

State of Colorado Oil and Gas Conservation Commission

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01/12/2023

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>
Contact Person: <u>Karen Olson</u>	Email: <u>taspillremediationcontractor@pdce.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 21306 Initial Form 27 Document #: 402886642

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>454142</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Boulter-Kawata Tank Battery</u>		Latitude: <u>40.318654</u>	Longitude: <u>-104.765803</u>
** correct Lat/Long if needed: Latitude: <u>40.318622</u>		Longitude: <u>-104.765942</u>	
QtrQtr: <u>NENW</u>	Sec: <u>15</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 Residential / 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 - 133' SSW; Surface Water: Freshwater Pond - 1,210' SE, Occupied Building: 470' E; FWS Wetlands: 665' E Freshwater Emergent Wetland (PEM1A).

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 and Figure 2	Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4 and 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 14, 2022, field screening and confirmation soil sampling was conducted in accordance with the COGCC Rule 911 during the decommissioning and closure of the Boulter 15-21 Tank Battery (Figure 1). Based on initial results, it was determined that a historic release was discovered below both the former above ground storage tank (AST) and separator. Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. Approximately 10,819 cubic yards (CY) of impacted material were removed under a stamped Engineered Excavation Plan and transported to the North Weld Waste Management Facility and Buffalo Ridge Management Facility for disposal under PDC manifests. In addition, groundwater vacuum recovery was conducted concurrent to excavation activities and to date 1,910 barrels (bbls) of groundwater were removed from the excavation and transported to NGL C4 for disposal under PDC waste manifests. Between February 15 and 24, 2022, six (6) soil samples (SEP01-B, SEP01-W @ 4', AST02-S, AST02-B, SS01, & SS12) were collected from impacted source material below and adjacent to the AST and separator between approximately 4 feet and 20 feet bgs. The samples were submitted for laboratory analysis of the full COGCC Table 915-1 analyte suite. Laboratory analytical results from the source samples indicated COCs include BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), 1-M, 2-M arsenic, barium, lead, selenium, and pH.

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 May 31 and June 30, 2022, ninety (90) soil samples (SS13-SS17, SS24-SS29, SS32-SS109, & SS116) were collected from the base and sidewalls of the engineered excavation and submitted for analysis for the above mentioned COCs. Soil samples (SS110-SS115) were collected from approximately 2.5 feet bgs and submitted for laboratory analysis of pH, EC, SAR, and boron. Analytical results indicated that organic compounds were in compliance of applicable COGCC Table 915-1 standards from the engineered excavation extent. Additionally, arsenic, barium, selenium, and/or pH were observed in exceedance of the applicable standards in 86 of the 90 final excavation extent soil samples.

Proposed Groundwater Sampling

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

On February 24, 2022, groundwater was encountered at approximately 20 feet bgs in the excavation. Consequently, one groundwater sample (GW01) was collected from the excavation and submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that all analyzed constituents were in exceedance of the applicable COGCC Table 915-1 Standards. The groundwater sample location is illustrated on Figure 1 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):

Overburden composite samples (CS01-CS05) were collected from stockpiled material in 5-point composite samples and submitted for the above mentioned COCs as well as soil suitability for reclamation. Analytical results indicated arsenic and selenium returned in exceedance of the applicable COGCC Table 915-1 Standards in all composite samples; however, consistent with levels observed in excavation extent samples. Additionally, CS02 returned with a pH and lead exceedance; therefore, these overburden soil piles were disposed of under PDC waste manifests. Additionally, a five point spoil pile sample (SP01) was collected beneath the excavated soil staging area and analyzed for the above mentioned COCs. Analytical results indicated arsenic, lead, and selenium were in exceedance of the applicable COGCC Table 915-1 standards. Three soil samples (BF01-BF03) was collected from imported backfill material and submitted for laboratory analysis of pH, EC, SAR and boron.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 162

Number of soil samples exceeding 915-1 106

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

Approximate areal extent (square feet) 19391

NA / ND

-- Highest concentration of TPH (mg/kg) 420

-- Highest concentration of SAR 1.87

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 35

Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 20

Number of groundwater monitoring wells installed 0

Number of groundwater samples exceeding 915-1 1

-- Highest concentration of Benzene (µg/l) 54

ND Highest concentration of Toluene (µg/l)

ND Highest concentration of Ethylbenzene (µg/l)

-- Highest concentration of Xylene (µg/l) 470

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 February 14, 2022, two background soil samples (BKG01) were collected at approximately 2.5 feet and 4 feet bgs from the native material topographically up-gradient of the tank battery and submitted to the laboratory on-hold. Due to the necessity to conduct supplemental source mass removal activities, the background samples were not analyzed.

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

Volume of solid waste (cubic yards) 1149

Volume of liquid waste (barrels) 0

☐ Is further site investigation required?

