

3R - 428

WORKPLAN

02/23/2009



TETRA TECH, INC.

February 19, 2009

Mr. Glen von Gonten
State of New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

**RE: Sategna 2E Environmental Work Plan for Monitoring Well Installation
and Semi-Annual Groundwater Sampling, Bloomfield, NM**

Dear Mr. von Gonten:

Enclosed please find a copy of the above-referenced document created by Tetra Tech, Inc. for this Bloomfield area ConocoPhillips site. The site characterization and soil and groundwater sampling methods we discussed during our April 2, 2008 meeting at your office have been incorporated into this work plan.

Please do not hesitate to contact me at (505) 237-8440 if you have any questions or require additional information.

Sincerely,

Kelly E. Blanchard
Project Manager

Enclosures (1)

32419

6121 Indian School Rd. NE Suite 200
Albuquerque, NM 87110
(505) 237-8440

RECEIVED

2009 FEB 23 AM 9 23

3R418

RECEIVED

2009 FEB 23 AM 9 24

**Environmental Work Plan for Monitoring
Well Installation and Semi-Annual
Groundwater Monitoring**

**Sategna 2E
San Juan Basin, Bloomfield, New Mexico**

Prepared for:

ConocoPhillips Company

*Risk Management and Remediation
420 South Keeler Avenue
Bartlesville, OK 74004
(918) 661-0935 office*

Prepared by:

Tetra Tech, Incorporated

*6121 Indian School Road NE, Suite 200
Albuquerque, NM 87110
(505) 237-8440*

February 2009

TABLE OF CONTENTS

1.0 PURPOSE AND NEED	2
2.0 SITE HISTORY	3
2.1 Site Activities.....	3
3.0 SCOPE OF WORK	5
3.1 Pre Field Work Preparation.....	5
3.2 Site Investigation.....	5
3.2.1 Soil Boring Advancement and Soil Sample Collection.....	5
3.2.2 Groundwater Monitoring Well Construction.....	6
3.2.3 Investigation Derived Waste.....	7
3.2.4 Groundwater Monitoring.....	7
3.3 Reporting.....	7
4.0 QUALITY ASSURANCE AND QUALITY CONTROL	9
5.0 REFERENCES	10

LIST OF FIGURES

Figure 1 – Site Location Map

Figure 2 – Proposed Groundwater Monitoring Well Locations

Figure 3 – Typical Monitoring Well Completion Diagram

APPENDICES

Appendix A – Historical Analytical Table

Appendix B – C-141 form (Release Notification and Corrective Action) for the Site

Appendix C – Soil Boring and Monitoring Well Completion Log Forms

Appendix D – Groundwater Sampling Forms

Appendix E – Site Contacts

1.0 PURPOSE AND NEED

This document presents the scope of work to be performed at the Sategna 2E 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 Glen A. DeVilbiss Trust.

This work is being conducted in response to the discovery of a release of approximately 8 barrels of condensate on November 24, 2008 at the Site. Tetra Tech Inc. (Tetra Tech) will conduct this work according to site characterization methods and soil and groundwater laboratory analyses requested by the New Mexico Oil Conservation Division (OCD) during an April 2008 meeting conducted in Santa Fe, New Mexico, with Glen Von Gonten, OCD Environmental Bureau Hydrologist.

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 2008 release discovery.

