

State of Colorado Oil and Gas Conservation Commission

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Report taken by:

Kari Brown

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>(970) 313-5582</u>
City: <u>DENVER</u>	State: <u>CO</u>	Zip: <u>80203</u>
Contact Person: <u>Jason Davidson</u>	Email: <u>COGCCSpillRemediation@pdce.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 17902 Initial Form 27 Document #: 402674196

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>TANK BATTERY</u>	Facility ID: <u>463941</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Kielian 2-2 battery</u>		Latitude: <u>40.335184</u>	Longitude: <u>-104.850155</u>
** correct Lat/Long if needed: Latitude: <u>40.335184</u>		Longitude: <u>-104.850155</u>	
QtrQtr: <u>SESE</u>	Sec: <u>2</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 GM

Most Sensitive Adjacent Land Use Residential

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

The Kielian 2-2 battery is surrounded by private ranching and agricultural mixed-use properties in all directions. There are residential properties ~400' west and ~300' southeast. The wellhead is located ~250' northwest of the battery. A small pond is in place ~60' west of the battery and a gravel pit is in place ~600' east. The Thompson and Platte Ditch is in place ~1,180' south of the battery. There is 1 groundwater well mapped within a 1/4 mile of the battery. Groundwater depth is unknown but is expected to be encountered at <20' bgs. The 100-year floodplain of the Big Thompson River drainage is mapped ~260' north of the battery. The battery is located within a Mule Deer Severe Winter Range Buffer and an Aquatic Native Species Conservation Waters buffer is mapped ~1,050' northwest of the battery.

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 4	Quarterly Groundwater Sampling Activities
Yes	SOILS	Refer to Figure 2 and Tables 1-3	Site Subsurface Investigation Activities

INITIAL ACTION SUMMARY

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

During facility closure activities, soil and potential groundwater impacts were observed in test pits advanced to groundwater below the partially buried produced water tank and below the horizontal separator on May 5, 2021.

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):

Please refer to the Source Removal section under the Remedial Action Plan tab of this Form 27 for a summary of the proposed soil sampling activities at the Site.

Proposed Groundwater Sampling

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

Quarterly groundwater sampling activities are ongoing at the Site. The next quarterly groundwater sampling event is scheduled for late-August 2022.

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):

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 27
Number of soil samples exceeding 915-1 14
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 20000

NA / ND

-- Highest concentration of TPH (mg/kg) 2285
-- Highest concentration of SAR 1.2
BTEX > 915-1 Yes
Vertical Extent > 915-1 (in feet) 7

Groundwater

Number of groundwater samples collected 9
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 4
Number of groundwater monitoring wells installed 9
Number of groundwater samples exceeding 915-1 1

-- Highest concentration of Benzene (µg/l) 18.4
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?

☒ Were background samples collected as part of this site investigation?

One background sample was collected during initial site investigation activities on 5/17/21.

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

Volume of solid waste (cubic yards) Volume of liquid waste (barrels)

☐ Is further site investigation required?

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.

Based on the results of the investigations conducted to date, PDC proposes to conduct excavation of hydrocarbon impacted soils at the Site, starting near the source and moving outward in each cardinal direction. Confirmation soil samples will be collected from the sidewalls of the final extent of excavation to demonstrate compliance with Table 915-1 Protection of Groundwater Soil Screening Levels (GWSSLs). The samples will be submitted to an accredited laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and Total Petroleum Hydrocarbons (TPH)-gasoline range organics (GRO) by US Environmental Protection Agency (EPA) Method 8260D, and TPH-diesel range organics (DRO) by EPA Method 8015D. To mitigate any potential residual dissolved phase hydrocarbons, a groundwater remediation amendment (Chemically Oxygenated Granular Activated Carbon (COGAC) or a mixture of sodium persulfate, calcium peroxide, and chelated iron) will be applied to the exposed groundwater in the open excavation prior to backfilling. Pending landowner approval, excavation activities are planned to start in the fourth quarter of 2022. Analytical results for soil samples collected to date are provided on Table 1, Table 2 and Table 3. Figure 2 illustrates the proposed starting location of the excavation. Copies of the Safety Data Sheets (SDSs) for COGAC, sodium persulfate, calcium peroxide, and chelated iron are also attached.

