3R - 426

RP WORKPLAN

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Environmental Work Plan for Monitoring Well Installation and Baseline Groundwater Monitoring

San Juan 27-5 #34A Well Site
San Juan Basin, Aztec, New Mexico
30-039-23739

Prepared for:

ConocoPhillips Company

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June 2009

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1.0 PURPOSE AND NEED

This document presents the scope of work to be performed at the San Juan 27-5 #34A 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 Bureau of Land Management (BLM). The Site is located in Rio Arriba County, approximately 26 miles northwest of Lindrith, NM, and 27 miles southeast of Blanco, New Mexico, in Section 30 of Township 27 North, Range 5 West.

This work is being conducted in response to the discovery of hydrocarbon impacted soil during equipment removal at the Site. Tetra Tech Inc. (Tetra Tech) will conduct this work according to site characterization methods and soil and groundwater laboratory analyses outlined in the New Mexico Oil Conservation Division (OCD) *Guidelines for Remediation of Leaks, Spills and Releases* (OCD, 1993).

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 2009 release discovery. Soil and groundwater analyses discussed below are summarized in Appendix A.

DATE	ACTIVITY
January 30, 2009	During removal of an aboveground storage tank (AST) at the Site, hydrocarbon impacts beneath the AST were visually confirmed. ConocoPhillips Company contacted Envirotech Inc. of Farmington, NM (Envirotech) for spill assessment services following the discovery. Envirotech collected a total of 6 soil samples during the assessment: a 5-point composite soil sample from just beneath the AST; 4 grab soil samples from test holes dug around the AST in order to delineate the extent of hydrocarbon impact (depth of these samples ranged from 10 to 15 feet below ground surface (bgs)); and another 5-point composite soil sample collected from "a small area...excavated to approximately 17 [feet] bgs..." (Envirotech, 2009). All soil samples collected were analyzed in the field for total petroleum hydrocarbons (TPH) using Environmental Protection Agency (EPA) method 418.1 and for organic vapors using a photoionization detector (PID). The two composite soil samples were also sent for laboratory analysis of benzene and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021, and the composite soil sample collected at a depth of 17 feet bgs was submitted for TPH analysis using EPA Method 8015. The New Mexico Oil Conservation Division (OCD) recommended remediation action levels for the Site were determined to be 100 parts per million (ppm) organic vapor, 100 ppm TPH, 10 ppm benzene, and 50 ppm for BTEX. All soil sample results were below these action levels except for those collected from one of the test holes (test hole 1) and from both composite samples collected at the surface beneath the AST and from the bottom of the excavation at 17 feet bgs (Appendix A).
March 3, 2009	Envirotech Inc. of Farmington, NM (Envirotech) returned to the Site to continue sampling activities. Envirotech stated that prior to their arrival, the "spill area was excavated to extents of 49' x 49' x 20' deep where groundwater was encountered..." (Envirotech, 2009). Envirotech collected a composite sample from the bottom of the excavation and from each of the 4 walls. Soil samples were analyzed for TPH and organic vapors in the field, and all results were below OCD action levels for organic vapors. The concentration of TPH found in the soil sample collected from the south wall was 2,170 ppm; all other TPH results were below OCD action levels (Appendix A).

DATE	ACTIVITY
March 3, 2009	The excavation was continued along the south wall an additional 4 feet and another soil sample was collected for TPH analysis. TPH results were found to be below OCD action levels and the excavation was discontinued at this point. Final excavation dimensions were reported at 53 feet by 49 feet by 20 feet deep. Groundwater was reached at this depth and had begun to seep into the excavation. A groundwater sample was collected and was sent to an analytical laboratory for volatile organic compound (VOC) analysis using EPA Method 8260. Laboratory results for benzene were found at a concentration of 95.6 micrograms per liter (ug/L), above the 10 ug/L New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standard for this constituent (Envirotech, 2009).
March 20, 2009	A report submitted to ConocoPhillips stated that a total of 1,900 cubic yards of soil were removed from the Site and were transported to an OCD-permitted facility on Crouch Mesa in Farmington, NM. Envirotech recommended the installation of groundwater monitoring wells at the Site to determine "groundwater gradient and the extent of groundwater contamination" (Envirotech, 2009).
April 2, 2009	Tetra Tech conducted a Site visit to determine placement of proposed groundwater monitoring wells.