DATE	ACTIVITY
November 24, 2008	Approximately eight (8) barrels of condensate were found to have spilled from an on-Site, aboveground storage tank (AST); corrosion was thought to be the cause of the release. Form C-141 was filled out by ConocoPhillips staff and notice was given to Brandon Powell via electronic mail. Form C-141 stated that the well was shut down and the production tank was emptied. The spilled fluids remained in the berm and none of the condensate was recovered.
November 25, 2008	Envirotech Inc. of Farmington, NM (Envirotech) obtained heated headspace soil results from just outside of the affected area; results were 0.2 and 1.1 parts per million (ppm). Depth of soil samples was not noted. Envirotech hand augered two soil borings to groundwater at a depth of approximately 8 feet below ground surface (bgs) and submitted groundwater samples for analysis. Results were below OCD action levels for benzene, toluene, ethylbenzene, and total xylenes (BTEX) in groundwater. Envirotech notes that groundwater levels in the soil borings increased to approximately 5 feet bgs, and groundwater beneath the Site was thought to be under confined aquifer conditions (Kerr, 2009).
December 4, 2008	Envirotech returned to the Site and obtained grab and composite soil samples from an excavation measuring approximately* 30 feet by 18 feet by 5 feet deep (Figure 2). Heated headspace results show values ranging from 6.5 ppm in a grab soil sample obtained from the bottom of the excavation to 1,400 ppm from a composite soil sample taken from the former location of the AST. Total petroleum hydrocarbons (TPH), BTEX, and chloride samples were obtained for soils analysis, and results were all below OCD action levels for BTEX; one soil sample obtained for chlorides showed results of 370 milligrams per kilogram (mg/kg). Results for TPH analysis obtained through Environmental Protection Agency (EPA) method 8015B for the composite soil sample taken at the site of the AST revealed results of 205 mg/kg; the OCD action level is 100 mg/kg. Results for TPH analysis obtained through EPA method 418.1 for the composite soil sample obtained at the location of the below ground tank revealed results of 521 mg/kg. The below ground tank was located within the berm and adjacent to the AST (Figure 2).
December 4, 2008	Results of all other soil analyses at all other sampling locations were below OCD action levels (Appendix A).

DATE	ACTIVITY
December 5, 2008	Envirotech notes seepage of groundwater into the excavation on December 4, 2008, and returns to the Site on December 5, 2008 to collect groundwater samples from the excavation for BTEX analysis. (Kerr, 2009). The OCD groundwater action levels for benzene, toluene, and total xylenes are 10 ug/l, 750 ug/l, and 620 ug/l, respectively. Benzene was found at a concentration of 327 ug/l, toluene was detected at 4,300 ug/l, and total xylenes were found at a concentration of 8,480 ug/L (Appendix A).
Week of December 8, 2008	A vacuum truck was utilized to pump groundwater seepage from the surface of the excavated area. Once removed, further excavation took place and groundwater slowly seeped into the excavation; this process was repeated a total of four (4) times. The first time water was pumped from the surface of the excavation, a hydrocarbon odor and free-phase, light non-aqueous phase liquid (LNAPL) were present. By the fourth and last event, neither the hydrocarbon odor nor free-phase LNAPL was present in the groundwater seepage. Each pumping event removed approximately 30-60 barrels of liquid from the Site (Frost, 2009).
January 20, 2009 & January 30, 2009	Tetra Tech conducted a Site visit to determine proposed groundwater monitoring well locations.

*Notes: Figure 2 depicts a generalized, not-to-scale excavation area.

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, quality assurance/quality control (QA/QC) is discussed in Section 4.0, and 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 – C-141 form (Release Notification and Corrective Action) for the Site
- Appendix C – Soil Boring and Monitoring Well Completion Log Forms
- Appendix D – Groundwater Sampling Forms
- 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 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 Sategna 2E 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 eight (8) 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 three (3) soil borings will be collected and 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, and nitrate/nitrites (various methods)

After the first regularly scheduled semi-annual 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 during the first semi-annual groundwater monitoring event at concentrations above the New Mexico Water Quality Control Commission (NMWQCC) Groundwater Quality Standards will be carried forward for analyses in subsequent semi-annual groundwater monitoring events. If all COCs are below NMWQCC groundwater quality standards after two (2) consecutive semi-annual groundwater monitoring events, ConocoPhillips will request a No Further Action (NFA) 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 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). The installed groundwater monitoring wells will include a sand filter pack to 2-feet above the top of the screen. A bentonite seal will be 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 semi-annual 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.

3.2.4 Groundwater Monitoring

Semi-annual groundwater sampling will be conducted at the Site in March and September 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 Southern Petroleum Laboratories (SPL) of Houston, Texas, or another ConocoPhillips-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. Groundwater samples will be shipped by overnight courier.

3.3 Reporting

Semi-annual groundwater monitoring reports will be prepared for the Site. The first semi-annual 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, the semi-annual 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 and cross sections, and a summary of key findings. Starting with the second semi-annual report, the groundwater elevations and groundwater analytical results from the previous semi-annual sampling event will be tabulated with the results from the current sampling event.

