

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>(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 #: 21306 Initial Form 27 Document #: 402886642

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>454142</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Boulter-Kawata Tank Battery</u>		Latitude: <u>40.318654</u>	Longitude: <u>-104.765803</u>
		** correct Lat/Long if needed: Latitude: <u>40.318622</u>	Longitude: <u>-104.765942</u>
QtrQtr: <u>NENW</u>	Sec: <u>15</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 Residential / 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: domestic - 133' SSW; Surface Water: Freshwater Pond - 1,210' SE, Occupied Building: 470' E; FWS Wetlands: 665' E Freshwater Emergent Wetland (PEM1A).

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 Table 5 and Figure 2	Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4 and Figures 1-3	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 February 14, 2022, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the Boulter 15-21 Tank Battery (Figure 1). Based on initial results, it was determined that a historic release was discovered below both the former above ground storage tank (AST) and separator. Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. Approximately 1,149 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management Facility and Buffalo Ridge Management Facility for disposal under PDC 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 February 15 and 24, 2022, three (3) soil samples (AST02-B, SS01, & SS12) were collected from impacted source material below and adjacent to the AST between approximately 4 feet and 20 feet bgs. The samples were submitted for laboratory analysis of the full COGCC Table 915-1 analyte suite. Laboratory analytical results from the AST source area indicated COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), 1-M, 2-M arsenic, barium, & selenium. Between February 17 & 24, 2022, ten (10) soil samples (SS02-SS11) were collected from the base and sidewalls of the excavation at depths between 7 feet & 18 feet bgs and were submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), 1-M, & 2-M. Final analytical results in soil samples collected from the final excavation extent indicate that organic concentrations were observed in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater SSLs in SS01, SS04, SS05, and SS12.

Proposed Groundwater Sampling

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

On February 24, 2022, groundwater was encountered at approximately 20 feet bgs in the excavation. Consequently, one groundwater sample (GW01) was collected from the excavation and submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that all analyzed constituents were in exceedance of the applicable COGCC Table 915-1 Standards. The groundwater sample location is illustrated on Figure 2 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):

On February 16, 2022, two (2) soil samples (SEP01-B and SEP01-W@4') were collected from impacted source material below and adjacent to the separator at approximately 4 feet bgs. The samples were submitted to Summit Scientific Laboratories for analysis of the full COGCC Table 915-1 analyte suite. Laboratory analytical results indicated COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36) arsenic, lead, and selenium. Additionally on February 16, 2022, four (4) soil samples (SEP01-S, SEP01-N, SEP01-E and SEP01-W@2') were collected from the sidewalls of the excavation at depths of approximately 2 feet bgs and were submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, and TPH (C6-C36). Final analytical results in soil samples collected from the final excavation extent indicate that organic concentrations were observed in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater SSLs in SEP01-B and SEP01-W@4'.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 57

Number of soil samples exceeding 915-1 14

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

Approximate areal extent (square feet) 3960

NA / ND

-- Highest concentration of TPH (mg/kg) 420

-- Highest concentration of SAR 0.289

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 33

Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 20'

Number of groundwater monitoring wells installed 0

Number of groundwater samples exceeding 915-1 1

-- Highest concentration of Benzene (µg/l) 54

ND Highest concentration of Toluene (µg/l)

ND Highest concentration of Ethylbenzene (µg/l)

-- Highest concentration of Xylene (µg/l) 470

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?

On February 14, 2022, two background soil samples (BKG01) were collected at approximately 2.5 feet and 4 feet bgs from the native material topographically up-gradient of the tank battery and submitted to the laboratory on-hold. Due to the necessity to conduct supplemental source mass removal activities, the background samples were not analyzed.

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

Volume of solid waste (cubic yards) 1149

Volume of liquid waste (barrels) 0

☐ Is further site investigation required?

During initial site investigative activities, deep soil impacts in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater Soil Screening Levels (SSLs) were discovered below 20 feet bgs. Due to the depth of the remaining impacts, source mass removal activities were discontinued. Supplemental source mass removal activities will continue under a stamped Engineered Excavation Work Plan and landowner approval.

