

State of Colorado
Energy & Carbon Management Commission

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Receive Date:

Report taken by:

Site Investigation and Remediation Workplan (Supplemental Form)

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. However, this shall not preclude the Operator from taking immediate action to protect public health or safety, the environment, wildlife, or livestock.

This Form 27 describes site conditions as currently understood by the Operator; approval of this Form 27 by COGCC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27.

This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

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

OPERATOR INFORMATION

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

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 20540 Initial Form 27 Document #: 402845752

PURPOSE INFORMATION

- Rule 913.c.(1): Pit or Cuttings Trench closure.
- Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
- Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
- Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
- Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
- Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
- Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
- Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
- Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
- Rule 913.g: Changes of Operator.
- Rule 915.b: Request to leave elevated inorganics in situ.
- Other: _____

SITE INFORMATION

No Multiple Facilities

Facility Type: <u>TANK BATTERY</u>	Facility ID: <u>443971</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Werning 3-2 & 4-2 tank battery</u>	Latitude: <u>40.346620</u>	Longitude: <u>-104.745230</u>	
	** correct Lat/Long if needed: Latitude: <u>40.346608</u>	Longitude: <u>-104.745381</u>	
QtrQtr: <u>NENW</u>	Sec: <u>2</u>	Twps: <u>4N</u>	Range: <u>66W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

SITE CONDITIONS

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

Nearest Well: Domestic / Livestock - 782 feet S, Surface Water: Godfrey Ditch - 158 feet SE, Occupied Buildings: 696 feet SE, Livestock: 662 feet SE, FWS
Wetlands: Riverine (R4SBCx) Godfrey Ditch - 158 feet SE, HPH: Webster State Wildlife Area - 258 feet E

Facility is located within 100-year floodplain

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 Table 5 & Figure 3-4	Confirmation Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4 & Figures 1-4	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 February 16, 2022, based on visual impacts encountered during reclamation activities, field screening and confirmation soil sampling was conducted in the vicinity of the former above ground storage tank (AST). On February 17, 2022 following receipt of the preliminary analytical results, it was determined that a historic release was discovered in the vicinity of the former AST (Figure 2). Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. Approximately 18,899 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management Facility for disposal under PDC manifests. During excavation activities, groundwater was encountered in the excavation at approximately 5 feet bgs. Approximately 35,830 barrels (BBLs) of impacted groundwater was removed and transported to the NGL C3 for disposal under PDC 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):

Four soil samples (AST01-B, AST01-W, SS06, & WC01) were collected from impacted source material adjacent to former AST at approximately 3 feet, 1.5 feet, 5 feet, & 10 feet bgs, respectively. The samples were submitted for the full Table 915-1 analytical suite. Analytical results indicated that the site-specific contaminants of concern include: BTEX, N, TPH (C6-C36) 1,2,4-TMB, 1,3,5-TMB, chrysene, fluorene, pyrene, 1-M, 2-M, As, Ba, Se, & pH. Between February 16, 2022, & March 30, 2023, two hundred and twenty-one (221) soil samples (SS01-SS05, SS07-SS22, SS25-SS48, SS50-SS99, WC01, SS102-SS181, SS183-SS227, SS229-SS230) were collected from the base & sidewalls of the excavation at depths ranging between 1.5 feet & 12.5 feet bgs and were submitted for laboratory analysis of the above referenced COCs. Analytical results indicated that organic compound concentrations were below the applicable Table 915-1 SSLs in the 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):

On February 24, 2022, one groundwater sample (GW01) was collected from the excavation. The groundwater samples were submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that organic compound concentrations were in compliance with the COGCC Table 915-1 standards in sample GW01. The groundwater sample location is illustrated on Figure 3 and the analytical results are summarized on Table 5.

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 January 10, 2022, per the approved proposed soil sampling plan, one soil sample (SEP01-DL) was collected adjacent to the separator dumpline risers, one sample (SEP01-FL) was collected beneath the flowline riser at the separator, and one sample (AST01) was collected adjacent to the above ground storage tank, one soil sample (PWV01-B) was collected from the base of the PWV excavation, and one soil sample (PWV01-N) was collected from the north sidewall of the PWV excavation. All soil samples were submitted for lab analysis of BTEX, naphthalene, 1,2,4-TMB, 1,3,5-TMB, and TPH (C6-C36). Additionally, soil samples PWV01-B and PWV01-N were submitted for analysis of Soil Suitability for Reclamation. Analytical results indicated that organic and inorganic compounds were in compliance with the applicable COGCC Table 915-1 Protection of Groundwater SSLs in all soil samples collected. The soil sample locations are illustrated on Figure 1.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil		NA / ND	
Number of soil samples collected	238	--	Highest concentration of TPH (mg/kg) 4230
Number of soil samples exceeding 915-1	41	--	Highest concentration of SAR 3.25
Was the areal and vertical extent of soil contamination delineated?	Yes	BTEX > 915-1	Yes
Approximate areal extent (square feet)	45650	Vertical Extent > 915-1 (in feet)	12
Groundwater			
Number of groundwater samples collected	1	--	Highest concentration of Benzene (µg/l) 1.1
Was extent of groundwater contaminated delineated?	No	ND	Highest concentration of Toluene (µg/l)
Depth to groundwater (below ground surface, in feet)	5	--	Highest concentration of Ethylbenzene (µg/l) 5
Number of groundwater monitoring wells installed	0	ND	Highest concentration of Xylene (µg/l)
Number of groundwater samples exceeding 915-1	0	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?