An annual report will be prepared that summarizes the results of the two semi-annual monitoring events. One (1) hard copy of each semi-annual monitoring report and of the annual monitoring report will be submitted to OCD.

A C-141 form (Release Notification and Corrective Action) was completed on November 24, 2008, by Gwen Frost of ConocoPhillips Company and was submitted to Brandon Powell of OCD via electronic mail (Appendix B).

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 semi-annual report.

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

Frost, G. (2009) Personal communication. Interview conducted by Kelly Blanchard, with Gwendolynne Frost of ConocoPhillips Company. February 19, 2009.

Kerr, K. (2009) Personal communication. Interview conducted by Gary Desselle, with Kyle Kerr of Envirotech. February 19, 2009.

FIGURES

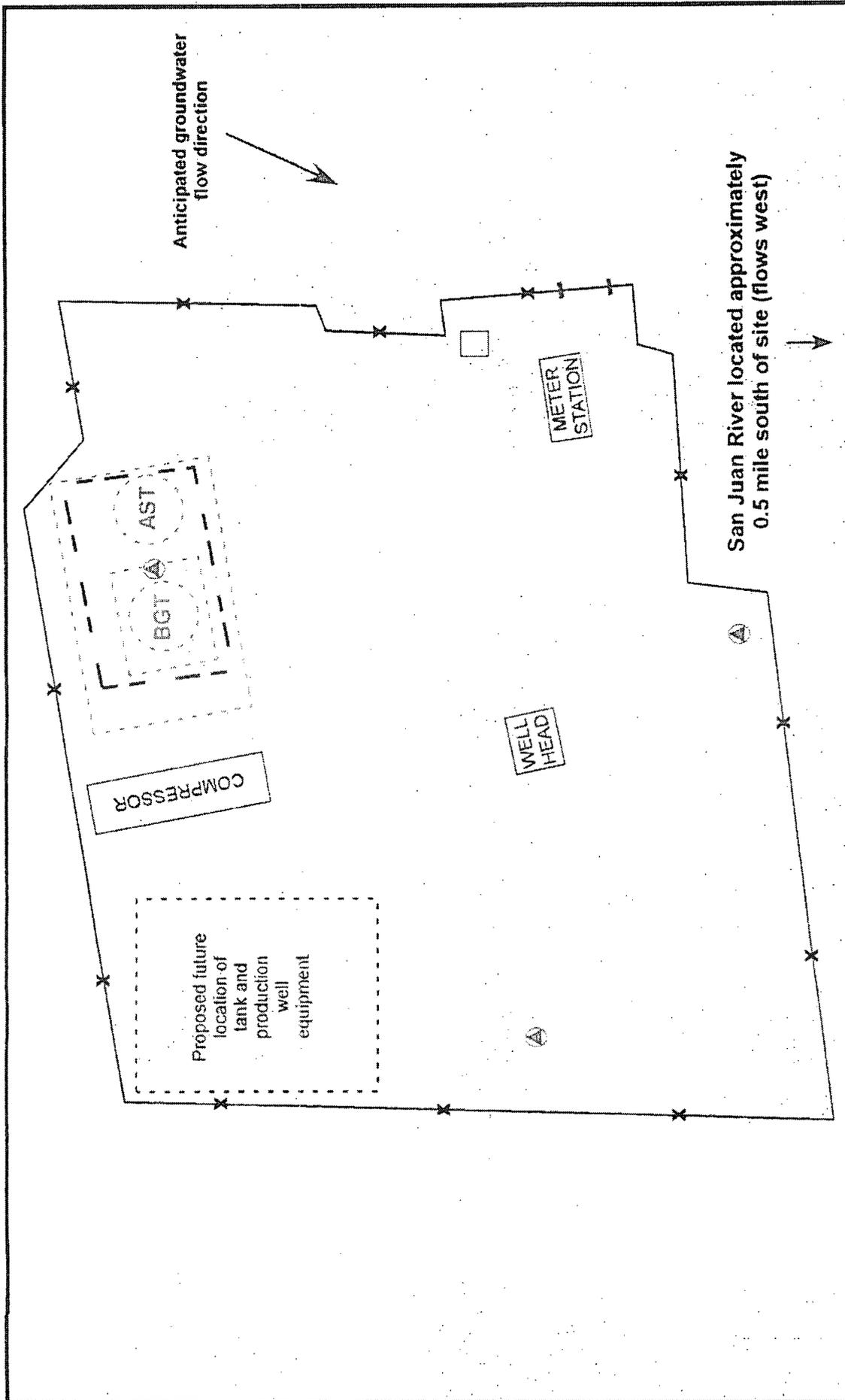
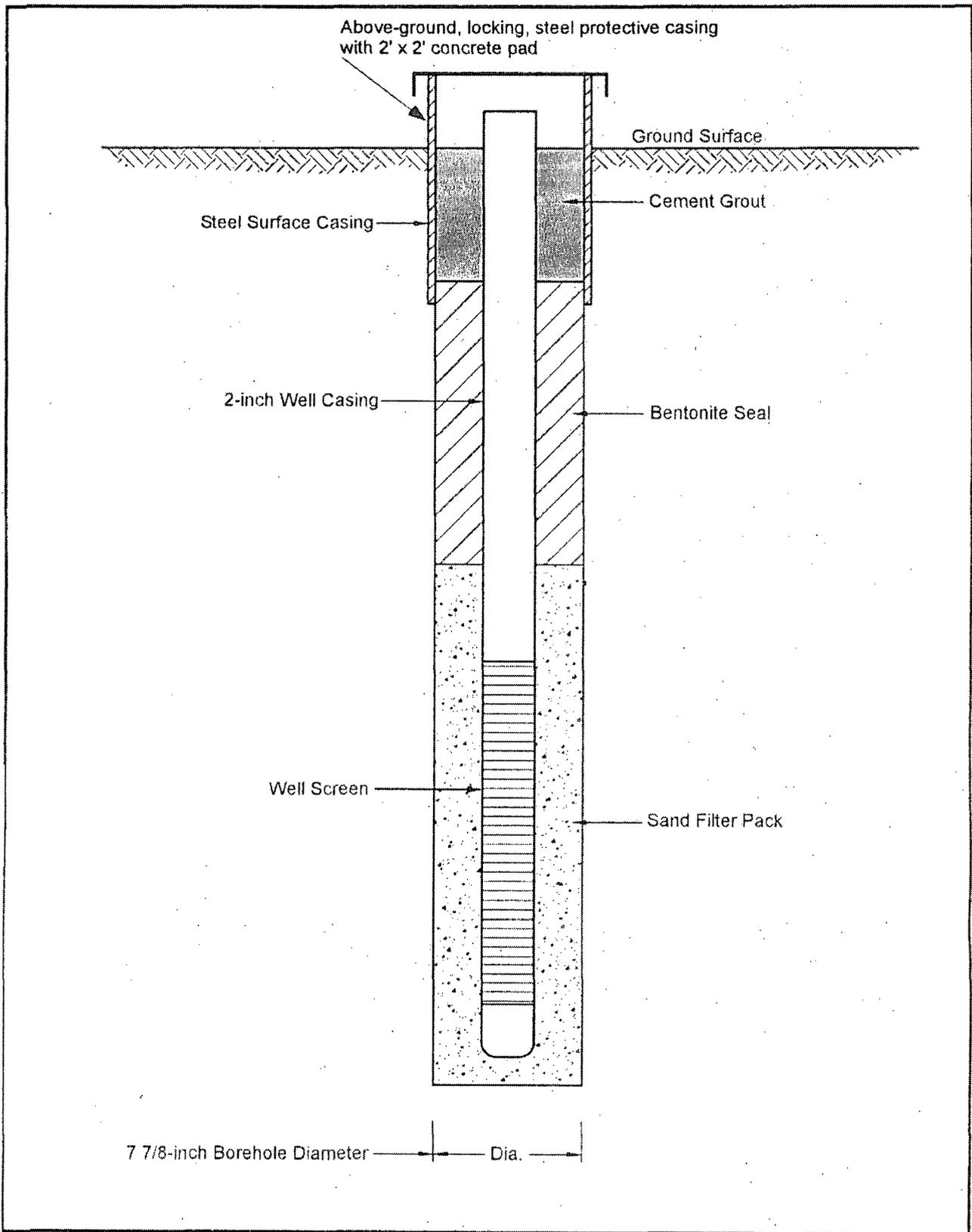


