

State of Colorado  
Energy & Carbon Management Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203  
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:  
403662968  
Receive Date:  
03/25/2024

Report taken by:  
Alexander Ahmadian

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 ECMC 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 Phone: <u>(303) 860-5800</u> Mobile: <u>( )</u>
Address: <u>1099 18TH STREET SUITE 1500</u>		
City: <u>DENVER</u>	State: <u>CO</u>	Zip: <u>80202</u>
Contact Person: <u>Karen Olson</u>	Email: <u>taspillremediationcontractor@pdce.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 21589 Initial Form 27 Document #: 402902806

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>329872</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>MCLEOD-64N66W 29NESE</u>	Latitude: <u>40.281146</u>	Longitude: <u>-104.794021</u>	
** correct Lat/Long if needed: Latitude: <u>40.282597</u>		Longitude: <u>-104.795100</u>	
QtrQtr: <u>NESE</u>	Sec: <u>29</u>	Twtp: <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 / Agricultural  
 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? No

**Other Potential Receptors within 1/4 mile**

Nearest Well: Other - 920' WSW / Irrigation - 1,255' WNW; Surface Water: Irrigation Ditch - 920' E; Occupied Building: 750' E; FWS Wetlands: 1,130' SE  
Freshwater Pond (PUBFx).

# SITE INVESTIGATION PLAN

## TYPE OF WASTE:

- |  |  |  |
|--|--|--|
| <input checked="" type="checkbox"/> E&P Waste      | <input type="checkbox"/> Other E&P Waste             | <input type="checkbox"/> Non-E&P Waste |
| <input checked="" type="checkbox"/> Produced Water | <input type="checkbox"/> Workover Fluids             | _____                                  |
| <input checked="" type="checkbox"/> Oil            | <input type="checkbox"/> Tank Bottoms                |  |
| <input checked="" type="checkbox"/> Condensate     | <input type="checkbox"/> Pigging Waste               |  |
| <input type="checkbox"/> Drilling Fluids           | <input type="checkbox"/> Rig Wash                    |  |
| <input type="checkbox"/> Drill Cuttings            | <input type="checkbox"/> Spent Filters               |  |
|  | <input type="checkbox"/> Pit Bottoms                 |  |
|  | <input type="checkbox"/> Other (as described by EPA) | _____                                  |

## DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	Refer to Document No. 403562813	Confirmation Groundwater Sampling
Yes	SOILS	Refer to Document No. 403562813	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 March 21, 2022, field screening and confirmation soil sampling was conducted in accordance with the ECMC Rule 911 during the decommissioning and closure of the McLeod 29-41 Tank Battery (Figure 1). Based on initial results, it was determined that a historic release was discovered below the former produced water vessel (PWV). Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. To date, approximately 2,689 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management and Buffalo Ridge Facilities 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 March 24 and April 11, 2022, three (3) soil samples (PWV01-W, SS01, and SS03) were collected from impacted source material adjacent to and below the PWV between depths of approximately 5 feet and 21 feet bgs. The samples were submitted for laboratory analysis of the full ECMC Table 915-1 analyte suite. Laboratory analytical results from the PWV source area indicated COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), fluorene, 1-M, and 2-M. Between March 24 and April 11, 2022, two (2) soil samples (SS02 & SS04) were collected from the base of the excavation at depths of 16 feet and 25 feet bgs and submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36). SS04 was submitted for additional analysis of fluorene, 1-M, & 2-M. Final analytical results for the soil samples (SS01-SS04) indicated that organic concentrations were in exceedance of the applicable ECMC Table 915-1 Protection of Groundwater SSLs in SS04.

### Proposed Groundwater Sampling

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

Groundwater was encountered in the engineered excavation at approximately 31 feet bgs on August 10, 2023. As such, one groundwater sample (GW01) was collected from the excavation at approximately 31 feet bgs and was submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB by EPA Method 8260. Analytical results indicated that 1,2,4-TMB & 1,3,5-TMB were in exceedance of the ECMC Table 915-1 standards. Supporting documentation was included on the previously submitted Supplemental Form 27 Document No. 403562813.

