

State of Colorado
Energy & Carbon Management Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203

Phone: (303) 894-2100 Fax: (303) 894-2109



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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: (970) 313-5582
City: DENVER	State: CO	Zip: 80202
Contact Person: Jason Davidson	Email: jason.davidson@chevron.com	Mobile: ()

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 9949 Initial Form 27 Document #: 200440744

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: TANK BATTERY	Facility ID: 426021	API #: _____	County Name: WELD
Facility Name: NELSON TANK BATTERY	Latitude: 40.347560	Longitude: -104.907030	
	** correct Lat/Long if needed: Latitude: 40.347524	Longitude: -104.906878	
QtrQtr: NENE	Sec: 5	Twp: 4N	Range: 6W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SM Most Sensitive Adjacent Land Use 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 Surface Water - Unnamed Ditch 375' NE

Nearest Occupied Building - 350' N

Additional Occupied Buildings - 640' N, 800' NW

Site lies at the edge of a Bald Eagle Active Nest Half Mile Buffer and Bald Eagle Roost Site Buffer

Mule Deer Winter Concentration Area Buffer - 560' E

Mule Deer Severe Winter Range Buffer - 320' E

No other potential receptors are located within 1/4 mile of the Site

Above distances are approximations

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 Tables 1-2 and Figure 4	Quarterly Groundwater Sampling
Yes	SOILS	210' x 150' x 12' deep	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.

Following the removal of the produced water vault, impacted soils were observed. The prior Operator conducted excavation activities to remove the impacted soils. Groundwater was encountered during the excavation activities. Supplemental investigation activities were conducted to delineate the extent of the soil and groundwater impacts.

Between November 15 and December 2, 2021, approximately 3,232 cubic yards of impacted soil were removed and transported to Waste Management's North Weld Landfill in Ault, Colorado for disposal under PDC waste manifests. In addition, approximately 5,720 barrels of impacted groundwater were removed from the excavation and transported to a NGL disposal facility 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):

Excavation source soil sample (EX-01 @7') was submitted for laboratory analysis of the full COGCC Table 915-1 analyte list. Analytical results indicate that contaminants of concern (COCs) include BTEX, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, TPH (C6-C36), naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, and arsenic. Sixty-nine (69) soil samples (EX-01 – EX-36) were collected from the base and sidewalls (saturated and unsaturated zones) of the excavation extent at depths ranging between 6 and 14 feet bgs and were submitted for laboratory analysis of the above referenced COCs. In addition, two soil samples (EX-37 and EX-38) were collected at a depth of approximately 2.5 feet bgs and submitted for laboratory analysis of soil suitability for reclamation.

Proposed Groundwater Sampling

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

On December 2, 2021, one groundwater sample (GW-01) was collected from the excavation and submitted for laboratory analysis of BTEX. Analytical results indicate that groundwater sample GW-01 was in compliance with the applicable ECOM Table 915-1 cleanup concentrations for Organic Compounds.

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 69
Number of soil samples exceeding 915-1 56
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 31500

NA / ND

-- Highest concentration of TPH (mg/kg) 1426
NA Highest concentration of SAR
BTEX > 915-1 Yes
Vertical Extent > 915-1 (in feet) 12

Groundwater

Number of groundwater samples collected 4
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 8
Number of groundwater monitoring wells installed 8
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)
ND Highest concentration of Xylene (µg/l)
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 12/2/2021, 8 background samples were collected from native material on Site between depths of approximately 2.5 feet and 14 feet bgs and submitted for laboratory analysis of arsenic. Analytical results indicated that all 8 samples exceeded the COGCC Table 915-1 Protection of Groundwater Soil Screening Level Concentration (GWSSL) for arsenic.

On 4/19/2023, 6 additional background samples were collected from native material off the location and submitted for laboratory analyses of arsenic. Analytical results indicated that all 6 background samples exceeded the GWSSL for arsenic. The concentration of arsenic in background sample BG-SW 6 Ft was higher than any other arsenic concentration on or off the location. Therefore, elevated arsenic concentrations are attributed to background levels and have been disregarded.

☐ 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?

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.

Initial source removal was completed via excavation by a previous operator in December 2016. Approximately 600 cubic yards of impacted soil were excavated, and 150 pounds of granular carbon and 150 pounds of gypsum amendment placed in the excavation before backfilling the excavation (document # 2527567).

Between November 15 and December 2, 2021, approximately 3,232 cubic yards of impacted soil were removed and transported to Waste Management's North Weld Landfill in Ault, Colorado for disposal under PDC waste manifests. In addition, approximately 5,720 barrels of impacted groundwater were removed from the excavation and transported to a NGL Energy Partners disposal facility under PDC waste manifests.

Landowner approval to excavate the northern portion of the impacted area was received in April 2023 subsequent to the November/December 2021 excavation work.

