

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 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 #: 24464 Initial Form 27 Document #: 403068933

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>SPILL OR RELEASE</u>	Facility ID: <u>481934</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Fagerberg 11C-7M</u>	Latitude: <u>40.502490</u>	Longitude: <u>-104.733780</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>SWSW</u>	Sec: <u>12</u>	Twp: <u>6N</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 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? Yes

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

Nearest Well: Irrigation - 1,801' E; Occupied Building: 1,285' N; Surface water: Irrigation ditch - 145' N; FWS Wetlands: 730' ENE

**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 1	Confirmation Groundwater Samples
Yes	SOILS	Refer to Tables 1-4, Figure 1	Confirmation Soil Samples

**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 April 6, 2022, a release was discovered at the Fagerberg Pad. Approximately 2 barrels of produced water were released from a nipple pin hole leak at the Fagerberg Pad. The majority of the release occurred inside secondary containment; however, due to high winds oil and produced water misted outside of secondary containment. Following the discovery, mitigation activities were immediately initiated and to date, approximately 40 cubic yards of impacted material were removed and transported to the North Weld Waste Management Facility in Ault, Colorado for disposal under PDC waste manifests. During excavation activities, groundwater was encountered at approximately 7 feet below ground surface (bgs).

**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 April 7, 2022, one soil sample (SS01) was collected from the impacted source material area beneath the separator at approximately 6 inches bgs, and submitted for analysis of the full COGCC Table 915-1 analytical suite. Analytical results indicate that the COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH, benzantracene, chrysene, fluoranthene, pyrene, 1-M, 2-M, EC, SAR, and boron. Between April 7 and 18, 2022, twenty-eight soil samples (SS02-SS20, SS23-SS31) were collected from the release extent as well as sidewalls and base of the excavation, at depths ranging from 6 inches to 7 feet bgs and were submitted for laboratory analysis of the above referenced COCs. Additionally, soil sample (SS21) was submitted for laboratory analysis of pH, EC, SAR & boron. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 standards in the samples collected from the release extent and final excavation extent.

**Proposed Groundwater Sampling**

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

During excavation activities, groundwater was encountered at approximately 7 feet bgs. 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 indicate that organic compound concentrations were in exceedance of the COGCC Table 915-1 standards in sample GW01.

**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		NA / ND	
Number of soil samples collected	30	--	Highest concentration of TPH (mg/kg) 6800
Number of soil samples exceeding 915-1	6	--	Highest concentration of SAR 41.4
Was the areal and vertical extent of soil contamination delineated?	Yes		BTEX > 915-1 Yes
Approximate areal extent (square feet)	2250		Vertical Extent > 915-1 (in feet) 4
<b>Groundwater</b>			
Number of groundwater samples collected	1	--	Highest concentration of Benzene (µg/l) 120
Was extent of groundwater contaminated delineated?	No	--	Highest concentration of Toluene (µg/l) 690
Depth to groundwater (below ground surface, in feet)	7	--	Highest concentration of Ethylbenzene (µg/l) 84
Number of groundwater monitoring wells installed	0	--	Highest concentration of Xylene (µg/l) 700
Number of groundwater samples exceeding 915-1	1	NA	Highest concentration of Methane (mg/l)
<b>Surface Water</b>			
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 April 14, 2022, three background soil samples (BKG01) were collected at approximately 2 foot, 2.5 feet, and 4 feet, respectively, from native material topographically up-gradient of the tank battery and submitted for analysis of the COGCC Table 915-1 metals and soil suitability for reclamation. Preliminary analytical results indicated that arsenic, barium, cadmium, and selenium were in exceedance of the applicable regulatory standards in native soil.

On October 7, 2022, six background soil borings (BKG02 – BKG07) were advanced to a depth of approximately 6 inches bgs in native material surrounding the facility. Six samples were collected at a depth of approximately 0-6 inches bgs and were submitted to Summit Scientific Laboratory (Summit) for analysis of electrical conductivity (EC). Background analytical results indicated that EC concentrations were in compliance with the applicable COGCC Table 915-1 regulatory standards in native soil on site.

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

Volume of solid waste (cubic yards) 40      Volume of liquid waste (barrels) 0

Is further site investigation required?