### 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 decommissioning activities conducted on March 21, 2022, soil encountered on-site and below production equipment was visually inspected and field screened for VOC concentrations using a PID. Per the approved proposed soil sampling plan, one soil sample (SEP01-DL) was collected adjacent to the separator dump-line riser, one sample (SEP01-FL) was collected beneath the flowline riser at the separator, and one sample (AST01) was collected adjacent to the above ground storage tank. Additionally, one grab soil sample (ECD01 @ 0-6") was collected adjacent to the ECD and field screened for VOCs using a PID. Soil samples SEP01-DL, SEP01-FL, and AST01 were submitted for lab analysis of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, and TPH (C6-C36). Analytical results indicated that organic compounds were in compliance with the applicable ECMC Table 915-1 Protection of Groundwater SSLs in all three soil samples collected. Supporting documentation can be found in Doc. No. 403562813.

# SITE INVESTIGATION REPORT

## SAMPLE SUMMARY

### Soil

Number of soil samples collected 95

Number of soil samples exceeding 915-1 71

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

Approximate areal extent (square feet) 2650

### NA / ND

-- Highest concentration of TPH (mg/kg) 3220

-- Highest concentration of SAR 3.56

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 31

### Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 31

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) 19

-- Highest concentration of Xylene (µg/l) 770

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 March 21, 2022, two (2) background soil samples (BKG01) were collected at approximately 2.5 feet and 5 feet bgs from native material topographically up-gradient of the tank battery. Due to the COA issued on ECMC document #403474998, the BKG01 samples were not representative of native soil conditions from similar depths as the impacts. As such, the BKG01 samples have not been used for determining native background metals concentrations and additional background soil samples will be collected and submitted for laboratory analysis of ECMC Table 915-1 metals during the proposed supplemental site investigation.

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

Volume of solid waste (cubic yards) 2689

Volume of liquid waste (barrels) 0

Is further site investigation required?

Up to ten (10) groundwater monitoring wells will be installed to delineate dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions will be recorded for each borehole. If elevated VOC concentrations are encountered during the investigation, a soil sample will be collected from the interval exhibiting the highest VOC concentration from the borehole and submitted for laboratory analysis of the ECMC approved COCs.

In addition, up to five (5) background soil borings will be advanced adjacent to the former excavation extent in order to evaluate ECMC Table 915-1 metals. The proposed soil boring location and proposed monitoring well location maps were included on the previously submitted Supplemental Form 27 Document No. 403562813.

## 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 March 11, 2022 and August 16, 2023, approximately 2,689 cubic yards of impacted material were excavated below and adjacent to the former PWV and transported to the North Weld Waste Management and Buffalo Ridge Facilities 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.

Supplemental source mass removal was re-initiated on August 10, 2023, via mechanical excavation under a stamped Engineered Excavation Work Plan. Prior to initiation of excavation activities, Per Document # 403474998, the ECMC approved COC list includes: BTEX, naphthalene, TPH (C6-C36), 1,2,4-TMB, 1,3,5-TMB, fluorene, 1-M, 2-M, arsenic, and selenium. Between August 10 & 17, 2023, fifty-seven (57) soil samples (SS05-SS52 & SS55-SS63) were collected from the base and sidewalls of the engineered excavation extent at depths ranging between approximately 7 feet and 31 feet bgs and submitted for analysis of the COCs. Additionally, six (6) soil samples (SS64-SS69) were collected from approximately 2.5 ft bgs and submitted for laboratory analysis of pH, EC, SAR, & boron. Analytical results indicated that constituent compounds were in compliance of applicable standards from the final excavation extent, with the exception of arsenic exceedances observed in soil samples SS05-SS22, SS24-SS27, SS29-SS52, & SS55-SS63. Due to the COA issued on ECMC document #403474998, background samples (BKG01) collected were not used in determining Table 915-1 metal concentrations in native material.

