

State of Colorado Oil and Gas Conservation Commission

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Report taken by:

RICK ALLISON

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>tasfillremediationcontractor@pdce.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 20282 Initial Form 27 Document #: 402818316

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>447187</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>CHRISTIANSEN-66N67W 35SENE</u>		Latitude: <u>40.444521</u>	Longitude: <u>-104.855381</u>
		** correct Lat/Long if needed: Latitude: <u>40.444542</u>	Longitude: <u>-104.855525</u>
QtrQtr: <u>SENE</u>	Sec: <u>35</u>	Twp: <u>6N</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 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: Irrigation - 834 feet NW, Surface Water: Irrigation Ditch - 205 feet NE / Cache La Poudre River 636 feet SE, Occupied Buildings: 837 feet SE, FWS Wetlands: Herbaceous Riparian (Rp1EM) - 165 feet S, HPH: Aquatic Native Species Conservation Waters - 212 feet SE, Bald Eagle Roost Site - 631 feet E

Conflict likely as facility is located within 100-year floodplain

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 & Figure 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 October 29, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the former Christiansen 35-15 tank battery (Figure 1). Based on initial field screening, it was determined that a historic release was discovered adjacent the produced water vessel (PWV) water dump line (WDL) associated with the tank battery. Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. Approximately 550 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste management Facility for disposal under PDC waste manifests. During excavation activities, groundwater was encountered at approximately 8 feet below ground surface (bgs). Groundwater vacuum recovery was conducted concurrent with excavation activities and approximately 170 barrels (bbls) of groundwater was removed from the excavation and transported to NGL C6 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 October 29, 2021, one soil sample (WDL) was collected from the source area (adjacent to the PWV WDL) 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 indicated that contaminants of concern (COCs) include BTEX, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, naphthalene, TPH, fluorene 1-methylnaphthalene (M), 2-M, arsenic, barium, cadmium, and selenium. Between November 2 and 4, 2021, eighteen (18) soil samples (SS01-SS17 and SS19) were collected from the base and sidewalls of the excavation at depths ranging from 4 to 8 feet bgs. All samples were submitted for laboratory analysis of the above referenced COCs. In addition, one sample (SS18) was collected at approximately 2.5 feet bgs and submitted for laboratory analysis of pH, electrical conductivity (EC), sodium adsorption ratio (SAR), and boron.

Proposed Groundwater Sampling

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

On November 1, 2021, one groundwater sample (GW01) was collected from the tank battery excavation and was submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that the 1,2,4-TMB concentration was in exceedance of the COGCC Table 915-1 standards in sample GW01. 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):

During initial closure activities conducted on October 29, 2021, soil encountered on site below production equipment was visually inspected and field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Per the approved proposed sampling plan, samples were collected below and/or adjacent to the separator flowline (SEP01-FL) and dump line (SEP01-DL), and above ground storage tanks (AST01 & AST02). The samples were submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, and TPH (C6-C36). Analytical results indicated that organic concentrations were below the COGCC Table 915-1 standards.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 29

Number of soil samples exceeding 915-1 9

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

Approximate areal extent (square feet) 1325

NA / ND

-- Highest concentration of TPH (mg/kg) 12

-- Highest concentration of SAR 1.9

BTEX > 915-1 No

Vertical Extent > 915-1 (in feet) 8

Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 8

Number of groundwater monitoring wells installed 0

Number of groundwater samples exceeding 915-1 1

ND Highest concentration of Benzene (µg/l)

ND Highest concentration of Toluene (µg/l)

-- Highest concentration of Ethylbenzene (µg/l) 28

-- Highest concentration of Xylene (µg/l) 23

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 October 29, 2021, one background sample (BKG01) was collected from native material topographically up-gradient of the former tank battery at 3 ft bgs and submitted for analysis of pH, EC, SAR, and the Table 915-1 metals. Additionally, on November 4, 2021, 4 background samples (BKG01) were collected at depths ranging from 2.5 ft to 8 ft bgs from native material on location and submitted for analysis of arsenic, barium, cadmium, and selenium. Analytical results indicated that arsenic, barium, and selenium were in exceedance of the applicable regulatory standards in native soil.

On April 28, 2022, 2 background soil borings (BKG02 and BKG03) were advanced to a depth of approximately 10 ft bgs in native material on location. Eight background soil samples were collected at depths ranging from 4 ft to 10 ft bgs and submitted for laboratory analysis of arsenic. Analytical results indicated that arsenic concentrations were in exceedance of the applicable regulatory standards in native soil.