On October 7, 2022, seven monitoring wells (BH01 – BH07) were installed to delineate dissolved-phase hydrocarbon impacts surrounding the former excavation extent (Figure 1). Lithologic descriptions and volatile organic compound (VOC) concentrations, measured using a photoionization detector (PID), were recorded for each borehole. The monitoring well and background soil boring locations are illustrated on Figure 1. Soil analytical results are summarized in Table 1. The GPS coordinates and field observed VOC concentrations are summarized in Table 2. The laboratory analytical report is included in Attachment A. The boring and well completion logs are included as Attachment B.

Additionally, based on analytical results received for samples collected during confirmation soil sampling activities in April 2022, further sampling is necessary to vertically and horizontally delineate EC exceedances recorded in soil samples SS07 and SS08, as well as, confirm the absence of hydrocarbon impacted material in the vicinity of soil sample SS04.

## 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 April 7 and 15, 2021, approximately 40 CY of impacted material were removed from the tank battery. All impacted material was transported to the North Weld Waste Management Facility for disposal under PDC waste manifests.

## 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.

Based on soil analytical results, 1-M and 2-M concentrations remain in exceedance of the applicable COGCC Table 915-1 regulatory standards in soil sample SS04. Monitored natural attenuation (MNA) will be the selected remediation strategy for the soil exceedance at this location. An assessment will be completed to confirm attenuation during EC delineation activities scheduled to be completed during the second quarter 2023.

Based on the analytical results received from the initial groundwater monitoring assessment, MNA was selected as the remediation strategy for this site during the fourth quarter 2022 and will remain the selected remediation strategy through the second quarter 2023.

## Soil Remediation Summary

In Situ

Ex Situ

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

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

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

If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_ 40

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

Name of Licensed Disposal Facility or COGCC Facility ID # \_\_\_\_\_

Yes \_\_\_\_\_ 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

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.

Based on the analytical data collected during source mass removal activities, PDC will conduct quarterly groundwater monitoring at the seven site monitoring wells (BH01 - BH07) until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (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.

First quarter 2023 analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all seven 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 in the June 2022 Initial Form 27 (Document No. 403169577). This section and estimate will be updated on an annual basis until closure criteria are achieved.

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 40

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 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.

The Fagerberg Pad is an active facility and there are no current plans for decommissioning or reclamation activities. This stated, following excavation activities, the location was backfilled, compacted, and re-contoured for tank battery operations to continue.

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. \_\_\_\_\_

Proposed date of completion of Reclamation. \_\_\_\_\_

## 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. 04/07/2022

Actual Spill or Release date, or date of discovery. 04/06/2022

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 04/07/2022

Proposed site investigation commencement. 04/07/2022

Proposed completion of site investigation. 06/30/2023

### REMEDIAL ACTION DATES

Proposed start date of Remediation. 04/06/2022

Proposed date of completion of Remediation. 06/27/2027

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:

Based on analytical results received for samples collected during confirmation soil sampling activities in April 2022, further sampling is necessary to vertically and horizontally delineate EC exceedances recorded in soil samples SS07 and SS08, as well as, confirm the absence of hydrocarbon impacted material in the vicinity of soil sample SS04. Site investigation activities are scheduled to be completed during the second quarter 2023.

**OPERATOR COMMENT**

This Supplemental Form 27 has been submitted to summarize quarterly groundwater monitoring activities and analytical results collected during the first quarter 2023 at the Fagerberg Pad location.

First quarter 2023 groundwater analytical results indicated that organic compound concentrations and inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards in all seven monitoring well locations for the second consecutive quarter.

Based on analytical results received for samples collected during confirmation soil sampling activities in April 2022, further sampling is necessary to vertically and horizontally delineate EC exceedances recorded in soil samples SS07 and SS08, as well as, confirm the absence of hydrocarbon impacted material in the vicinity of soil sample SS04. Site investigation activities are scheduled to be completed during the second quarter 2023.

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: 03/13/2023

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: RICK ALLISON

Date: 04/25/2023

Remediation Project Number: 24464

**COA Type**

**Description**

<u>COA Type</u>	<u>Description</u>
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**

403336604	FORM 27-SUPPLEMENTAL-SUBMITTED
403338180	MONITORING REPORT

Total Attach: 2 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)