

State of Colorado  
Oil and Gas Conservation Commission

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Report taken by:  
Candice (Nikki) Graber

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>COGCCSpillRemediation@pdce.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

**PROJECT INFORMATION**  
Remediation Project #: 13062 Initial Form 27 Document #: 401993810

**PURPOSE INFORMATION**

901.e. Sensitive Area Determination  909.c.(5), Rule 910.b.(4): Remediation of impacted ground water

909.c.(1), Rule 905: Pit or PW vessel closure  Rule 909.e.(2)A.: Notice completion of remediation in accordance with Rule 909.b.

909.c.(2), Rule 906: Spill/Release Remediation  Rule 909.e.(2)B.: Closure of remediation project

909.c.(3), Rule 907.e.: Land treatment of oily waste  Rule 906.c.: Director request

909.c.(4), Rule 908.g.: Centralized E&P Waste Management Facility closure  Other \_\_\_\_\_

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

Facility Type: <u>LOCATION</u>	Facility ID: <u>326979</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>MOSSBERG PMJ-65N66W 30NWSE</u>	Latitude: <u>40.368534</u>	Longitude: <u>-104.819473</u>	
	** correct Lat/Long if needed: Latitude: <u>40.367974</u>	Longitude: <u>-104.818169</u>	
QtrQtr: <u>NWSE</u>	Sec: <u>30</u>	Twp: <u>5N</u>	Range: <u>66W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

**SITE CONDITIONS**

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

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

Is groundwater less than 20 feet below ground surface? Yes

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

# SITE INVESTIGATION PLAN

## TYPE OF WASTE:

- |  |  |  |
|--|--|--|
| <input checked="" type="checkbox"/> E&P Waste      | <input type="checkbox"/> Other E&P Waste             | <input type="checkbox"/> Non-E&P Waste |
| <input checked="" 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 type="checkbox"/> Other (as described by EPA) | _____                                  |

## DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	TBD	sampling
Yes	SOILS	25' x 40'	sampling

## INITIAL ACTION SUMMARY

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

The partially buried produced water vault was removed. Initial pit soil sampling results came back over Table 910-1 limits. A soil and groundwater impact investigation was done, which included removing approximately 400 yards of impacted soil. Groundwater was encountered during excavation at 15' below ground surface, which was also sampled. Those results also came back over Table 910-1 limits. Excavation soil samples confirm all of the impacted soil above the saturated zone has been removed. Approximately 35 bbls of impacted groundwater were removed by a hydrovac truck, followed by the application of 220 lbs of carbon amendment to the exposed excavation bottom. The excavation was then been backfilled.

## 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 ):

Another MW will be installed to the south of BH06. A soil sample will be collected from the bore where PID reading is the highest, above the saturated zone. That sample will be taken to Origins Laboratory in Denver to be analyzed for BTEX, DRO, and GRO.

### Proposed Groundwater Sampling

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

Another MW will be installed to the south of BH06. Once developed, a groundwater sample will be collected from the MW and taken to Origins Laboratory in Denver to be analyzed for BTEX.

### 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 ):

Additional monitoring wells may be installed if groundwater impact extents are not defined after the 11th MW is installed and sampled. Quarterly groundwater monitoring the second quarter of each month until 4 consecutive quarters of table 910-1 compliance has been achieved.

# SITE INVESTIGATION REPORT

## SAMPLE SUMMARY

### Soil

Number of soil samples collected 9  
Number of soil samples exceeding 910-1 0  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 0

### NA / ND

ND Highest concentration of TPH (mg/kg) \_\_\_\_\_  
NA Highest concentration of SAR \_\_\_\_\_  
BTEX > 910-1 Yes  
Vertical Extent > 910-1 (in feet) 0

### Groundwater

Number of groundwater samples collected 20  
Was extent of groundwater contaminated delineated? No  
Depth to groundwater (below ground surface, in feet) 15  
Number of groundwater monitoring wells installed 10  
Number of groundwater samples exceeding 910-1 5

-- Highest concentration of Benzene (µg/l) 870  
ND Highest concentration of Toluene (µg/l) \_\_\_\_\_  
-- Highest concentration of Ethylbenzene (µg/l) 81.4  
-- Highest concentration of Xylene (µg/l) 41.7  
NA Highest concentration of Methane (mg/l) \_\_\_\_\_

### Surface Water

0 Number of surface water samples collected  
0 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?

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) 400      Volume of liquid waste (barrels) 35

Is further site investigation required?

Another MW will be installed to the south of BH06. Once developed, a groundwater sample will be collected from the MW and taken to Origins Laboratory in Denver to be analyzed for BTEX. Additional monitoring wells may be installed if groundwater impact extents are not defined after the 11th MW is installed and sampled. Quarterly groundwater monitoring the second quarter of each month until 4 consecutive quarters of table 910-1 compliance has been achieved.

