes (BTEX) were below the respective NMOCD regulations of 100 ppm, 10 ppm and 50 ppm.
November 2007	Envirotech report recommends plugging and abandonment of the temporary ground water monitoring well and a no further action determination for the Site (Envirotech, 2007).

3.0 SCOPE OF WORK

The Scope of Work for Site activities is described below. Work conducted at the Site will consist of field preparation prior to the start of work (Section 3.1); a Site investigation (Section 3.2) consisting of soil boring advancement and soil sample collection (Section 3.2.1); soil boring completion to groundwater monitoring wells (Section 3.2.2); proper handling and disposal of investigation-derived waste (Section 3.2.3); and groundwater monitoring (Section 3.2.4). Reporting is discussed in Section 3.3, the preliminary exposure pathway assessment (PEPA) prepared by Tetra Tech for ConocoPhillips internal use is described in Section 3.4, and quality assurance/quality control (QA/QC) is discussed in Section 4.0. References can be found in Section 5.0. Figure 1 is a Site location map, Figure 2 displays the Site layout and proposed locations of groundwater monitoring wells to be installed, and Figure 3 is a typical groundwater monitoring well completion diagram. Appendices follow the Figures and include:

- Appendix A – Historical Analytical Tables;
- Appendix B – Groundwater Monitoring Well Installation Log for MW-1;
- Appendix C – Soil Boring and Monitoring Well Completion Log Forms, MW-2 through MW-4;
- Appendix D – Groundwater Sampling Forms; and
- Appendix E – Site Contacts

3.1 Pre Field Work Preparation

The proposed groundwater monitoring well location map (Figure 2) will be reviewed and approved by ConocoPhillips Risk Management and Remediation personnel. Once these well locations have been approved, New Mexico One-Call will be contacted to perform a utility locate within a 250 foot radius from the Shepherd and Kelsey 1E wellhead. Additionally, monitoring well installation permits will be acquired by WDC Exploration and Wells of Peralta, NM (WDC), and a Health and Safety Plan (HASP) will be prepared by Tetra Tech prior to the start of field work.

3.2 Site Investigation

3.2.1 Soil Boring Advancement and Soil Sample Collection

The subject Site is scheduled to have three (3) soil borings completed into two-inch diameter groundwater monitoring wells in order to define the groundwater flow direction and to determine the extent, if any, of petroleum hydrocarbon-impacts to groundwater. Borings will be advanced until auger refusal is met or until a sufficient depth into groundwater is achieved. Depth to groundwater at the Site is expected to be found at a depth of four (4) feet bgs (Envirotech, 2007).

Prior to the start of drilling operations, each boring location will be "day lighted" by Riley Industrial Services of Farmington, New Mexico, in order to insure that no underground utilities within the Site will be damaged by drilling equipment. "Day lighting" of each boring will be

performed using a vacuum truck and water pressure to advance a hole approximately ten (10) inches in diameter and three (3) feet deep. One soil sample will be collected from just below the "day lighted" hole to just above the water table with a split-spoon sampling device during the advancement of each boring, while the lithology of the borehole will be recorded to the total depth of the boring. The soil sample will be field screened with a photo-ionization organic vapor detector (PID) using the heated headspace method. The results will be recorded on the boring log, and the soil sample will be submitted to a laboratory for the following analytical parameters:

- Volatile Organic Compounds (VOCs), EPA Method 8260B
- Semivolatile Organic Compounds (SVOCs), EPA Method 8270C
- Total petroleum hydrocarbons (TPH), EPA Method 418.1
- Total metals, EPA Methods 6010/6020/7470A/7471A
- General chemistry (as described in 40 CFR 136.3), including alkalinity, bromide, chloride, fluoride, orthophosphate, sulfate, nitrate/nitrite, pH, specific conductance, TDS, and hardness (various methods)

After the first regularly scheduled quarterly groundwater monitoring event covered under this work plan, an expanded baseline groundwater parameter list will be submitted for laboratory analysis. Compounds of concern (COCs) detected in groundwater at concentrations above the New Mexico Water Quality Control Commission (NMWQCC) Groundwater Quality Standards during the first quarterly groundwater monitoring event will be carried forward for analyses in subsequent quarterly groundwater monitoring events. If all COCs are below NMWQCC groundwater quality standards after eight (8) consecutive quarters of groundwater monitoring, ConocoPhillips will request a No Further Action status for this Site.