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, and quality assurance/quality control (QA/QC) is discussed in Section 4.0. References are 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 Table
- Appendix B – Soil Boring and Monitoring Well Completion Log Forms
- Appendix C – Groundwater Sampling Forms
- Appendix D – Site Contacts

3.1 Pre Field Work Preparation

The proposed groundwater monitoring well location map (Figure 2) will be reviewed and approved by the San Juan Business Unit and 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 San Juan 27-5 #34A wellhead. Additionally, monitoring well installation permits will be acquired by Tetra Tech, 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 four (4) 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 20 feet bgs.

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 five (5) feet deep. Soil samples 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 (as practical beneath the water table). Soil samples will be collected in two-

foot intervals for field screening with a photo-ionization organic vapor detector (PID) using the heated headspace method. The interval containing the highest PID readings within each of the four (4) soil borings will be collected for laboratory analysis. If no hydrocarbon impacts are noted during field PID screening, the soil sample collected from just above the water table will be collected for laboratory analysis and will be submitted to Southern Petroleum Laboratories (SPL) of Houston, Texas, or another ConocoPhillips Company-approved laboratory. Soil analysis will consist of 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, and nitrate/nitrites (various methods)

3.2.2 Groundwater Monitoring Well Construction

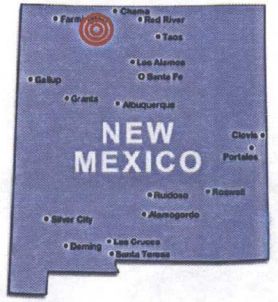
WDC Exploration and Wells of Peralta, New Mexico (WDC) will be utilized as the drilling contractor at the Site, and drilling operations will be supervised by Tetra Tech personnel. Groundwater monitoring wells will be constructed using 2-inch diameter polyvinyl chloride (PVC) casing and at least 15 feet of PVC screen (approximately 10 feet of the screen to be installed below the water table, as requested by Glen VonGonten of OCD during a meeting with Tetra Tech in April 2008). The installed groundwater monitoring wells will include a sand filter pack to 2-feet above the top of the screen. A bentonite seal will placed on top of the filter pack, followed by cement grouting to the ground surface. Each well will be completed with a locking, steel, stick-up mounted well head set in a concrete pad (Figure 3). If deemed necessary, traffic bollards will be installed around each groundwater monitoring well by ConocoPhillips Company; Tetra Tech will not be responsible for this aspect of monitoring well installation. Following construction, the groundwater monitoring wells will be developed using a surge block and bailer or purge pump, and the wells will be incorporated into a groundwater monitoring program.

3.2.3 Investigation Derived Waste

In the event that a hydrocarbon sheen or odor is observed in well development water, the development water will be containerized in on-Site wastewater disposal tanks. Otherwise, development water will be spread on-Site. 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 that 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 a soil cutting PID result is greater than 100 ppm, those soil cuttings will be containerized and transported by Envirotech to the Envirotech Soil Remediation Facility (or another ConocoPhillips-approved waste disposal facility) located along Angel Peak Road, approximately 16 miles south of Bloomfield, NM.

FIGURE 1.

Site Location Map
ConocoPhillips
San Juan 27-5 #34A
Rio Arriba County, NM



ConocoPhillips
San Juan 27-5 #34A Site
Location

Latitude: 34.547445° N
Longitude: -107.406587° W

0 200 400
Feet

Source: Google™ Earth

N

TETRA TECH, INC.

