FORM 27 Rev 5/22

# State of Colorado
# Oil and Gas Conservation Commission

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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.
Closure request is not available for an Initial Site Investigation and Remediation Workplan.

## OPERATOR INFORMATON

Name of Operator: PDC ENERGY INC Operator No: 69175
Address: 1775 SHERMAN STREET - STE 3000
City: DENVER State: CO Zip: 80203
Contact Person: Karen Olson Email: taspillremediationcontractor@pdce.com

**Phone Numbers**
Phone: (303) 860-5800
Mobile: ( )

## PROJECT, PURPOSE & SITE INFORMATION

### PROJECT INFORMATION

Remediation Project #: 19818 Initial Form 27 Document #: 402795431

### PURPOSE INFORMATION

- [ ] Rule 913.c.(1): Pit or Cuttings Trench closure.
- [X] Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
- [ ] Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
- [ ] Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
- [ ] Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
- [X] Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
- [ ] Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
- [ ] Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
- [X] Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
- [ ] Rule 913.g: Changes of Operator.
- [ ] Rule 915.b: Request to leave elevated inorganics in situ.
- [ ] Other:

### SITE INFORMATION

No Multiple Facilities

Facility Type: LOCATION Facility ID: 311355 API #: County Name: WELD
Facility Name: LOLOFF-65N64W 35NENE Latitude: 40.361326 Longitude: -104.514483
** correct Lat/Long if needed: Latitude: 40.362858 Longitude: -104.507697
QtrQtr: NENE Sec: 35 Twp: 5N Range: 64W Meridian: 6 Sensitive Area? Yes

### SITE CONDITIONS

General soil type - USCS Classifications: SM
Most Sensitive Adjacent Land Use: Wetlands / Agriculture
Is domestic water well within 1/4 mile? Yes
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**

Nearest Well: Irrigation - 952 feet NW, Surface Water: Freshwater Pond - 275 feet SE, Livestock: 0 feet (appears to be located within pastureland), FWS Wetlands: Freshwater Emergent Wetland (PEM1C) - 125 feet SW

# SITE INVESTIGATION PLAN

## TYPE OF WASTE:

- [X] **E&P Waste**
  - [X] Produced Water
  - [X] Oil
  - [X] Condensate
  - [ ] Drilling Fluids
  - [ ] Drill Cuttings
- [ ] **Other E&P Waste**
  - [ ] Workover Fluids
  - [ ] Tank Bottoms
  - [ ] Pigging Waste
  - [ ] Rig Wash
  - [ ] Spent Filters
  - [ ] Pit Bottoms
  - [ ] Other (as described by EPA) _____
- [ ] **Non-E&P Waste** _____

## DESCRIPTION OF IMPACT

| Impacted? | Impacted Media | Extent of Impact | How Determined |
|---|---|---|---|
| Yes | GROUNDWATER | Refer to Table 5 & Figures 1 & 2 | Confirmation Groundwater Sampling |
| Yes | SOILS | Refer to Tables 1-4 & Figures 1 & 2 | Confirmation Soil 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.

On October 15, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the Loloff 35-5 Tank Battery (Figure 1). Based on initial results, it was determined that a historic release was discovered below the former separator. During excavation activities, groundwater was encountered at approximately 3 feet below ground surface (bgs). Approximately 980 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management Facility for disposal under PDC manifests. Additionally, groundwater vacuum recovery was conducted concurrent with excavation activities and approximately 220 barrels (bbls) of groundwater were removed from the excavation and transported to NGL C6 for disposal under PDC waste manifests.

## PROPOSED SAMPLING PLAN

### Proposed Soil Sampling

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

On October 14, 2021, one soil sample (SS01) was collected from the source area at approximately 3 feet bgs and submitted to Summit Scientific Laboratories for analysis of the full COGCC Table 915-1 analyte list. Preliminary analytical results indicate that the COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene (N), TPH, anthracene, chrysene, fluorene, and 1-methylnaphtalene. Between October 15 and December 3, 2021, sixty-one (61) soil samples (SS02-SS62) were collected from the sidewalls and base of the excavation at depths ranging from 2.5 to 5 feet bgs and were submitted for laboratory analysis of the above referenced COCs. Additionally, soil sample SS51 was submitted for additional analysis of pH, EC, SAR, & boron. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs in the samples collected from the final excavation extent. Soil sample SS51 exceeded the applicable regulatory standard for SAR.

### Proposed Groundwater Sampling

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

On October 15, 2021, one groundwater sample (GW01) was collected from the tank battery excavation and was submitted for laboratory analysis of BTEX, N, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that organic compound concentrations were in exceedance of the COGCC Table 915-1 standards in sample GW01. The groundwater sample location is illustrated on Figure 1 and the analytical results are summarized on Table 5.

