

State of Colorado
Oil and Gas Conservation Commission

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Report taken by:
CHRIS CANFIELD

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>		
City: <u>DENVER</u>	State: <u>CO</u>	Phone: <u>(303) 860-5800</u>
	Zip: <u>80203</u>	Mobile: <u>()</u>
Contact Person: <u>Karen Olson</u>	Email: <u>COGCCSpillRemediation@pdce.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 16854 Initial Form 27 Document #: 402594837

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>LOCATION</u>	Facility ID: <u>311418</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>LINKUS-61N68W 24SWNE</u>	Latitude: <u>40.039328</u>	Longitude: <u>-104.949254</u>	
	** correct Lat/Long if needed: Latitude: <u>40.038885</u>	Longitude: <u>-104.948633</u>	
QtrQtr: <u>SWNE</u>	Sec: <u>24</u>	Twp: <u>1N</u>	Range: <u>68W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

SITE CONDITIONS

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

Well: Irrigation - 1096 feet SE, Surface Water: Unnamed stream - 823 feet W, Occupied Buildings: - 425 feet W, FWS Wetlands: Riverine - 867 feet W

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
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 June 4, 2021, field screening and confirmation soil sampling were conducted in accordance with the COGCC Rule 911 during the decommissioning of the Linkus 32-24 Tank Battery (Figure 1). Based on the initial analytical results, it was determined that two separate historic releases were discovered at/below the former produced water vessel (PWV) and separator (SEP). Following the discovery, mitigation activities were initiated to delineate and remove remaining hydrocarbon impacts. Approximately 395 cubic yards (CY) of impacted material were removed from the PWV excavation and approximately 230 CY of impacted material were removed from the SEP excavation.

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):

On June 4, 2021, one soil sample was collected from the PWV (PWV01-B) source area at approximately 4 feet bgs. The sample was submitted for laboratory analysis of the full COGCC Table 915-1 analyte list. Preliminary analytical results indicated that site specific COCs include benzene, toluene, ethylbenzene, xylenes (BTEX), naphthalene (N), 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB and total petroleum hydrocarbons (TPH). Between June 4 and June 14, 2021, twenty-seven (27) soil samples (AST01, S01-S26) were collected from the sidewalls and base of the excavation at depths ranging between 2.5 feet and 16.5 feet bgs and were submitted for the above referenced COCs. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs in the samples collected from the final excavation extent. Analytical results are summarized in Tables 1-4, GPS coordinates and field screened VOC concentrations are summarized in Table 5.

Proposed Groundwater Sampling

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

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 June 4, 2021, one soil sample was collected from the SEP (SS01) source area at approximately 3 feet bgs. The sample was submitted for laboratory analysis of the full COGCC Table 915-1 analyte list. Preliminary analytical results indicated that site specific COCs include BTEX, N, 1,2,4-TMB, 1,3,5-TMB, TPH, chrysene, fluoranthene, fluorene, pyrene, 1-methylnaphthalene (M), 2-M, barium, cadmium, and selenium. Between June 4 and June 10, 2021, eleven (11) soil samples (SS01-SS11, SS13) were collected from the sidewalls and base of the excavation at depths ranging between 3 and 13 feet bgs and were submitted for the above referenced COCs. In addition, one sample (SS12) was collected at approximately 2.5 feet bgs and submitted for Table 915-1 soil suitability constituents. Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs in the samples collected from the final excavation extent.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 41
Number of soil samples exceeding 915-1 11
Was the areal and vertical extent of soil contamination delineated? No
Approximate areal extent (square feet) 1553

NA / ND

-- Highest concentration of TPH (mg/kg) 5996
-- Highest concentration of SAR 7.42
BTEX > 915-1 Yes
Vertical Extent > 915-1 (in feet) 16

Groundwater

Number of groundwater samples collected 0
Was extent of groundwater contaminated delineated? No
Depth to groundwater (below ground surface, in feet)
Number of groundwater monitoring wells installed
Number of groundwater samples exceeding 915-1

Highest concentration of Benzene (µg/l)
Highest concentration of Toluene (µg/l)
Highest concentration of Ethylbenzene (µg/l)
Highest concentration of Xylene (µg/l)
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 June 4, 2021, one background soil sample (BKG01) was collected at approximately 2.5 feet bgs and submitted for analysis of pH, SAR and COGCC Table 915-1 metals. Analytical results indicated arsenic, barium, and selenium were in exceedance of the applicable regulatory standards.