The baseline parameter list for groundwater includes analyses of the following parameters:

- VOCs, EPA Method 8260B
- SVOCs, EPA Method 8270C
- TPH, gasoline range organics (GRO), EPA Method 8015B
- TPH, diesel range organics (DRO), EPA Method 8015B
- Total metals, EPA Methods 6010/6020/7470A/7471A
- General chemistry (as described in 40 CFR 136.3), including alkalinity, bromide, chloride, fluoride, orthophosphate, sulfate, nitrate/nitrite, pH, specific conductance, TDS, and hardness (various methods)

3.2.2 Groundwater Monitoring Well Construction

WDC will be utilized at the drilling contractor at the Site, and drilling operations will be supervised by Tetra Tech personnel. Groundwater monitoring wells will be constructed using 2-inch diameter polyvinyl chloride casing and at least 15 feet of screen (approximately 10 feet of the screen to be installed below the water table). The installed groundwater monitoring wells will contain a filter pack to 2-feet above the top of the screen, with a sand collar above the filter pack. The annular seal will placed on top of the sand collar, followed by cement grouting to the land surface. Each well will be completed with a locking, stick-up mounted well head set in concrete (Figure 3). Traffic bollards will be installed around each groundwater monitoring well.

Following construction, the ground water monitoring wells will be developed using a surge block and bailer or purge pump, and the wells will be incorporated into a quarterly groundwater monitoring program.

3.2.3 Investigation Derived Waste

All well development water will be containerized in on-Site wastewater disposal tanks. Soil cuttings will be placed on polyethylene sheeting and will be covered in the event of precipitation during field activities. Once each soil boring is complete, a representative sample of soil cuttings from each soil boring will be field screened using a PID and will be spread on-Site if the results are less than 100 ppm. In the event that soil cutting PID results are greater than 100 ppm, soil cuttings will be containerized and transported by Envirotech to the Envirotech Soil Remediation Facility (or other ConocoPhillips-approved waste disposal facility) located along Angel Peak Road, approximately 16 miles south of Bloomfield, NM.

3.2.4 Groundwater Monitoring

Quarterly groundwater sampling will be conducted in January, April, July and October 2009 at the Site. A dedicated, disposable bailer will be used to purge and sample each well. A groundwater sample will be collected once depth to groundwater, specific conductance, pH, dissolved oxygen, and temperature are determined to have stabilized (within a 10% margin). Records of each sampling event will be kept on Tetra Tech ground water sampling forms and in a bound field notebook dedicated to the Site. Groundwater samples will be containerized in bottles supplied by SPL Laboratories of Houston, Texas or other ConocoPhillilps-approved laboratories. The groundwater samples will be placed on ice in a cooler under chain of custody documentation and submitted to SPL (or other ConocoPhillips-approved laboratory) for analysis. Groundwater samples will be shipped by overnight courier.

3.3 Reporting

Quarterly groundwater monitoring reports will be prepared for the Site. The first quarterly report will include a summary of the groundwater monitoring well installation and a brief narrative of the sampling events. In general, the quarterly reports will include the date(s) the events occurred, copies of field notes from each sampling event, copies of laboratory chain-of-custody documentation and results, laboratory quality assurance/quality control (QA/QC) documentation, tabulated groundwater elevations, soil results and groundwater concentration/elevation maps and cross sections, and a summary of key findings. Starting with the second quarterly report, the groundwater elevations and groundwater analytical results from the previous quarter(s) will be tabulated with the results from the current quarter.

An annual report will be prepared that summarizes the results of the most recent quarterly monitoring event and will include a compilation of the results of the previous monitoring events at the Site. One (1) hard copy of each quarterly monitoring report and of the annual monitoring report will be submitted to OCD.

