

State of Colorado
Energy & Carbon Management Commission

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

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 21647 Initial Form 27 Document #: 402905269

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 #: 123-21776	County Name: WELD
Facility Name: ECKHARDT 43-34	Latitude: 40.354020	Longitude: -104.528640	
** correct Lat/Long if needed: Latitude: 40.354040		Longitude: -104.528645	
QtrQtr: NESE	Sec: 34	Twp: 5N	Range: 64W Meridian: 6 Sensitive Area? Yes

Facility Type: SPILL OR RELEASE	Facility ID: 481771	API #: _____	County Name: WELD
Facility Name: Eckhardt 43-34	Latitude: 40.354042	Longitude: -104.528648	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: NESE	Sec: 34	Twp: 5N	Range: 64W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SM

Most Sensitive Adjacent Land Use Residential /
Agricultural

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

Nearest Well: Domestic - 1,320' N; Surface Water: Irrigation Ditch - 575' S; Occupied Building: 655' SE; Livestock: 0' (Within Pasture); FWS Wetlands: 575' S Riverine (R5UBFx).

Flowline conflict - Flowline crosses under irrigation ditch approximately 645' SSE of the wellhead; flowline then runs east towards the tank battery.

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 Doc 403478996	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.

Between March 11 and 14, 2022, field screening and confirmation soil sampling was conducted in accordance with the ECMC Rule 911 during the decommissioning of the Eckhardt 43-34 wellhead (Figure 1). Based on observed soil staining and olfactory impacts, it was determined that a historic release was discovered adjacent to the former wellhead. Additionally, during the in-situ abandonment of the flowline, soil staining and olfactory impacts were observed, it was determined that a historic release was discovered adjacent to the separator flowline riser. Following the discovery of the releases, mitigation activities were initiated and to date, approximately 8 cubic yards of impacted material was removed at the wellhead and 10 cubic yards of impacted material was removed adjacent to the separator flowline riser. All material removed was transported to the North Weld Waste Management Facility in Ault, CO for disposal under PDC waste manifests. During excavation activities, groundwater was encountered at adjacent to the wellhead at approximately 6.5 feet bgs and approximately 5.5 feet bgs adjacent to the separator flowline riser. Groundwater vacuum recovery was not conducted during excavation activities.

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 March 11, 2022, one soil sample (SS01) was collected from the impacted source material adjacent to the wellhead at 6 feet bgs and submitted for laboratory analysis of the full ECMC Table 915-1 analytical suite. Analytical results indicate that the COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), arsenic and lead, based upon analytical results. Additionally on March 11, 2022, ten (10) soil samples were collected from the sidewalls and base of the excavation and submitted for laboratory analysis of the above mentioned COCs. Analytical results indicate that organic constituents were below the applicable ECMC Table 915-1 standards. One soil sample (SS11) was collected from the sidewall of the final excavation extent at approximately 2.5 feet bgs to evaluate soil suitability for reclamation.

Proposed Groundwater Sampling

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

On March 11, 2022, during excavation activities, groundwater was encountered adjacent to the wellhead at approximately 6.5 feet bgs. Consequently, 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 indicated that organic compound concentrations were below the Protection of Groundwater SSLs in sample GW01. No groundwater was recovered during excavation activities.

On March 14, 2022, during excavation activities, groundwater was encountered adjacent to the separator at approximately 5.5 feet bgs. Consequently, 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 indicated that 1,2,4-TMB concentrations were in exceedance of the Protection of Groundwater SSLs in sample GW01. No groundwater was recovered during excavation activities.

