

State of Colorado
Oil and Gas Conservation Commission

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10/28/2022

Report taken by:
Taylor Robinson

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>1775 SHERMAN STREET - STE 3000</u>		Phone: <u>(303) 860-5800</u>
City: <u>DENVER</u> State: <u>CO</u> Zip: <u>80203</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>	Twp: <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:

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> E&P Waste | <input type="checkbox"/> Other E&P Waste | <input type="checkbox"/> Non-E&P Waste |
| <input checked="" type="checkbox"/> Produced Water | <input type="checkbox"/> Workover Fluids | |
| <input checked="" type="checkbox"/> Oil | <input type="checkbox"/> Tank Bottoms | |
| <input checked="" type="checkbox"/> Condensate | <input type="checkbox"/> Pigging Waste | |
| <input type="checkbox"/> Drilling Fluids | <input type="checkbox"/> Rig Wash | |
| <input type="checkbox"/> Drill Cuttings | <input type="checkbox"/> Spent Filters | |
| | <input type="checkbox"/> Pit Bottoms | |
| | <input type="checkbox"/> Other (as described by EPA) | |

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
No	GROUNDWATER	Refer to Table 5 & Figure 3	Confirmation Soil 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.

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 impact. Approximately 5,019 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 5,385 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):

Three soil samples (AST01-B, AST01-W, & SS06) was collected from impacted source material adjacent to former AST at approximately 3 feet, 1.5 feet, & 5 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, naphthalene, TPH (C6-C36) 1,2,4-TMB, 1,3,5-TMB, chrysene, fluorene, 1-M, 2-M, arsenic, barium, selenium, and pH. Between February 16 and April 7, 2022, sixty two (62) soil samples (SS01-SS05, SS07-SS22, SS25-SS48, & SS50-SS66) were collected from the base and sidewalls of the excavation at depths ranging between 1.5 feet and 8 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 Protection of Groundwater SSLs in the samples collected from the final excavation extent along the west, south, and east sidewalls.

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 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 <u>62</u>	-- Highest concentration of TPH (mg/kg) <u>974</u>
Number of soil samples exceeding 915-1 <u>21</u>	-- Highest concentration of SAR <u>0.627</u>
Was the areal and vertical extent of soil contamination delineated? <u>No</u>	BTEX > 915-1 <u>Yes</u>
Approximate areal extent (square feet) <u>14750</u>	Vertical Extent > 915-1 (in feet) <u>8</u>
Groundwater	
Number of groundwater samples collected <u>1</u>	-- Highest concentration of Benzene (µg/l) <u>1.1</u>
Was extent of groundwater contaminated delineated? <u>No</u>	ND Highest concentration of Toluene (µg/l) <u></u>
Depth to groundwater (below ground surface, in feet) <u>5</u>	-- Highest concentration of Ethylbenzene (µg/l) <u>5</u>
Number of groundwater monitoring wells installed <u>0</u>	ND Highest concentration of Xylene (µg/l) <u></u>
Number of groundwater samples exceeding 915-1 <u>0</u>	NA Highest concentration of Methane (mg/l) <u></u>

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 and April 6, 2022, ten (10) background soil samples (BKG02-BKG04) were collected between approximately 2 feet and 8 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) 5019 Volume of liquid waste (barrels) 5385

Is further site investigation required?

During initial source mass removal activities at the former tank battery soil impacts in exceedance of the applicable COGCC Table 915-1 Protection of groundwater SSLs were identified on the north sidewall of the excavation. Due to agricultural operations, source mass removal activities were discontinued along the north sidewall. Supplemental source mass removal activities at the north excavation sidewall will resume pending the completion of the seasonal agricultural operations and landowner approval. A remediation strategy will be determined following supplemental source mass removal activities.

Thirteen (13) groundwater monitoring wells will be installed to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former eastern, western, and southern sidewalls of the tank battery excavation. VOC concentrations using a 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 COGCC approved COCs. Proposed monitoring well locations are illustrated on Figure 4. Pending the completion of supplemental source mass removal activities, additional groundwater monitoring wells will be installed to the north of the former tank battery in order to confirm the absence of dissolved phase hydrocarbon impacts.

Additionally, up to three (3) additional background soil borings will be advanced to approximately 8 feet bgs with samples being collected between 2 feet and 8 feet bgs. The background soil borings will be advanced adjacent to the former tank battery excavation extent to evaluate COGCC Table 915-1 metals & pH in native material. Confirmation sampling will be completed by the end of the first quarter 2023 pending landowner approval. The proposed background soil boring locations are illustrated on Figure 5.

