

State of Colorado  
Energy & Carbon Management Commission

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Document Number:  
403562813  
Receive Date:  
10/26/2023

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 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 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>	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 / 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 Table 5 & Figure 2	Confirmation Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4 & 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 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. The groundwater sample location is illustrated on Figure 3 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 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. The soil sample locations are illustrated on Figure 1.

# 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. Proposed monitoring well locations are illustrated on Figure 5.

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 locations are illustrated on Figure 4.

## 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.

**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 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.

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   Confirmation Sample Summary & Supplemental Site Investigation 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 & Supplemental Site Investigation Proposal

## 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:

No beneficial use.

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

E&P waste (solid) description Hydrocarbon Impacted Soil

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

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

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

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.

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. 11/01/2023

Proposed completion of site investigation. 03/31/2024

### 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 first quarter 2024.

**OPERATOR COMMENT**

Based upon the analytical results, constituent compound concentrations in soil samples collected from the final excavation extent at the former McLeod 29-41 tank battery are below the ECMC Table 915-1 standards for the approved list of contaminants of concern, with the exception of arsenic exceedances observed in soil samples SS05-SS22, SS24-SS27, SS29-SS52, & SS55-SS63. Per the COA issued on ECMC document #403474998, previously collected background soil samples (BKG01) were not used in determining Table 915-1 metal concentrations in native material. As such, a supplemental site investigation is needed to determine Table 915-1 metal concentrations in native material.

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: Senior Program Manager

Submit Date: 10/26/2023

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: Alexander Ahmadian

Date: 12/11/2023

Remediation Project Number: 21589

**COA Type**

**Description**

	ECMC approves of the proposed soil boring locations. If field observations indicate that the proposed delineation borings are located inside the previous excavation extent additional soil borings will be required. Additionally, depending on the results of the current site investigation plan, Operator may be required to install additional soil borings to fully delineate soil impacts.
	Operator shall field log soil borings during monitoring well installation and provide boring logs/well construction diagrams with the next monitoring report. Operator shall provide boring logs in accordance with standard environmental practices. This includes at a minimum; lithology description, USCS classifications, PID readings, sample collection depths, depth to water, and well construction.
	In accordance with Rule 914, if impacts are observed during monitoring well installation a step out monitoring well(s) shall be installed to define the horizontal extent of impacts to soil and groundwater and the monitoring wells shall be installed within 45 days of observations.
	Operator will submit a minimum of one soil sample for the proposed laboratory analysis from each soil boring advanced during monitoring well installation.
4 COAs	

**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**

403562813	INVESTIGATION/REMEDATION WORKPLAN (SUPPLEMENTAL)
403563009	PHOTO DOCUMENTATION
403563011	LOGS
403573064	ANALYTICAL RESULTS

403573065	SOIL SAMPLE LOCATION MAP
403573066	SOIL SAMPLE LOCATION MAP
403573068	SOIL SAMPLE LOCATION MAP
403573069	SITE INVESTIGATION PLAN
403573070	SITE INVESTIGATION PLAN
403620873	FORM 27-SUPPLEMENTAL-SUBMITTED

Total Attach: 10 Files

**General Comments**

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

Total: 0 comment(s)