Up to fifteen (15) groundwater monitoring wells will be installed to delineate dissolved-phase hydrocarbon impacts within and surrounding the former 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 soil 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 3.

Up to five (5) additional background soil borings will be advanced to approximately 35 feet bgs. The background soil borings will be advanced adjacent to the former excavation extent to evaluate the COGCC Table 915-1 Soil Suitability for Reclamation and metals in native material. Confirmation sampling will be completed by the end of the fourth quarter 2022. The proposed background 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.

Between February 14 and June 30, 2022, approximately 10,819 cubic yards of impacted material were removed from the excavation under a stamped Engineered Excavation Plan and transported to the North Weld Waste Management Facility in Ault, Colorado and the Buffalo Ridge Management Facility in Keenesburg, CO for disposal under PDC waste manifests. In addition, groundwater vacuum recovery was conducted concurrent to the excavation activities and approximately 1,910 barrels (bbls) of groundwater were removed from the excavation and transported to NGL C4 for disposal under PDC waste 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.

On June 8, 2022, a release was observed at the ongoing Boulter 15-21 tank battery. The spill occurred during source mass removal excavation activities for remediation project #21306 where a hydraulic line broke on the dewatering pump. During excavation activities the dewatering pump stopped working, upon inspection the leak was found. The hydraulic line failure resulted in the release of 0.5 gallons of hydraulic fluid outside of secondary containment into an open excavation with groundwater. Mitigation activities were initiated immediately and impacts from the hydraulic line leak were removed during excavation and dewatering activities. Additionally, impacted groundwater and soil was removed and transported to the North Weld Waste Management Facility and NGL C4 for disposal under PDC waste manifests. The hydraulic leak occurred at 28 feet bgs in the excavation and impacted material has been removed while continuing excavation activities on-site. The above referenced confirmation soil samples confirm the extent of impacted material has been removed. All work under spill ID 482342 will proceed under current remediation project #21306, the subject of this report.

Analytical results are summarized in Tables 1-5. GPS coordinates and field screened VOC concentrations are summarized in Table 6. Field screening and laboratory sample locations are illustrated on Figures 1-2. Proposed monitoring well locations are illustrated on Figure 3. Proposed background soil boring locations are illustrated on Figure 4. Laboratory reports are included as Attachment A and field notes and photos are included as Attachment B. A remediation strategy will be selected following the evaluation of soil and groundwater analytical results.

Soil Remediation Summary

☐ In Situ

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)

1149

Name of Licensed Disposal Facility or COGCC 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

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, PDC will conduct quarterly groundwater monitoring at the fifteen 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

☐ 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.

- Source mass removal has been completed.
- Native material assessment of Table 915-1 metals is ongoing.
- Facility and infrastructure were decommissioned and the location will be reclaimed in accordance with the COGCC 1000 Series.
- Monitoring wells will be installed, and groundwater will be monitored.

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: \$ 40000

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 1149

E&P waste (solid) description Hydrocarbon impacted soils

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: North Weld Waste Management & Buffalo Ridge Management

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

E&P waste (liquid) description

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility:

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No

If YES:

☐ Compliant with Rule 913.h.(1).

☐ Compliant with Rule 913.h.(2).

☐ Compliant with Rule 913.h.(3).

Do all soils meet Table 915-1 standards? _____

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? _____

Is additional groundwater monitoring to be conducted? _____

Operator shall comply with the 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 at the former tank battery location, the 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? _____

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. 02/15/2022

Proposed date of completion of Reclamation. 01/05/2028

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. 07/26/2021

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). 12/24/2021

Proposed site investigation commencement. 04/01/2023

Proposed completion of site investigation. 06/30/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 02/15/2022

Proposed date of completion of Remediation. 01/05/2028

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:

OPERATOR COMMENT

This form is being submitted as a first quarter 2023 timeline update for the former Boulter 15-21 Tank Battery. A Supplemental Form 27 submitted on October 28, 2022, under Document No. 403207174 is still pending review.

Following the approval of the fourth quarter 2022 Supplemental Form 27 (referenced above), PDC will install and conduct quarterly groundwater monitoring at the fifteen proposed monitoring wells at the former Boulter 15-21 tank battery until closure criteria are met. Additionally, PDC will conduct a supplemental site investigation to evaluate COGCC Table 915-1 Soil Suitability for Reclamation and metals in native material adjacent to the former excavation. 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: 01/12/2023

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: 03/16/2023

Remediation Project Number: 21306

COA Type

Description

	COGCC approves of the proposed monitoring well locations. Additionally, depending on the results of the site investigation plan, Operator may be required to install additional monitoring wells to fully delineate soil impacts.
	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

403281480	FORM 27-SUPPLEMENTAL-SUBMITTED
403281564	PHOTO DOCUMENTATION
403281566	SOIL SAMPLE LOCATION MAP
403281574	ANALYTICAL RESULTS

Total Attach: 4 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)