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):

On March 14, 2022, one soil sample (SS01) was collected from the impacted source material adjacent to the separator flowline riser at 4 feet bgs and submitted for laboratory analysis of the full ECMC Table 915-1 analytical suite. Analytical results indicate that the COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), chrysene, fluorene, pyrene, 1-M and 2-M, based upon analytical results. Additionally on March 14, 2022, seven (7) soil samples were collected from the sidewalls and base of the excavation and submitted for laboratory analysis of the above mentioned COCs. Analytical results indicate that organic constituents were in exceedance of the applicable ECMC Table 915-1 standards in multiple base and sidewall samples. Excavation activities were temporarily discontinued due to the active status of the tank battery.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 102

Number of soil samples exceeding 915-1 71

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

Approximate areal extent (square feet) 300

NA / ND

-- Highest concentration of TPH (mg/kg) 2780

-- Highest concentration of SAR 14.3

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 13

Groundwater

Number of groundwater samples collected 2

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 6

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) 17

-- Highest concentration of Xylene (µg/l) 37

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 3/11/22, three background soil samples (BKG01) were collected at approximately 2.5 feet, 4 feet, and 6 feet bgs from native material adjacent to the wellhead. Analytical results indicated that SAR, arsenic, barium, and selenium were in exceedance of the applicable regulatory standards in native soil adjacent to the wellhead.

On 10/10/22, twenty background soil samples (BKG02-BKG06) were collected at depths ranging from between 2.5 feet and 7 feet bgs from native material adjacent to the wellhead. Analytical results indicated that arsenic, barium, and selenium were in exceedance of the applicable regulatory standards in native soil adjacent to the wellhead.

On 01/17/24, six background soil samples (BKG07) were collected at depths ranging from between 3.5 feet and 13 feet bgs from native material adjacent to the wellhead. Analytical results indicated that arsenic and lead were in exceedance of the applicable regulatory standards in native soil adjacent to the wellhead.

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

Volume of solid waste (cubic yards) 18

Volume of liquid waste (barrels) 0

☒ Is further site investigation required?

Based on the final analytical results for soil samples collected during the supplemental site investigations arsenic and lead constituents remain in exceedance of the Table 915-1 Protection of Groundwater Site Soil Screening Levels (SSLs) in multiple locations. However, all soils are within background concentrations or below EPA Residential Screening Levels (RSLs) for lead. PDC is proposing to use the five (5) existing groundwater monitoring wells onsite, BH01-BH05, to collect one additional round of groundwater samples from each monitoring well and submit the five (5) samples for laboratory analysis of dissolved arsenic and dissolved lead (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 and 14, 2022, approximately 8 cubic yards of impacted material was removed at the wellhead and 10 cubic yards of impacted material was removed adjacent to the separator flowline riser. All material removed was transported to the North Weld Waste Management Facility in Ault, CO for disposal under PDC waste manifests. No groundwater was recovered during excavation activities.

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 analytical results and per the COA issued on Supplemental Form 27 Document No. 403221432, on March 29, 2023, nine soil borings (SB01-SB09) were advanced to approximately 7 feet and 10 feet bgs to vertically and horizontally delineate arsenic and lead exceedances recorded during excavation activities. Volatile organic compounds (VOCs) using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole. Forty-two (42) soil samples were collected from the soil borings at depths ranging from 4 feet to 10 feet bgs and were submitted to Summit Scientific Laboratory for analysis of arsenic and lead. Soil analytical results indicated that arsenic and/or lead concentrations were in exceedance of the applicable ECMC Table 915-1 regulatory standards in 36 sample locations.

Consequently, January 17-18, 2024, forty-five (45) soil samples were collected from thirteen (13) soil borings (SB10-SB22) advanced within and adjacent to the wellhead final excavation extent to vertically and horizontally delineate arsenic and lead exceedances observed during excavation and previous SSI activities. VOCs using a PID and lithologic descriptions were recorded for each borehole. Soil samples were collected at depths ranging from between 2 feet and 13 feet bgs and were submitted to Summit Scientific for laboratory analysis of arsenic and/or lead. Soil analytical results indicated that arsenic and/or lead concentrations in 31 of the 45 soil samples were in exceedance of the applicable ECMC Table 915-1 regulatory standards and/or above the calculated average arsenic or lead background concentrations, multiplied by 1.25.