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

Volume of solid waste (cubic yards) 550

Volume of liquid waste (barrels) 170

☒ Is further site investigation required?

Based on the final analytical results, additional source mass removal activities will be conducted in the vicinity of SS09 and SS14. Confirmation soil samples will be collected from the sidewalls and base of the final extent to confirm the absence of hydrocarbon impacts. Soil samples will be submitted for the above COGCC approved COC list. Excavation activities will commence pending landowner approval.

On April 28, 2022, five (5) monitoring wells (BH01 - BH05) were installed to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former tank battery excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole. During monitoring well installation activities, an elevated PID reading of 12.4 ppm was recorded in monitoring well BH01. A soil sample was collected from the interval exhibiting elevated VOC concentration (9 feet bgs), as well as from the terminus of the soil boring (13 feet bgs). Two soil samples were submitted to Summit Scientific Laboratory (Summit) for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, TPH (C6-C36) 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, fluorene, 1-M, 2-M, arsenic, barium, cadmium, and selenium.

Soil analytical results indicated that organic compound concentrations were in compliance with the applicable COGCC Table 915-1 regulatory standards in both samples collected from soil boring BH01. Additionally, arsenic, barium, cadmium, and selenium concentrations were below regulatory standards or within 1.25x the background concentrations.

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 October 29 and November 4, 2021, approximately 550 cubic yards of impacted material were removed from the excavation and transported to North Weld Waste Management in Ault, Colorado for disposal under PDC waste manifests.

Groundwater vacuum recovery activities were conducted concurrent with excavation activities. Approximately 170 barrels of groundwater were recovered and transported to the NGL C6 facility for disposal under PDC waste manifests.

Final analytical results received for the samples collected from the final excavation extent indicated that 1-M is in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater SSLs in soil samples SS09 and SS14. Additionally, arsenic is in exceedance of the applicable COGCC Table 915-1 Protection of Groundwater SSL in soil samples SS09 and SS12. Based on these results, additional excavation and soil sampling activities will be conducted in the vicinity of SS09 and SS14 in order to remove remaining hydrocarbon impacts. Additional background soil sampling activities will be conducted in order to observe arsenic concentrations in native material. Please see the Proposed Soil Boring Location Map 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.

Monitored natural attenuation was the selected remediation strategy for this location for the second quarter 2022 and will remain the selected remediation strategy through the fourth quarter 2022.

Additionally, following 4 consecutive quarters of groundwater sampling, given the slight exceedance Table 915-1 Protection of Groundwater SSL in soil samples SS09 and SS14 for 1- methylanthralene (M), confirmation soil sampling will be conducted to evaluate natural attenuation.

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) _____ 550

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.

PDC will conduct quarterly groundwater monitoring at the five site monitoring wells until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-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. Third quarter 2022 analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all five monitoring well locations.

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

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.

Financial assurance information was included on the second quarter 2022 Supplemental Form 27 (Document No. 403089606). This section and estimate will be updated on an annual basis until closure criteria are met.

Operator anticipates the remaining cost for this project to be: \$ 36000

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 550

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 170

E&P waste (liquid) description Hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: NGL C6

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 tank battery decommissioning 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. 10/29/2021

Proposed date of completion of Reclamation. 03/07/2027

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. 08/16/2021

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

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 10/14/2021

Proposed site investigation commencement. 10/14/2021

Proposed completion of site investigation. 12/31/2022

REMEDIAL ACTION DATES

Proposed start date of Remediation. 10/29/2021

Proposed date of completion of Remediation. 03/07/2027

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

This Supplemental Form 27 was submitted to summarize quarterly groundwater monitoring and analytical results collected during the third quarter 2022 at the former Christiansen 35-15 tank battery location.

Third quarter 2022 analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 groundwater standards in all five monitoring well locations for the second consecutive quarter.

Additionally, following 4 consecutive quarters of groundwater sampling, given the slight exceedance Table 915-1 Protection of Groundwater SSL in soil samples SS09 and SS14 for 1- methylnaphthalene (M), confirmation soil sampling will be conducted to evaluate natural attenuation.

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: 10/04/2022

Email: taspillremediationcontractor@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: RICK ALLISON

Date: 01/05/2023

Remediation Project Number: 20282

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**

403173245	FORM 27-SUPPLEMENTAL-SUBMITTED
403173706	MONITORING REPORT

Total Attach: 2 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)