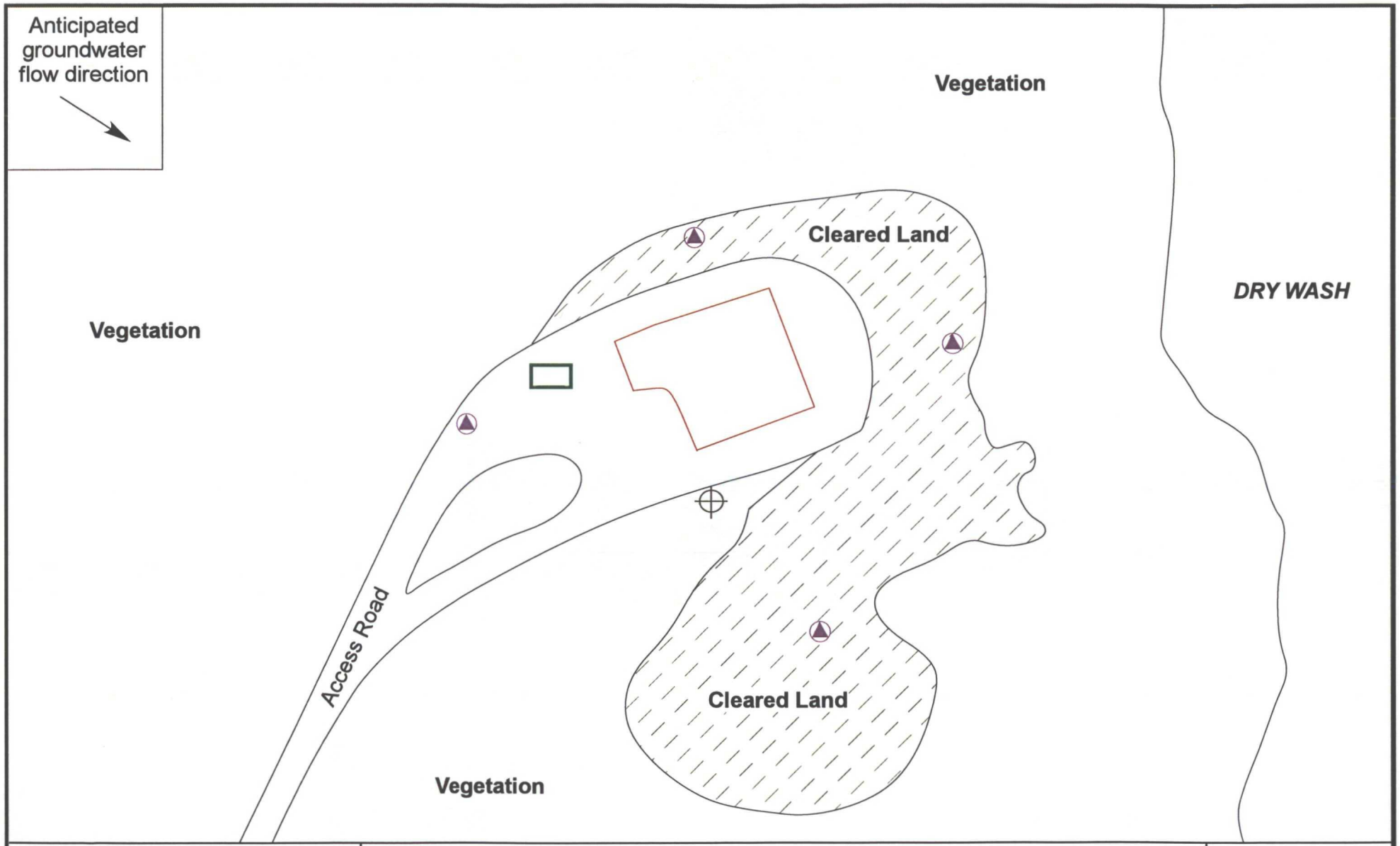


FIGURE 2:
SITE LAYOUT MAP
CONOCOPHILLIPS COMPANY
SAN JUAN 27-5 #34A
OIL AND GAS PRODUCTION WELL
Sec 30, T27N, R5W
Rio Arriba County, New Mexico