In addition, a C-141 form (Release Notification and Corrective Action) will be completed and submitted to OCD for the Site.

3.4 PEPA

A preliminary exposure pathway assessment (PEPA) will be prepared for the Site using an internal ConocoPhillips Company checklist. In addition, an Environmental Data Resources (EDR) report will be generated for the Site and site reconnaissance and mapping will be conducted by Tetra Tech in the field. The PEPA document will be prepared for ConocoPhillips internal use only.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

A quality assurance evaluation will be conducted by the analytical laboratory on collected samples to check for accuracy, precision and reliability of each reported analyte concentration. Sample spiked-matrix batch samples will be analyzed to determine the accuracy of laboratory results. Quality assurance documentation will be provided on the laboratory report. In addition, at least one duplicate groundwater sample will be obtained during sampling activities and will be labeled with a false name and false time in order to remove any laboratory bias toward the sample. Results of the duplicate sample analysis will be reported with the groundwater results table contained in the quarterly report.

At least one field audit of investigation and sampling protocol will be conducted by the project manager during the period covered by this work plan. Variations from standard operating procedures will be documented and corrected, if necessary.

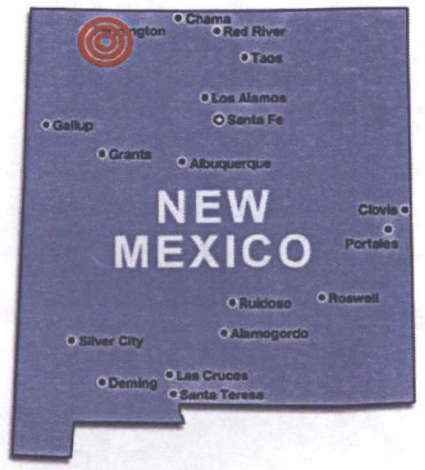
5.0 REFERENCES

Envirotech, Inc. (2007). *Cleanup, Drilling, and Groundwater Sampling Report at Shepherd and Kelsey No. 1E, Bloomfield, NM.* Prepared for ConocoPhillips. Report Dated November 2007. 74 pp.

FIGURES

FIGURE 1.

Site Location Map
ConocoPhillips
Shepherd & Kelsey 1E
Bloomfield, NM



Directions from HW 64 to ConocoPhillips Shepherd & Kelsey 1E Site Location

Approximate ConocoPhillips Shepherd & Kelsey 1E Site location

N

TETRA TECH, INC.

