FORM 27 Rev 5/22

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109

Document Number: 403344300
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.
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 #: 19816 Initial Form 27 Document #: 402795437

PURPOSE INFORMATION

- [ ] Rule 913.c.(1): Pit or Cuttings Trench closure.
- [ ] 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: WELL Facility ID: API #: 123-13757 County Name: WELD
Facility Name: LOLOFF 35-5 Latitude: 40.361111 Longitude: -104.509722
** correct Lat/Long if needed: Latitude: 40.361149 Longitude: -104.509716
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 - 1,365 feet N, Surface Water: Freshwater Pond - 250 feet E, Livestock: 0 feet (appears to be located within pastureland), FWS Wetlands: located within Freshwater Emergent Wetland (PEM1C) - 0 feet

Flowline conflict possible as wellhead and flowline are located within designated wetlands and appears to be located within pastureland

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 14, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the former Loloff 35-5 Wellhead (Figure 1) and associated flowline (Figure 2). During decommissioning activities, historic hydrocarbon impacts were discovered at the wellhead. Following this discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. During excavation activities, groundwater was encountered in the excavation at approximately 3 feet below ground surface (bgs). Approximately 30 cubic yards (cy) of impacted material were excavated and transported to the North Weld Waste Management Facility for disposal under PDC waste manifests. Additionally, approximately 8 barrels (bbls) of impacted groundwater were removed from the excavation and transported to the NGL C6 facility 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 adjacent to the cut and capped wellhead from the impacted source material at approximately 3 feet bgs and submitted for laboratory analysis of the full COGCC Table 915-1 analytical suite. Analytical results indicated contaminants of concern (COC) include BTEX, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, naphthalene, TPH, pH, SAR, arsenic and lead. Additionally on October 14, 2021, nine soil samples (SS02-SS10) were collected from the base and sidewalls of the excavation at depths ranging between 2.5 feet and 5 feet bgs. The samples were submitted for laboratory analysis of the above referenced COCs. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs in all samples collected from the final excavation extent.

Proposed Groundwater Sampling

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

On October 14, 2021, one groundwater sample (GW01) was collected from beneath the flowline where groundwater was encountered at a significant direction change. A second groundwater sample (GW02) was collected from the excavation. The groundwater samples were submitted for laboratory analysis of BTEX, N, 1,2,4-TMB and 1,2,5-TMB. Analytical results indicated that all analyzed constituents were below the applicable COGCC Table 915-1 Standards.

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 soil sampling plan, three field screened soil samples were collected adjacent to/below the flowline at 3' bgs. One flowline sample (FL01-01) was collected from beneath a significant direction change in the flowline and was submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, and TPH. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected: 20
Number of soil samples exceeeding 915-1: 20
Was the areal and vertical extent of soil contamination delineated? No
Approximate areal extent (square feet): 328

NA / ND

-- Highest concentration of TPH (mg/kg): 4180
-- Highest concentration of SAR: 9.1
BTEX > 915-1: Yes
Vertical Extent > 915-1 (in feet): 5

Groundwater

Number of groundwater samples collected: 2
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet): 3
Number of groundwater monitoring wells installed: 0
Number of groundwater samples exceeding 915-1: 0

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):
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?

[X] Were background samples collected as part of this site investigation?

On October 15, 2021, three background soil samples (BKG01) were collected at approximately 2.5 feet, 4 feet, and 5 feet bgs, respectively, from native material topographically up-gradient of the wellhead and were submitted for analysis of pH, sodium adsorption ratio (SAR), and the COGCC Table 915-1 metals. Additionally on November 30, 2022, six background soil samples (BKG02 and BKG03) were collected from approximately 2.5 feet, 4 feet, and 5 feet bgs, respectively, from native material topographically up-gradient of the wellhead and were submitted for analysis of pH, SAR, arsenic, and barium.

On November 2, 2022, two background soil borings (BKG04 and BKG05) were advanced in native material to the northwest of the former wellhead. Ten soil samples were collected from the borings at depths ranging from approximately 2.5 feet to 8 feet bgs and were submitted for laboratory analysis of pH, SAR, arsenic, and lead.

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

Volume of solid waste (cubic yards): 30
Volume of liquid waste (barrels): 8

[X] Is further site investigation required?

