FORM
27
Rev 3/16

State of Colorado
Oil and Gas Conservation Commission

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Report taken by: Candice (Nikki) Graber

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.
Refer to Rules 340, 905, 906, 907, 908, 909, and 910

OPERATOR INFORMATON

Name of Operator: PDC ENERGY INC Operator No: 69175
Address: 1775 SHERMAN STREET - STE 3000
City: DENVER State: CO Zip: 80203
Contact Person: Karen Olson Email: COGCCSpillRemediation@pdce.com

Phone Numbers
Phone: (303) 860-5800
Mobile: ( )

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 9303 Initial Form 27 Document #: 2315670

PURPOSE INFORMATION

- [ ] 901.e. Sensitive Area Determination
- [ ] 909.c.(1), Rule 905: Pit or PW vessel closure
- [x] 909.c.(2), Rule 906: Spill/Release Remediation
- [ ] 909.c.(3), Rule 907.e.: Land treatment of oily waste
- [ ] 909.c.(4), Rule 908.g.: Centralized E&P Waste Management Facility closure
- [x] 909.c.(5), Rule 910.b.(4): Remediation of impacted ground water
- [ ] Rule 909.e.(2)A.: Notice completion of remediation in accordance with Rule 909.b.
- [ ] Rule 909.e.(2)B.: Closure of remediation project
- [ ] Rule 906.c.: Director request
- [ ] Other

SITE INFORMATION

N Multiple Facilites (in accordance with Rule 909.c.)

Facility Type: LOCATION Facility ID: 322831 API #: County Name: WELD
Facility Name: GIRVAN-64N65W 10SENW Latitude: 40.328686 Longitude: -104.651187
** correct Lat/Long if needed: Latitude: Longitude:
QtrQtr: SENW Sec: 10 Twp: 4N Range: 65W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

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

Surface water ~3,905 feet northeast, residential ~363 feet southeast, nearest water well ~232 feet southeast. Depth to groundwater ~5 feet below ground surface (bgs).

SITE INVESTIGATION PLAN

TYPE OF WASTE:

- [x] **E&P Waste**
  - [x] Produced Water
  - [ ] Oil
  - [x] Condensate
  - [ ] Drilling Fluids
  - [ ] Drill Cuttings
- [ ] **Other E&P Waste**
  - [ ] Workover Fluids
  - [ ] Tank Bottoms
  - [ ] Pigging Waste
  - [ ] Rig Wash
  - [ ] Spent Filters
  - [ ] Pit Bottoms
  - [ ] Other (as described by EPA) _____
- [ ] **Non-E&P Waste** _____

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
	GROUNDWATER	Refer to the attached Fig 3 & Tab 2	Drilling & groundwater sampling
	SOILS	Refer to Figs 2 & 3 and Table 1	Excavation and 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.

A historical release was discovered on November 7, 2013 during a production line repair at the Girvan 22-10 (API # 05-123-12134) tank battery. A Form 19 was previously submitted to the COGCC. An aerial map of the site is included on Figure 1.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

- [x] Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

Confirmation soil samples were collected from the final extent of the 2013 and 2017 excavation areas following the removal of hydrocarbon impacted material.

Proposed Groundwater Sampling

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

Yes, groundwater sampling will be collected on a quarterly basis at the existing monitoring well network.

Proposed Surface Water Sampling

- [ ] Will surface water samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Additional Investigative Actions

- [ ] Additional alternative investigative actions described in attached Site Investigation Plan (summary):

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected: 11

Number of soil samples exceeeding 910-1: 0

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

Approximate areal extent (square feet): 2380

NA / ND

-- Highest concentration of TPH (mg/kg): 218

NA Highest concentration of SAR:

BTEX > 910-1: No

Vertical Extent > 910-1 (in feet): 4

Groundwater

Number of groundwater samples collected: 20

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet): 5`

Number of groundwater monitoring wells installed: 20

Number of groundwater samples exceeding 910-1: 5

-- Highest concentration of Benzene (µg/l): 3600

ND Highest concentration of Toluene (µg/l):

ND Highest concentration of Ethylbenzene (µg/l):

-- Highest concentration of Xylene (µg/l): 510

NA Highest concentration of Methane (mg/l):

Surface Water

0 Number of surface water samples collected

Number of surface water samples exceeding 910-1

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?

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

Volume of solid waste (cubic yards):

Volume of liquid waste (barrels):

☐ 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.

Additional source material was removed during January 2017 excavation activities, as summarized in the attached Form 27 Addendum - Summary of Remediation Activities.

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.

A soil vapor extraction (SVE) and air sparge (A) system was operational between the second quarter 2014 and fourth quarter 2018. Monitored natural attenuation (MNA) was selected as the remediation strategy for the fourth quarter 2018 and will continue through the first quarter 2020.

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) 330
  - 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
- No Air sparge / Soil vapor extraction
- Yes Natural Attenuation
- ☐ Other ____

GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

On September 19, 2019, four additional monitoring wells (BH21 - BH24) were installed cross- and down-gradient of the existing monitoring network to establish point of compliance. Boring and well completion logs are attached. Quarterly groundwater sampling of benzene, toluene, ethylbenzene, and total xylenes (BTEX) will continue at the 24 site monitoring wells using USEPA Method 8260B. Groundwater monitoring will be conducted until four consecutive quarters of groundwater concentrations are in compliance with COGCC Table 910-1 standards are achieved.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Frequency: [X] Quarterly [ ] Semi-Annually [ ] Annually [ ] Other

Report Type: [X] Groundwater Monitoring [ ] Land Treatment Progress Report [ ] O&M Report [ ] Other

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 330

E&P waste (solid) description E&P contaminated soil

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: Waste Management - North Weld Landfill

Volume of E&P Waste (liquid) in barrels 480

E&P waste (liquid) description Petroleum hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility: Licensed disposal facility

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

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

Do all soils meet Table 910-1 standards?

Does the previous reply indicate consideration of background concentrations?

Are the only residual soil impacts pH, SAR, or EC at depths greater than 3 feet below ground surface?

Does Groundwater meet Table 910-1 standards?

Is additional groundwater monitoring to be conducted?

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 area where the excavation is located has been backfilled and compacted with clean material and the ground surface was contoured to match pre-existing conditions.

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 approve the seed mix?

If NO, does the seed mix comply with local soil conservation district recommendations?

IMPLEMENTATION SCHEDULE

PRIOR DATES

Date of Surface Owner notification/consultation, if required.

Actual Spill or Release date, if known.

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date).

Date of commencement of Site Investigation. 11/07/2013

Date of completion of Site Investigation. 10/04/2019

REMEDIAL ACTION DATES

Date of commencement of Remediation. 02/01/2014

Date of completion of Remediation.

SITE RECLAMATION DATES

Date of commencement of Reclamation.

Date of completion of Reclamation.

OPERATOR COMMENT

Per the Condition of Approval (COA) issued by the COGCC on September 5, 2019, four monitoring wells (BH21 and BH24) were installed cross- and down-gradient of the existing monitoring well network to delineate dissolved-phase hydrocarbons impacts and establish point of compliance.

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:` 10/18/2019 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: Candice (Nikki) Graber Date: 10/22/2019

Remediation Project Number: 9303

COA Type	Description

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
402212243	FORM 27-SUPPLEMENTAL-SUBMITTED
402214561	MONITORING REPORT

Total Attach: 2 Files

General Comments

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)