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

Volume of solid waste (cubic yards) 625 Volume of liquid waste (barrels) 0

Is further site investigation required?

REMEDIAL ACTION PLAN

Does this Supplemental Form 27A include changes to a previously approved Remedial Action Plan? No

SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

Between June 4 and June 14, 2021, approximately 395 cubic yards (CY) of impacted material were removed from the PWV and approximately 230 CY of impacted material were removed from the SEP. All impacted material was transported to Front Range Landfill 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.

Analytical results indicated that organic compound concentrations were below the applicable COGCC Table 915-1 Protection of Groundwater SSLs in the samples collected from the final excavation extent. All metal concentrations were below the EPA Residential Soil Screening Levels.

Analytical results for the background sample (BKG01 at 2.5' bgs) indicated that arsenic, barium, and selenium were in exceedance of applicable regulatory standards. Pending the approval of the reduced analyte list, no additional investigation activities will be required at this time.

Soil Remediation Summary

In Situ

Ex Situ

_____ Bioremediation (or enhanced bioremediation)
_____ Chemical oxidation
_____ Air sparge / Soil vapor extraction
_____ Natural Attenuation
_____ Other _____

Yes _____ Excavate and offsite disposal
If Yes: Estimated Volume (Cubic Yards) _____ 625
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.

Groundwater was not encountered during source mass removal activities.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

Quarterly Semi-Annually Annually Other Confirmation Sampling Summary, Analyte Reduction Request, and Closure Request

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 Sampling Summary, Analyte Reduction Request, and Closure Request

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 625

E&P waste (solid) description Hydrocarbon impacted soils

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Front Range Landfill

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? Yes

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? No

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? Yes

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 tank battery decommissioning and excavation activities, the location was 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. _____

Proposed date of completion of Reclamation. _____

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. 12/18/2020

Actual Spill or Release date, or date of discovery. 06/04/2021

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 02/15/2021

Proposed site investigation commencement. 06/04/2021

Proposed completion of site investigation. 06/10/2021

REMEDIAL ACTION DATES

Proposed start date of Remediation. 06/04/2021

Proposed date of completion of Remediation. 06/10/2021

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

Based on analytical results for the waste characterization sample PWV01-B collected from the produced water vessel source area, PDC is requesting that the COCs for the historic release discovered at the Linkus 32-24 Tank Battery PWV be reduced to the following: BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, and TPH.

Based on analytical results for the waste characterization sample SS01 collected from the tank battery separator source area, PDC is requesting that the COCs for the historic release discovered at the Linkus 32-24 Tank Battery SEP be reduced to the following: BTEX, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH, chrysene, fluoranthene, fluorene, pyrene, 1-M, 2-M, barium, cadmium, and selenium.

Should the COGCC approve the analyte reduction request, PDC is submitting a tank battery closure request for this location based on analytical results and field observations recorded during the decommissioning of the Linkus 32-24 tank battery.

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: 10/21/2021

Email: COGCCSpillRemediation@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: CHRIS CANFIELD

Date: 11/05/2021

Remediation Project Number: 16854

Condition of Approval

COA Type

Description

	The surface area disturbed by the remediation activity shall be reclaimed in accordance with the 1000 Series Reclamation Rules. For locations with active ongoing oil and gas operations, comply with Rule 1003 interim reclamation requirements and for locations that will no longer have active oil and gas operations, comply with Rule 1004 Final Reclamation requirements.
	Based on the information presented, it appears that no further action is necessary at this time and the COGCC approves the closure request. However, should future conditions at the site indicate contaminant concentrations in soils exceeding COGCC standards or if groundwater is found to be impacted, then further investigation and/or remediation activities may be required.
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.

<u>Att Doc Num</u>	<u>Name</u>
402831800	FORM 27-SUPPLEMENTAL-SUBMITTED
402846518	SOIL SAMPLE LOCATION MAP
402846522	PHOTO DOCUMENTATION
402846525	ANALYTICAL RESULTS
402846526	PHOTO DOCUMENTATION
402846555	ANALYTICAL RESULTS

Total Attach: 6 Files

General Comments

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

Total: 0 comment(s)