### 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 ):

During initial closure activities conducted on October 14, 2021, soil encountered on site and below production equipment was visually inspected and field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Per the approved proposed soil sampling plan, samples were collected below and/or adjacent to the above ground storage tank (AST). Field screening locations are illustrated on Figure 1.

# SITE INVESTIGATION REPORT

## SAMPLE SUMMARY

**Soil**

Number of soil samples collected: 65

Number of soil samples exceeeding 915-1: 6

Was the areal and vertical extent of soil contamination delineated? No

Approximate areal extent (square feet): 2100

**NA / ND**

-- Highest concentration of TPH (mg/kg): 1062

-- Highest concentration of SAR: 13.5

BTEX > 915-1: Yes

Vertical Extent > 915-1 (in feet): 5

**Groundwater**

Number of groundwater samples collected: 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet): 3

Number of groundwater monitoring wells installed: 0

Number of groundwater samples exceeding 915-1: 1

-- Highest concentration of Benzene (µg/l): 220

ND Highest concentration of Toluene (µg/l):

-- Highest concentration of Ethylbenzene (µg/l): 10

ND Highest concentration of Xylene (µg/l):

NA Highest concentration of Methane (mg/l):

**Surface Water**

0 Number of surface water samples collected

Number of surface water samples exceeding 915-1

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?

On October 26, 2021, three background soil samples (BKG01) were collected at approximately 2.5 feet, 4 feet, and 6 feet bgs, respectively, from native material topographically up-gradient of the tank battery and submitted for analysis of COGCC Table 915-1 metals. Analytical results indicated that arsenic and selenium were in exceedance of the applicable regulatory standards in native soil.

On April 14, 2022 and November 2, 2022, five background soil borings (BKG02 – BKG06) were advanced in native soil to a depth of approximately five feet bgs. Fifteen background samples were collected from depths ranging from 2.5 to 5 feet bgs and were submitted to Summit for laboratory analysis of pH, EC, and SAR. Background soil analytical results indicated that pH, EC, and SAR concentrations were in exceedance of the applicable regulatory standards in native soil on location.

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

Volume of solid waste (cubic yards): 980

Volume of liquid waste (barrels): 220

☒ Is further site investigation required?

On April 14, and April 15, 2022, seventeen (17) monitoring wells (BH01 – BH17) were installed to confirm the absence of dissolved-phase hydrocarbon impacts within and adjacent to the former excavation extent. Lithologic descriptions and volatile organic compound (VOC) concentrations measured using a photoionization detector (PID) were recorded for each monitoring well. One soil sample was collected from each soil boring at approximately 2.5 feet bgs to assess soil suitability parameters for reclamation. Seventeen soil samples were submitted to Summit Scientific Laboratory (Summit) for analysis of pH, electrical conductivity (EC), sodium adsorption ratio (SAR), and boron. Additional soil samples were collected from each soil boring at the observed water table interface and at intervals that exhibited elevated VOC concentrations at depths ranging from 3.5 feet to 5 feet bgs. Eighteen soil samples were submitted to Summit for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH)[C6-C36], 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, anthracene, chrysene, fluorene, 1-methylnaphthalene (M), and SAR.

Soil analytical results indicated that organic compound concentrations were in compliance with the applicable COGCC Table 915-1 regulatory standards in all sample locations. Additionally, SAR, and boron were in compliance with the applicable regulatory standards in all sample locations. pH and EC concentrations were in exceedance of the applicable regulatory standards and greater than the background concentration in soil borings BH08, BH10, BH11, BH13, and BH15 – BH17.

# 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.

Between October 15 and December 3, 2021, approximately 980 cubic yards of impacted material were excavated adjacent to the separator and transported to the North Weld Waste Management Facility for disposal under PDC waste manifests.

Groundwater vacuum recovery activities were conducted concurrent with excavation activities. Approximately 220 barrels of groundwater were recovered and transported to the NGL C6 facility for disposal under PDC waste manifests.

## 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.

Based on the analytical results received from the initial groundwater monitoring event, monitored natural attenuation (MNA) was the selected remediation strategy for the second quarter 2022 and will remain the selected remediation strategy through the first quarter 2023.

### Soil Remediation Summary

☐ **In Situ**

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

☒ **Ex Situ**

- Yes Excavate and offsite disposal
  - If Yes: Estimated Volume (Cubic Yards) 980
  - 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
- 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.

Based on the analytical data collected during source mass removal activities, PDC will conduct quarterly groundwater monitoring at the seventeen site monitoring wells (BH01 - BH17) until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5 -TMB by EPA Method 8260B, chloride and sulfate anions by EPA Method 300.0 and total dissolved solids (TDS) by Method SM 2540C in accordance with Table 915-1.

Fourth quarter 2022 groundwater analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all 17 monitoring well locations.

