

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: PDC ENERGY INC	Operator No: 69175	Phone Numbers
Address: 1099 18TH STREET SUITE 1500		Phone: (303) 860-5800
City: DENVER State: CO Zip: 80202		Mobile: ()
Contact Person: Karen Olson	Email: taspillremediationcontractor@pdce.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 19634 Initial Form 27 Document #: 402756652

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

Yes Multiple Facilities

Facility Type: WELL	Facility ID: _____	API #: 123-14039	County Name: WELD
Facility Name: VONFELDT 13-12	Latitude: 40.495307	Longitude: -104.618470	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: SWSW	Sec: 12	Twp: 6N	Range: 65W Meridian: 6 Sensitive Area? Yes
Facility Type: LOCATION	Facility ID: 327034	API #: _____	County Name: WELD
Facility Name: VONFELDT-66N65W 12SWSW	Latitude: 40.495244	Longitude: -104.618768	
** correct Lat/Long if needed: Latitude: 40.495086		Longitude: -104.618131	
QtrQtr: SWSW	Sec: 12	Twp: 6N	Range: 65W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SM

Most Sensitive Adjacent Land Use Agriculture

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

Tank Battery: Nearest Well: Domestic - 1,565 feet NW, Surface Water: Unnamed Freshwater Pond - 45 feet SW / Willow Creek #2 - 54 feet SE, Occupied Buildings: 161 feet SSW / 707 feet SW, Livestock: 854 feet SW, FWS Wetlands: Freshwater Pond (PUBFx) - 45 feet SW / Riverine (R4SBCx) - 54 feet SE

Wellhead: Nearest Well: Domestic - 1,430 feet NW, Surface Water: Unnamed Freshwater Pond - 92 feet S, Occupied Buildings: 162 feet SSW / 706 feet SW, Livestock: 808 feet SW, FWS Wetlands: Freshwater Pond (PUBFx) - 92 feet SW

Flowline conflict possible as both wellhead and flowline are located <100 feet from surface water and FWS wetlands

Flowline conflict possible as tank battery is located <100 feet from surface water and FWS wetlands

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
No	GROUNDWATER	Refer to Table 5, Figures 1 & 2	Confirmation Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4, Figures 1 & 2	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 September 2, 2021, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the former Von Feldt 13-12 wellhead, associated flowline, and tank battery. During decommissioning activities, historic hydrocarbon impacts were discovered at the wellhead. Following this discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. During excavation activities, groundwater was encountered in the excavation at approximately 6 feet below ground surface (bgs). Approximately 8 cubic yards (cy) of impacted material were excavated and transported to the North Weld Waste Management Facility for disposal under PDC waste 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):

On September 2, 2021, two soil samples (WH01 & WH01-N) were collected from the impacted source material at approximately 6 feet and 5 feet bgs, respectively, and were submitted for laboratory analysis of the full COGCC Table 915-1 analytical suite. Analytical results indicated that contaminants of concern (COC) include: benzene, toluene, ethylbenzene, xylene(s) (BTEX), 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, naphthalene (N), total petroleum hydrocarbons (TPH), arsenic, barium, lead, and selenium. Additionally on September 2, 2021, three (3) soil samples (WH01-[direction]) were collected from the remaining three sidewalls of the excavation at approximately 5 feet bgs and were submitted for laboratory analysis of BTEX, 1,2,4-TMB, 1,3,5-TMB, N, and TPH. In addition, one soil sample (FLR01) was collected at approximately 2.5' bgs adjacent to the flowline riser and submitted for laboratory analysis of Table 915-1 organic constituents, ph, EC, SAR, and boron.

Proposed Groundwater Sampling

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

On September 2, 2021, one groundwater sample (GW01) was collected from the wellhead excavation and submitted for laboratory analysis of BTEX, N, 1,2,4-TMB and 1,2,5-TMB. Analytical results indicated that all analyzed constituents were below the applicable COGCC Table 195-1 Standards. The groundwater sample location is illustrated on Figure 2 and the analytical results are summarized on Wellhead Table 5.