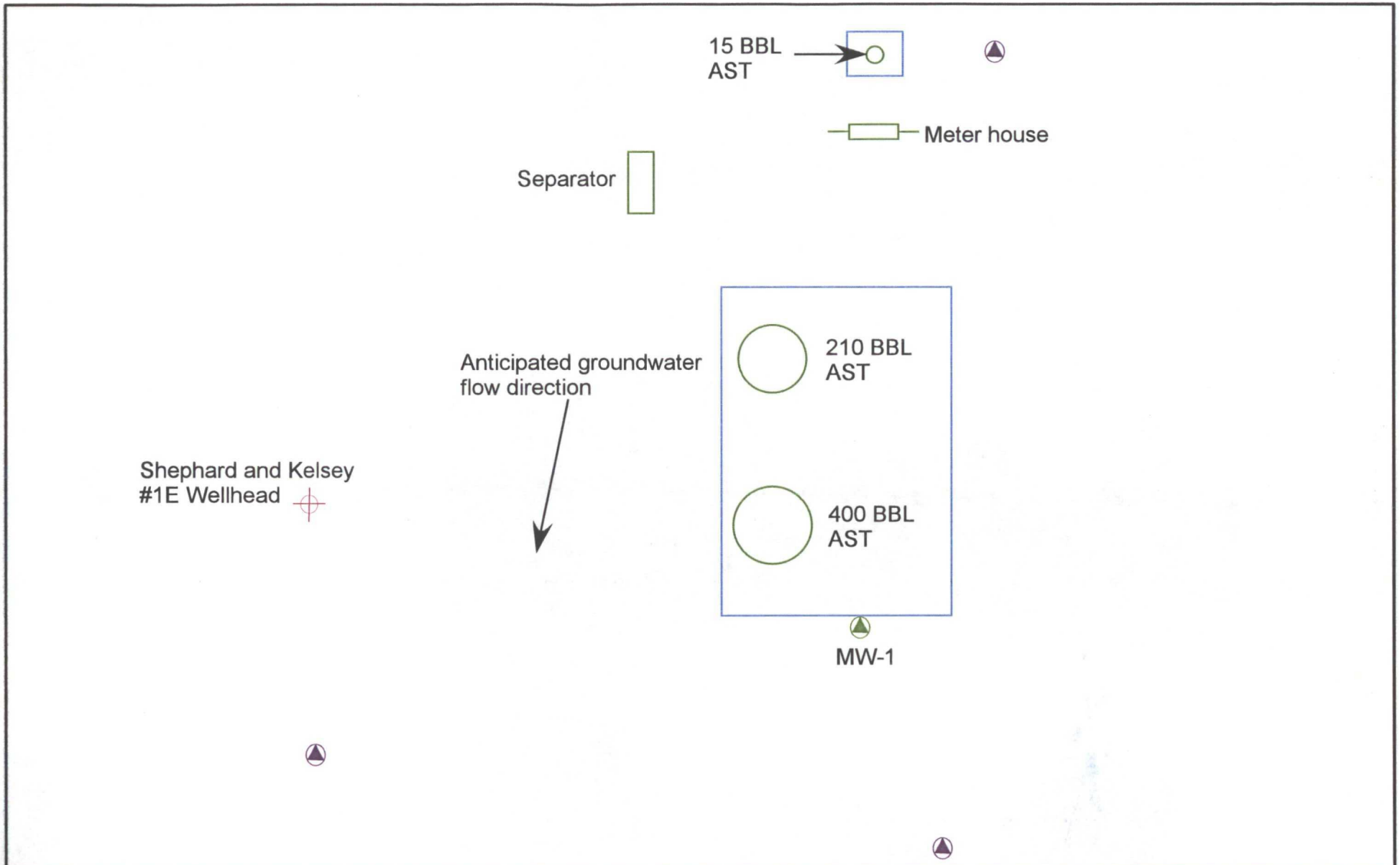


FIGURE 2:
PROPOSED WELL LOCATIONS MAP
CONOCOPHILLIPS
SHEPHARD & KELSEY #1E
Sec 29, Twp 29N, Rng 11W
Bloomfield, New Mexico

