

State of Colorado  
Oil and Gas Conservation Commission

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Document Number:  
402443764

Receive Date:  
\_\_\_\_\_

Report taken by:  
\_\_\_\_\_

Site Investigation and Remediation Workplan (Supplemental Form)

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. However, this shall not preclude the Operator from taking immediate action to protect public health or safety, the environment, wildlife, or livestock.

This Form 27 describes site conditions as currently understood by the Operator; approval of this Form 27 by COGCC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27.

This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

Refer to Rules 340, 905, 906, 907, 908, 909, and 910

OPERATOR INFORMATION

Name of Operator: <u>PDC ENERGY INC</u>	Operator No: <u>69175</u>	<b>Phone Numbers</b>
Address: <u>1775 SHERMAN STREET - STE 3000</u>		Phone: <u>(303) 860-5800</u>
City: <u>DENVER</u> State: <u>CO</u> Zip: <u>80203</u>		Mobile: <u>( )</u>
Contact Person: <u>Karen Olson</u>	Email: <u>karen.olson@pdce.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

**PROJECT INFORMATION**  
Remediation Project #: 15469 Initial Form 27 Document #: 402371873

**PURPOSE INFORMATION**

<input type="checkbox"/> 901.e. Sensitive Area Determination	<input type="checkbox"/> 909.c.(5), Rule 910.b.(4): Remediation of impacted ground water
<input type="checkbox"/> 909.c.(1), Rule 905: Pit or PW vessel closure	<input type="checkbox"/> Rule 909.e.(2)A.: Notice completion of remediation in accordance with Rule 909.b.
<input type="checkbox"/> 909.c.(2), Rule 906: Spill/Release Remediation	<input type="checkbox"/> Rule 909.e.(2)B.: Closure of remediation project
<input type="checkbox"/> 909.c.(3), Rule 907.e.: Land treatment of oily waste	<input checked="" type="checkbox"/> Rule 906.c.: Director request
<input type="checkbox"/> 909.c.(4), Rule 908.g.: Centralized E&P Waste Management Facility closure	<input type="checkbox"/> Other _____

**SITE INFORMATION** Y Multiple Facilities ( in accordance with Rule 909.c. )

Facility Type: <u>NONFACILITY</u>	Facility ID: <u>475912</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Morales Water Well</u>	Latitude: <u>40.007119</u>	Longitude: <u>-104.798120</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>NWSE</u>	Sec: <u>32</u>	Twp: <u>1N</u>	Range: <u>66W</u> Meridian: _____ Sensitive Area? <u>Yes</u>

**SITE CONDITIONS**

General soil type - USCS Classifications SM Most Sensitive Adjacent Land Use Cropland

Is domestic water well within 1/4 mile? Yes Is surface water within 1/4 mile? No

Is groundwater less than 20 feet below ground surface? Yes

**Other Potential Receptors within 1/4 mile**

# SITE INVESTIGATION PLAN

## TYPE OF WASTE:

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> E&P Waste       | <input checked="" type="checkbox"/> Other E&P Waste                     | <input type="checkbox"/> Non-E&P Waste |
| <input type="checkbox"/> Produced Water  | <input type="checkbox"/> Workover Fluids                                | _____                                  |
| <input type="checkbox"/> Oil             | <input type="checkbox"/> Tank Bottoms                                   |  |
| <input type="checkbox"/> Condensate      | <input type="checkbox"/> Pigging Waste                                  |  |
| <input type="checkbox"/> Drilling Fluids | <input type="checkbox"/> Rig Wash                                       |  |
| <input type="checkbox"/> Drill Cuttings  | <input type="checkbox"/> Spent Filters                                  |  |
|  | <input type="checkbox"/> Pit Bottoms                                    |  |
|  | <input checked="" type="checkbox"/> Other (as described by EPA) Methane | _____                                  |

## DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	Ongoing investigation	Ongoing investigation

## INITIAL ACTION SUMMARY

Description of initial action or emergency response measures take to abate, investigate, and/or remediate impacts associated with E&P Waste.

In response to a landowner request, as well as demonstration of good stewardship and to support landowner concerns in area where PDC operates, PDC retained a third-party environmental consultant, Olsson Associates, to collect a water sample at the Casias domestic water well (Permit #137465), located in Section 32, Township 1 North, and Range 66 West.