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 and April 7, 2022, approximately 5,019 cubic yards (CY) of impacted material were removed and transported to the North Weld Waste Management Facility for disposal under PDC manifests. Additionally, approximately 5,385 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.

The remaining hydrocarbon impacts identified to the north of the former tank battery will be removed via mechanic excavation pending the completion of the seasonal agricultural operations and landowner approval. Impacted material will be transported off-site to the North Weld Waste Management facility for disposal under PDC waste manifests. Confirmation soil samples will be collected from the base and sidewalls of the final excavation extent and submitted for laboratory analysis of the COGCC approved COC analyte suite. Excavation activities and final analytical results will be summarized in a forthcoming Supplemental Form 27. A remediation strategy will be selected following the evaluation of soil and groundwater analytical results.

Analytical results 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 1-3. The proposed groundwater monitoring well locations are illustrated on Figure 4 and the proposed soil boring locations are illustrated on Figure 5. The laboratory reports are included as Attachment A and the wellhead and flowline decommissioning field notes and photo logs are included in Attachment B.

Soil Remediation Summary

In Situ

Ex Situ

_____ Bioremediation (or enhanced bioremediation)

Yes _____ Excavate and offsite disposal

_____ Chemical oxidation

_____ If Yes: Estimated Volume (Cubic Yards) _____ 5019

_____ 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.

Based on the analytical data collected during source mass removal activities at the tank battery, PDC will conduct quarterly groundwater monitoring at the thirteen 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. Pending the completion of supplemental source mass removal activities and landowner approval, additional groundwater monitoring wells will be installed to the north of the former tank battery.

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 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.

- Partial source mass removal has been completed. Removal activities will continue following landowner approval.
- Investigation and delineation is on-going for soil and groundwater. Native material assessment of soil suitability for reclamation and metals is ongoing.
- Monitoring wells will be installed, and groundwater will continue to be monitored for natural attenuation.
- 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: \$ 100000

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 5019

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 5385

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.

Following supplemental source mass removal activities adjacent to the former tank battery, this location will be backfilled, compacted, and re-contoured to match pre-existing conditions. The location will be reclaimed in accordance with the COGCC 1000 series.

Is the described reclamation complete? Yes

Does the reclamation described herein constitute interim or final reclamation of the Oil and Gas Location?

Interim Final

Did the Surface Owner provide the seed mix? _____

If YES, does the seed mix comply with local soil conservation district recommendations? _____

Did the local soil conservation district provide the seed mix? _____

SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. 02/16/2022

Proposed date of completion of Reclamation. 07/22/2027

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. 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. 01/01/2023

Proposed completion of site investigation. 03/31/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 02/16/2022

Proposed date of completion of Remediation. 07/22/2027

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

This form has been prepared to provide a timeline update for the Werning 3, 4-2 tank battery. Comments of prior SF27 document 403080093 remain pending.

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, and SS06 @ 5'), PDC is requesting that the contaminants of concern (COCs) for this historic release at the separator excavation be reduced to the following: BTEX, naphthalene, TPH (C6-C36) 1,2,4-TMB, 1,3,5-TMB, chrysene, fluorene, 1-M, 2-M, arsenic, barium, selenium, and pH.

Following the approval of this form and landowner approval, PDC will install and conduct quarterly groundwater monitoring at the thirteen proposed monitoring wells adjacent to the former Werning 3, 4-2 tank battery until closure criteria are met. Additionally, up to 3 background soil borings will be advanced to evaluate COGCC Table 915-1 Metals and pH in native material.

Additionally, following the approval of this form, the completion of seasonal agricultural operations, and landowner approval, supplemental source mass removal activities will resume at the former Werning 3, 4-2 tank battery. 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: 10/28/2022

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: Taylor Robinson

Date: 02/01/2023

Remediation Project Number: 20540

COA Type

Description

	Based on analytical results received from the three waste characterization samples COGCC approves the operator's analyte reduction request to include contaminants of concern (COCs) be reduced to the following: BTEX, naphthalene, TPH (C6-C36) 1,2,4-TMB, 1,3,5-TMB, chrysene, fluorene, 1-M, 2-M, arsenic, barium, selenium, and pH.
	Operator will continue quarterly reporting until the site investigation is complete and the implementation schedule can be updated.
2 COAs	

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

403210873	FORM 27-SUPPLEMENTAL-SUBMITTED
403210917	SOIL SAMPLE LOCATION MAP
403210921	ANALYTICAL RESULTS
403210922	PHOTO DOCUMENTATION

Total Attach: 4 Files

General Comments

User Group

Comment

Comment Date

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)