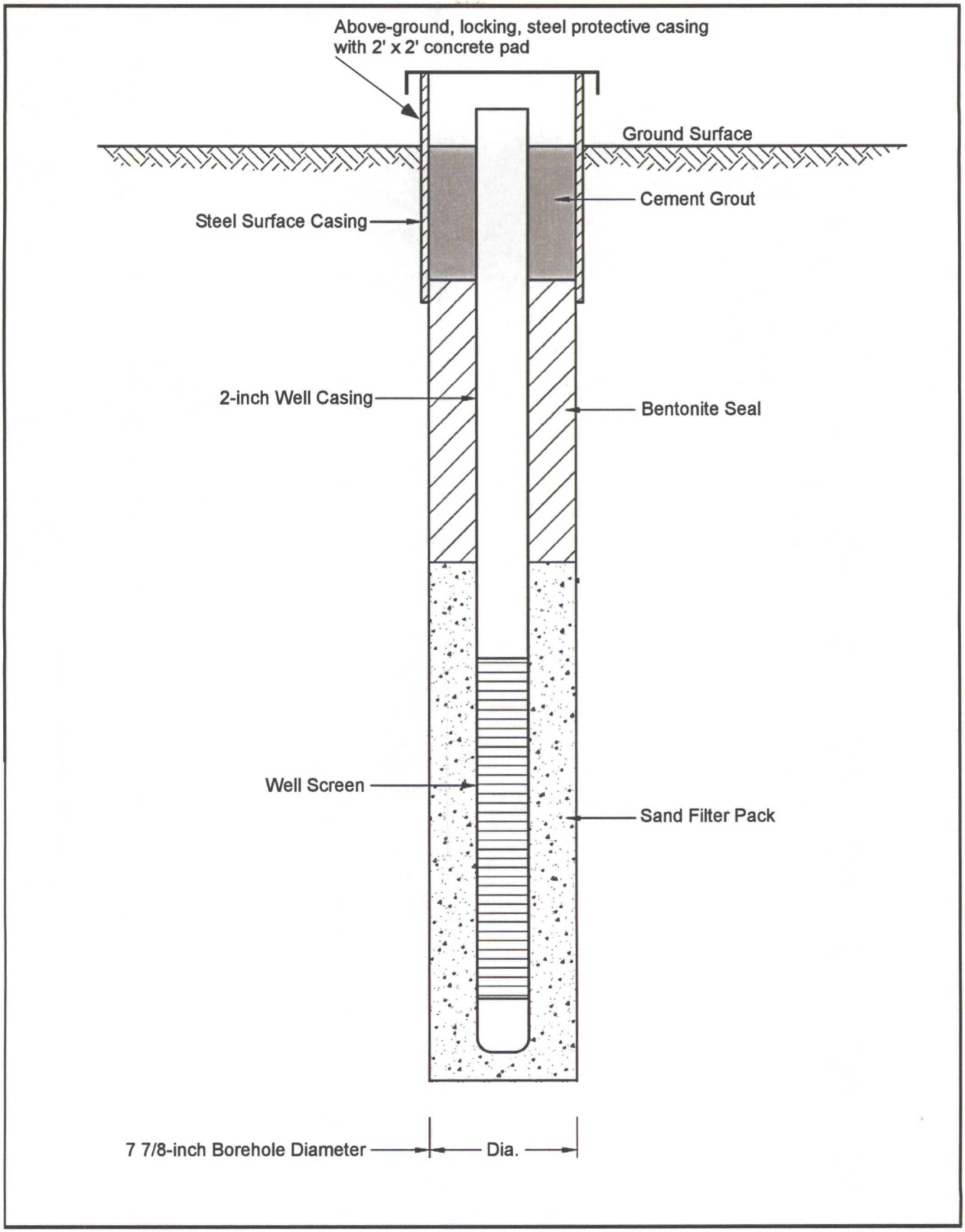
LEGEND

- WELLHEAD
- PROPOSED MONITORING WELL
- SITE BOUNDARY
- UNKNOWN EQUIPMENT

0 45 90
FEET

N

TETRA TECH, INC.



February 2009

Figure 3
Typical Monitoring Well Completion Diagram

APPENDICES

APPENDIX A
Historical Analytical Table

Appendix A - Historical Analytical Results

San Juan 27-5 #34A Well Site - Rio Arriba County, New Mexico

Soil Samples		Analytes (ppm)				
Sample ID	Date	Benzene (EPA Method 8021)	BTEX (EPA Method 8021)	TPH (EPA Method 418.1)	GRO/DRO (EPA Method 8015)	Organic Vapor (PID)
5 pt composite	1/30/2009	0.55	2.65	**352***	NA	**440.0**
Bottom @ 17'	1/30/2009	0.28	18.27	**352**	**2,610**	**456**
Test hole 1	1/30/2009	NA	NA	40	NA	**450**
Test hole 2	1/30/2009	NA	NA	32	NA	8
Test hole 3	1/30/2009	NA	NA	32	NA	8
Test hole 4	1/30/2009	NA	NA	32*	NA	11
South Wall	3/3/2009	NA	NA	**2,170***	NA	ND
North Wall	3/3/2009	NA	NA	12	NA	ND
East Wall	3/3/2009	NA	NA	16	NA	ND
West Wall	3/3/2009	NA	NA	24	NA	ND
Bottom @ 20'	3/3/2009	NA	NA	8	NA	ND
South Wall 2	3/3/2009	NA	NA	20	NA	ND
NMOCD Recommended Remediation Action Levels		10	50	100	100	100

Groundwater Sample		Analytes (ug/L)			
Sample ID	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes
Bottom @ 20'	3/3/2009	**95.6**	233	96.7	357
NMWQCC Groundwater Quality Standards		10	750	750	620