On March 11, 2020, Olsson collected a water sample from the well in accordance with COGCC Baseline Water Quality Sampling Program – Rule 318A.f. The water sample was submitted to Origins Laboratory Inc for analysis of the full COGCC baseline analytical suite.

On March 20, 2020 preliminary analytical results were returned and identify the presence of methane at a concentration of 26 milligrams per liter (mg/l). PDC notified the COGCC of the findings and forwarded the sample for further compositional and isotopic laboratory testing. Results plot on the border between microbial and thermogenic.

On March 24, 2020 the COGCC submitted a request to PDC Energy, Inc. (PDC) and Great Western Operating Company, LLC (G W), the area operators, to initiate an investigation of the occurrence of dissolved methane in a domestic water well (COGCC Complaint: 200448002; DWR Permit 137465 / Receipt 024601). The well was permitted by MaryAnn Morales and is completed / screened in the Laramie Fox Hills aquifer.

The first request of the March 24, 2020 letter from the COGCC is for area operators to submit engineering data for wells it operates within the study area. PDC operates wells on the Phelps and Eberle pads within the study area. Engineering data for these wells is attached.

## PROPOSED SAMPLING PLAN

### Proposed Soil Sampling

Will soil samples be collected as part of this investigation? ( Number, type (grab/composite), analyses, and locations of samples ):

### Proposed Groundwater Sampling

Will groundwater samples be collected as part of this investigation? ( Number, analyses, and locations of samples ):

Per approval of COGCC on April 10, 2020, a phased study area water well sampling approach will be implemented. For Phase I, sixteen (16) area water wells completed / screened within the Laramie Fox Hills aquifer are proposed to be sampled. This is the same aquifer the Casias domestic water well is completed/screened within. Consent request letters to the landowners' have been sent and replies are pending. The water wells are proposed to be sampled in accordance with COGCC Baseline Water Quality Sampling Program – Rule 318A.f. Subsequent sampling phases maybe initiated depending on the results of the prior phase. A listing of the phase I wells is attached.

### Proposed Surface Water Sampling

Will surface water samples be collected as part of this investigation? ( Number, analyses, and locations of samples ):

## Additional Investigative Actions

Additional alternative investigative actions described in attached Site Investigation Plan ( summary ):

# SITE INVESTIGATION REPORT

## SAMPLE SUMMARY

### Soil

Number of soil samples collected 0  
Number of soil samples exceeding 910-1 \_\_\_\_\_  
Was the areal and vertical extent of soil contamination delineated? \_\_\_\_\_  
Approximate areal extent (square feet) \_\_\_\_\_

### NA / ND

\_\_\_\_\_ Highest concentration of TPH (mg/kg) \_\_\_\_\_  
\_\_\_\_\_ Highest concentration of SAR \_\_\_\_\_  
\_\_\_\_\_ BTEX > 910-1 \_\_\_\_\_  
\_\_\_\_\_ Vertical Extent > 910-1 (in feet) \_\_\_\_\_

### Groundwater

Number of groundwater samples collected 12  
Was extent of groundwater contaminated delineated? Yes  
Depth to groundwater (below ground surface, in feet) 374'  
Number of groundwater monitoring wells installed 0  
Number of groundwater samples exceeding 910-1 2

ND \_\_\_\_\_ Highest concentration of Benzene (µg/l) \_\_\_\_\_  
ND \_\_\_\_\_ Highest concentration of Toluene (µg/l) \_\_\_\_\_  
ND \_\_\_\_\_ Highest concentration of Ethylbenzene (µg/l) \_\_\_\_\_  
ND \_\_\_\_\_ Highest concentration of Xylene (µg/l) \_\_\_\_\_  
-- \_\_\_\_\_ Highest concentration of Methane (mg/l) 26

### Surface Water

0 Number of surface water samples collected  
\_\_\_\_\_ Number of surface water samples exceeding 910-1  
If surface water is impacted, other agency notification may be required.

## OTHER INVESTIGATION INFORMATION

Were impacts to adjacent property or offsite impacts identified?

