

State of Colorado Oil and Gas Conservation Commission

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Document Number:

403014370

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 #: 16033 Initial Form 27 Document #: 402505741

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>LOCATION</u>	Facility ID: <u>318458</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>L. H. MILLER UNIT-64N66W 25NWNW</u>		Latitude: <u>40.287570</u>	Longitude: <u>-104.730760</u>
		** correct Lat/Long if needed: Latitude: <u>40.288227</u>	Longitude: <u>-104.730893</u>
QtrQtr: <u>NWNW</u>	Sec: <u>25</u>	Twp: <u>4N</u>	Range: <u>66W</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

A domestic water well is located approximately 398 feet west of the location. An irrigation pond is located approximately 673 feet northeast of the location. The following additional receptors were evaluated and determined to be outside of the 1/4-mile radius of the site: CPW Sensitive Wildlife Habitat (SWH) and FWS wetlands. Livestock is located approximately 655 northeast of the location.

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
UNDETERMINED	GROUNDWATER	Refer to Figure 1 and Table 2	Implementation of Groundwater Assessment
Yes	SOILS	Refer to Figure 1 and Table 1	Confirmation Soil Sampling

INITIAL ACTION SUMMARY

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

On January 6, 2021, visually impacted material was discovered below the dump lines during facility decommissioning activities at the LH Miller Unit 1 tank battery. Following a limited site investigation, analytical results indicated that the visually stained material exhibited organic compound concentrations below COGC Table 910-1 standards. On January 8, 2021, hydrocarbon impacted material was discovered below a historic concrete vault during ACM abatement activities. Following the discovery, excavation activities were initiated and approximately 360 cubic yards of impacted material were removed and transported to the North Weld Waste Management Facility in Ault, Colorado 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):

Between January 11 and January 13, 2020, 22 soil samples (SS01 – SS22) were collected from the sidewalls and base of the excavations at depths ranging between 3 feet and 10 feet below ground surface (bgs). The soil samples were submitted to Summit Scientific Laboratories (Summit) for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by EPA Method 8260B, and TPH - diesel range organics (DRO) by EPA Method 8015. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 910-1 soil standards in the soil samples collected from the final excavation extent and below the former dump lines.

Proposed Groundwater Sampling

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

During initial excavation activities, groundwater was encountered at approximately 6 feet bgs. Following the completion of source mass removal and groundwater vacuum recovery activities, one groundwater sample (GW01) collected from the excavation on January 14, 2021 and was submitted to Summit for analysis of BTEX by EPA Method 8260B. Analytical results indicated that BTEX concentrations were below the applicable COGCC Table 910-1 groundwater 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):

Five (5) monitoring wells will be installed via direct-push drilling methods to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent. Proposed monitoring well locations are illustrated on Figure 2.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 22

Number of soil samples exceeding 915-1 1

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

Approximate areal extent (square feet) 1800

NA / ND

-- Highest concentration of TPH (mg/kg) 1580

NA Highest concentration of SAR

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 10

Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 6'

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) 6.6

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?

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

Volume of solid waste (cubic yards) 360

Volume of liquid waste (barrels) 360

☒ Is further site investigation required?

Five (5) monitoring wells will be installed via direct-push drilling methods 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) will be recorded for each borehole. If elevated VOC concentrations are encountered during the investigation, a sample will be collected from the interval exhibiting the highest VOC concentration from the borehole and submitted for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH C6-C36) by EPA Methods 8260B and 8015. In addition, one soil sample will be collected in the area most likely to be impacted by produced water to confirm soil suitability for reclamation and submitted for laboratory analysis of electrical conductivity (EC), pH, sodium adsorption ratio (SAR), and boron by saturated paste and hot water soluble extraction methods. Proposed monitoring well locations are illustrated on Figure 2.

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 January 6 and January 13, 2021, approximately 360 cubic yards of impacted material were removed and transported to the North Weld Waste Management Facility for disposal. As previously described, confirmation soil samples collected from the final excavation extent indicated that unsaturated and saturated hydrocarbon impacted material was successfully removed by excavation activities.

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 soil and groundwater analytical results collected during drilling activities and the initial groundwater assessment, monitored natural attenuation (MNA) was selected as the remediation strategy during the third quarter 2021 and will remain the selected remediation strategy for the second quarter 2022.

Soil Remediation Summary

<input type="checkbox"/> In Situ	<input checked="" type="checkbox"/> Ex Situ
<input type="checkbox"/> Bioremediation (or enhanced bioremediation)	Yes <input type="checkbox"/> Excavate and offsite disposal
<input type="checkbox"/> Chemical oxidation	<input type="checkbox"/> If Yes: Estimated Volume (Cubic Yards) <input type="text" value="360"/>
<input type="checkbox"/> Air sparge / Soil vapor extraction	<input type="checkbox"/> Name of Licensed Disposal Facility or COGCC Facility ID # <input type="text"/>
<input type="checkbox"/> Natural Attenuation	<input type="checkbox"/> Excavate and onsite remediation
<input type="checkbox"/> Other <input type="text"/>	<input type="checkbox"/> Land Treatment
	<input type="checkbox"/> Bioremediation (or enhanced bioremediation)
	<input type="checkbox"/> Chemical oxidation
	<input type="checkbox"/> Other <input type="text"/>

Groundwater Remediation Summary

<input type="checkbox"/> Bioremediation (or enhanced bioremediation)
<input type="checkbox"/> Chemical oxidation
<input type="checkbox"/> Air sparge / Soil vapor extraction
Yes <input type="checkbox"/> Natural Attenuation
<input type="checkbox"/> Other <input type="text"/>

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). Groundwater samples will be submitted for laboratory analysis of chloride and sulfate anions by EPA Method 300.0 and total dissolved solids (TDS) by Method SM2540C in accordance with Table 915-1. First quarter 2022 analytical results indicated that TDS and sulfate anion concentrations were in exceedance of the applicable COGCC Table 915-1 regulatory standards in monitoring well BH05. Inorganic parameters were in compliance with the applicable regulatory standards in the remaining four monitoring well locations. Additionally, during the first quarter 2022, four consecutive quarters of organic compound concentrations in compliance with the COGCC Table 915-1 regulatory standards were achieved. Quarterly groundwater monitoring will continue until closure criteria is achieved.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☒ 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:

☒ 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 360

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

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: North Weld Waste Management Facility

Volume of E&P Waste (liquid) in barrels 360

E&P waste (liquid) description Groundwater

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: NGL Energy 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.

The excavation area was backfilled, compacted, and re-graded to match pre-existing conditions. The facility was decommissioned and will be reclaimed in accordance with the COGCC 1000 Series rules.

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. 01/06/2021

Proposed date of completion of Reclamation. 12/16/2026

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. 01/11/2021

Actual Spill or Release date, or date of discovery. 01/11/2021

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 10/20/2020

Proposed site investigation commencement. 01/06/2021

Proposed completion of site investigation. 04/09/2021

REMEDIAL ACTION DATES

Proposed start date of Remediation. 01/11/2021

Proposed date of completion of Remediation. 12/16/2026

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 LH Miller Unit 1 tank battery location.

During the first quarter 2022, four consecutive quarters of organic compound concentrations in compliance with the COGCC Table 915-1 standards were achieved. Based on these results, PDC is requesting that BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB be removed from the quarterly sampling and analysis plan.

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: 16033

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**

403014380	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)