

# 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:

403964334

Receive Date:

Report taken by:

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

### PROJECT, PURPOSE & SITE INFORMATION

#### PROJECT INFORMATION

Remediation Project #: 20066 Initial Form 27 Document #: 402802849

#### 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>WELL</u>	Facility ID: _____	API #: <u>123-25595</u>	County Name: <u>WELD</u>
Facility Name: <u>CHURCHILL 5</u>	Latitude: <u>40.374268</u>	Longitude: <u>-104.559313</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>NWNW</u>	Sec: <u>28</u>	Twp: <u>5N</u>	Range: <u>64W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

#### SITE CONDITIONS

General soil type - USCS Classifications SM Most Sensitive Adjacent Land Use Residential / Agriculture

Is domestic water well within 1/4 mile? No 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

Surface Water: Freshwater Pond - 478 feet E-SE, Occupied Buildings - 993 feet NW, Livestock - 0 feet (appears to be located within pastureland), FWS  
Wetlands: Freshwater Emergent Wetland (PEM1C) - 421 feet SE

Flowline conflict likely as wellhead is located within both pastureland and 1/4-mile bound of Bald Eagle Active Nest Site (1202.c NSO); flowline crosses unrelated flowline at approximately 565' from wellhead

## 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 ECMC Document No. 40289438	Confirmation Groundwater Sampling
Yes	SOILS	Refer to ECMC Document No. 40289438	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 20, 2021, field screening and confirmation soil sampling was conducted in accordance with the ECMC Rule 911 during the decommissioning and closure of the former Churchill 5 Wellhead (Figure 1) and associated flowline (Figure 2). During excavation activities, hydrocarbon impacted groundwater was encountered in the excavation at approximately 6 feet below ground surface (bgs). Analytical results for the excavation groundwater sample indicated that organic compound concentrations were in exceedance of the ECMC Table 915-1 standards.

### 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 20, 2021, wellhead decommissioning and confirmation sampling activities were completed at the Churchill 5 Wellhead. Two soil samples (WH01 and FLR01) were collected adjacent to the cut and capped well casing at approximately 6 feet bgs and below the flowline riser at approximately 3 feet bgs. The samples were submitted for the Table 915-1 Organic compounds in soil, TPH (C6-C36), and soil suitability for reclamation. Following the discovery of the release, soil sample WH01 was additionally submitted for analysis of Table 915-1 metals. Analytical results indicated that organic compound concentrations were below the applicable Table 915-1 Protection of Groundwater SSLs.

#### Proposed Groundwater Sampling

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

On October 20, 2021, one groundwater sample (GW05) was collected from the excavation. The groundwater sample was submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that organic compound concentrations were in exceedance of the ECMC Table 915-1 standards in sample GW05.

#### 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 20, 2021, soil encountered on-site and below production equipment was visually inspected and field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Per the approved proposed soil sampling plan, samples were collected below the flowline riser at the separator, along the flowline at significant direction changes and where the flowline is in close proximity to High Priority Habitats as well as between ground surface and 6 inches in the four cardinal directions surrounding the wellhead.

## SITE INVESTIGATION REPORT

### SAMPLE SUMMARY

**Soil**Number of soil samples collected 9Number of soil samples exceeding 915-1 3Was the areal and vertical extent of soil contamination delineated? NoApproximate areal extent (square feet) 25**Groundwater**Number of groundwater samples collected 1Was extent of groundwater contaminated delineated? NoDepth to groundwater (below ground surface, in feet) 6Number of groundwater monitoring wells installed 0Number of groundwater samples exceeding 915-1 1**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.

**NA / ND**ND Highest concentration of TPH (mg/kg)         -- Highest concentration of SAR 2.01BTEX > 915-1 NoVertical Extent > 915-1 (in feet) 6-- Highest concentration of Benzene (µg/l) 7.1-- Highest concentration of Toluene (µg/l) 13ND Highest concentration of Ethylbenzene (µg/l)         -- Highest concentration of Xylene (µg/l) 11NA Highest concentration of Methane (mg/l)         **OTHER INVESTIGATION INFORMATION**☐ Were impacts to adjacent property or offsite impacts identified?☒ Were background samples collected as part of this site investigation?

On October 22, 2021, two background soil sample (BKG01) were collected at approximately 3 feet and 6 feet bgs, respectively, and submitted for analysis of pH, arsenic, and selenium. Analytical results indicate arsenic and selenium were in exceedance of the applicable regulatory standards.

On August 12, 2022, three background soil borings (BKG02 – BKG04) were advanced to a depth of approximately 6 feet bgs in native material surrounding the former wellhead location. Six samples were collected at depths of approximately 3 feet and 6 feet bgs and were submitted for laboratory analysis of the Table 915-1 metals suite. Background analytical results indicated that arsenic and selenium concentrations were in exceedance of the applicable ECMC 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)         Volume of liquid waste (barrels)         ☒ Is further site investigation required?

On August 12, 2022, five monitoring wells (BH01 – BH05) were installed to delineate dissolved-phase hydrocarbon impacts within and adjacent to 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.

One soil sample was collected from each soil boring (BH01 – BH05) at the interval exhibiting the highest VOC concentration. Due to staining and slightly elevated PID readings observed in monitoring well BH01, one sample was also collected from clean material beneath the elevated readings. Six soil samples were collected at depths ranging from approximately 5 feet to 10 feet bgs and were submitted to Summit Scientific Laboratory for analysis of the full Table 915-1 analytical suite.

