

State of Colorado  
Oil and Gas Conservation Commission

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FOR OGCC USE ONLY

#7846

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6/17/2013

**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: 2213128

**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		Contact Name and Telephone	
Name of Operator: PDC Energy, Inc.		Name: Brandon Brunns	
Address: 1775 Sherman Street, Suite 3000		No: (303) 831-3971	
City: Denver State: CO Zip: 80203		Fax: (303) 860-5838	
API/Facility No: 05-123-22518		County: Weld	
Facility Name: Barrell 41-4		Facility Number: 305118	
Well Name: Barrell 41-4		Well Number: Barrell 41-4	
Location (Qtr, Sec, Twp, Rng, Meridian): NENE S4 T6N R64W		Latitude: 40.522198 Longitude: -104.550254	

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Unknown

Site Conditions: Is location within a sensitive area (according to Rule 901e)?  Y  N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Oil and gas production, Cultivated

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Vona sandy loam, 1 to 3 percent slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Surface water is located approximately 200' north of the tank Battery, a residential building is approximately 975' west, and a water well is located approximately 980' southwest of the site.

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>Refer to the attached Figure 2 and Table 1</u>	<u>Excavation and soil sampling</u>
<input type="checkbox"/> Vegetation		
<input type="checkbox"/> Groundwater		
<input type="checkbox"/> Surface water		

**REMEDIALTION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):

A Form 19 was submitted on March 25, 2011 and the COGCC assigned spill tracking number 2213128 for the site. In addition, PDC submitted a No Further Action Request to the COGCC on July 30, 2012. An aerial map of the site is included as Figure 1.

Describe how source is to be removed:

The source area was previously excavated and impacted material was transported and disposed of as described in the Form 19 submitted on March 25, 2011.

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.:

Excavation and in-situ treatment activities were conducted as described in the previously submitted Form 19 and No Further Action Request. On April 18, 2012 chemical oxidant (chemox) injections were conducted at four (4) locations using direct push injection rods in the area of residual petroleum impacts. The locations of the injection points as well as the previous sampling locations are illustrated on Figure 2. A total of 5,181 pounds (lbs) of Fenton's Reagent was injected into the Site subsurface at 2-foot intervals at depths ranging between 15-feet below ground surface (bgs) to 25-feet bgs. On July 10, 2012, Tasman completed advancement of four confirmation soil borings (IP01, IP02, IP03, and IP04) within the area of residual petroleum hydrocarbon impacts (Figure 2) using direct push technology. Total depths of the soil borings ranged from depths of approximately 18-feet bgs to 25 feet bgs. Soil samples were collected from the 15 to 18 foot bgs sample core in IP01, IP03, and IP04 and the 20 to 25 foot bgs sample core in IP02. During soil boring activities, Tasman field screened soil probe samples using a standard photo ionization detector (PID) instrument. The soil samples were characterized by visual inspection and field screening of organic vapors using the PID. Confirmation soil samples were collected from each core and were submitted under chain-of-custody procedures to Summit Scientific Laboratories in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, and total petroleum hydrocarbons-gasoline range organics (TPH-GRO) by United States Environmental Protection Agency (USEPA) Method 8260B, and TPH-diesel range organics (TPH-DRO) by USEPA Method 8015. On November 28, 2012, the COGCC notified PDC that the confirmation soil sampling was not adequate and that additional soil sampling needed to be conducted within the area of soil sample SS02 at approximately 25 to 27 feet bgs. On January 8, 2013, PDC completed advancement of an angled soil boring (SS02A) from the east side of the tank battery secondary containment berm using direct push technology to access the 25 to 27 feet bgs zone near the SS02 soil sample location. Soil sample SS02A was collected from the 25 to 27 feet bgs interval and submitted to Summit Scientific for laboratory analysis of BTEX, naphthalene, GRO and DRO by USEPA Method 8015. The SS02A analytical results indicate that TPH-GRO and TPH-DRO concentrations exceed the COGCC Table 910-1 standards. On February 15, 2013, PDC installed an angled remediation well (BH-02) within the area of SS02A with a slot screened interval between 25 and 28 feet bgs. PDC proposes to utilize this well for supplemental chemox injections. Subsequent to chemox injections at that well, PDC will conduct angled direct push drilling and soil sampling activities within the area of SS02 and SS02A. Should the soil samples demonstrate that supplemental chemox injections were effective in remediating the residual petroleum hydrocarbon impacts, PDC will submit a Form 4 Sundry Notice and no further action (NFA) request to the COGCC. PDC took time to evaluate how the initial chemox injections affected subsurface hydrocarbon impacts prior to submitting this Form 27. A summary of soil analytical data is presented in Table 1 and the laboratory analytical reports are included as Attachment A. The extent of the excavation, soil sample locations, and BH-02 location are illustrated on Figure 2.



REMEDIATION WORKPLAN (CONT.)

OGCC Employee: \_\_\_\_\_

Tracking Number: 2213128
Name of Operator: PDC Energy, Inc.
OGCC Operator No: 69175
Received Date:
Well Name & No: Barrell 41-4
Facility Name & No.: Barrell 41-4

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
Groundwater was not encountered during excavation or drilling activities at the site.

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 area where the tank battery was located has been backfilled and compacted with clean material and the ground surface was contoured to match pre-existing conditions.

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 [x] N If yes, describe:
PDC feels that no further Site investigation is required at this time. PDC will evaluate how the chemox injections are addressing subsurface impacts and will complete additional investigations should they be warranted. The excavation extent and soil sample locations are illustrated on Figure 2 and the soil analytical results are summarized in Table 1. The laboratory analytical report is included as Attachment A.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Waste was disposed of at the Waste Management Facility in Ault, CO.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 2/10/2011 Date Site Investigation Completed: 6/21/2011 Remediation Plan Submitted: 5/20/13
Remediation Start Date: NA Anticipated Completion Date: NA Actual Completion Date:

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: [Signature] Title: EHS Professional Date: 5/20/13

OGCC Approved: \_\_\_\_\_ Title: EPS Date: 6/25/2013