Confirmation soil samples (CS01-CS10) were collected from clean backfill material and submitted for analysis of BTEX, naphthalene, TMBs, TPH (C6-C36), fluorene, 1-M, 2-M, and arsenic. Analytical results indicated that all constituents were below the applicable standards.

Supporting documentation was included on the previously submitted Supplemental Form 27 Document No. 403562813.

### Soil Remediation Summary

In Situ

Ex Situ

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

Yes \_\_\_\_\_ Excavate and offsite disposal

\_\_\_\_\_ Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_ 2689

\_\_\_\_\_ Air sparge / Soil vapor extraction

Name of Licensed Disposal Facility or ECMC 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.

Based on the analytical data collected during supplemental source mass removal activities, PDC will conduct quarterly groundwater monitoring at the thirteen proposed 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, as well as total dissolved solids (TDS), chlorides, and sulfates in accordance with Table 915-1.

# 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.

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.

- Source mass removal has been completed.
- Investigation and delineation of organic constituents is complete, inorganic constituents is ongoing.
- Monitoring wells will be installed and groundwater will be monitored.
- Facility and infrastructure were decommissioned and the location will be reclaimed in accordance with the ECMC 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: \$ 40000

## 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:

Volume of E&P Waste (solid) in cubic yards 2689

E&P waste (solid) description Hydrocarbon Impacted Soil

ECMC Disposal Facility ID #, if applicable: \_\_\_\_\_

Non-ECMC Disposal Facility: North Weld Waste Management & Buffalo Ridge Facilities

Volume of E&P Waste (liquid) in barrels 0

E&P waste (liquid) description \_\_\_\_\_

ECMC Disposal Facility ID #, if applicable: \_\_\_\_\_

Non-ECMC 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 ECMC 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 and supplemental source mass removal activities, the location was backfilled, compacted, and re-contoured to match pre-existing conditions. The location will be reclaimed in accordance with the ECMC 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. 03/21/2022

Proposed date of completion of Reclamation. 04/25/2028

## 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. 09/24/2021

Actual Spill or Release date, or date of discovery. 03/21/2022

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 01/07/2022

Proposed site investigation commencement. 04/01/2024

Proposed completion of site investigation. 06/30/2024

### REMEDIAL ACTION DATES

Proposed start date of Remediation. 03/21/2022

Proposed date of completion of Remediation. 04/25/2028

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:

Based on the evaluation of soil and groundwater analytical results, a supplemental site investigation is needed to establish a groundwater monitoring network and investigate Table 915-1 metals in native material. As such, the proposed date of the completion of site investigation was adjusted to span through the second quarter 2024.

**OPERATOR COMMENT**

This form is being submitted as a first quarter 2024 timeline update for the McLeod 29-41 tank battery. Per ECMC request, tables and figures previously submitted have not been included with this form submittal. Please refer to ECMC document no. 403562813 for previously submitted tables and figures.

Following approval of this form and landowner approval, PDC will install and conduct quarterly groundwater monitoring at the thirteen proposed monitoring wells at the former McLeod 29-41 tank battery until closure criteria are met. Concurrently, supplemental site investigation activities will be initiated to determine Table 915-1 metal concentrations in native material. Supplemental Form 27s will be prepared and submitted on a quarterly schedule to provide updates and progress of the remediation until closure criteria has been achieved.

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

Signed: Karen Olson

Title: Remediation Advisor

Submit Date: 03/25/2024

Email: taspillremediationcontractor@pdce.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with ECMC Rules and applicable orders and is hereby approved.

ECMC Approved: Alexander Ahmadian

Date: 04/29/2024

Remediation Project Number: 21589

**COA Type**

**Description**

<u>COA Type</u>	<u>Description</u>
0 COA	

**ATTACHMENT 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**

403662968	FORM 27-SUPPLEMENTAL-SUBMITTED
-----------	--------------------------------

Total Attach: 1 Files

**General Comments**

**User Group**

**Comment**

**Comment Date**

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
		Stamp Upon Approval

Total: 0 comment(s)