Notes:

ppm - parts per million
ug/L - micrograms per liter
NMOCD - New Mexico Oil Conservation Division
NMWQCC - New Mexico Water Quality Control Commission
Constituents in **BOLD** note action level/groundwater quality standard exceedence
NS - not sampled
TPH - total petroleum hydrocarbons
PID - photoionization detector results for organic vapor analysis
pt - point
All samples obtained by Envirotech, Inc. of Farmington, NM.

bgs - below ground surface
ND - not detected
BTEX - benzene, toluene, ethylbenzene, and total xylenes
GRO - gasoline range organics
DRO - diesel range organics
*QA/QC of the Envirotech report (Envirotech, 2009) resulted in changes to values originally reported in the table.

APPENDIX B
Soil Boring and Monitoring Well Completion Log Forms

Lithology Record

Project/Client: ______________________

Borehole: ______________ **Method:** ______________

Geologist: ______________________

Date: ______________________

Driller: ______________________

Interval (ft.)	Group Name and Description	USCS Class	Color	Moisture Content	Consistency of Cohesive Soils (Clay)	Density of Non-Cohesive Soils (Sand)	Angularity/Shape of Particles	Cementation & Type	Structure	Dry Strength	Plasticity	Additional Information	% Rec. (ft/ft)
Blow Ct. Sample: Y N Analytes: Time:	PID:			dry damp moist wet sat.	v. soft soft firm (stiff) hard v. hard	v. loose loose m. dense dense v. dense	angular subangular subrounded rounded flat elongated	none weak moderate strong CHOOSE: Calcareous OR Silicious	stratified laminated fissured slickensided blocky lensed homogenous interbedded	none low medium high v. high	nonplastic low medium high		
Blow Ct. Sample: Y N Analytes: Time:	PID:			dry damp moist wet sat.	v. soft soft firm (stiff) hard v. hard	v. loose loose m. dense dense v. dense	angular subangular subrounded rounded flat elongated	none weak moderate strong CHOOSE: Calcareous OR Silicious	stratified laminated fissured slickensided blocky lensed homogenous interbedded	none low medium high v. high	nonplastic low medium high		
Blow Ct. Sample: Y N Analytes: Time:	PID:			dry damp moist wet sat.	v. soft soft firm (stiff) hard v. hard	v. loose loose m. dense dense v. dense	angular subangular subrounded rounded flat elongated	none weak moderate strong CHOOSE: Calcareous OR Silicious	stratified laminated fissured slickensided blocky lensed homogenous interbedded	none low medium high v. high	nonplastic low medium high		
Blow Ct. Sample: Y N Analytes: Time:	PID:			dry damp moist wet sat.	v. soft soft firm (stiff) hard v. hard	v. loose loose m. dense dense v. dense	angular subangular subrounded rounded flat elongated	none weak moderate strong CHOOSE: Calcareous OR Silicious	stratified laminated fissured slickensided blocky lensed homogenous interbedded	none low medium high v. high	nonplastic low medium high		

TETRA TECH, INC.