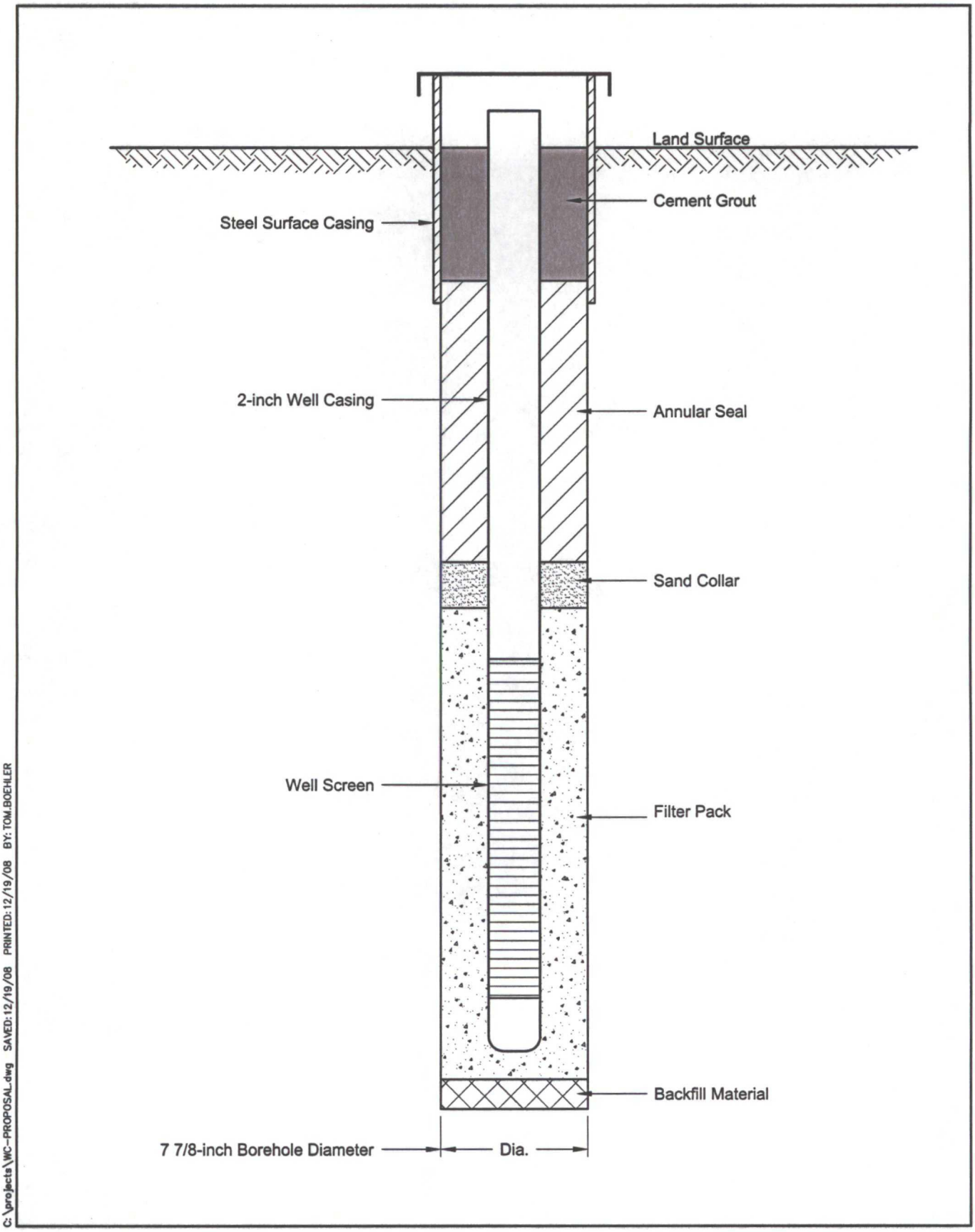
LEGEND

- WELLHEAD
- MONITORING WELL
- PROPOSED MW LOCATION
- BERM
- EQUIPMENT

0 20 40
FEET

N

TETRA TECH, INC.



December 2008

Figure 3
Typical Monitoring Well Completion diagram

APPENDICES

APPENDIX A
Historical Analytical Tables

Table 1: Summary of Analytical Results

Soil Samples

Sample ID	Date	TPH (ppm)	OVM (ppm)	Benzene (ppm)	Total BTEX (ppm)	Comments
NMOCD Regulations		***100***	***100***	***10***	***50***	
Test Hole #1	6/4/2007	20	0.2			
Test Hole #2	6/4/2007	20	0.1			
Test Hole #3	6/4/2007	24	0.1			
Test Hole #4	6/4/2007	<5.0	0.1			
Test Hole #5	6/4/2007	<5.0	0.1			
Test Hole #6	6/4/2007	<5.0	0.1			
Test Hole #7	6/4/2007	48	147			
Test Hole #8	6/4/2007	<5.0	1.1			
Test Hole #9	6/4/2007	40	0.8			
Test Hole #10	6/4/2007	12	0			
West Wall	6/5/2007	<5.0	9.7			Excavation #1
Bottom	6/5/2007	<5.0	4.3			Excavation #1
N/S & E Wall composite	6/5/2007	<5.0	3.2			Excavation #1
Test Hole #11	6/12/2007	764	177			New Contamination Encountered
Test Hole #12	6/13/2007	96	433			
Test Hole #13	6/13/2007	24	88.6			
Test Hole #14	6/13/2007	24	0			
Test Hole #15	6/13/2007	32	0.7			
Test Hole #16	6/13/2007	32	0			
Test Hole #17	6/13/2007	32	48.9			
South Wall #1	6/15/2007	992	64.7			Excavation #2
West Wall #1	6/15/2007	20	3			Excavation #2
East Wall #1	6/15/2007	48	175			Excavation #2
North Wall #1	6/15/2007	56	273			Excavation #2
Bottom @5 feet	6/15/2007	52	33.6			Excavation #2
North Wall #2	6/15/2007	56	114			Excavation #2
South Wall #2	6/15/2007	48	56.6			Excavation #2
East Wall #2	6/15/2007	32	295			Excavation #2
South Wall #3	6/18/2007	28	4.6			Excavation #2
East Wall #3	6/18/2007	16	0.7			Excavation #2
North Wall # 3	6/18/2007	NS	356			Excavation #2
North Wall #4	6/18/2007	64	14.6			Excavation #2
Soil Water Interface @5' BGS	9/26/2006	<0.2	0.3	<0.0009	0.00163	Excavation #2

