

State of Colorado Oil and Gas Conservation Commission

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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 #: 16917 Initial Form 27 Document #: 402607738

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

No Multiple Facilities

Facility Type: <u>WELL</u>	Facility ID: _____	API #: <u>123-20261</u>	County Name: <u>WELD</u>
Facility Name: <u>KRISTIN 1</u>		Latitude: <u>40.302610</u>	Longitude: <u>-104.831500</u>
		** correct Lat/Long if needed: Latitude: _____	Longitude: _____
QtrQtr: <u>NENE</u>	Sec: <u>24</u>	Twp: <u>4N</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 Cropland

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

Surface Water: South Platte River - 1144 feet SE, FWS Wetlands: Forested/Shrub Riparian - 482 feet E, HP Habitat: Location falls within the following HPHs - Mule Deer Sever Winter Range, Mule Deer Migration Corridor, Bald Eagle Active Nest Site (1/4 mile buffer) / Aquatic Native Species Conservation - 760 feet SE

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
Yes	GROUNDWATER	Refer to Figure 1 and Table 1	Monitoring Well Installations and Groundwater Sampling
Yes	SOILS	Refer to Tables 1-6 and Figures 1-4	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 May 7 and 12, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the Kristin 1 Wellhead (Figure 1). During decommissioning activities, a reportable release was discovered. Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. During excavation activities, groundwater was observed in the excavation at approximately 3.5 feet below ground surface (bgs). Approximately 44 cubic yards (CY) of impacted material were removed 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 May 12, 2021, one soil sample (WH01) 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 site specific containments of concern (COCs) include BTEX, naphthalene, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, TPH (C6-C36), anthracene, chrysene, fluoranthene, fluorene, and pyrene. Between May 12 and 17, 11 soil samples (WH01, SS01 – SS09, and SS11) were collected from the sidewalls and base of the excavation at depths ranging from 3 feet to 5.5. feet bgs and were submitted for laboratory analysis of the above referenced organic COCs. The final excavation extent and sample locations are illustrated on Figure 3. Initial analytical results are summarized in Tables 1 through 4. The laboratory reports are included in Attachment A.

Proposed Groundwater Sampling

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

On May 12, 2021, one groundwater sample (GW01) was collected from the excavation prior to source mass removal activities and submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that organic compound concentrations were in exceedance of the applicable COGCC Table 915-1 groundwater standards. The groundwater sample location is illustrated on Figure 3 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 May 7, 2021, soil encountered adjacent to and surrounding the wellhead and below the flowline riser was visually inspected and field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). In addition, a field screening samples was collected, and inspection conducted below the separator end of the flowline. Per the approved proposed soil sampling plan, two soil samples (FLR01 and WH01) were collected at approximately 2.5 feet and 3 feet below ground surface (bgs) from undisturbed areas most likely to be impacted by oil and gas operations located adjacent to and below production infrastructure. Due to the discovery of the historic release, the samples collected on May 7, 2021, were not submitted for laboratory analysis. GPS coordinates and field screened VOC concentrations are summarized in Table 6. Sample locations at the wellhead and along the flowline are illustrated on Figures 1 and 2.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 11

Number of soil samples exceeding 915-1 2

Was the areal and vertical extent of soil contamination delineated? Yes

Approximate areal extent (square feet) 575

NA / ND

-- Highest concentration of TPH (mg/kg) 7

-- Highest concentration of SAR 4.66

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) 280

-- Highest concentration of Toluene (µg/l) 83

-- Highest concentration of Ethylbenzene (µg/l) 110

-- Highest concentration of Xylene (µg/l) 1900

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?

Between July 8, 2021, and January 4, 2022, five (5) background samples (BKG02 - BKG04) were collected from native soil at depths of 3 and 6 feet below ground surface (bgs) and submitted for laboratory analysis of arsenic and selenium. Background soil analytical results indicated that arsenic and selenium concentrations were above the applicable COGCC Table 915-1 regulatory standards in native soil. Based on these results, arsenic and selenium exceedances recorded in soil samples collected during monitoring well installation activities were within 1.25x the background concentrations and representative of native soil conditions.

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

Volume of solid waste (cubic yards) 44

Volume of liquid waste (barrels) 290

☒ Is further site investigation required?

On July 8, 2021, five (5) temporary monitoring wells (BH01 - BH05) were installed via hand auger to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent. Lithologic descriptions and volatile organic compound (VOC) concentrations using a photoionization detector (PID) were recorded for each borehole. Per the condition of approval (COA) issued in the approved Supplemental Form 27 (Document No. 402726915), confirmation soil samples were collected from each borehole at depths of 3 and 6 feet bgs and submitted for analysis of the COGCC approved contaminants of concern (COCs). Analytical results received during initial monitoring well installation activities indicated that organic and inorganic constituent concentrations were in compliance with the applicable COGCC Table 915-1 regulatory standards in all borehole locations aside from arsenic and selenium. Based on background soil analytical results, the arsenic and selenium exceedances observed in samples collected during monitoring well installation activities are indicative of native soil conditions. Supplemental site investigation activities and corresponding analytical results were reported in the approved Supplemental Form 27 (Document No. 402950700).

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 May 12 and 17, 2021, approximately 44 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.

REMEDATION 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 initial groundwater analytical results, monitored natural attenuation (MNA) was the selected remediation strategy for this location between the third quarter 2021 and the second quarter 2022.

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)

44

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.

On July 8, 2021, groundwater monitoring was initiated at the five temporary monitoring wells (BH01 - BH05) at the former Kristin 1 wellhead location. Groundwater samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB by EPA Method 8260B in accordance with Table 915-1. Per the approved Supplemental Form 27 (Document No. 402809874), analysis of total dissolved solids (TDS) and chloride and sulfate anions were removed from the quarterly sampling plan following the third quarter 2021 groundwater monitoring event. During the second quarter 2022, four consecutive quarters of groundwater concentrations in compliance with the COGCC Table 915-1 regulatory standards were achieved.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☐ Quarterly☐ Semi-Annually☐ Annually☒ Other☐ No Further Action (NFA) Request

☐ Request Alternative Reporting Schedule:

☐ Semi-Annually☐ Annually☒ Other☐ No Further Action (NFA) Request

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 _____

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 44

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 290

E&P waste (liquid) description Impacted groundwater

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: NGL Disposal Facility

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? Yes

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? Yes

Does the previous reply indicate consideration of background concentrations? Yes

Does Groundwater meet Table 915-1 standards? Yes

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?

☒ 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. 05/07/2021

Proposed date of completion of Reclamation. 04/05/2023

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. 12/30/2021

Actual Spill or Release date, or date of discovery. 05/13/2021

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 03/01/2021

Proposed site investigation commencement. 05/07/2021

Proposed completion of site investigation. 04/05/2022

REMEDIAL ACTION DATES

Proposed start date of Remediation. 05/12/2021

Proposed date of completion of Remediation. 04/05/2022

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

During the second quarter 2022, four consecutive quarters of groundwater concentrations in compliance with the COGCC Table 915-1 standards were achieved at the former Kristin 1 wellhead location. Consequently, PDC is requesting a No Further Action (NFA) determination for this remediation project.

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: 16917

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**

403040725	ANALYTICAL RESULTS
403040726	GROUND WATER SAMPLE LOCATION
403040727	GROUND WATER ELEVATION MAP

Total Attach: 3 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)