

State of Colorado  
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax 894-2109



FOR OGCC USE ONLY

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee:

☐ Spill ☐ Complaint  
☐ Inspection ☐ NOAV

Tracking No:

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

☐ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☒ Site/Facility Closure ☐ Other (describe): \_\_\_\_\_

**GENERAL INFORMATION**

<b>OGCC Operator Number:</b> 69175 Name of Operator: <u>Petroleum Development Corporation</u> Address: <u>1775 Sherman Street, Suite 3000</u> City: <u>Denver</u> State: <u>CO</u> Zip: <u>80203</u>		Contact Name and Telephone <b>Name:</b> <u>Brandon Bruns</u> No: <u>(303) 860-5800</u> Fax: <u>(303) 860-5838</u>
API/Facility No: <u>05-123-11273</u> Facility Name: <u>Bunyan 1</u> Well Name: <u>Bunyan</u> Location (QtrQtr, Sec, Twp, Rng, Meridian): <u>NESW Sec 21 T4N R67W 6th PM</u>	County: <u>Weld</u> Facility Number: _____ Well Number: <u>1</u> Latitude: _____ Longitude: _____	

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Condensate and Produced Water

Site Conditions: Is location within a sensitive area (according to Rule 901e)? ☒ Y ☐ N If yes, attach evaluation. Groundwater <20 feet below ground surface.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Agriculture

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Wiley-Colby complex, 1 to 3 percent slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Surface water is located 1,900' south of the site; a building is located 1,360' north of the site; a water well is located 2,640' west of the site; and depth to groundwater is 12' below ground surface (bgs).

Description of Impact (if previously provided, refer to that form or document):


Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>40' N-S x 50' E-W x 13' bgs</u>	<u>Laboratory analysis and field screening of soil samples</u>
<input type="checkbox"/> Vegetation	_____	_____
<input checked="" type="checkbox"/> Groundwater	<u>See attached data</u>	<u>Laboratory analysis of groundwater samples</u>
<input type="checkbox"/> Surface water	_____	_____

**REMEDIALATION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):  
 A Form 19 was submitted on January 10, 2008 (Spill #1981118). A Form 27 was submitted on April 21, 2008 (Remediation #4212).

Describe how source is to be removed:  
 Described in previous Form 27.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:  
 In addition to groundwater monitoring, enhanced fluid recovery (EFR) will be used to expedite the remediation time frame. EFR will be used to extract impacted groundwater and soil gas from the surface using a high capacity vacuum blower. EFR was completed at the site on July 19, 2011 at well MW03. Future EFR events are planned at well MW03 based on historical groundwater concentrations at this location.

<b>FORM 27</b> Rev 6/99	<b>State of Colorado</b> <b>Oil and Gas Conservation Commission</b> 1120 Lincoln Street, Suite 801, Denver, Colorado (303) 894-2100 Fax 894-2109		Tracking Number: _____ Name of Operator: <u>Petroleum Development Corporation</u> OGCC Operator No: <u>69175</u> Received Date: _____ Well Name & No: <u>Bunyan 1</u> Facility Name & No.: <u>Bunyan 1</u>
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OGCC Employee: \_\_\_\_\_

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

Monitoring wells MW01 through MW04 were installed at the site on February 26, 2008 (Figure 2). Following installation, each well was developed, purged, and sampled. Groundwater samples were collected from the wells and submitted for laboratory analysis of BTEX by EPA Method 8260B. Laboratory results indicated the benzene concentration in groundwater in monitoring well MW03 was not in compliance with the CDHPE WQCC Reg. 41 Standard (Reg. 41). Concentrations of the remaining analytes in MW03 and the BTEX concentrations in groundwater in monitoring well MW01 (MW02 and MW04 were dry and could not be sampled) were in compliance with the Reg. 41 standards (Table 2). The monitoring wells were sampled on a quarterly basis until December 2008, when it was determined that an additional point of compliance (POC) was needed. Monitoring well MW05 was installed on December 30, 2008 (Figure 2). Following installation, the well was developed, purged, and sampled. A groundwater sample was collected from the well and submitted for laboratory analysis of BTEX by EPA Method 8260B. Laboratory results indicated the BTEX concentrations in groundwater in monitoring well MW05 were below laboratory reporting limits and in compliance with the Reg. 41 standards. The monitoring wells were sampled on a quarterly basis until April 2011, when it was determined that an additional POC was needed due to elevated benzene concentrations that were observed in monitoring wells MW03 and MW04 during previous sampling events. Monitoring well MW06 and replacement monitoring well MW05R were installed on April 18, 2011 (Figure 2). Following installation, each well was developed, purged, and sampled. A groundwater sample was collected from each well and submitted for laboratory analysis of BTEX by EPA Method 8260B. Laboratory results indicated the BTEX concentrations in groundwater in monitoring wells MW05R and MW06 were below laboratory reporting limits and in compliance with the Reg. 41 standards (Table 2). PDC will continue to monitor groundwater concentrations at the site until four consecutive quarters of groundwater analytical results in compliance with Reg. 41 standards are achieved.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The site was restored to pre-release grade. PDC deconstructed and moved the tank battery from its previous location.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☒ Y ☐ N If yes, describe:

Laboratory results from the most recent quarterly sampling event indicate the benzene concentration in groundwater in monitoring well MW03 is not in compliance with the Reg. 41 standard. Concentrations of the remaining analytes in MW03 and the BTEX concentrations in monitoring wells MW01 through MW06 (MW04 was dry and could not be sampled) were below laboratory reporting limits and in compliance with the Reg. 41 standards (Table 2). PDC will continue to monitor groundwater concentrations at the site until four consecutive quarters of groundwater analytical results in compliance with Reg. 41 standards are achieved.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):


Described in previous Form 27.

<b>IMPLEMENTATION SCHEDULE</b>			
Date Site Investigation Began:	1/4/2008	Date Site Investigation Completed:	4/19/2011
Remediation Start Date:	1/7/2008	Anticipated Completion Date:	NA
		Remediation Plan Submitted:	9/12/2011
		Actual Completion Date:	TBD

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Brandon Bruns

Signed:  Title: Environmental Field Coordinator Date: 9/12/2011

OGCC Approved: \_\_\_\_\_ Title: EPS Date: 9/12/2011