FIGURE 2:
 SITE LAYOUT MAP
 CONOCOPHILLIPS COMPANY
 SATEGNA 2E OIL AND GAS
 PRODUCTION WELL
 Sec 21, T29N, R11W
 Bloomfield, New Mexico

- LEGEND**
- GENERAL AREA of EXCAVATION
 - FORMER BELOW GROUND TANK (BGT) AND ABOVE GROUND STORAGE TANK (AST) LOCATION
 - - - - - GATED ENTRANCE
 - * - * - FENCE LINE
 - ⊙ PROPOSED MONITORING WELL

0 30 60
 FEET

TETRA TECH, INC.



February 2009



Figure 3
Typical Monitoring Well Completion Diagram

APPENDICES

APPENDIX A
Historical Analytical Table

Sample ID	Date	Analytes (mg/kg unless otherwise noted)					Analytes (ug/kg)						
		GRO	DRO	TPH (Method 8015B)	TPH (Method 418.1)	Chlorides	PID (ppm)	Benzene	Toluene	Ethylbenzene	p,m-Xylenes	o-Xylenes	Total BTEX*
5 pt BGT	12/4/2008	33.1	40.7	73.8	521	370	850	4.2	227	67.1	590	153	1,040
5 pt AST	12/4/2008	133	72.3	205	NA	NA	1,400	17.2	1,610	472	4,500	1,340	7,940
N(orth) Wall	12/4/2008	2.1	1.9	4.0	NA	NA	39	1.7	14.6	3.1	22.8	7.0	49.2
S(outh) Wall	12/4/2008	65.1	43.9	109	NA	NA	560	2.5	109	25.3	174	63.3	374
E(ast) Wall	12/4/2008	3.8	2.0	5.8	NA	NA	543	<0.9	20.2	8.2	69.7	14.3	112
W(est) Wall	12/4/2008	<0.2	<0.1	<0.2	NA	NA	860	1.7	2.6	1.4	2.8	3.0	11.5
Bottom of excavation	12/4/2008	NA	NA	NA	NA	NA	6.5	NA	NA	NA	NA	NA	NA
# 1 @ 8' BGS, 11/25	11/25/2008	<0.2	<0.1	<0.2	NA	NA	0.2	1.7	4.6	5.7	23.3	6.2	41.5
# 2 @ 8' BGS, 11/25	11/25/2008	<0.2	<0.1	<0.2	NA	NA	1.1	3.6	10.9	4.0	8.6	6.4	33.5
NMOC/DN/ME Action Levels		--	--	100	100	--	100	10,000	--	--	--	--	50,000

Sample ID	Date	Analytes (ug/L)					Total Xylenes	Total BTEX**
		Benzene	Toluene	Ethylbenzene	p,m-Xylenes	o-Xylenes		
+GW # 1	11/25/2008	0.5	1	0.5	0.8	0.3	1.1	3.1
+GW # 2	11/25/2008	0.3	1.5	0.5	3.2	0.9	4.1	6.4
Water**	12/5/2008	327	4,300	366	6,440	2,040	8,480	13,500
NMOC/DN/ME Action Levels		10	750	750	--	--	620	--

Notes:

ppm - parts per million
 mg/kg - milligrams per kilogram of soil
 ug/L - micrograms per liter

NMOC - New Mexico Oil Conservation Division
 NMED - New Mexico Environment Department

*As reported by Envirotech Analytical Laboratory, results are not always an exact sum of individual BTEX constituents
 **Water collected one day after the 12/4/08 excavation. Groundwater seeped into the excavation and was then sampled by Envirotech at this point.

