

# State of Colorado Oil and Gas Conservation Commission

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401575748

Receive Date:

Report taken by:

## 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: KERR MCGEE OIL & GAS ONSHORE LP		Operator No: 47120	<b>Phone Numbers</b>
Address: P O BOX 173779			
City: DENVER	State: CO	Zip: 80217-3779	
Contact Person: Phillip Hamlin		Email: Phil.Hamlin@anadarko.com	
		Phone: (970) 336-3500	
		Mobile: (970) 515-1161	

### PROJECT, PURPOSE & SITE INFORMATION

#### PROJECT INFORMATION

Remediation Project #: 10048

Initial Form 27 Document #: 401177410

#### PURPOSE INFORMATION

- |  |  |
|--|--|
| <input type="checkbox"/> 901.e. Sensitive Area Determination                                       | <input checked="" 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 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: SPILL OR RELEASE	Facility ID: 448259	API #:	County Name: WELD
Facility Name: SPILL/RELEASE POINT		Latitude: 40.231807	Longitude: -104.801408
		** correct Lat/Long if needed: Latitude:	Longitude:
QtrQtr: NENW	Sec: 17	Twp: 3N	Range: 66W Meridian: 6 Sensitive Area? Yes

#### SITE CONDITIONS

General soil type - USCS Classifications SM

Most Sensitive Adjacent Land Use Non-crop land

Is domestic water well within 1/4 mile? No

Is surface water within 1/4 mile? No

Is groundwater less than 20 feet below ground surface? Yes

#### Other Potential Receptors within 1/4 mile

An occupied building is located approximately 115 feet south of the release location.

# 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	See attached data	Groundwater sampling and laboratory analysis
Yes	SOILS	100' (N-S) x 85' (E-W) x 10' bgs	Excavation, soil sampling, and laboratory analysis

## 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 November 1, 2016, historical impacts were discovered during abandonment activities at the Tuttle L 63N66W/17SEW production facility. The facility was shut in, associated infrastructure was removed, and excavation activities were initiated. Groundwater was encountered in the excavation area at approximately 10 feet below ground surface (bgs). The COGCC issued Spill/Release Point ID 448259 for this release. A partially-buried produced water vessel was removed during excavation activities.

## 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 ):

Soil samples were collected from the final lateral extent of the excavation area, and from ten (10) exploratory soil borings, as described in the Initial Form 27. Based on the data presented, impacted soils remain at the site, to the north of the previously excavated area, as shown on Figure 1.

### Proposed Groundwater Sampling

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

Between November 21, 2016 and August 3, 2017, twelve (12) temporary monitoring wells (BH01, BH01R, BH02, BH02R, BH04, and BH08 - BH14) were installed to assess the extent of groundwater impacts. Quarterly groundwater sampling was initiated on November 23, 2016 and is ongoing at the ten (10) temporary monitoring wells remaining at the site; wells BH01 and BH02 were destroyed and subsequently replaced by BH01R and BH02R, respectively. Groundwater samples are collected from the temporary monitoring wells on a quarterly basis and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX). Groundwater analytical data is presented in Table 1, and the groundwater sample locations are illustrated on Figure 2. Laboratory analytical reports are included as Attachment A.

### 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 ):

A partially-buried produced water vessel was removed during excavation activities.

# SITE INVESTIGATION REPORT

## SAMPLE SUMMARY

### Soil

Number of soil samples collected 25  
Number of soil samples exceeding 910-1 8  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 8500

### NA / ND

-- Highest concentration of TPH (mg/kg) 1752  
NA Highest concentration of SAR             
BTEX > 910-1 Yes  
Vertical Extent > 910-1 (in feet) 10

### Groundwater

Number of groundwater samples collected 34  
Was extent of groundwater contaminated delineated? Yes  
Depth to groundwater (below ground surface, in feet) 10'  
Number of groundwater monitoring wells installed 12  
Number of groundwater samples exceeding 910-1 15

-- Highest concentration of Benzene (µg/l) 14000  
-- Highest concentration of Toluene (µg/l) 1400  
-- Highest concentration of Ethylbenzene (µg/l) 618  
-- Highest concentration of Xylene (µg/l) 8040  
NA Highest concentration of Methane (mg/l)           

### Surface Water

0 Number of surface water samples collected  
0 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?

During excavation activities, soil impacts were observed on the adjacent property east of the Tuttle L 63N66W/17SENW production facility. The excavation was advanced onto the adjacent property to remove hydrocarbon impacted soil. Soil samples collected from the final extent of the east sidewall of the excavation were in full compliance with State standards. In addition, off-site soil impacts were identified during advancement and sampling of soil borings BH01, BH03, and BH06, as shown on Figure 1. Impacted groundwater has been detected in off-site temporary groundwater monitoring wells BH04 and BH09.

☐ 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?