In addition to the well subject to the investigation water well Permit # 137465, a mixture of biogenic and thermogenic methane was detected in one well (Permit No. 268360) at a concentration of 11.6mg/l.

The area water well sampling summary report is attached to this SF27 submittal. Additionally, laboratory supplied electronic data deliverables (EDDs) for the sampling activity have been uploaded per the eform 43 process to the Colorado Oil and Gas Information System (COGIS) under Facility ID number 475912 using Olsson's operator number (200168). The data was uploaded in this manner to eliminate data submittal by PDC and GW as the investigation was conducted under a joint effort, per the requests of the COGCC.

Were background samples collected as part of this site investigation?

Was investigation derived waste (IDW) generated as part of this investigation?

Volume of solid waste (cubic yards) \_\_\_\_\_ Volume of liquid waste (barrels) \_\_\_\_\_

Is further site investigation required?

# REMEDIAL ACTION PLAN

Does this Supplemental Form 27A include changes to a previously approved Remedial Action Plan? No \_\_\_\_\_

## SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

N/A.

## REMEDIATION SUMMARY

Describe how remediation of existing impacts to soil and groundwater is to be accomplished (i.e. summarize remedial action plan). Provide a brief narrative description including: technical justification, schedule for implementation, estimated time to attain NFA status, plus plans and specifications for the selected remedial action technology.

PDC and GW (Operators) will install a methane water treatment system (System) at domestic water well Permit #137465 (Water Well). The System will be designed to treat water that is brought to the surface by the Water Well to reduce levels of methane to a target level of less than 10 mg/l.

The equipment will consist of a vent at the wellhead, a new tank equipped with an enclosed mister, a new carbon filter, and a new pressure tank. With the exception of the vent stack at the wellhead, all treatment equipment will be enclosed within a wooden shed placed directly over the existing exterior cellar. The System will be installed in accordance with professional engineer stamped drawings, using qualified contractors and a licensed electrician. Please refer to the attached Process and Instrumentation Drawing and System Enclosure Layout.

The Operators and their contractors will sample the water entering and exiting the System and perform maintenance on the System for a period of three years after the System is operational and confirmed to be treating water to less than 10 mg/L of methane. Sampling of the water entering and exiting the System will be performed with reasonable frequency to ensure proper start-up of the System, and thereafter on a quarterly schedule. All samples will be collected according to COGCC's Model Sampling and Analysis Plan - Version 2 - April 2020 and will be analyzed for dissolved gases (methane, ethane, and propane) by US Environmental Protection Agency (EPA) Method RSK 175. Operators will provide all water sample results to the Property owners and to the COGCC on a quarterly basis.

## Soil Remediation Summary

In Situ

- \_\_\_\_\_ Bioremediation ( or enhanced bioremediation )
- \_\_\_\_\_ Chemical oxidation
- \_\_\_\_\_ Air sparge / Soil vapor extraction
- \_\_\_\_\_ Natural Attenuation
- \_\_\_\_\_ Other \_\_\_\_\_

Ex Situ

- \_\_\_\_\_ Excavate and offsite disposal
- \_\_\_\_\_ If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_
- \_\_\_\_\_ Name of Licensed Disposal Facility or COGCC Facility ID # \_\_\_\_\_
- \_\_\_\_\_ Excavate and onsite remediation
- \_\_\_\_\_ Land Treatment
- \_\_\_\_\_ Bioremediation (or enhanced bioremediation)
- \_\_\_\_\_ Chemical oxidation
- \_\_\_\_\_ Other \_\_\_\_\_

## Groundwater Remediation Summary

- Bioremediation ( or enhanced bioremediation )
  - Chemical oxidation
  - Air sparge / Soil vapor extraction
  - Natural Attenuation
- Yes    Other    Ex Situ Methane Water Treatment \_\_\_\_\_

## GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

As the area of impact has been delineated, no further area water investigation activities are proposed. Water quality monitoring of the System influent and effluent will be collected to demonstrate the System treating water to less than 10 mg/l of methane.