Depth of the sample was approximately 6 feet bgs (personal communication with Kyle Kerr, Envirotech, 2/19/09).
 + Sample taken from hand-augered soil borings at approximately 8 feet bgs, not from properly developed groundwater monitoring wells.
 Constituents in BOLD note action level exceedance

NA = not analyzed
 BGT = below ground tank
 AST = above ground tank
 BGS = below ground surface
 GRO - gasoline range organics
 DRO - diesel range organics
 TPH - total petroleum hydrocarbons
 PID - photoionization detector



TETRA TECH

APPENDIX B
C-141 Form

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

Initial Report Final Report

Name of Company Burlington Resources, a wholly owned subsidiary of ConocoPhillips Company	Contact Gwen R. Frost
Address 3401 E. 30th St., Farmington, NM 87402	Telephone No. 505-326-9866
Facility Name Sategna 2E	Facility Type Gas Well API # 30-045-24060
Surface Owner Private	Mineral Owner Private Lease No. Fee

LOCATION OF RELEASE

Unit Letter J	Section 21	Township T29N	Range R11W	Feet from the 1450'	North/South Line South	Feet from the 1854'	East/West Line East	County San Juan
-------------------------	----------------------	-------------------------	----------------------	-------------------------------	----------------------------------	-------------------------------	-------------------------------	---------------------------

Latitude 36.70784° N Longitude 107.99385° W

NATURE OF RELEASE

Type of Release - Condensate	Volume of Release - 8 BBL Condensate	Volume Recovered - 0 BBL
Source of Release: Tank Leak	Date and Hour of Occurrence Unknown	Date and Hour of Discovery 11/24/08 - 8:45 a.m.
Was Immediate Notice Given? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom? OCD - Brandon Powell via email	
By Whom? Gwen Frost	Date and Hour - 11/25/08 - 5:00 p.m.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* **On November 24, 2008, 2008 a COPC MSO discovered an approximate 8 BBL condensate spill on the Sategna #2E due to a leak in the production tank possibly from corrosion. Upon discovery, the MSO shut in the well and had the production tank emptied. All spilled fluids remained in the berm. None of the condensate was recoverable.**

Describe Area Affected and Cleanup Action Taken.* **All of the spilled fluids remained on location. The spill impacted soil on the ground surface around the tank. The production tank will be removed and affected soils will be excavated. To prevent reoccurrence, COPC will continue to perform tank inspections.**

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: <i>Gwen R. Frost</i>	OIL CONSERVATION DIVISION	
Printed Name: Gwen R. Frost	Approved by District Supervisor:	
Title: Environmental Engineer	Approval Date:	Expiration Date:
E-mail Address: gwendolynne.frost@conocophillips.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 11/25/08 Phone: 505-326-9549		

* Attach Additional Sheets If Necessary

APPENDIX C
Soil Boring and Monitoring Well Completion Log
Forms

Lithology Record

Project/Client:

Borehole:

Geologist:

Date:

Driller:



Method:

Tetra Tech, Inc.
6121 Indian School Rd. NE, Suite 200
Albuquerque NM 87110
(505) 237-8440 Fax (505) 237-8556