# REMEDIATION PROGRESS UPDATE

## PERIODIC REPORTING

**Approved Reporting Schedule:**

[X] Quarterly [ ] Semi-Annually [ ] Annually [X] Other Supplemental Site Investigation Summary

[ ] **Request Alternative Reporting Schedule:**

[ ] Semi-Annually [ ] Annually [ ] Other

Rule 913.e:
After initial approval of a Form 27, the Operator will provide quarterly update reports in a Supplemental Form 27 to document progress of site investigation and remediation, unless an alternative reporting schedule has been requested by the Operator and approved by the Director. The Director may request a more frequent reporting schedule based on site-specific conditions.

**Report Type:** [X] Groundwater Monitoring [ ] Land Treatment Progress Report [ ] O&M Report

[X] Other Supplemental Site Investigation Summary

## Adequacy of Operator's General Liability Insurance and Financial Assurance

Describe the adequacy of the Operator's general liability insurance and Financial Assurance to fully address the anticipated costs of Remediation, including the estimated remaining cost for this project (below).
If this information has been provided on a Form 27 within the last 12 months, provide the Document Number of that form.

Financial assurance information was included on the second quarter 2022 Supplemental Form 27 (Document No. 403139315). This section and estimate will be updated on an annual basis until closure criteria are achieved.

Operator anticipates the remaining cost for this project to be: $ 25000

## 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 980

E&P waste (solid) description Hydrocarbon impacted soil

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: North Weld Waste Management

Volume of E&P Waste (liquid) in barrels 220

E&P waste (liquid) description Hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: NGL C6

# REMEDIATION COMPLETION REPORT

## REMEDIATION COMPLETION SUMMARY

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

If YES:

[ ] Compliant with Rule 913.h.(1).

[ ] Compliant with Rule 913.h.(2).

[ ] Compliant with Rule 913.h.(3).

Do all soils meet Table 915-1 standards?

Does the previous reply indicate consideration of background concentrations?

Does Groundwater meet Table 915-1 standards?

Is additional groundwater monitoring to be conducted?

Operator shall comply with the COGCC 1000-Series Reclamation Requirements for all impacted and disturbed areas.

# 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 tank battery decommissioning activities, the location was backfilled, compacted, and re-contoured to 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?

[X] Interim [ ] Final

Did the Surface Owner provide the seed mix?

If YES, does the seed mix comply with local soil conservation district recommendations?

Did the local soil conservation district provide the seed mix?

## SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. 10/14/2021

Proposed date of completion of Reclamation. 03/01/2027

# IMPLEMENTATION SCHEDULE

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

## PRIOR DATES

Date of Surface Owner notification/consultation, if required. 06/24/2021

Actual Spill or Release date, or date of discovery. 10/15/2021

## SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 09/20/2021

Proposed site investigation commencement. 09/20/2021

Proposed completion of site investigation. 11/02/2022

## REMEDIAL ACTION DATES

Proposed start date of Remediation. 10/15/2021

Proposed date of completion of Remediation. 03/01/2027

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

[ ] Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

## OPERATOR COMMENT

This Supplemental Form 27 was submitted to summarize quarterly groundwater monitoring and analytical results collected during the fourth quarter 2022 at the former Loloff 35-5 tank battery location.

Soil analytical results received for samples collected during supplemental site investigation activities on November 2, 2022, indicated that pH, EC, and SAR were in exceedance of the applicable COGCC Table 915-1 regulatory standards in native soil on site. Additionally, during monitoring well installation activities on April 14 and 15, 2022, elevated pH remains above background levels recorded in point of compliance (POC) well BH08 and elevated EC remains above background levels recorded in POC wells BH11, BH13, and BH15 - BH17.

Based on the location of the POC wells, the elevated pH and EC recorded in native soil on site, and the absence of pH and EC exceedances in the source waste characterization sample (SS01), elevated pH and EC recorded during monitoring well installation activities are indicative of native soil conditions and PDC is requesting to remove pH and EC as contaminates of concern for this remediation project.

Additionally, the SAR concentration recorded in soil sample SS51 from the final excavation extent was below SAR concentrations recorded in background soil boring BKG04 and indicative of native soil conditions.

Fourth quarter 2022 groundwater analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all 17 monitoring well locations for the third consecutive quarter.

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: 12/01/2022  Email: taspillremediationcontractor@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: 12/12/2022

Remediation Project Number: 19818

| COA Type | Description |
|---|---|
| | |
| 0 COA | |

## 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 |
|---|---|
| 403210144 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 403233371 | MONITORING REPORT |

Total Attach: 2 Files

## General Comments

| User Group | Comment | Comment Date |
|---|---|---|
| | | Stamp Upon Approval |

Total: 0 comment(s)