Well Completion Diagram

Job Name _____

Job No. _____ Date _____

Project Manager _____

Well I.D. _____

Field Geologist _____

Driller _____

Equipment _____

Materials

_____ Pounds _____ Filter Pack

_____ Pounds _____ Bentonite Seal

_____ Gallons _____ Grout

_____ Pounds _____ Concrete

_____ Feet of native fill/ slough

_____ Feet of _____ inch _____ pvc _____ Blank Casing

_____ Feet of _____ inch _____ Slotted Screen

_____ Feet of _____ Outer Casing

_____ Feet of _____ Sump/ Silt Trap

Placement Method _____

Notes _____

_____

Development

Method _____

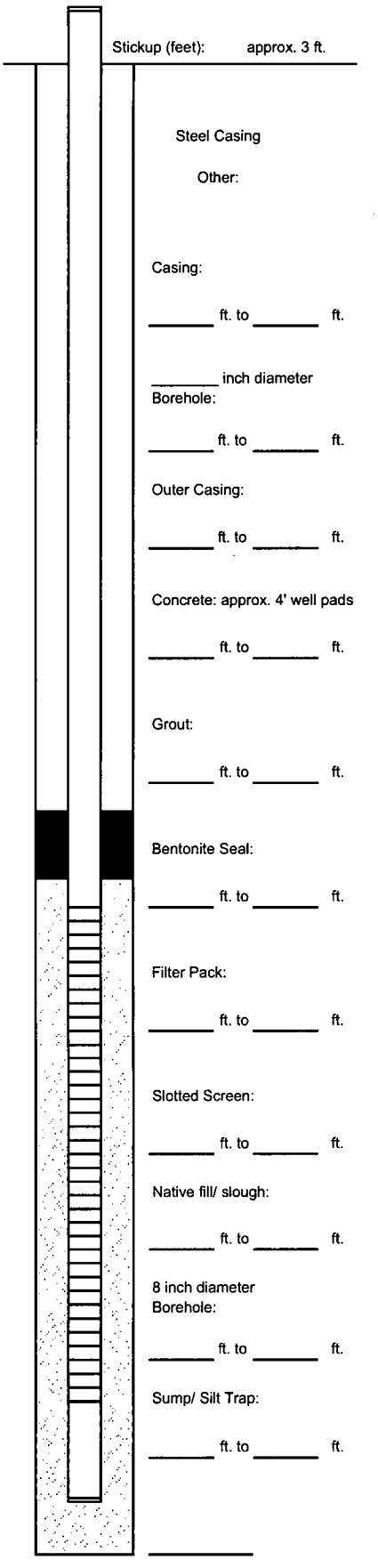
Date _____

Amount Purged _____ gallons

Notes _____

_____

Well ID MW-



APPENDIX C
Groundwater Sampling Form

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 D
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 (or GW Riley or Bill McPherson)	Riley Industrial - Day lighting	505-327-4947	
Gwen Frost	ConocoPhillips San Juan Business Unit	505-326-9549	505-215-3121
Mark Stallsmith	ConocoPhillips PTRRC	505-324-6172	505-320-8029
Terry Lauck	ConocoPhillips Risk Management and Remediation Site Manager	918-661-0935	918-815-0556
Wade Hock	ConocoPhillips Field Manager		505-320-3775

3.2.4 Groundwater Monitoring

A baseline groundwater monitoring event will be conducted at the Site in June 2009. A dedicated, disposable bailer will be used to purge and sample each well. A groundwater sample will be collected once specific conductance, pH, dissolved oxygen, oxidation/reduction potential (ORP) and temperature are determined to have stabilized (within a 10% margin), or until at least three (3) well volumes have been removed. Records of each sampling event will be kept on Tetra Tech groundwater sampling forms and in a bound field notebook dedicated to the Site. Groundwater samples will be containerized in bottles supplied by SPL of Houston, Texas, or another ConocoPhillilps-approved laboratory. 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 via an overnight courier.

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)

Compounds of concern (COCs) detected in the baseline groundwater parameter list in concentrations above the New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standards will be carried forward for analyses in subsequent groundwater monitoring events. The timing and duration of the subsequent groundwater monitoring events will be dependent upon the results of the baseline analysis, and will be covered under a separate, OCD-approved work plan. In the event that all COCs are detected at concentrations below NMWQCC groundwater quality standards after the first groundwater monitoring event, ConocoPhillips will discuss Site-specific closure requirements with OCD.

3.3 Reporting

A groundwater monitoring report will be prepared for the Site after completion of the baseline groundwater quality analysis. The report will include a summary of the groundwater monitoring well installation, a brief description of the soil and groundwater sampling events and a discussion of analytical sampling results. In general, Tetra Tech groundwater monitoring 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 laboratory analytical results, laboratory quality assurance/quality control (QA/QC) documentation, tabulated groundwater elevations, groundwater concentration/elevation maps, a generalized geologic cross section, and a summary of key findings. In the event that a quarterly, semi-annual or annual groundwater monitoring program is

initiated at the Site, groundwater elevations and groundwater analytical results from the previous sampling event will be tabulated with the results from the current sampling event.

One (1) hard copy and one (1) electronic copy of each monitoring report will be submitted to OCD.

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.

At least one field audit of health and safety procedures and 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 Incorporated (2009). *Burlington Resources Spill Closure Report Located at San Juan 27-5 #34A, Section 30, Township 27N, Range 5W, Rio Arriba County, New Mexico.* Prepared for ConocoPhillips. Report Dated March 20, 2009. 3 pp (not including Figures, Tables, and Appendices).

New Mexico Oil Conservation Division (1993). *Guidelines for Remediation of Leaks, Spills and Releases.* August 13, 1993. 16 pp. (not including Appendices).

FIGURES