Between March 1, 2022 and February 10, 2023, twenty-four (24) background soil samples (BKG02-BKG08) were collected between depths of approximately 2 feet and 10 feet bgs from native material topographically up-gradient of the tank battery. All background soil samples were submitted for analysis of COGCC Table 915-1 metals and pH. Analytical results indicated that arsenic, barium, selenium, and pH were in exceedance of the applicable regulatory standards in native soil.

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

Volume of solid waste (cubic yards) 18899 Volume of liquid waste (barrels) 35830

Is further site investigation required?

Twenty five (25) groundwater monitoring wells will be installed to confirm the absence of dissolved-phase hydrocarbon impacts within & surrounding the former tank battery excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions will be recorded for each borehole. If elevated VOC concentrations are encountered during the investigation, a sample will be collected from the interval exhibiting the highest VOC concentration from the borehole and submitted for laboratory analysis of the ECMC Director approved analyte list (contaminants of concern).

Soil samples will be collected from the the monitoring wells completed to the south and northeast of the former excavation extent at depths ranging between 2 feet and 12 feet bgs and submitted for laboratory analysis of pH to complete the horizontal delineation of the pH exceedances observed in soil samples collected from the final excavation extent. Soil samples will be collected from the the monitoring wells completed within the shallow excavation extent at 8 feet & 12 feet bgs & from the northeast portion of the deep excavation extent at 13 feet and 14 feet bgs to be submitted for laboratory analysis of pH to complete the vertical delineation of the exceedances observed in soil samples collected from the final excavation extent.

Up to five (5) background soil borings will be completed. Soil samples will be completed at at 2 ft, 5 ft, 8 ft, 10 ft, 12 ft, 13 ft & 14 ft bgs and submitted for laboratory analysis of pH.

Proposed monitoring well locations are illustrated on Figure 5 & the proposed soil boring location are illustrated on Figure 6. Groundwater monitoring well installation, confirmation and background soil sampling will be conducted following landowner approval. 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.

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 February 16, 2022 and March 17, 2023, approximately 18,899 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management Facility for disposal under PDC manifests. Additionally, approximately 35,830 barrels (BBLs) of impacted groundwater was removed and transported to the NGL C3 for disposal under PDC manifests.

REMEDIATION SUMMARY

Describe how remediation of existing impacts to soil and groundwater is to be accomplished (i.e. summarize remedial action plan). Provide a brief narrative description including: technical justification, schedule for implementation, estimated time to attain NFA status, plus plans and specifications for the selected remedial action technology.

Analytical results for the excavation and delineation of hydrocarbon impacts conducted between February 16, 2022 and March 30, 2023, are summarized in Tables 1 through 5, and GPS coordinates and field screened VOC concentrations are summarized in Table 6. Field screening and laboratory sample locations are illustrated on Figures 1-4. The proposed groundwater monitoring well locations are illustrated on Figure 5 and the proposed soil boring locations are illustrated on Figure 6. The laboratory reports are included as Attachment A and the excavation field notes and photo logs are included in Attachment B.

As PDC understands, onions are the main crop grown in the land surrounding the former Werning 3, 4-2 Tank Battery. Sulfate is a common soil amendment used to aid onion growing conditions, and sulfuric acid can be a byproduct of this process which may result in lower pH concentrations in soil. PDC made several attempts to contact the land-owner and/or tenant of the land to determine if sulfate is/has been applied to the localized onion crop. PDC will persist in contacting the land-owners to confirm or rule out sulfate amendments as the result of the low pH values observed on-site. Furthermore, PDC will also evaluate the native material pH conditions to the south of the excavation prior to committing to a remediation or reclamation strategy for the low pH observed on-site.

The several attempts to contact the landowner has contributed to the delay in this report. 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.