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.

Soil Remediation Summary

☐ In Situ

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

☐ Ex Situ

_____ Excavate and offsite disposal
_____ If Yes: Estimated Volume (Cubic Yards) _____
_____ 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
_____ 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 May 24, 2022, groundwater monitoring was conducted in monitoring wells MW01 through MW09. Prior to purging, depth to water measurements were collected in each monitoring well using an oil water interface probe to determine relative groundwater elevations and calculate well specific target purge volumes. No free product was observed in any of the monitoring wells. After purging at least three casing volumes from each monitoring well using a peristaltic pump, groundwater samples were collected into laboratory provided containers, placed on ice, and delivered with a completed chain-of-custody form to Origins Laboratory in Denver, Colorado, for analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, and naphthalene by EPA Method 8260D.

During the May 2022 groundwater monitoring event, depth to groundwater ranged from approximately 3.5 feet below ground surface (ft-bgs) in monitoring well MW04 to 7.52 ft-bgs in monitoring well MW01. Groundwater was calculated to flow north-northeast with an average hydraulic gradient of 0.0049 feet of vertical rise per foot of horizontal run as measured from well MW01 to well MW02.

Laboratory analytical results for the sample collected from monitoring well MW06 reported a benzene concentration of 18.4 micrograms per liter (µg/L), which is above the COGCC Table 915-1 standard of 5 µg/L. All remaining groundwater analytical results were compliant with applicable COGCC Table 915-1 groundwater standards. The groundwater analytical results and relative groundwater elevations are summarized in Table 1 and displayed on Figure 1, which are included as attachments. The laboratory analytical report is also attached.

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 Remediation Progress and Groundwater Monitoring Report

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.

Operator does not have site-specific financial assurance for this project; however, Operator has inactive well, blanket, and surface bonding including Surety IDs 106077122, 106473808, and 106473820, as well as commercial general liability and/or umbrella/excess insurance meeting the requirements of Rule 705.b. Operator does not anticipate making an insurance claim for this project.

- Investigation and delineation are complete for soil and groundwater.
- Quarterly groundwater monitoring is ongoing.
- Removal of source mass material will be conducted, pending landowner approval, during the fourth quarter of 2022.
- Facility and infrastructure were decommissioned and the location will be reclaimed in accordance with the COGCC 1000 Series.

Costs included herein are estimates only and may change over time based on numerous factors. Accordingly, Operator makes no guarantees as to the accuracy of such cost estimates, thus providing an estimate for the next year below.

Operator anticipates the remaining cost for this project to be: \$ 130000

WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation? No

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

Volume of E&P Waste (solid) in cubic yards

E&P waste (solid) description

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility:

Volume of E&P Waste (liquid) in barrels

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.

Reclamation will be conducted in accordance with COGCC 1004 Series Rules.

Is the described reclamation complete? _____

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. 01/07/2023

Proposed date of completion of Reclamation. 01/07/2024

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. 04/13/2021

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

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 04/30/2021

Proposed site investigation commencement. 08/16/2021

Proposed completion of site investigation. 01/20/2022

REMEDIAL ACTION DATES

Proposed start date of Remediation. 12/19/2022

Proposed date of completion of Remediation. 01/06/2023

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

Location ownership transferred to PDC effective May 6, 2022.

Pending landowner approval, excavation activities are planned to start in the fourth quarter of 2022.

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Jason Davidson

Title: Senior Env. Specialist

Submit Date: 07/21/2022

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: Kari Brown

Date: 11/10/2022

Remediation Project Number: 17902

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**

403110968	FORM 27-SUPPLEMENTAL-SUBMITTED
403111714	GROUND WATER ELEVATION MAP
403111715	SOIL SAMPLE LOCATION MAP
403111716	ANALYTICAL RESULTS
403111717	ANALYTICAL RESULTS
403111718	ANALYTICAL RESULTS
403111719	ANALYTICAL RESULTS
403111720	ANALYTICAL RESULTS
403111729	SAFETY DATA SHEETS
403111731	SAFETY DATA SHEETS
403111732	SAFETY DATA SHEETS
403111733	SAFETY DATA SHEETS
403111734	SAFETY DATA SHEETS

Total Attach: 13 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)