Water Samples

Sample ID	Date	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Total Xylenes (ppb)
NMOCD/NMED Regulations		**10**	**750**	**750**	**620**
Sample #1 (Excavation #1)	6/4/2007	ND	ND	ND	ND
Sample #1 (Excavation #2)	6/15/2007	***134***	178	278	***1301***
MW-1 (Excavation #2)	9/26/2007	0.4	0.4	0.5	1.1

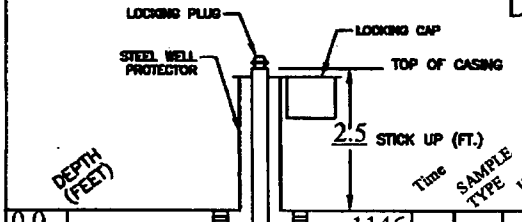
- values in bold italics exceed NMED groundwater standards

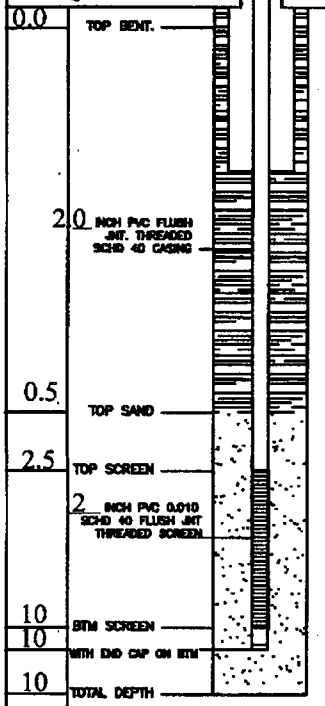
APPENDIX B
Groundwater Monitoring Well Installation Log for MW-1

ABOVE GRADE WELL COMPLETION DIAGRAM / LITHOLOGY LOG

MW 1

SB





DEPTH (FEET)	Time	SAMPLE TYPE	HEADSPACE (PPM)	LITHOLOGY	SAMPLE DESCRIPTION	DEPTH (FEET)
	1146				sandy clay, light brown, dry, no odor	0
		NS			split spoon empty, light brown sand/clay slightly moist	
					WL on 9/26/07 at 1247	
	1201	SS	0.3		dark grey sand, wet, strong swamp odor	5
	1211	NS				10
						15

Well Materials Used:

5 Sks 10–12 Silica Sand
1/2 Sks Bentonite Chips
___ Sks Class "A" Cement
___ Sks Quickcrete
5.0 Ft Blank Casing
7.5 Ft Screen

Well Development:
X Bailed
___ Pumped
15 Gallons of Water

Remarks:

DRILLER: Danny Padilla
HELPER: Robert Salazar
DRILLING COMPANY: Envirotech
DRILLING METHOD: HSA

BIT SIZE: 7 7/8"
TOTAL BORING DEPTH: 10
DATE STARTED: 9/26/07
SAMPLER TYPE: Split Spoon

LOCATION: Shepherd and Kelsey #1E
ELEVATION: ___
DATE COMPLETED 9/26/07
GEOLOGIST: Greg Crabtree

