

State of Colorado
Oil and Gas Conservation Commission

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Report taken by:
PETER GINTAUTAS

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 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>Karen.Olson@pdce.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION
Remediation Project #: 12066 Initial Form 27 Document #: 401810831

PURPOSE INFORMATION

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

SITE INFORMATION N Multiple Facilities (in accordance with Rule 909.c.)

Facility Type: <u>SPILL OR RELEASE</u>	Facility ID: <u>454782</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>A.R. 18-44</u>	Latitude: <u>40.310100</u>	Longitude: <u>-104.923580</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>NESE</u>	Sec: <u>18</u>	Twp: <u>4N</u>	Range: <u>67W</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? No 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

Occupied housing is located approximately 1,330 feet south of the location.

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 type="checkbox"/> Oil | <input type="checkbox"/> Tank Bottoms | |
| <input 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 Figure 2 and Table 2.	Implementation of site investigation plan.
Yes	SOILS	Refer to Figure 1 and Table 1.	Excavation and 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 April 13, 2018, a historic release was discovered during plug and abandonment activities at the A.R. 18-44 tank battery. Approximately 890 cubic yards of impacted material were excavated and transported to the North Weld Waste Management Facility in Ault, Colorado for disposal under PDC waste 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):

Between April 13 and April 25, 2018, thirteen (13) soil samples (SS01 - SS13) were collected from the sidewalls of the excavation at 4.5 and 5 feet below ground surface (bgs). Soil samples were submitted to Summit Scientific Laboratories (Summit) in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260B, and TPH - diesel range organics (DRO) by USEPA Method 8015. Analytical results indicated that constituent concentrations were below the applicable COGCC Table 910-1 standards in soil samples collected from the final excavation extent within the unsaturated interval. Soil analytical results are summarized in Table 1 and soil sample locations are illustrated on Figure 1.

Proposed Groundwater Sampling

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

Groundwater was encountered during excavation activities at approximately 6 feet bgs. Groundwater recovery activities were conducted concurrent with source mass removal and approximately 7,820 barrels of groundwater were removed and transported to a licensed disposal facility. One (1) groundwater sample (GW01) was collected on May 17, 2018, following vacuum recovery and impacted soil removal activities. The sample was submitted to Summit for laboratory analysis of BTEX by USEPA Method 8260B. Analytical results indicated that BTEX concentrations were below the applicable COGCC Table 910-1 groundwater standards. Groundwater analytical results is summarized in Table 2 and the excavation groundwater sample location is illustrated on Figure 1.

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 October 15, 2018, six (6) monitoring wells were installed via direct-push drilling methods within and in cardinal directions of the former excavation extent. During well installation, two (2) soil samples (SS14 and SS15) were collected from monitoring wells (BH01 and BH02) located within the former excavation extent at approximately 7-9 feet bgs. The samples were collected below the depth of the soil samples which previously exhibited organic compound concentrations in exceedance of regulatory standards. The samples were submitted for laboratory analysis of BTEX, naphthalene, TPH-GRO by USEPA Method 8260B, and TPH-DRO by USEPA 8015. Analytical results indicated that constituent concentrations were below applicable COGCC Table 910-1 standards.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 15
Number of soil samples exceeding 910-1 3
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 4500

NA / ND

-- Highest concentration of TPH (mg/kg) 4100
NA Highest concentration of SAR
BTEX > 910-1 Yes
Vertical Extent > 910-1 (in feet) 5

Groundwater

Number of groundwater samples collected 7
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 6'
Number of groundwater monitoring wells installed 6
Number of groundwater samples exceeding 910-1 0

-- Highest concentration of Benzene (µg/l) 1.3
-- Highest concentration of Toluene (µg/l) 1.4
ND Highest concentration of Ethylbenzene (µg/l)
ND Highest concentration of Xylene (µg/l)
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) 890 Volume of liquid waste (barrels) 7820

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 April 13 and April 25, 2018, approximately 890 cubic yards of impacted material were excavated and transported to the North Weld Waste Management Facility in Ault, Colorado for disposal under PDC waste manifests. As previously described, confirmation soil samples collected from the final extent of the excavation indicated that hydrocarbon impacted material in unsaturated and saturated soils were successfully removed by excavation activities. Furthermore, the two soil samples (SS14 and SS15) collected during supplemental site investigation activities demonstrated that the vertical extent of hydrocarbon impacts was successfully defined and removed during excavation 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.

On October 15, 2018, six (6) monitoring wells (BH01 - BH06) were installed via direct-push drilling methods to confirm dissolved-phase hydrocarbon concentrations remained below regulatory standards following remediation activities. On January 21, 2019, groundwater monitoring was conducted at all six (6) monitoring well locations at the site. Groundwater samples were submitted to Summit for analysis of BTEX by USEPA Method 8260B. Analytical results indicated that BTEX concentrations were below laboratory detection limits in all six (6) monitoring well locations. Groundwater analytical results are summarized in Table 1 and illustrated on Figure 1.

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) _____ 890
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.

Per the Condition of Approval (COA) issued on November 16, 2018, one additional quarter of groundwater monitoring will be performed to confirm the absence of dissolved-phase hydrocarbon impacts. Should analytical results indicate that BTEX concentrations remain below regulatory standards, PDC will request a No Further Action (NFA) determination for this location.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Frequency: Quarterly Semi-Annually Annually Other _____

Report Type: 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 _____ 890

E&P waste (solid) description E&P contaminated material.

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: North Weld Waste Management Facility

Volume of E&P Waste (liquid) in barrels _____ 7820

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 excavation area will be backfilled, compacted, and re-graded to match pre-existing conditions. The produced water vessel and associated production infrastructure were decommissioned. The former facility 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 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). 04/13/2018
 Date of commencement of Site Investigation. 04/13/2018
 Date of completion of Site Investigation. 10/18/2018

REMEDIAL ACTION DATES

Date of commencement of Remediation. 04/13/2018
 Date of completion of Remediation. 10/18/2018

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____
 Date of completion of Reclamation. _____

OPERATOR COMMENT

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: 03/01/2019 Email: Karen.Olson@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: PETER GINTAUTAS Date: 03/01/2019

Remediation Project Number: 12066

COA Type

Description

	Submit reports of site investigation and progress of remediation including results of sampling and analysis on an annual basis or more often until remediation is closed.
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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

401955617	FORM 27-SUPPLEMENTAL-SUBMITTED
401955629	MONITORING REPORT

Total Attach: 2 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)