

State of Colorado
Energy & Carbon Management Commission1120 Lincoln Street, Suite 801, Denver, Colorado 80203
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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 Olsen	Email: karen.olson@chevron.com	Mobile: ()

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 11394 Initial Form 27 Document #: 401653263

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: SPILL OR RELEASE	Facility ID: 455029	API #: _____	County Name: WELD
Facility Name: Stephens 7-11 PWV removal	Latitude: 40.419674	Longitude: -104.814520	
** correct Lat/Long if needed: Latitude: 40.419674		Longitude: -104.814520	
QtrQtr: nene	Sec: 7	Twp: 5n	Range: 66w Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SM Most Sensitive Adjacent Land Use Cropland

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

HPH - 1121 SW - Aquatic Native Species Conservation Water (1202. C), North Boomerang Extension Canal - 183 W

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 Document No. 403466798	sampling
Yes	SOILS	Refer to Document No. 403555133	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.

Partially buried produced water vault was removed, impacted soils beneath it were hauled to North Weld Landfill, and the pit was backfilled. Tasman Geosciences was brought in to install MWs at the site for groundwater impact extent determination, in which 18 new MWs were installed at the site, on top of the 4 that were existing there from the previous operator. After multiple rounds of step-out MWs, the extents of the groundwater impact have been defined.

On August 30, 2023, source mass removal activities were re-initiated at the Stephens 7-11, 12 tank battery location to delineate and remove remaining hydrocarbon impacted material. Between August 30, and September 14, 2023, approximately 2,490 cubic yards of impacted soil was removed and transported to North Weld Waste Management Facility for disposal under PDC waste manifests. On August 30, and September 14, 2023, two soil samples (WC01 & WC02) were collected from impacted source material at approximately 7 feet and 15 feet bgs, respectively, and submitted for laboratory analysis of the full Table 915-1 analytical suite. Laboratory analytical results from the source waste characterization samples indicated COCs include BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, TPH(C6-C36), benz(a)anthracene, fluorene, pyrene, 1-M, and 2-M.

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):

Between August 30, and September 14, 2023, 63 soil samples (SS01, SS03 - SS18, SS19-N, SS20-W, SS21-S, SS22E, SS23 - SS58, & SS62 - SS67) were collected from the base and sidewalls of the excavation at depths ranging from approximately 7 feet to 16 feet bgs and submitted for analysis of the above mentioned COCs. Additionally, four soil samples (SS02 & SS59 - SS61) were collected from within the root zone at approximately 2.5 feet bgs and submitted for laboratory analysis of pH, EC, SAR, and boron. Analytical results indicated that all constituent concentrations were in compliance with the applicable ECMC Table 915-1 regulatory standards for samples collected from the final excavation extent.

Proposed Groundwater Sampling

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

Following monitoring well installation activities, PDC will re-initiate quarterly groundwater monitoring at the one site monitoring well (BH21R) and the 13 proposed monitoring wells until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene 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.

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 4

Was the areal and vertical extent of soil contamination delineated? Yes

Approximate areal extent (square feet) 7791

NA / ND

-- Highest concentration of TPH (mg/kg) 219

-- Highest concentration of SAR 2.59

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 16

Groundwater

Number of groundwater samples collected 14

Was extent of groundwater contaminated delineated? Yes

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

Number of groundwater monitoring wells installed

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)

ND 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 September 6, and 7, 2023, eight background soil samples were collected from two background locations (BKG01 & BKG02) located in native material at depths ranging from approximately 2.5 feet to 11 feet bgs and were submitted for laboratory analysis of arsenic. Analytical results indicated that arsenic concentrations were in exceedance of the applicable ECMC regulatory standards in all background soil sample locations. Based on the results, the arsenic concentrations recorded in source waste characterization samples WC01 and WC02 were below the mean background arsenic concentration on site.

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

Volume of solid waste (cubic yards) 2490

Volume of liquid waste (barrels) 0

☒ Is further site investigation required?

Between April 9, 2024, and April 19, 2024, 13 monitoring wells (BH23 – BH35) were installed to confirm the absence of dissolved-phase hydrocarbon impacts and establish POC within and surrounding the former excavation extent [Figure 1]. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole. Per the condition of approval (COA) issued in the approved Supplemental Form 27 (Document No. 403555133), one soil sample was collected from each borehole during monitoring well installation activities. Thirteen soil samples were collected from the interval exhibiting the most elevated VOC concentration at depths ranging from approximately 1-2 feet to 20 -21 feet bgs and submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB, total petroleum hydrocarbons (TPH[C6-C36]), benz(a)anthracene, fluorene, pyrene, 1-methylnaphthalene (M), and 2-M.

Soil analytical results indicated that organic compound concentrations were in compliance with the applicable ECMC Protection of Groundwater Soil Screening Levels in all 13 soil sample locations.

A supplemental site investigation will be conducted to assess Table 915-1 compliance on site. The proposed soil boring locations are illustrated on 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.

Following the discovery of the release in April 2018, approximately 35 cubic yards of impacted material were excavated and transported to the North Weld Waste Management Facility for disposal under SRC waste manifests.

On August 30, 2023, source mass removal activities were re-initiated at the Stephens 7-11, 12 tank battery location to delineate and remove remaining hydrocarbon impacted material. Between August 30, and September 14, 2023, approximately 2,490 cubic yards of impacted soil was removed and transported to North Weld Waste Management Facility for disposal under PDC waste manifests.