Conoco Phillips
Shepherd and Kelsey #1E
Sec 29 Twp 29N Rng 10W

REVISIONS
BY ___ DATE ___
BY ___ DATE ___

JOB # 96052-1032

ENVIROTECH INC.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
5796 U.S. HIGHWAY 64
FARMINGTON, NEW MEXICO 87401
(505) 632-0615
AbvGrdlog.dwg

MW-1

DATE 11/28/07 DRAWN GWC
SCALE ___ APPROVED ___

PAGE 1 OF 1

APPENDIX C
Soil Boring and Monitoring Well Completion Log Forms, MW-2 through MW-4

TETRA TECH, INC.

PROJECT NAME _____
PROJECT NUMBER _____
LOCATION _____
BORING NUMBER _____
DATUM _____ ELEVATION _____
LOGGED BY: _____ DATE _____
REVIEWED BY: _____ DATE _____

DRILLER _____ DRILLING RIG _____
DRILLING METHOD _____
AUGER ID _____ AUGER O.D. _____

SAMPLING METHOD

SURFACE CONDITIONS

DRILLING	
START	FINISH
TIME	TIME
DATE	DATE

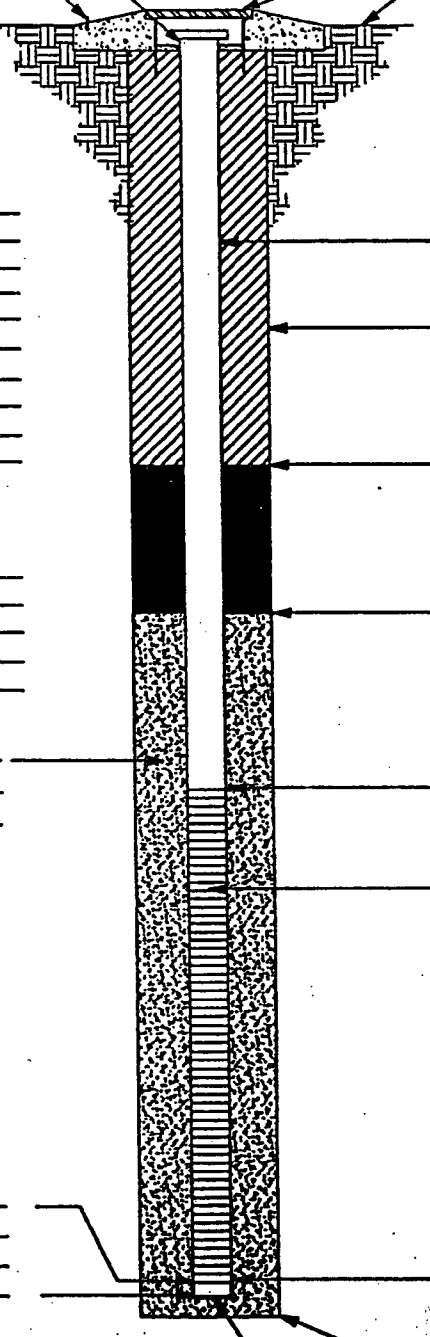
WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DEPTH IN FEET	RECOVERY	PID READING (PPM)	DESCRIPTION OF MATERIAL	SAMPLER NUMBER	DEPTH IN FEET		COMMENTS
					FROM	TO	

MAXIM
TECHNOLOGIES, INC.®

PROJECT NAME _____
PROJECT NUMBER _____
LOCATION _____
BORING NUMBER _____
DATE _____ TIME OF CONSTRUCTION _____
PREPARED BY: _____ DATE: _____
REVIEWED BY: _____ DATE: _____

DRILLER _____ DRILLING RIG _____
DRILLING METHOD _____ TO _____
_____ TO _____
_____ TO _____



TOP OF CASING ELEVATION: _____
SURVEY PIN ELEVATION: _____
GROUND SURFACE ELEVATION: _____

MANHOLE DIAMETER: _____
SIZE CONCRETE PAD: _____

_____
FEET OF RISER _____
FEET OF SCREEN _____
HOLE COVERS _____
CAPS _____
BAGS OF SAND _____
BAGS OF BENTONITE POWDER _____
BAGS OF BENTONITE CHIPS _____
BUCKETS OF PELLETS _____
BAGS OF CEMENT _____
BAGS OF CONCRETE MIX _____