During tank battery decommission activities, groundwater was encountered below the separator and produced water vessel at approx. 3 ft. to 4 ft bgs. Consequently, groundwater samples (GW01 - GW03) were collected below the separator flowline, separator dump line, and produced water vessel, respectively. All three samples were submitted for laboratory analysis of BTEX, N, 1,2,4-TMB and 1,2,5-TMB. Analytical results indicated that all analyzed constituents were below the applicable COGCC Table 195-1 Standards.

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 September 2, 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 adjacent to the cut and capped wellhead, between ground surface and 6 inches in the four cardinal directions surrounding the wellhead, below and/or adjacent to the separator flowline and dump line (SEP01-FL, SEP01-DL), the base and sidewalls of the produced water vessel (PWV01-B, PWV01-[direction]), and below the AST (AST01). The samples were submitted for laboratory analysis of BTEX, naphthalene, 1, 2, 4- TMB, 1, 3, 5-TMB, and TPH (C6-C36). In addition, the samples collected adjacent to the produced water vessel were submitted for laboratory analysis of pH, EC, SAR, and boron.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 11

Number of soil samples exceeding 915-1 6

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

Approximate areal extent (square feet) 280

NA / ND

ND Highest concentration of TPH (mg/kg) _____

-- Highest concentration of SAR 0.221

BTEX > 915-1 No

Vertical Extent > 915-1 (in feet) 6

Groundwater

Number of groundwater samples collected 4

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet) 3

Number of groundwater monitoring wells installed 0

Number of groundwater samples exceeding 915-1 0

ND Highest concentration of Benzene (µg/l) _____

ND Highest concentration of Toluene (µg/l) _____

ND Highest concentration of Ethylbenzene (µg/l) _____

-- Highest concentration of Xylene (µg/l) 29

NA Highest concentration of Methane (mg/l) _____

Surface Water

0 Number of surface water samples collected

0 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 September 2, 2021, two background soil sample (BKG01) were collected at approximately 5 feet and 6 feet bgs and submitted for analysis of pH, EC, SAR and the Table 915-1 Metals Suite. Analytical results indicate pH, arsenic, and selenium were in exceedance of the applicable regulatory standards.

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

Volume of solid waste (cubic yards) 8

Volume of liquid waste (barrels) 0

Is further site investigation required?

On January 21, 2022, five (5) monitoring wells (BH01-BH05) were installed via direct-push drilling methods to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole.

Additionally, on January 21, 2022, two background soil borings (BKG02-BKG03) were advanced to a depth of approximately 7 feet bgs to assess metal concentrations in native soil on site. Ten (10) soil samples were collected from depths ranging from 3 feet to 7 feet bgs and were submitted for laboratory analysis of the COGCC Table 915-1 Metals Suite. Analytical results indicated that arsenic, barium, and selenium concentrations were above the applicable regulatory standards in both background soil boring locations. In addition, arsenic, barium, lead, and selenium exceedances observed in samples collected from the final excavation extent were below 1.25x the background concentrations and indicative 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.

On September 2, 2021, approximately 8 CY of impacted material were removed from the excavation and transported to the North Weld Waste Management Facility in Ault, Colorado 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.

Based on analytical results and field data observed during source mass removal and monitoring well installation activities, monitored natural attenuation (MNA) was the selected remediation strategy between the first quarter 2022 and the second quarter 2023.

Soil Remediation Summary

<input type="checkbox"/> In Situ _____ Bioremediation (or enhanced bioremediation) _____ Chemical oxidation _____ Air sparge / Soil vapor extraction _____ Natural Attenuation _____ Other _____	<input checked="" type="checkbox"/> Ex Situ Yes _____ Excavate and offsite disposal If Yes: Estimated Volume (Cubic Yards) _____ 8 Name of Licensed Disposal Facility or COGCC Facility ID # _____ _____ Excavate and onsite remediation _____ Land Treatment _____ Bioremediation (or enhanced bioremediation) _____ Chemical oxidation _____ Other _____
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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 January 28, 2023, groundwater monitoring was initiated at the five site monitoring wells (BH01-BH05) at the former Von Feldt 13-12 wellhead 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. Per the approved Supplemental Form 27 (Document No. 403210939), BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB were removed from the quarterly sampling and analysis plan following the fourth quarter 2022.

