

State of Colorado Oil and Gas Conservation Commission

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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 INFORMATION

Name of Operator: <u>PDC ENERGY INC</u>	Operator No: <u>69175</u>	Phone Numbers
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>
Contact Person: <u>Karen Olson</u>	Email: <u>COGCCSpillRemediation@pdce.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 19634 Initial Form 27 Document #: 402756652

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.
- ☒ 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.
- ☒ 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

☐ Yes ☐ Multiple Facilities

Facility Type: <u>WELL</u>	Facility ID: _____	API #: <u>123-14039</u>	County Name: <u>WELD</u>
Facility Name: <u>VONFELDT 13-12</u>		Latitude: <u>40.495307</u>	Longitude: <u>-104.618470</u>
		** correct Lat/Long if needed: Latitude: _____	Longitude: _____
QtrQtr: <u>SWSW</u>	Sec: <u>12</u>	Twp: <u>6N</u>	Range: <u>65W</u>
		Meridian: <u>6</u>	Sensitive Area? <u>Yes</u>
Facility Type: <u>LOCATION</u>	Facility ID: <u>327034</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>VONFELDT-66N65W 12SWSW</u>		Latitude: <u>40.495244</u>	Longitude: <u>-104.618768</u>
		** correct Lat/Long if needed: Latitude: <u>40.495086</u>	Longitude: <u>-104.618131</u>
QtrQtr: <u>SWSW</u>	Sec: <u>12</u>	Twp: <u>6N</u>	Range: <u>65W</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? 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

Tank Battery: Nearest Well: Domestic - 1,565 feet NW, Surface Water: Unnamed Freshwater Pond - 45 feet SW / Willow Creek #2 - 54 feet SE, Occupied Buildings: 161 feet SSW / 707 feet SW, Livestock: 854 feet SW, FWS Wetlands: Freshwater Pond (PUBFx) - 45 feet SW / Riverine (R4SBCx) - 54 feet SE

Wellhead: Nearest Well: Domestic - 1,430 feet NW, Surface Water: Unnamed Freshwater Pond - 92 feet S, Occupied Buildings: 162 feet SSW / 706 feet SW, Livestock: 808 feet SW, FWS Wetlands: Freshwater Pond (PUBFx) - 92 feet SW

Flowline conflict possible as both wellhead and flowline are located <100 feet from surface water and FWS wetlands

Flowline conflict possible as tank battery is located <100 feet from surface water and FWS wetlands

SITE INVESTIGATION PLAN

TYPE OF WASTE:

☒ E&P Waste ☐ Other E&P Waste ☐ Non-E&P Waste

☒ Produced Water

☐ Workover Fluids

☒ Oil

☐ Tank Bottoms

☒ Condensate

☐ Pigging Waste

☐ Drilling Fluids

☐ Rig Wash

☐ Drill Cuttings

☐ Spent Filters

☐ Pit Bottoms

☐ Other (as described by EPA)

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
No	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 September 2, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the former Von Feldt 13-12 wellhead, associated flowline, and tank battery. 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 6 feet below ground surface (bgs). Approximately 8 cubic yards (cy) of impacted material were excavated and transported to the North Weld Waste Management Facility for disposal under PDC waste manifests.

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 September 2, 2021, two soil samples (WH01 & WH01-N) were collected from the impacted source material at approximately 6 feet and 5 feet bgs, respectively, and were submitted for laboratory analysis of the full COGCC Table 915-1 analytical suite. Analytical results indicated that contaminants of concern (COC) include: benzene, toluene, ethylbenzene, xylene(s) (BTEX), 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, naphthalene (N), total petroleum hydrocarbons (TPH), arsenic, barium, lead, and selenium. Additionally on September 2, 2021, three (3) soil samples (WH01-[direction]) were collected from the remaining three sidewalls of the excavation at approximately 5 feet bgs and were submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, N, and TPH. In addition, one soil sample (FLR01) was collected at approximately 2.5' bgs adjacent to the flowline riser and submitted for laboratory analysis of Table 915-1 organic constituents, ph, EC, SAR, and boron.

Proposed Groundwater Sampling

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

On September 2, 2021, one groundwater sample (GW01) was collected from the wellhead excavation and 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 195-1 Standards. The groundwater sample location is illustrated on Figure 2 and the analytical results are summarized on Wellhead Table 5.

During tank battery decommission activities, groundwater was encountered below the separator and produced water vessel at approx. 3 ft. to 4 ft bgs. Consequently, groundwater samples (GW01 - GW03) were collected below the separator flowline, separator dump line, and produced water vessel, respectively. All three 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 195-1 Standards. The groundwater sample location is illustrated on tank battery Figure 1.