Page of

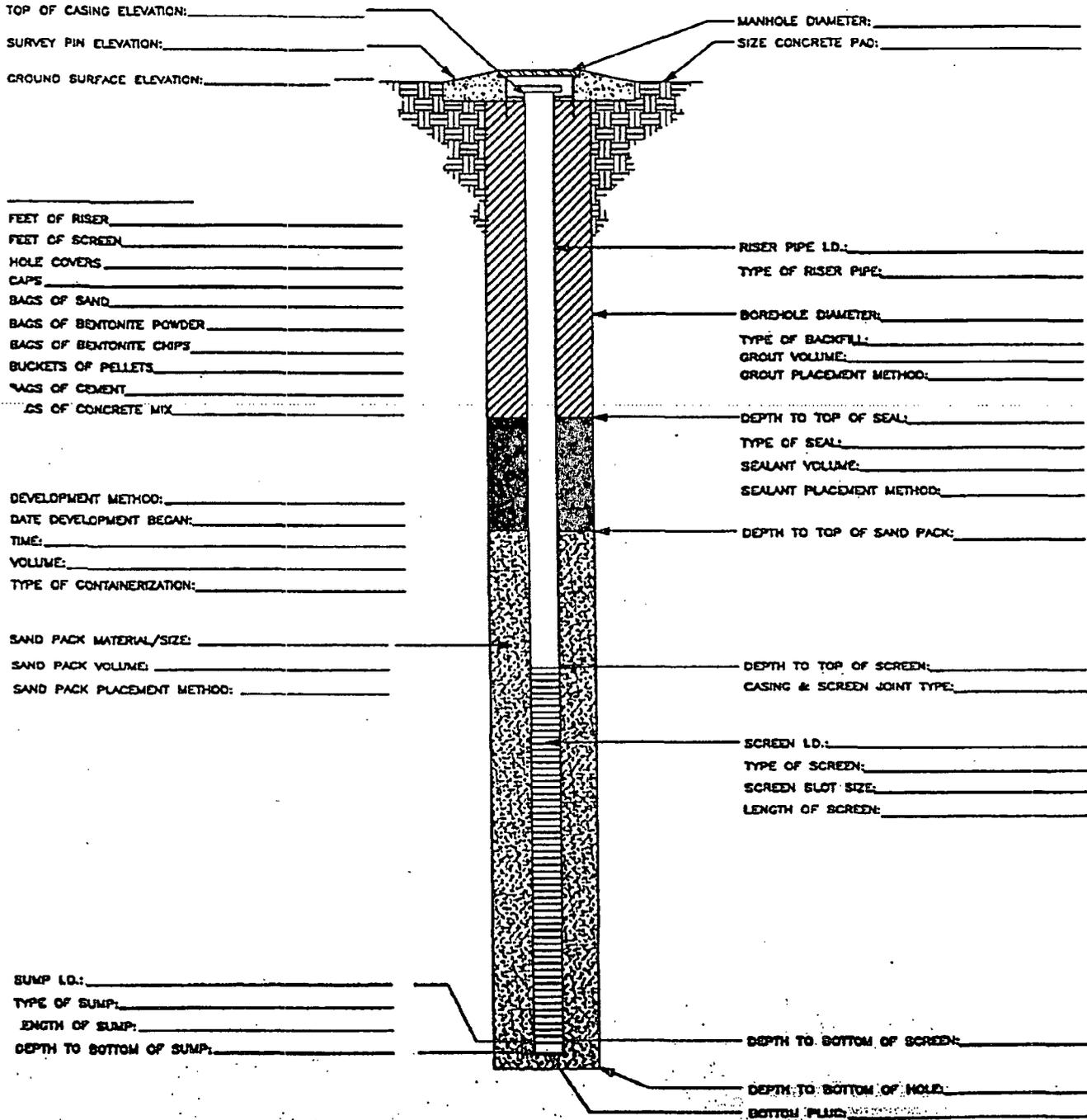
Interval (ft.)	Group Name and Description	USCS Class	Color	Moisture Content	Consistency of Cohesive Soils (Clay)	Density of Non-Cohesive Soils (Sand)	Angular/Shape of Particles	Cementation & Type	Structure	Dry Strength	Dilatancy	Toughness	Plasticity	Additional Information	% Rec. (ftft)
Blow Ct. Sample: Y N Analyzes:				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 stickensided blocky lensed homogenous interbedded	none low medium high v. high	none slow rapid	low medium high	nonplastic low medium high		
Time: PID:															
Blow Ct. Sample: Y N Analyzes:				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 stickensided blocky lensed homogenous interbedded	none low medium high v. high	none slow rapid	low medium high	nonplastic low medium high		
Time: PID:															
Blow Ct. Sample: Y N Analyzes:				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 stickensided blocky lensed homogenous interbedded	none low medium high v. high	none slow rapid	low medium high	nonplastic low medium high		
Time: PID:															
Blow Ct. Sample: Y N Analyzes:				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 stickensided blocky lensed homogenous interbedded	none low medium high v. high	none slow rapid	low medium high	nonplastic low medium high		
Time: PID:															



TETRA TECH, 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 _____



APPENDIX D
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

<u>Constituents Sampled</u>	<u>Container Description</u>	<u>Preservative</u>

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

