

State of Colorado
Energy & Carbon Management Commission

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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 COGCC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27. This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

Closure request is not available for an Initial Site Investigation and Remediation Workplan.

OPERATOR INFORMATION

Name of Operator: <u>PDC ENERGY INC</u>	Operator No: <u>69175</u>	Phone Numbers
Address: <u>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>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>	Twps: <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:

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> E&P Waste | <input type="checkbox"/> Other E&P Waste | <input type="checkbox"/> Non-E&P Waste |
| <input type="checkbox"/> Produced Water | <input type="checkbox"/> Workover Fluids | _____ |
| <input checked="" type="checkbox"/> Oil | <input type="checkbox"/> Tank Bottoms | |
| <input 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 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

Number of soil samples collected 30
Number of soil samples exceeding 915-1 6
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 2250

NA / ND

-- Highest concentration of TPH (mg/kg) 6800
-- Highest concentration of SAR 41.4
BTEX > 915-1 Yes
Vertical Extent > 915-1 (in feet) 4

Groundwater

Number of groundwater samples collected 1
Was extent of groundwater contaminated delineated? No
Depth to groundwater (below ground surface, in feet) 7
Number of groundwater monitoring wells installed 0
Number of groundwater samples exceeding 915-1 1

-- Highest concentration of Benzene (µg/l) 120
-- Highest concentration of Toluene (µg/l) 690
-- Highest concentration of Ethylbenzene (µg/l) 84
-- Highest concentration of Xylene (µg/l) 700
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 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.

On July 10, 2023, eight soil borings (SB01 - SB08) were advanced to a depth of approximately 5 feet bgs to delineate EC exceedances recorded during excavation activities as well as, confirm the absence of hydrocarbon impacted material in the vicinity of soil sample SS04. Lithologic descriptions and VOC concentrations, measured using a PID, were recorded for each borehole. Ten soil samples were collected at depths ranging from 6 inches to 1 foot below ground surface and were submitted for laboratory analysis of EC. Soil sample SB01 @ 0-6" was submitted for additional analysis of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, TPH (C6-C36), benz(a)anthracene, chrysene, fluoranthene, pyrene, 1-M, 2-M, SAR, and boron.

Soil analytical results indicated that EC was in compliance with the applicable COGCC Table 915-1 regulatory standard in all soil sample locations. Additionally, organic compound concentrations, SAR, and boron were in compliance with the applicable regulatory standards in soil sample SB01 @ 0-6". Based on the data, the organic exceedances recorded in soil sample SS04 have naturally attenuated and no further remediation is necessary. Furthermore, the original EC exceedances recorded in soil samples SS07 and SS12 could not be replicated and have been vertically and horizontally delineated below Table 915-1 standards. Following production facility decommissioning, confirmation soil sampling will take place to verify EC concentrations are in compliance with the applicable Soil Suitability for Reclamation standards and the location will be reclaimed in accordance with 1000 Series rules and regulations.

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) was the selected remediation strategy for the soil exceedance at this location. Based on soil analytical results received for samples collected during July 2023 site investigation activities, natural attenuation was successful and no further remediation is necessary,

Based on the analytical results received from the initial groundwater monitoring assessment, MNA was selected as the remediation strategy for this site between the fourth quarter 2022 and the third quarter 2023.

Soil Remediation Summary

In Situ

_____ Bioremediation (or enhanced bioremediation)

_____ Chemical oxidation

_____ Air sparge / Soil vapor extraction

Yes _____ Natural Attenuation

_____ Other _____

Ex Situ

Yes _____ Excavate and offsite disposal

_____ If Yes: Estimated Volume (Cubic Yards) _____ 40

_____ Name of Licensed Disposal Facility or COGCC Facility ID # _____

_____ Excavate and onsite remediation

_____ Land Treatment

_____ Bioremediation (or enhanced bioremediation)

_____ Chemical oxidation

_____ Other _____

Groundwater Remediation Summary

_____ Bioremediation (or enhanced bioremediation)

_____ Chemical oxidation

_____ Air sparge / Soil vapor extraction

Yes _____ Natural Attenuation

_____ Other _____

GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

On October 13, 2022, PDC initiated quarterly groundwater monitoring at the seven site monitoring wells (BH01 - BH07) at the Fagerberg Pad location. Groundwater samples were 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.

During the third quarter 2023, four consecutive quarters of organic compound concentrations and inorganic parameters in compliance with the applicable COGCC Table 915-1 regulatory standards were achieved.

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). Closure criteria for this location has been achieved and no further remediation is required at this time.

Operator anticipates the remaining cost for this project to be: \$ 1000

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? Yes

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? Yes

Does the previous reply indicate consideration of background concentrations? Yes

Does Groundwater meet Table 915-1 standards? Yes

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. 07/10/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 04/06/2022

Proposed date of completion of Remediation. 07/10/2023

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 July 2023 supplemental site investigation activities, the organic exceedances recorded in soil sample SS04 have naturally attenuated and no further remediation is necessary. Furthermore, the original EC exceedances recorded in soil samples SS07 and SS12 could not be replicated and have been vertically and horizontally delineated below Table 915-1 standards. Consequently, PDC is requesting a No Further Action (NFA) determination for this remediation project. Following production facility decommissioning, confirmation soil sampling will take place to verify EC concentrations are in compliance with the applicable Soil Suitability for Reclamation standards and the location will be reclaimed in accordance with 1000 Series rules and regulations.

OPERATOR COMMENT

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

During the third quarter 2023, four consecutive quarters of organic compound concentrations and inorganic parameters in compliance with the applicable COGCC Table 915-1 regulatory standards were achieved.

Soil analytical results received for samples collected during July 2023 supplemental site investigation activities indicated that EC was in compliance with the applicable COGCC Table 915-1 regulatory standard in all soil sample locations. Additionally, organic compound concentrations, SAR, and boron were in compliance with the applicable regulatory standards in soil sample SB01 @ 0-6".

Based on the data, the organic exceedances recorded in soil sample SS04 have naturally attenuated and no further remediation is necessary. Furthermore, the original EC exceedances recorded in soil samples SS07 and SS12 could not be replicated and have been vertically and horizontally delineated below Table 915-1 standards. Consequently, PDC is requesting a No Further Action (NFA) determination for this remediation project. Following production facility decommissioning, confirmation soil sampling will take place to verify EC concentrations are in compliance with the applicable Soil Suitability for Reclamation standards and the location will be reclaimed in accordance with 1000 Series rules and regulations.

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: _____

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: _____

Date: _____

Remediation Project Number: 24464

COA Type

Description

0 COA	

Attachment Check List

Upon approval, the approved Form 27 and all listed attachments will be indexed to the Remediation Project file. Only the approved Form 27 will also be indexed to the related Facilities.

Att Doc Num

Name

403501112	ANALYTICAL RESULTS
403501114	ANALYTICAL RESULTS

Total Attach: 2 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)