

State of Colorado  
Oil and Gas Conservation Commission

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401531565  
Receive Date:  
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Report taken by:  
RICK ALLISON

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 INFORMATON

|  |                                    |                              |
|--|------------------------------------|------------------------------|
| 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 #: 10053 Initial Form 27 Document #: 401208325

**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 checked="" 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 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** N Multiple Facilites ( in accordance with Rule 909.c. )

|  |                            |                               |   |
|--|----------------------------|-------------------------------|---|
| Facility Type: <u>SPILL OR RELEASE</u>         | Facility ID: <u>448930</u> | API #: _____                  | County Name: <u>WELD</u>  |
| Facility Name: <u>Nelson 11,21-33</u>          | Latitude: <u>40.363197</u> | Longitude: <u>-104.904219</u> |   |
| ** correct Lat/Long if needed: Latitude: _____ |                            | Longitude: _____              |   |
| QtrQtr: <u>NWNW</u>                            | Sec: <u>33</u>             | Twp: <u>5N</u>                | Range: <u>67W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u> |

**SITE CONDITIONS**

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

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**

Residential buildings are located approximately 697 feet east of tank battery location. Closest surface water is located approximately 965 feet southwest of the tank battery location.

# 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 type="checkbox"/> Produced Water       | <input type="checkbox"/> Workover Fluids             | _____                                  |
| <input checked="" 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    | Not defined.                  | Completion of Site Investigation plan. |
| Yes       | SOILS          | Refer to Figure 2 and Table 1 | Completion of excavation activities.   |

## INITIAL ACTION SUMMARY

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

On January 9, 2017, approximately 12 barrels of oil were released inside secondary containment at the Nelson 11, 21-33 tank battery. Approximately 210 cubic yards of impacts material were removed and transported to the North Weld Landfill in Ault, Colorado for disposal under PDC waste manifests. A Supplemental Form 19 was submitted to the COGCC on January 19, 2017, under Doc# 401188021. The COGCC issued Spill Point ID: 448930 to the project.

## 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 ):

On January 10 and 11, 2017, six (6) confirmation soil samples were collected from the final extent of the excavation area. Based on soil analytical results, the extent of petroleum hydrocarbon impacts in soil was successfully defined and removed during excavation activities. No further soil sampling is required.

### Proposed Groundwater Sampling

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

Five (5) temporary monitoring wells will be installed via direct push drilling methods to delineate the extent of dissolved phase hydrocarbon impacts.

### 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 6  
Number of soil samples exceeding 910-1 0  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 945

### NA / ND

ND Highest concentration of TPH (mg/kg) \_\_\_\_\_  
NA Highest concentration of SAR \_\_\_\_\_  
BTEX > 910-1 No  
Vertical Extent > 910-1 (in feet) 8

### Groundwater

Number of groundwater samples collected 1  
Was extent of groundwater contaminated delineated? No  
Depth to groundwater (below ground surface, in feet) 10'  
Number of groundwater monitoring wells installed 0  
Number of groundwater samples exceeding 910-1 1

-- Highest concentration of Benzene (µg/l) 210  
-- Highest concentration of Toluene (µg/l) 350  
-- Highest concentration of Ethylbenzene (µg/l) 6.2  
-- Highest concentration of Xylene (µg/l) 360  
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) 210      Volume of liquid waste (barrels) 4360

Is further site investigation required?

Temporary monitoring wells will be installed to delineate the extent of petroleum hydrocarbon impacts in groundwater and establish point of compliance in all directions. Proposed well locations are illustrated on Figure 3.

# 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.

On January 9, 2017, an oil release occurred within secondary containment at the Nelson 11, 21-33 tank battery due to a cracked drain valve. The lateral and vertical extent of the excavation was determined in the field using a photoionization detector (PID) to measure volatile organic compound (VOC) concentrations in soil. Approximately 210 cubic yards of impacted material were removed and transported to the North Weld County Landfill in Ault, Colorado for disposal under PDC waste manifests. Six (6) soil samples (SS01 - SS06) were collected from the sidewalls of the final extent of excavation at approximately 8 feet below ground surface (bgs). Samples were submitted to Summit Scientific Laboratories in Golden, Colorado for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA Method 8260B, and TPH - diesel range organics (DRO) by USEPA Method 8015. Analytical results indicated constituent concentrations were below COGCC Table 910-1 soil standards in the samples collected from the final extent of the excavation. Groundwater was encountered during excavation activities at approximately 10 feet bgs. Following the completion of excavation activities, approximately 4,630 barrels of groundwater were removed via vacuum truck and transported to a licensed disposal facility. A groundwater sample (GW01) was subsequently collected and submitted for laboratory analysis of BTEX by USEPA Method 8260B. Analytical results indicated that the benzene concentration was above the COGCC Table 910-1 groundwater standard. The final excavation extent and sample locations are illustrated on Figure 2. Soil and groundwater analytical data are summarized in Table 1 and Table 2, respectively. The laboratory analytical reports are included as Attachment 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.

Monitored natural attenuation (MNA) was initiated as the selected remediation strategy for the site following the initial site investigation at the beginning of the second quarter 2017 and continued until fourth quarter 2017. Based on persisting elevated benzene concentrations, enhance fluid recovery (EFR) and air sparge (AS) activities will be initiated as the selected remediation strategy beginning the first quarter 2018.

## Soil Remediation Summary

In Situ

Ex Situ

|   |       |   |
|---|-------|---|
| _____ Bioremediation ( or enhanced bioremediation ) | Yes   | Excavate and offsite disposal                                   |
| _____ Chemical oxidation                            | _____ | If Yes: Estimated Volume (Cubic Yards) _____ 210                |
| _____ 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 )  
\_\_\_\_\_ Chemical oxidation  
Yes Air sparge / Soil vapor extraction  
No 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.

PDC will continue to sample the ten monitoring wells (BH01 - BH10) on a quarterly basis to assess the dissolved phase petroleum hydrocarbon impacts in groundwater using USEPA Method 8260. Groundwater sampling will continue until four consecutive quarters of groundwater monitoring data indicate that BTEX concentrations are in compliance with the COGCC Table 910-1 groundwater standards.

## 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 210

E&P waste (solid) description E&P contaminated soil

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

Non-COGCC Disposal Facility: North Weld Landfill

Volume of E&P Waste (liquid) in barrels 4630

E&P waste (liquid) description Petroleum hydrocarbon impacted groundwater

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

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

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.

The excavation was backfilled and re-contoured to match pre-existing conditions. The tank battery was reconstructed and is operational.

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. 01/09/2017

## SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 01/10/2017

Date of commencement of Site Investigation. 01/11/2017

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

## REMEDIAL ACTION DATES

Date of commencement of Remediation. 01/10/2017

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 EHS Manager

Submit Date: 02/01/2018

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: RICK ALLISON

Date: 02/06/2018

Remediation Project Number: 10053

## COA Type

## Description

|  |  |
|--|--|
|  |  |
|--|--|

## **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

|           |                                |
|-----------|--------------------------------|
| 401531565 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 401531574 | MONITORING REPORT              |

Total Attach: 2 Files

## **General Comments**

### User Group

### Comment

### Comment Date

|  |  |                     |
|--|--|---------------------|
|  |  | Stamp Upon Approval |
|--|--|---------------------|

Total: 0 comment(s)