A remediation strategy will be selected for the location following landowner discussions as well as the evaluation of soil and groundwater analytical results.

Soil Remediation Summary

In Situ

Ex Situ

_____ Bioremediation (or enhanced bioremediation)

Yes _____ Excavate and offsite disposal

_____ Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) _____ 18899

_____ Air sparge / Soil vapor extraction

Name of Licensed Disposal Facility or COGCC 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

_____ 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.

PDC will conduct quarterly groundwater monitoring at the twenty-five proposed monitoring wells 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, as well as total dissolved solids (TDS), chlorides, and sulfates in accordance with Table 915-1.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

Quarterly Semi-Annually Annually Other

Confirmation Sample Summary, Analyte Reduction Request, & Supplemental Site Investigation Proposal

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, Analyte Reduction Request, & Supplemental Site Investigation Proposal

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 has been completed.
- Investigation and delineation has been completed for organic compounds in soil.
- Monitoring wells will be installed and groundwater will be monitored.
- Investigation and delineation is on-going for arsenic, barium, selenium, and pH in soil.
- Facility and infrastructure were decommissioned and the location will be reclaimed in accordance with the COGCC 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: \$ 60000

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 18899

E&P waste (solid) description Hydrocarbon impacted soils

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: North Weld Waste Management Facility

Volume of E&P Waste (liquid) in barrels 35830

E&P waste (liquid) description Hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: NGL C3

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 COGCC 1000-Series Reclamation Requirements for all impacted and disturbed areas.

RECLAMATION PLAN

RECLAMATION PLANNING

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing.

The excavation was backfilled, compacted, and re-graded to match pre-existing conditions. Following decommissioning of this facility, 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. 02/16/2022

Proposed date of completion of Reclamation. 09/06/2028

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. 09/22/2021

Actual Spill or Release date, or date of discovery. 02/16/2022

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 11/15/2021

Proposed site investigation commencement. 09/11/2023

Proposed completion of site investigation. 12/30/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 02/16/2022

Proposed date of completion of Remediation. 09/06/2028

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 changed as result of supplemental source mass removal activities, the necessity of additional site investigation activities, and the installation of monitoring wells. The proposed completion of the site investigation extends through the end of 2023, in respect to landowner approval, as wells are proposed to be installed in an active agricultural field.

OPERATOR COMMENT

This Supplemental Form 27 was submitted to summarize supplemental site investigation activities and analytical results at the former Werning 3,4-2 Tank Battery location.

Soil analytical results received for soil samples collected during supplemental site investigation activities indicated that arsenic, barium, and selenium concentrations were observed in exceedance of the Table 915-1 applicable standards in confirmation samples and in native material.

Consequently, a statistical analysis was conducted to evaluate arsenic, barium, and selenium concentrations recorded in the excavation confirmation soil samples and background samples collected during supplemental site investigation activities. Due to the non-parametric distribution of data, the Mann-Whitney-Wilcoxon rank-sum test was applied to assess if the site concentrations were representative of native background concentrations. The analysis indicated that arsenic, barium, and selenium concentrations were not significantly higher than background concentrations and subsequently, are representative of background conditions at the former Werning 3,4-2 Tank Battery. See Attachment C for the Metals Statistical Evaluation for further discussion on the assessment and supporting data.

Should the ECMC agree with the aforementioned metal evaluation and based on analytical results received from the three waste characterization samples collected adjacent to the former AST at the Werning 3, 4-2 tank battery (AST01-B, AST01-W, SS06 @ 5', and WC01 @ 10'), PDC is requesting that the contaminants of concern (COCs) for this historic release at the AST excavation be amended to the following: BTEX, naphthalene, TPH (C6-C36) 1,2,4-TMB, 1,3,5-TMB, chrysene, pyrene, fluorene, 1-M, 2-M, and pH.

Following the approval of this form and landowner approval, PDC will install and conduct quarterly groundwater monitoring at the 25 proposed monitoring wells until closure criteria are met. Additionally, PDC will conduct a supplemental site investigation to delineate the vertical and horizontal extents of pH exceedances recorded in the soil samples collected from the final excavation extent, and to further evaluate pH conditions in native material. 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: Senior Program Manager

Submit Date: _____

Email: taspillremediationcontractor@pdce.com

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

COGCC Approved: _____

Date: _____

Remediation Project Number: 20540

COA Type	Description
0 COA	

Attachment Check List

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

Att Doc Num	Name
403520587	ANALYTICAL RESULTS
403520588	PHOTO DOCUMENTATION
403520589	OTHER
403520590	SOIL SAMPLE LOCATION MAP

Total Attach: 4 Files

General Comments

User Group

Comment

Comment Date

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

Total: 0 comment(s)