Soil Remediation Summary

☐ In Situ

☒ Ex Situ

Bioremediation (or enhanced bioremediation)

Yes Excavate and offsite disposal

Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) 18

Air sparge / Soil vapor extraction

Name of Licensed Disposal Facility or ECMC 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

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 21, 2022, groundwater monitoring was initiated at the five site monitoring wells (BH01 - BH05) at the former Eckhardt 43-34 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 in accordance with Table 915-1. Per the approved Supplemental Form 27 (Document No. 403221432), chloride and sulfate anions and TDS were removed from the quarterly sampling and analysis plan following the fourth quarter 2022.

During the third quarter 2023, four consecutive quarters of organic compound concentrations in accordance with the applicable ECMC Table 915-1 regulatory standards were achieved. Consequently, PDC was granted the request to discontinue groundwater monitoring at this remediation project per ECMC document no. 403478996.

PDC is proposing to use the five (5) existing groundwater monitoring wells onsite, BH01-BH05, to collect one additional round of groundwater samples from the monitoring wells and submit the five (5) samples for laboratory analysis of dissolved arsenic and dissolved lead (Figure 4).

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☒ Quarterly☐ Semi-Annually☐ Annually☒ Other

Confirmation Sample Summary, Supplemental Site Investigation Proposal, & Timeline Update

☐ 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, & Timeline Update

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.

Wellhead:

- Investigation and delineation has been completed for organics in soil. Metals delineation is ongoing.
- Source mass removal has been completed.
- Monitoring wells were installed, and groundwater closure criteria was achieved during the third quarter 2023.
- 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: \$ 10000

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 18

E&P waste (solid) description Hydrocarbon impacted soils

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: North Weld Waste Management Facility

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

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 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. 01/10/2022

Proposed date of completion of Reclamation. 04/01/2029

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. 11/18/2021

Actual Spill or Release date, or date of discovery. 03/11/2022

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 01/10/2022

Proposed site investigation commencement. 05/01/2024

Proposed completion of site investigation. 09/30/2024

REMEDIAL ACTION DATES

Proposed start date of Remediation. 03/11/2022

Proposed date of completion of Remediation. 04/01/2029

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 the soil analytical results and the need for supplemental site investigation activities, the proposed date of site investigation commencement and the proposed date of the completion of site investigation was adjusted to span through the third quarter of 2024.

OPERATOR COMMENT

This Supplemental Form 27 was drafted to summarize confirmation soil sampling field activities and analytical results, as well as native material soil sampling analytical results, conducted at the former Eckhardt 43-34 wellhead location.

Following receipt and evaluation of analytical results, new peak background concentrations were observed for both arsenic (14.0 mg/kg) and lead (15.1 mg/kg) in native material soil sample BKG07. During the January 2024 supplemental site investigation (SSI) elevated arsenic and lead concentrations were again identified in exceedance of the ECMC Table 915-1 Protection of Groundwater SSLs at the site (Tables 1 & 4).

Although soil samples onsite remain in exceedance of applicable background concentrations and/or Table 915-1 Protection of Groundwater SSLs for arsenic and lead, all confirmation and SSI soil samples collected and analyzed for lead at the site are below EPA RSLs. To confirm groundwater is protected and in accordance with the previously issued Condition of Approval (COA) on Supplemental Form 27 document #403478996, PDC is proposing to use the five (5) existing temporary groundwater monitoring wells onsite, BH01-BH05, to collect one additional round of groundwater samples from the temporary monitoring wells (Figure 4). The five (5) groundwater samples will be submitted for laboratory analysis of dissolved arsenic and dissolved lead. Should analytical results indicate dissolved arsenic and dissolved lead concentrations are below applicable domestic water or agricultural standards, protection of groundwater will be demonstrated. Consequently, PDC will request a No Further Action (NFA) Request for this location.

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: Remediation Advisor

Submit Date: _____

Email: taspillremediationcontractor@pdce.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: 21647

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
403754601	SOIL SAMPLE LOCATION MAP
403754605	SOIL SAMPLE LOCATION MAP
403754623	SOIL SAMPLE LOCATION MAP
403754627	GROUND WATER SAMPLE LOCATION
403756966	ANALYTICAL RESULTS
403756991	LOGS
403756999	PHOTO DOCUMENTATION

Total Attach: 7 Files

General Comments

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)