Between September 2017 and August 2018, 22 monitoring wells (BH01 - BH22) were installed to delineate dissolved-phase hydrocarbon impacts. In May 2019, four replacement monitoring wells (BH15R, BH18R, BH20R, and BH21R) were advanced to accommodate large seasonal groundwater fluctuations. Based on analytical results collected during the initial groundwater assessment, enhanced fluid recovery (EFR) and air sparge (AS) activities were initiated in October 2018 and continued through the fourth quarter 2022. Based on analytical results collected during the third and fourth quarters 2022, monitored natural attenuation (MNA) was initiated as the selected remediation strategy for this location beginning in the first quarter 2023 through the second quarter 2023.

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 the COA issued in the approved Supplemental Form 27 (Document No. 403807312), further clarification was required for the removal of monitoring wells BH05 and BH07 from the monitoring well network. Monitoring wells BH05 and BH07 were destroyed during September 2023 supplemental source mass removal activities and were replaced by monitoring well BH29, which is serving as the POC monitoring well to the north of the northwest portion of the former excavation extent. In addition, per the COA, the ECMC agreed to remove BH01 and BH02 from the sampling and analysis plan based on four consecutive quarters of organic compounds in compliance with the applicable ECMC standards and the sufficient POC established by the current monitoring well network. While BH13 and BH17 were also requested to be removed from the network, the COA did not mention these monitoring wells. Consequently, PDC is re-requesting that BH13 and BH17 be removed from the monitoring well network based on four consecutive quarters of compliant results and the sufficient POC on site.

Following September 2023 source mass removal activities, MNA was established as the remediation strategy for this location during the second quarter 2024 and will remain the selected remediation strategy for the first quarter 2025.

Soil Remediation Summary

<input type="checkbox"/> In Situ	<input checked="" type="checkbox"/> Ex Situ
_____ Bioremediation (or enhanced bioremediation)	Yes Excavate and offsite disposal
_____ Chemical oxidation	If Yes: Estimated Volume (Cubic Yards) 2525
_____ Air sparge / Soil vapor extraction	Name of Licensed Disposal Facility or ECMC Facility ID # _____
_____ Natural Attenuation	No 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.

Per the Supplemental Form 27 (Document No. 403225463) monitoring wells BH18R, BH19, BH20R, BH21R, and BH22 were removed from the sampling plan due to four consecutive quarters of organic compounds in compliance with the approved regulatory standards. Per the COA issued in the approved Supplemental Form 27 (Document No. 403555133), monitoring well BH21R was added back to the monitoring well network during the second quarter 2024 to establish POC south of the former excavation extent.

PDC will continue to conduct quarterly groundwater monitoring at the 14 site monitoring wells (BH21R, and BH23 - BH35) until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB by EPA Method 8260B, chloride and sulfate anions by EPA Method 300.0 and TDS by Method SM 2540C in accordance with Table 915-1.

Fourth quarter 2024 analytical results indicated that organic compound concentrations were in compliance with the applicable ECMC Table 915-1 regulatory standards in all 14 monitoring well locations. TDS, chloride, and sulfate anions were in compliance with the applicable regulatory standards or within 1.25x the background concentrations of the cross-gradient monitoring wells (BH29, BH31, and BH35) in all 14 monitoring well locations.

Following the fourth quarter 2024 groundwater monitoring event, monitoring well BH30 was abandoned due to developer work activities and land access agreements. A monitoring well will be temporarily re-installed via hand auger in the vicinity of BH30 during the first quarter 2025 groundwater monitoring event.

REMEDATION 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 second quarter 2024 Supplemental Form 27 (Document No. 403466798). This section and estimate will be updated on an annual basis until closure criteria are achieved.

Operator anticipates the remaining cost for this project to be: \$ 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 2525

E&P waste (solid) description Hydrocarbon impacted soils

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: North Weld Waste Management

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

E&P waste (liquid) description

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility:

REMEDATION COMPLETION REPORT

REMEDATION 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 excavation and decommissioning activities, this location was backfilled, compacted, and re-contoured to match pre-existing conditions. This location will be reclaimed in accordance with the ECMC 1000 Series rules.

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. 04/17/2018

Proposed date of completion of Reclamation. 01/14/2032

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. 05/16/2018

Actual Spill or Release date, or date of discovery. 04/17/2018

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 03/20/2018

Proposed site investigation commencement. 12/03/2024

Proposed completion of site investigation. 12/31/2025

REMEDIAL ACTION DATES

Proposed start date of Remediation. 03/20/2018

Proposed date of completion of Remediation. 01/14/2032

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

☒ Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

The implementation schedule has been updated to allow for the supplemental site investigation to assess Table 915-1 compliance on site. The proposed soil boring locations are illustrated on Figure 4.

OPERATOR COMMENT

This Supplemental Form 27 was submitted to summarize quarterly groundwater monitoring activities and analytical results collected during the fourth quarter 2024 at the former Stephens 7-11, 12 tank battery location.

Fourth quarter 2024 analytical results indicated that organic compound concentrations were in compliance with the applicable ECMC Table 915-1 regulatory standards in all 14 monitoring well locations for the third consecutive quarter. TDS, chloride, and sulfate anions were in compliance with the applicable regulatory standards or within 1.25x the background concentrations of the cross gradient monitoring wells (BH29, BH31, and BH35) in all 14 monitoring well locations.

Following the fourth quarter 2024 groundwater monitoring event, monitoring well BH30 was abandoned due to developer work activities and land access agreements. A monitoring well will be temporarily re-installed via hand auger in the vicinity of BH30 during the first quarter 2025 groundwater monitoring event.

Prior to the first quarter 2025, a supplemental site investigation will be conducted to assess and verify Table 915-1 soil compliance on site. The proposed soil boring locations are illustrated on Figure 4.

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: tas-chevron-2@tasman-geo.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with ECMC Rules and applicable orders and is hereby approved.

ECMC Approved: _____

Date: _____

Remediation Project Number: 11394

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

403955047	ANALYTICAL RESULTS
403999975	MONITORING REPORT

Total Attach: 2 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)