A remediation strategy will be determined following supplemental source mass removal activities.

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 February 14 and 25, 2022, approximately 1,149 cubic yards of impacted material were removed from the excavation and transported to the North Weld Waste Management Facility in Ault, Colorado and the Buffalo Ridge Management Facility in Keenesburg, CO for disposal under PDC waste manifests.

REMEDICATION 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.

Between March 15 and 18, 2022, seven (7) soil borings (SB01-SB07) were advanced to between 23 and 34 feet bgs using direct push drilling and solid stem auger drilling methods. Lithologic descriptions and volatile organic compound (VOC) concentrations measured using a photoionization detector (PID) were collected and recorded for each boring. Based on results of sampled intervals collected during initial site activities, confirmation soil samples were collected from each boring at approximately 7 feet, 14 feet, 20 feet bgs, the interval exhibiting the highest PID, and the terminus of the soil boring. Samples were submitted to Summit Scientific Laboratories for analysis of BTEX, naphthalene, TPH (C6-C36), 1,2,4-TMB, and 1,3,5-TMB, 1-M, and 2-M. Analytical results indicated that organic compound concentrations were in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater SSLs in SB01 @ 21 feet and 33 feet bgs.

Remaining hydrocarbon impacts will be removed via mechanic excavation under a stamped Engineered Excavation Work Plan. Impacted material will be transported off-site to the North Weld Waste Management facility for disposal under PDC waste manifests. Confirmation soil samples will be collected from the base and sidewalls of the final excavation extent and submitted for laboratory analysis of the COGCC approved COC analyte suite. Excavation activities and final analytical results will be summarized in a forthcoming Supplemental Form 27.

Soil Remediation Summary

☐ In Situ

☒ Ex Situ

_____ Bioremediation (or enhanced bioremediation)

_____ Yes _____ Excavate and offsite disposal

_____ Chemical oxidation

_____ If Yes: Estimated Volume (Cubic Yards) _____ 1149

_____ 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

_____ 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.

A groundwater monitoring plan will be determined after the engineered excavation is complete.

REMEDATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☐ Quarterly

☐ Semi-Annually

☐ Annually

☒ Other

Confirmation Sample Summary, Analyte Reduction Request and Source Mass Removal Proposal

☐ **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 Confirmation Sample Summary, Analyte Reduction Request and Source Mass Removal Proposal

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 1149

E&P waste (solid) description Hydrocarbon impacted soils

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: North Weld Waste Management & Buffalo Ridge 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: _____

REMEDATION COMPLETION REPORT

REMEDATION 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 supplemental source mass removal activities at the former tank battery location, the location will be 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? _____

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. 02/15/2022

Proposed date of completion of Reclamation. 04/20/2027

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. 07/26/2021

Actual Spill or Release date, or date of discovery. 02/16/2022

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 12/24/2021

Proposed site investigation commencement. 12/24/2021

Proposed completion of site investigation. 09/30/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 02/15/2022

Proposed date of completion of Remediation. 04/20/2027

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

Following the approval of this Form and pending landowner approval, supplemental source mass removal activities will resume. The supplemental excavation activities are proposed to be conducted by the end of 2022.

Additionally, based on analytical results received from the four waste characterization samples collected (AST02-B, SEP01-B, SS01, & SS12), PDC is requesting that the contaminants of concern (COCs) for this historic release at the Boulter 15-21 tank battery be reduced to the following: BTEX, naphthalene, TPH (C6-C36), 1,2,4-TMB, 1,3,5-TMB, 1-methylnaphthalene (M), 2-M, arsenic, barium, lead, and selenium.

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: 04/25/2022

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: 05/12/2022

Remediation Project Number: 21306

Condition of Approval**COA Type****Description**

	COGCC agrees to the amended sampling plan
1 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**

403021669	FORM 27-SUPPLEMENTAL-SUBMITTED
403022555	LOGS
403022558	SOIL SAMPLE LOCATION MAP
403026482	SOIL SAMPLE LOCATION MAP
403026484	SOIL SAMPLE LOCATION MAP
403026486	ANALYTICAL RESULTS
403026489	PHOTO DOCUMENTATION

Total Attach: 7 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)