# REMEDIATION PROGRESS UPDATE

## PERIODIC REPORTING

Frequency:  Quarterly  Semi-Annually  Annually  Other \_\_\_\_\_

Report Type:  Groundwater Monitoring  Land Treatment Progress Report  O&M Report

Other \_\_\_\_\_

## WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation? \_\_\_\_\_

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

Volume of E&P Waste (solid) in cubic yards \_\_\_\_\_

E&P waste (solid) description \_\_\_\_\_

COGCC Disposal Facility ID #, if applicable: \_\_\_\_\_

Non-COGCC Disposal Facility: \_\_\_\_\_

Volume of E&P Waste (liquid) in barrels \_\_\_\_\_

E&P waste (liquid) description \_\_\_\_\_

COGCC Disposal Facility ID #, if applicable: \_\_\_\_\_

Non-COGCC Disposal Facility: \_\_\_\_\_

## REMEDIATION COMPLETION REPORT

### REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No \_\_\_\_\_

Do all soils meet Table 910-1 standards? \_\_\_\_\_

Does the previous reply indicate consideration of background concentrations? \_\_\_\_\_

Are the only residual soil impacts pH, SAR, or EC at depths greater than 3 feet below ground surface? \_\_\_\_\_

Does Groundwater meet Table 910-1 standards? No \_\_\_\_\_

Is additional groundwater monitoring to be conducted? Yes \_\_\_\_\_

## RECLAMATION PLAN

### RECLAMATION PLANNING

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.

If remediation activities are conducted, the location(s) will be reclaimed in accordance with COGCC 1000 series.

Is the described reclamation complete? No \_\_\_\_\_

Does the reclamation described herein constitute interim or final reclamation of the Oil and Gas Location?

Interim?  Final?

Did the Surface Owner approve the seed mix? \_\_\_\_\_

If NO, does the seed mix comply with local soil conservation district recommendations? \_\_\_\_\_

# IMPLEMENTATION SCHEDULE

## **PRIOR DATES**

Date of Surface Owner notification/consultation, if required. \_\_\_\_\_

Actual Spill or Release date, if known. \_\_\_\_\_

## **SITE INVESTIGATION DATES**

Date of Initial Actions described in Site Investigation Plan (start date). 03/24/2020

Date of commencement of Site Investigation. 04/15/2020

Date of completion of Site Investigation. 06/23/2020

## **REMEDIAL ACTION DATES**

Date of commencement of Remediation. 07/10/2020

Date of completion of Remediation. \_\_\_\_\_

## **SITE RECLAMATION DATES**

Date of commencement of Reclamation. \_\_\_\_\_

Date of completion of Reclamation. \_\_\_\_\_

**OPERATOR COMMENT**

Area water well sampling summary report is attached to this SF27 submittal. Additionally, laboratory supplied electronic data deliverables (EDDs) for the sampling program have been uploaded per the eform 43 process to the Colorado Oil and Gas Information System (COGIS) under Facility ID number 475912 using Olsson's operator number (200168). The data was uploaded in this manner to eliminate duplicate data submittal by PDC and GW as the investigation was conducted under a joint effort, per the requests of the COGCC.

Landowner approval to proceed with the installation of an ex situ methane mitigation water treatment system has been received for water well Permit # 137465. The system layout design is attached to this SF27. Operators have initiated discussions with the owner of water well, Permit No. 268360, Receipt No. 3601941 to conduct similar remediation activities.

PDC production gas and bradenhead samples for the wells on the Phelps and Eberle pads have been uploaded per the eform 43 process per the COGCC March 24, 2020 request.

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

Signed: Karen Olson

Title: Snr. Program Manager

Submit Date: \_\_\_\_\_

Email: Karen.olson@pdce.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with COGCC Rules and applicable orders and is hereby approved.

COGCC Approved: \_\_\_\_\_

Date: \_\_\_\_\_

Remediation Project Number: 15469

**COA Type****Description**

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**Attachment Check List**

Upon approval, the approved Form 27 and all listed attachments will be indexed to the Remediation Project file. Only the approved Form 27 will also be indexed to the related Facilities.

**Att Doc Num****Name**

402443796	MONITORING REPORT
402445646	REMEDIAL ACTION PLAN

Total Attach: 2 Files

**General Comments****User Group****Comment****Comment Date**

		Stamp Upon Approval
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Total: 0 comment(s)