Between April 18 and April 25, 2023, approximately 1,510 cubic yards of impacted soil were removed and transported to Waste Management's North Weld Landfill in Ault, Colorado for disposal under PDC waste manifests. In addition, approximately 930 barrels of impacted groundwater were removed from the excavation and transported to an NGL disposal facility under PDC waste manifests. Copies of the waste manifests are available upon request.

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.

Between 11/25-21/21, discrete soil confirmation samples were collected from the final excavation extents to the north from the sidewalls (unsaturated and saturated intervals) and from the base. The samples were submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, TPH (C6-C36), 1-methylnaphthalene (MNA), 2-MNA, and arsenic, the COCs identified per director approval.

Between 4/18-25/23, discrete soil confirmation samples were collected from the final excavation sidewalls (saturated and unsaturated intervals) as well as the floor of the excavation. The soil samples were submitted to Summit Scientific for laboratory analyses of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, TPH (C6-C36), 1-MNA, 2-MNA, acenaphthene, anthracene, benzo(a)-anthracene, benzo(b)-pyrene, chrysene, dibenzo(a,h)-anthracene, fluorene, pyrene, and arsenic as the previously approved contaminants of concern in Form 27 Supplemental Doc. #402997148. The data indicate that organic constituents in the soil have been adequately excavated and removed from the Site. These data are summarized in the attached Tables 1 - 3 and illustrated on the attached Figures 3 - 5. Also illustrated on these figures are the extent of excavation completed by Eagle Environmental in Nov./Dec. 2021, as well as the extent of excavation completed by Fremont Environmental in April 2023. A photo log and the laboratory analytical reports are attached.

Additional background soil samples were collected from native material off the location and submitted for laboratory analyses of arsenic. As shown in Table 3, arsenic concentrations are elevated in all 61 samples; however, the concentration of arsenic in background sample BG-SW 6 Ft was higher than any other arsenic concentration on or off the location. Therefore, elevated arsenic concentrations are attributed to background levels and have been disregarded.

Monitored natural attenuation (MNA) was selected as the remediation strategy for this Site.

Soil Remediation Summary

☒ In Situ

Yes Bioremediation (or enhanced bioremediation)

Chemical oxidation

Air sparge / Soil vapor extraction

Natural Attenuation

Other

☒ Ex Situ

Yes Excavate and offsite disposal

If Yes: Estimated Volume (Cubic Yards) 5342

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

Yes Other Mobile air sparge/fluid recovery

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.

Groundwater monitoring will continue on a quarterly basis at the 8 replacement monitoring wells. Groundwater samples will be submitted for laboratory analyses of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB by EPA Method 8260D and inorganics including total dissolved solids (TDS), sulfates, and chlorides in accordance with Table 915-1 approved methods.

Groundwater samples were collected on 12/4/2024. As shown on Tables 1 and 2 and illustrated on Figure 4, all constituents were less than their respective Table 915-1 standards for organics. Four monitoring wells were inaccessible on the sampling date since the landowner had placed a large pile of cow manure on top of the wells; these conditions are unchanged from the 9/4/2024 sampling event.

Groundwater sampling and analysis will continue until four consecutive ECMC-compliant quarters have been achieved. At that time, a no further action (NFA) determination will be requested. If all the monitoring wells had been accessible during the September and December 2024 sampling events, it is likely that organic constituents would have exhibited four consecutive quarters of compliant concentrations.

The next quarterly round of sampling is scheduled for March 2025.

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.

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.

- Source mass removal is complete.
- Eight groundwater monitoring wells have been installed.
- Monitored natural attenuation (MNA) was selected as the remediation strategy for this Site.
- Quarterly groundwater sampling is ongoing and will continue until four consecutive quarters of groundwater results below ECMC Table 915-1 concentration levels are achieved.

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: \$ 5000

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 5342

E&P waste (solid) description Hydrocarbon impacted soil

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: Waste Management's North Weld Landfill in Ault, CO

Volume of E&P Waste (liquid) in barrels 6650

E&P waste (liquid) description Hydrocarbon impacted groundwater

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: NGL Energy Partners

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? Yes

Does the previous reply indicate consideration of background concentrations? Yes

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 completion of the supplemental source removal activities to the north, the excavation was backfilled 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? No

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. 11/17/2016

Proposed date of completion of Reclamation. 10/31/2027

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. 03/02/2021

Actual Spill or Release date, or date of discovery. 11/17/2016

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 12/01/2016

Proposed site investigation commencement. 11/17/2016

Proposed completion of site investigation. 12/19/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 01/24/2019

Proposed date of completion of Remediation. 03/31/2025

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:

OPERATOR COMMENT

Four of the eight monitoring wells were inaccessible due to farming operations; these conditions are unchanged from the 9/4/2024 sampling event.
The next quarterly round of sampling is scheduled for March 2025.

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

Signed: Paul Henehan

Title: Consulting Engineer

Submit Date:

Email: paulh@fremontenv.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: 9949

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

404038219	MONITORING REPORT
404038222	ANALYTICAL RESULTS

Total Attach: 2 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)