Soil analytical results indicated that organic compound concentrations, pH, electrical conductivity (EC), sodium adsorption ratio (SAR), and boron were in compliance with the applicable ECMC Table 915-1 regulatory standards in all monitoring well locations. Arsenic and selenium concentrations were in exceedance of the applicable regulatory standards in all monitoring well locations. Additionally, the barium concentration was in exceedance of the applicable regulatory standard in monitoring well BH03.

Based on these results, the arsenic and selenium concentrations recorded in soil samples collected from monitoring well BH01 are below or within 1.25x the background concentrations of background soil samples collected from similar depths. Additionally, based on the location of the point of compliance (POC) monitoring wells (BH02 – BH05), and the absence of organic compound detections or elevated EC and SAR, the arsenic, barium, and selenium concentrations recorded in these monitoring wells are representative of native soil conditions.

**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.

No investigative derived waste was generated as part of the Churchill 5 wellhead decommissioning and sampling activities. Any hydrocarbon impacted material generated in supplemental site investigative activities will be transported off-site to a licensed disposal facility in accordance with Rules 905 and 906.

## REMEDIAL ACTION 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 analytical data received from the initial groundwater monitoring event, monitored natural attenuation (MNA) was the selected remediation strategy for the third quarter 2022 and will remain the selected remediation strategy through the fourth quarter 2024.

Based on persisting benzene concentrations recorded in monitoring well BH01, PDC proposes to install a solar air sparge (AS) remediation system to address and remediate remaining dissolved-phase hydrocarbon impacts.

Four remediation AS wells will be advanced in cardinal directions around the former source area. The proposed remediation wells are illustrated on the attached Figure 1.

## Soil Remediation Summary

☐ In Situ

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

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

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

\_\_\_\_\_ Natural Attenuation

\_\_\_\_\_ Other \_\_\_\_\_

☐ Ex Situ

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

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

Name of Licensed Disposal Facility or ECMC 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 (BH01 - BH05) 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), 1,3,5-TMB, by EPA Method 8260B in accordance with Table 915-1. Per the approved Supplemental Form 27 (Document No. 403540311), total dissolved solids (TDS), chloride, and sulfate were removed from the quarterly sampling and analysis plan following the third quarter 2023. In the Fourth Quarter 2024, Chevron will analyze all environmental samples for full table 915-1 analytical suites.

Third quarter 2024 analytical results indicated that the benzene concentration was in exceedance of the applicable ECMC Table 915-1 regulatory standard in monitoring well BH01. Organic compound concentrations were in compliance with the applicable regulatory standards in the remaining four 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 third quarter 2023 Supplemental Form 27 (Document No. 403540311). 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: \$ 35000

### WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation? No

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

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

E&P waste (solid) description

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility:

Volume of E&P Waste (liquid) in barrels

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 wellhead and flowline 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. 10/20/2021

Proposed date of completion of Reclamation. 12/17/2026

## 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. 08/05/2021

Actual Spill or Release date, or date of discovery. 10/20/2021

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 09/27/2021

Proposed site investigation commencement. 09/27/2021

Proposed completion of site investigation. 08/12/2022

### REMEDIAL ACTION DATES

Proposed start date of Remediation. 11/01/2024

Proposed date of completion of Remediation. 12/17/2026

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:

The Implementation Schedule has been updated in the Remediation Action dates to reflect the proposed changes of the remedial strategy for this project. Following the approval of this form and land owner approval, a solar AS remediation system will be deployed to address persisting benzene concentrations recorded in monitoring well BH01.

## **OPERATOR COMMENT**

This Supplemental Form 27 has been submitted to summarize quarterly groundwater monitoring activities and analytical results collected during the third quarter 2024 at the former Churchill 5 wellhead location. A proposal for an active remediation strategy to address dissolved-phase hydrocarbon impacts at the site is also included in this Supplemental Form 27.

Third quarter 2024 analytical results indicated that the benzene concentration was in exceedance of the applicable ECMC Table 915-1 regulatory standard in monitoring well BH01. Organic compound concentrations were in compliance with the applicable regulatory standards in the remaining four monitoring well locations.

Based on persisting benzene concentrations recorded in monitoring well BH01, PDC is proposing to deploy a solar AS remediation system and advance four remediation AS wells in cardinal directions of the source monitoring well to address and remediate remaining dissolved-phase hydrocarbon impacts.

Following the approval of this form, land owner consent, and the approval of the EPA Underground Injection Control (UIC) - Class V Injection Well Permit for air sparging, the system will be set on location. Installation of the air sparge wells is scheduled for October 25, 2024 and it is anticipated that the system will be in operation by the end of the fourth quarter 2024.  
Supplemental Form 27s will be submitted on a quarterly schedule for this remediation project until closure criteria is achieved.

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

Signed: Andy Sagen

Title: Environmental Consultant

Submit Date: \_\_\_\_\_

Email: Tas-chevron-1@tasman-geo.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: \_\_\_\_\_

Date: \_\_\_\_\_

Remediation Project Number: 20066

### **COA Type**

### **Description**

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**

403964381	ANALYTICAL RESULTS
403965138	MONITORING REPORT
403994713	REMEDIAL ACTION PLAN

Total Attach: 3 Files

## **General Comments**

### **User Group**

### **Comment**

### **Comment Date**

Environmental	Operator submitted this form on 10/21/2024, ECMC returned it to draft on 11/14/2024 to consolidate extraneous reporting.	11/14/2024
---------------	--	------------

Total: 1 comment(s)