Hydrocarbon impacted soil and groundwater remain at the site. The 10 temporary groundwater monitoring wells remaining at the site will continue to be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with State standards for four consecutive quarters. Additional temporary groundwater monitoring wells may be installed, as necessary, to maintain point of compliance (POC). Additional confirmation soil samples will be collected from the final impacted soil area extent, subsequent to the completion of soil remediation activities north of the previous excavation area.

# 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 November 1 and 22, 2016, approximately 1,920 cubic yards of impacted soil were excavated and transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado and the Buffalo Ridge landfill in Keenesburg, Colorado for disposal. Due to the location of overhead utilities, excavation equipment was unable to access hydrocarbon impacted soils north of the excavation area. Approximately 40 barrels of impacted groundwater were removed from the excavation area and transported to the Kerr-McGee Aggregate Recycling Facility in Weld County, Colorado.

## 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.

Laboratory data indicate that impacted soils in the excavation area have been remediated to be in full compliance with State standards, with the exception of impacted soil north of the excavation in the vicinity of boreholes BH01, BH03, and BH06. Remaining impacted soil will be addressed through the implementation of in-situ or ex-situ remediation technologies, including additional targeted excavation, which are currently under evaluation. Prior to backfilling the initial excavation area, approximately 605 pounds of activated carbon were added to the groundwater within the excavation to mitigate remaining hydrocarbon impacts in groundwater. Quarterly groundwater monitoring is ongoing, and will be continued until concentrations remain in full compliance with State standards for four consecutive quarters. Additional remedial activities will be evaluated as appropriate. Estimated time to attain NFA is TBD based on the review of groundwater concentrations, the extent of impacted groundwater, and the efficacy of selected remedial technologies.

## 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) 1920  
Name of Licensed Disposal Facility or COGCC Facility ID # 149007  
No Excavate and onsite remediation  
\_\_\_\_\_ No Land Treatment  
\_\_\_\_\_ No Bioremediation (or enhanced bioremediation)  
\_\_\_\_\_ No Chemical oxidation  
\_\_\_\_\_ No Other \_\_\_\_\_

## Groundwater Remediation Summary

No \_\_\_\_\_ Bioremediation ( or enhanced bioremediation )  
No \_\_\_\_\_ Chemical oxidation  
No \_\_\_\_\_ Air sparge / Soil vapor extraction  
Yes \_\_\_\_\_ Natural Attenuation  
Yes \_\_\_\_\_ Other Activated carbon adsorption \_\_\_\_\_

## 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.

Between November 21, 2016 and August 3, 2017, a total of 12 temporary groundwater monitoring wells (BH01, BH01R, BH02, BH02R, BH04, and BH08 - BH14) were installed at the site to assess the extent of groundwater impacts. The 10 temporary groundwater monitoring wells remaining at the site will continue to be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with State standards for four consecutive quarters. Additional temporary monitoring wells may be installed, as necessary, to maintain POC. Groundwater sample locations are illustrated on Figure 2, and a potentiometric surface contour map for the First Quarter 2018 is presented as Figure 3. Boring logs for the temporary monitoring wells and exploratory borings completed at the site are included as Attachment B.

## REMEDATION 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:

NA

Volume of E&P Waste (solid) in cubic yards 1920

E&P waste (solid) description Hydrocarbon impacted soils.

COGCC Disposal Facility ID #, if applicable: 149007

Non-COGCC Disposal Facility: Buffalo Ridge Landfill - Keenesburg,  
Colorado

Volume of E&P Waste (liquid) in barrels 40

E&P waste (liquid) description Hydrocarbon impacted groundwater.

COGCC Disposal Facility ID #, if applicable: 434766

Non-COGCC Disposal Facility: \_\_\_\_\_

## REMEDATION COMPLETION REPORT

### REMEDATION 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 site has been restored to its pre-release grade. Kerr-McGee will consult with the Surface Owner to determine reclamation specifics to properly conduct reclamation activities in accordance with COGCC 1000 Series Rules.

Is the described reclamation complete? No

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. 11/03/2016

Actual Spill or Release date, if known. \_\_\_\_\_

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 11/01/2016

Date of commencement of Site Investigation. 11/01/2016

Date of completion of Site Investigation. \_\_\_\_\_

### REMEDIAL ACTION DATES

Date of commencement of Remediation. 11/01/2016

Date of completion of Remediation. \_\_\_\_\_

### 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: ` Phillip Hamlin

Title: Senior HSE Representative

Submit Date: ` \_\_\_\_\_

Email: Phil.Hamlin@anadarko.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: \_\_\_\_\_

Date: \_\_\_\_\_

Remediation Project Number: 10048

### COA Type

### Description

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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

401576597	ANALYTICAL RESULTS
401577384	ANALYTICAL RESULTS
401584513	LOGS
401623345	SOIL SAMPLE LOCATION MAP
401623348	GROUND WATER SAMPLE LOCATION
401623349	GROUND WATER ELEVATION MAP

Total Attach: 6 Files

### General Comments

#### User Group

#### Comment

#### Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)