# 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.

Following the discovery of historic hydrocarbon impacts below the produced water vessel, approximately 400 cubic yards of impacted material were mechanically excavated and transported to the North Weld Waste Management Facility for disposal under SRC Energy waste manifests. Groundwater vacuum recovery activities were conducted concurrent with source mass removal activities and approximately 35 barrels of impacted groundwater were removed and transported to CSI for disposal under SRC Energy manifests. Confirmation soil samples collected from the final excavation extent confirmed that hydrocarbon impacts were successfully removed from within the unsaturated interval during mitigation activities. Following the completion of source mass removal activities, 220 lbs of carbon amendment were spread into the excavation during backfilling activities.

## 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.

In August and September 2019, a groundwater assessment was completed to confirm the absence of dissolved-phase hydrocarbon impacts within and adjacent to the former excavation extent. Ten monitoring wells (BH01 - BH10) were installed via direct-push drilling methods. Based on the initial groundwater analytical results, monitored natural attenuation (MNA) was implemented as the remediation strategy for the third quarter 2019 and will continue as the selected remediation strategy through the second quarter 2020.

## Soil Remediation Summary

In Situ

Ex Situ

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

Yes \_\_\_\_\_ Excavate and offsite disposal

\_\_\_\_\_ Chemical oxidation

\_\_\_\_\_ If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_ 400

\_\_\_\_\_ Air sparge / Soil vapor extraction

\_\_\_\_\_ Name of Licensed Disposal Facility or COGCC Facility ID # \_\_\_\_\_

\_\_\_\_\_ Natural Attenuation

\_\_\_\_\_ Excavate and onsite remediation

\_\_\_\_\_ Other \_\_\_\_\_

\_\_\_\_\_ Land Treatment

\_\_\_\_\_ Bioremediation (or enhanced bioremediation)

\_\_\_\_\_ Chemical oxidation

\_\_\_\_\_ Other \_\_\_\_\_

## Groundwater Remediation Summary

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

No \_\_\_\_\_ Chemical oxidation

\_\_\_\_\_ Air sparge / Soil vapor extraction

Yes \_\_\_\_\_ Natural Attenuation

\_\_\_\_\_ Other \_\_\_\_\_

## 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.

In August and September 2019, ten monitoring wells (BH01 - BH10) were installed to assess groundwater conditions below the historic release and confirm the absence of dissolved-phase hydrocarbon impacts. Fourth quarter 2019 analytical results indicated that benzene concentrations were in exceedance of the applicable COGCC Table 910-1 groundwater standards in the down-gradient monitoring well BH06. Per the COA issued by the COGCC, one additional monitoring well was installed via hand-auger, down-gradient of the existing monitoring well network. Due to large seasonal fluctuations, shallow groundwater was not encountered during the POC monitoring well installation. Based on field conditions encountered during multiple quarters, monitoring wells BH01 through BH10 were replaced on March 25-26, 2020, to accommodate seasonal groundwater fluctuations. In addition, one monitoring well (BH11) was installed down-gradient of monitoring well BH06 to establish POC. These wells will be sampled during the second quarter 2020. Quarterly groundwater monitoring will continue at the 11 site monitoring wells using USEPA Method 8260B until closure criteria is achieved.

# 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? Yes

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

No beneficial use.

Volume of E&P Waste (solid) in cubic yards \_\_\_\_\_ 400

E&P waste (solid) description Hydrocarbon impacted material.

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

Non-COGCC Disposal Facility: North Weld Waste Management Facility

Volume of E&P Waste (liquid) in barrels \_\_\_\_\_ 35

E&P waste (liquid) description Hydrocarbon impacted groundwater

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

Non-COGCC Disposal Facility: CSI Bennett

## 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? \_\_\_\_\_

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

## 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.

Following source mass removal activities, the excavation was backfilled and re-graded to the match pre-existing conditions. The location will be reclaimed in accordance with the COGCC 1000 Series.

Is the described reclamation complete? Yes

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? Yes

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

## 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). 04/02/2019

Date of commencement of Site Investigation. 06/12/2019

Date of completion of Site Investigation. \_\_\_\_\_

### REMEDIAL ACTION DATES

Date of commencement of Remediation. 06/12/2019

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

### SITE RECLAMATION DATES

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

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

### OPERATOR COMMENT

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

Signed: Karen Olson

Title: Senior Program Manager

Submit Date: 03/31/2020

Email: COGCCSpillRemediation@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: Candice (Nikki) Graber

Date: 04/02/2020

Remediation Project Number: 13062

### COA Type

### Description

	Operator shall provide boring logs for the replaced monitoring wells and BH11.
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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.

<u>Att Doc Num</u>	<u>Name</u>
402357697	FORM 27-SUPPLEMENTAL-SUBMITTED
402358186	MONITORING REPORT

Total Attach: 2 Files

### General Comments

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
		Stamp Upon Approval

Total: 0 comment(s)