Due to seasonal dry conditions and insufficient water columns, samples were not collected from monitoring wells BH01 and BH05 during the second quarter 2023 groundwater monitoring event. Second quarter 2023 analytical results indicated that inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards or within background concentrations in all sampled monitoring well locations.

In addition, sulfate and chloride anion concentration trends were examined over time and compared to historic background data and groundwater flow direction. Based on the results, TDS and anion concentrations in all monitoring wells were below the 125% threshold of the historic maximum background concentration during all six quarterly sampling events. Based on this data and the absence of organic impacts on site following excavation activities, PDC is requesting a No Further Action (NFA) determination for this remediation project.

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 reported on the second quarter 2022 Supplemental Form 27 (Document No. 403067993) 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 8

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.

Following facility decommissioning and excavation activities, the location was backfilled, compacted, and re-contoured to match pre-existing conditions. The location will be reclaimed in accordance with the COGCC 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. 10/05/2021

Proposed date of completion of Reclamation. 04/25/2024

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. 06/25/2021

Actual Spill or Release date, or date of discovery. 09/02/2021

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 08/16/2021

Proposed site investigation commencement. 08/16/2021

Proposed completion of site investigation. 03/31/2022

REMEDIAL ACTION DATES

Proposed start date of Remediation. 09/02/2021

Proposed date of completion of Remediation. 04/25/2023

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:

During the second quarter 2023, six consecutive quarters of inorganic parameters within the 125% threshold of the historic maximum background concentrations were achieved. Based on the data, no further remediation is required at this time.

OPERATOR COMMENT

This Supplemental Form 27 was submitted to summarize quarterly groundwater monitoring activities and analytical results collected during the second quarter 2023 at the former Von Feldt 13-12 wellhead location.

Second quarter 2023 groundwater analytical results indicated that inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards or within 1.25x background concentrations in all sampled monitoring well locations.

In addition, sulfate and chloride anion concentration trends were examined over time and compared to historic background data and groundwater flow direction. Based on the results, TDS and anion concentrations in all monitoring wells were below the 125% threshold of the historic maximum background concentration during all six quarterly sampling events. Based on this data, the absence of organic impacts on site following excavation activities, and the site being down-gradient of agricultural operations, PDC is requesting a No Further Action (NFA) determination for this remediation project.

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: 06/01/2023

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: 06/15/2023

Remediation Project Number: 19634

COA Type

Description

	<p>Based on the information presented, it appears that no further remedial action is necessary at this time and the COGCC approves the closure request. However, should future conditions at the site indicate contaminant concentrations in soils exceeding COGCC standards or if groundwater is found to be impacted, then further investigation and/or remediation activities may be required.</p> <p>The surface area disturbed by the remediation activity shall be reclaimed in accordance with the 1000 Series Reclamation Rules. For locations with active ongoing oil and gas operations, comply with Rule 1003 interim reclamation requirements and for locations that will no longer have active oil and gas operations, comply with Rule 1004 Final Reclamation requirements.</p>
1 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.

<u>Att Doc Num</u>	<u>Name</u>
403402131	INVESTIGATION/REMEDATION WORKPLAN (SUPPLEMENTAL)
403414081	GROUND WATER ELEVATION MAP
403414082	GROUND WATER SAMPLE LOCATION
403419480	ANALYTICAL RESULTS
403434606	FORM 27-SUPPLEMENTAL-SUBMITTED

Total Attach: 5 Files

General Comments

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

Total: 0 comment(s)