RISER PIPE I.D.: _____
TYPE OF RISER PIPE: _____
BOREHOLE DIAMETER: _____
TYPE OF BACKFILL: _____
GROUT VOLUME: _____
GROUT PLACEMENT METHOD: _____
DEPTH TO TOP OF SEAL: _____
TYPE OF SEAL: _____
SEALANT VOLUME: _____
SEALANT PLACEMENT METHOD: _____
DEPTH TO TOP OF SAND PACK: _____

DEVELOPMENT METHOD: _____
DATE DEVELOPMENT BEGAN: _____
TIME: _____
VOLUME: _____
TYPE OF CONTAINERIZATION: _____

SAND PACK MATERIAL/SIZE: _____
SAND PACK VOLUME: _____
SAND PACK PLACEMENT METHOD: _____

DEPTH TO TOP OF SCREEN: _____
CASING & SCREEN JOINT TYPE: _____
SCREEN I.D.: _____
TYPE OF SCREEN: _____
SCREEN SLOT SIZE: _____
LENGTH OF SCREEN: _____

SUMP I.D.: _____
TYPE OF SUMP: _____
LENGTH OF SUMP: _____
DEPTH TO BOTTOM OF SUMP: _____

DEPTH TO BOTTOM OF SCREEN: _____
DEPTH TO BOTTOM OF HOLE: _____
BOTTOM PLUG: _____

APPENDIX D
Groundwater Sampling Forms

WATER SAMPLING FIELD FORM

Project No. _____ _____ of _____

Site Location _____

Site/Well No. MW-_____ Coded/ Replicate No. _____ Date _____

Weather _____ Time Sampling Began _____ Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Pt (MP) _____

Height of MP Above/Below Land Surface _____ MP Elevation _____

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

Held _____ Depth to Water Below MP _____ Diameter of Casing 2 inch / 4 inch

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

Gallons per Foot _____

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

Purging Equipment _____

SAMPLING DATA/FIELD PARAMETERS

Time	Temperature	pH	Conductivity	TDS	DO	DO%	ORP	Other

Sampling Equipment Low Flow Pump / Disposable Bailer

Constituents Sampled	Container Description	Preservative

Remarks _____

Sampling Personnel _____

Well Casing Volumes

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

APPENDIX E
Site Contacts

Site Contacts

Name	Affiliation	Work Phone	Cell Phone
Kelly Blanchard	Tetra Tech, Inc.	505-237-8440	505-975-2563
Ana Moreno	Tetra Tech, Inc.	505-237-8440	505-440-8640
Gary Desselle	Tetra Tech, Inc.	505-237-8440	505-288-0680
Christine Matthews	Tetra Tech, Inc.	505-237-8440	
Brandon Powell	New Mexico Oil Conservation Division District 3 (Aztec)	505-334-6178, x 15	505-320-0200
Glen Von Gonten	New Mexico Oil Conservation Division District 4 (Santa Fe)	505-476-3488	
Bryan Nydoske	WDC Exploration and Wells District Manager	505-865-5222	505-991-3578
April Pohl	Envirotech Landfarm Administrator - Soil Disposal	505-632-0615	505-320-6431
David Brackney	Riley Industrial - Day lighting	505-327-4947	
Gregg Wurtz	ConocoPhillips San Juan Business Unit	505-324-6194	505-320-2653
Gwen Frost	ConocoPhillips San Juan Business Unit	505-326-9549	505-215-3121
Mike Mankin	ConocoPhillips PTRRC	505-599-4098	505-947-8602
Maxwell Blair	ConocoPhillips PTRRC	505-599-4021	505-320-2732
Terry Lauck	ConocoPhillips Risk Management and Remediation Site Manager	918-661-0935	918-815-0556