On March 23, 2022, four monitoring wells were installed via direct-push drilling methods to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent as well as define the vertical and horizontal extent of Table 915-1 metal and soil suitability constituents identified in soil samples collected from the final excavation extent. Due to reclamation activities and land access requirements, monitoring well BH01 was installed on June 9, 2022. Two soil samples were collected from boreholes BH02 – BH05 at depths of 2.5 ft and 4 ft bgs and were submitted to Summit for analysis of pH, SAR, arsenic, & lead. One soil sample was collected from the terminus of borehole BH01 at approximately 11 ft bgs and was submitted to Summit for analysis of pH. Soil analytical results indicated that inorganic concentrations were in compliance with the applicable COGCC regulatory standards or within 1.25x background concentrations in all nine soil sample locations, aside from the arsenic concentration in BH05 @ 2.5'.

On November 2, 2022, four soil borings (SB01-SB04) were advanced to a depth of approximately 8 ft bgs using a Soggy Bottom Sampler System (SBS) to delineate inorganic constituents in soil samples collected during October 2021 source mass removal activities. Eight confirmation soil samples were collected from soil borings SB01–SB04 at depths of approximately 6 ft & 8 ft bgs. Soil samples collected from SB01 were submitted for laboratory analysis of SAR, soil samples collected from borings SB02 and SB04 were submitted for analysis of pH, and samples collected from boring SB03 were submitted for analysis of pH, SAR, & arsenic.

Soil analytical results indicated that SAR, arsenic, and pH concentrations were in compliance with the applicable regulatory standards or indicative of background native material in all sample locations.

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 October 14, 2021, approximately 30 CY of impacted solids were removed from the excavation and transported to North Weld Waste Management Facility in Ault, Colorado for disposal under PDC waste manifests. Additionally, groundwater vacuum recovery was conducted concurrent with excavation activities and approximately 8 barrels of groundwater were removed from the excavation 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.

Monitored natural attenuation was the selected strategy for this location for the second quarter 2022 and will remain the selected remediation strategy for the second 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) 30
  - 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.

PDC will conduct quarterly groundwater monitoring at the five site monitoring wells (BH01-BH05) 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. Due to the delay in the installation of monitoring well BH01, it was not sampled during the second quarter 2022.

First quarter groundwater monitoring was conducted in two events due to frozen water columns in BH01 & BH02. Analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all monitoring well locations. Sulfate anion concentration trends were examined over time and compared to historic background data. All wells were below 1.25x the historic maximum background concentration recorded in monitoring well BH02 during the second quarter 2022. Furthermore, the sulfate anion exceedances recorded in monitoring well BH04 during the second quarter 2022 and BH01 during the first quarter 2023 are within 1.25x the background concentration recorded in monitoring well BH02 during the second quarter 2022. The graph illustrating this data is included as Attachment A.

During the first quarter 2023, organic compounds, TDS, & chloride anions were in compliance with the applicable regulatory standards for the third consecutive quarter. Additionally, sulfate anion concentrations were within 1.25x the historic background concentrations of the up- and cross gradient monitoring wells (BH04 & BH05) for three consecutive quarters. Sample locations and analytical results are illustrated on Figures 1 & 2. Groundwater elevation data is illustrated on Figure 3. Groundwater analytical results are summarized in Tables 1 & 2. The laboratory analytical report is included in Attachment B.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

[X] Quarterly [ ] Semi-Annually [ ] Annually [ ] Other

[ ] **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

[ ] Other

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. 403107000). 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: $ 20000

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 30

E&P waste (solid) description Hydrocarbon impacted soils

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: North Weld Waste Management

Volume of E&P Waste (liquid) in barrels 8

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 wellhead and flowline abandonment 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. 01/24/2027

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. 10/14/2021

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. 09/20/2021

Proposed date of completion of Remediation. 01/24/2027

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 has been submitted to summarize quarterly groundwater monitoring activities and analytical results collected during the first quarter 2023 at the former Loloff 35-5 wellhead location.

First quarter 2023 analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all monitoring well locations. In addition, sulfate anion concentration trends were examined over time and compared to historic background data. Based on the results, all wells were below 1.25x the historic maximum background concentration recorded in monitoring well BH02 during the second quarter 2022. Furthermore, the sulfate anion exceedances recorded in monitoring well BH04 during the second quarter 2022 and BH01 during the first quarter 2023 were within 1.25x the background concentration recorded in monitoring well BH02 during the second quarter 2022. The graph illustrating this data is included as Attachment A.

During the first quarter 2023, organic compounds, TDS, and chloride anions were in compliance with the applicable COGCC Table 915-1 regulatory standards for the third consecutive quarter. Additionally, sulfate anion concentrations were within 1.25x the historic background concentrations of the up- and cross gradient monitoring wells (BH04 and BH05) for three consecutive quarters.

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: 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: Date:

Remediation Project Number: 19816

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
403357335	MONITORING REPORT

Total Attach: 1 Files

General Comments

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)