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 September 2, 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 adjacent to the cut and capped wellhead, between ground surface and 6 inches in the four cardinal directions surrounding the wellhead, below and/or adjacent to the separator flowline and dump line (SEP01-FL, SEP01-DL), the base and sidewalls of the produced water vessel (PWV01-B, PWV01-[direction]), and below the AST (AST01). The samples were submitted for laboratory analysis of BTEX, naphthalene, 1, 2, 4- TMB, 1, 3, 5-TMB, and TPH (C6-C36). In addition, the samples collected adjacent to the produced water vessel were submitted for laboratory analysis of pH, EC, SAR, and boron.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 11

Number of soil samples exceeding 915-1 6

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

Approximate areal extent (square feet) 280

NA / ND

ND Highest concentration of TPH (mg/kg)

-- Highest concentration of SAR 0.221

BTEX > 915-1 No

Vertical Extent > 915-1 (in feet) 6

Groundwater

Number of groundwater samples collected 4

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)

-- Highest concentration of Xylene (µg/l) 29

NA Highest concentration of Methane (mg/l)

Surface Water

0 Number of surface water samples collected

0 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 September 2, 2021, two background soil sample (BKG01) were collected at approximately 5 feet and 6 feet bgs and submitted for analysis of pH, EC, SAR and the Table 915-1 Metals Suite. Analytical results indicate pH, arsenic, and selenium were in exceedance of the applicable regulatory standards.

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

Volume of solid waste (cubic yards) 8

Volume of liquid waste (barrels) 0

☒ Is further site investigation required?

On January 21, 2022, five (5) groundwater monitoring wells (BH01-BH05) were installed via direct-push drilling methods to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole. Observed VOC concentrations were below 0.3 parts per million (ppm).

Additionally, on January 21, 2022, two background soil borings (BKG02-BKG03) were advanced to a depth of approximately 7 feet bgs to assess metal concentrations in native soil on site. Ten (10) soil samples were collected from depths ranging from 3 feet to 7 feet bgs and were submitted for laboratory analysis of the COGCC Table 915-1 Metals Suite. Analytical results indicated that arsenic, barium, and selenium concentrations were above the applicable regulatory standards in both background soil boring locations. In addition, arsenic, barium, lead, and selenium exceedances observed in samples collected from the final excavation extent were below 1.25x the background concentrations and indicative of native soil conditions. Soil boring and monitoring well locations are illustrated on Figure 1. Background soil analytical results and field summary data are summarized in Tables 1 and 2. The laboratory analytical report is included in Attachment A. The soil boring and well completion logs are included as Attachment B.

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 September 2, 2021, approximately 8 CY of impacted material were removed from the excavation and transported to the North Weld Waste Management Facility in Ault, Colorado 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 analytical results and field data observed during source mass removal and monitoring well installation activities, monitored natural attenuation (MNA) was the selected remediation strategy for the first quarter 2022 and will remain the selected remediation strategy through the second quarter 2022.

Soil Remediation Summary

☐ In Situ

☒ Ex Situ

Bioremediation (or enhanced bioremediation)

Yes Excavate and offsite disposal

Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) 8

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

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 five site monitoring wells (BH01-BH05) until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (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. First quarter 2022 groundwater analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 regulatory standards in all monitoring well locations. In addition, the sulfate anion concentration was above the applicable regulatory standard in monitoring well BH02. Inorganic parameters were in compliance with applicable regulatory standards in the remaining four monitoring well locations.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☒ Quarterly ☐ Semi-Annually ☐ Annually ☒ 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: ☒ Groundwater Monitoring ☐ Land Treatment Progress Report ☐ O&M Report

☒ Other Supplemental Site Investigation Summary

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 8

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 0

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

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 facility decommissioning and excavation 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?

☒ 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. 10/05/2021

Proposed date of completion of Reclamation. 11/30/2026

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. 06/25/2021

Actual Spill or Release date, or date of discovery. 09/02/2021

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 08/16/2021

Proposed site investigation commencement. 08/16/2021

Proposed completion of site investigation. 03/31/2022

REMEDIAL ACTION DATES

Proposed start date of Remediation. 09/02/2021

Proposed date of completion of Remediation. 11/30/2026

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 activities and analytical results collected during the first quarter 2022 at the former Von Feldt 13-12 wellhead location.

Analytical results collected during the supplemental background investigation conducted on January 21, 2022, indicated that arsenic, barium, and selenium concentrations were in exceedance of the Table 915-1 Protection of Groundwater SSLs in native soils. Based on the results, arsenic, barium, lead, and selenium exceedances observed in soil samples collected from the final excavation extent are within 1.25x the background concentrations and indicative of native soil conditions, as referenced in footnote 11 of the Table 915-1.

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: 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:

Date:

Remediation Project Number: 19634

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**

402976195	MONITORING REPORT
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Total Attach: 1 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)