

State of Colorado  
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203  
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:  
401872955  
Receive Date:  
02/20/2019

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 INFORMATION

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

PROJECT, PURPOSE & SITE INFORMATION

**PROJECT INFORMATION**  
Remediation Project #: 5604 Initial Form 27 Document #: 2524527

**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 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: <u>LOCATION</u>	Facility ID: <u>327892</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>HSR-BOTT-64N65W 23NENW</u>	Latitude: <u>40.303850</u>	Longitude: <u>-104.632990</u>	
	** correct Lat/Long if needed: Latitude: <u>40.304738</u>	Longitude: <u>-104.630559</u>	
QtrQtr: <u>NENW</u>	Sec: <u>23</u>	Twp: <u>4N</u>	Range: <u>65W</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? 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 and wetlands approximately 550 feet (ft) southwest, and groundwater approximately 3 ft below ground surface (bgs).

# 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 type="checkbox"/> Produced Water       | <input type="checkbox"/> Workover Fluids             |  |
| <input checked="" 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
Yes	GROUNDWATER	See Attached Data	Groundwater Samples/Lab Analysis
Yes	SOILS	110' N-S X 80' E-W X 5' bgs	Soil Samples/Lab 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.

In December 2010, the load line valve on the HSR-Bott 3-23, HSR-Fisher 6-23 production tank froze and split. Approximately 177 barrels (bbls) of oil were released within the tank battery berm. A vacuum truck was used to recover approximately 115 bbls of the released oil. The petroleum hydrocarbon impacted soil was excavated.

Since the December 2010 release, the production facility was sold to Noble Energy, Inc., and Kerr-McGee Oil and Gas Onshore, LP retained responsibility for remediating the petroleum hydrocarbon groundwater plume at this facility. In September 2018, Noble deconstructed the tank battery, and additional impacted soil was excavated beneath the former oil tank and former partially-buried produced water sump. The Site Map depicting the 2010 and 2018 excavation locations is attached as Figure 1.

## 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 ):

Please refer to the Form 27 submitted to the Colorado Oil and Gas Conservation Commission (COGCC) on March 2, 2011, for 2010 excavation activities.

In September 2018, Noble deconstructed the tank battery. On September 27, 2018, following the removal of impacted soil beneath the former tank battery, eight soil samples were collected from the excavation sidewalls for laboratory analysis of total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and total xylenes (BTEX), pH, and specific conductivity (EC). Analytical results indicated that TPH, BTEX, and EC levels were in full compliance with COGCC Table 910-1 allowable levels at the lateral extent of the excavation. Three soil samples exceeded the allowable level for pH; however, the samples were collected below the root zone (greater than 3 ft bgs); therefore, no additional excavation was necessary. The soil sample locations are depicted on Figure 1. The soil sample analytical results are summarized in Table 1.

### Proposed Groundwater Sampling

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

Please refer to the Form 27 submitted to the COGCC on March 2, 2011, for 2010 excavation groundwater sampling.

On September 27, 2018, one groundwater sample (GW02) was collected from the 2018 excavation and submitted for laboratory analysis of BTEX. Laboratory analytical results indicated sample GW02 exceeded the COGCC Table 910-1 allowable level for benzene at 22.6 micrograms per liter (µg/L). The excavation groundwater sample locations are depicted on Figure 1. The groundwater sample analytical results are summarized in Table 1.

Groundwater monitoring has been conducted on a quarterly basis since January 2011.

### 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 17  
Number of soil samples exceeding 910-1 8  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 7536

### NA / ND

-- Highest concentration of TPH (mg/kg) 4700  
NA Highest concentration of SAR           
BTEX > 910-1 Yes  
Vertical Extent > 910-1 (in feet) 4

### Groundwater

Number of groundwater samples collected 250  
Was extent of groundwater contaminated delineated? Yes  
Depth to groundwater (below ground surface, in feet) 3'  
Number of groundwater monitoring wells installed 11  
Number of groundwater samples exceeding 910-1 48

-- Highest concentration of Benzene (µg/l) 5200  
-- Highest concentration of Toluene (µg/l) 15000  
-- Highest concentration of Ethylbenzene (µg/l) 217  
-- Highest concentration of Xylene (µg/l) 6900  
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?

Groundwater impacts were detected in the adjoining rangeland northwest of the tank battery.

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? Yes

## SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

Approximately 1,600 cubic yards of impacted soil were removed from the 2010 excavation and approximately 470 cubic yards of impacted soil were removed from the 2018 excavation and transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado, for recycling. The impacted soil was excavated into the capillary and phreatic zones to address potential hydrocarbon impacts that may have been present below the current groundwater table due to seasonal fluctuations. Approximately 600 barrels of impacted groundwater were removed from the 2010 excavation and transported to a licensed injection facility for disposal. Approximately 540 barrels of impacted groundwater were removed from the 2018 excavation and transported to a licensed injection facility for disposal. The general site layout and 2010 and 2018 excavation footprints are depicted on the Site Map provided as Figure 1.

## REMIATION 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.

While backfilling the 2010 excavation, 15 gallons of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, was applied to the excavation groundwater prior to backfilling. Due to persistent, elevated benzene concentrations in multiple monitoring wells, an air sparging (AS) system was installed at the site to remediate the dissolved-phase petroleum hydrocarbon plume. Pilot test wells (AS01 and AS02) and observation wells (OW01 through OW04) were installed in March 2014, with pilot testing activities occurring on April 2, 2014.

The AS system was installed in August 2014 and system start-up commenced in December 2014. The system is comprised of eight AS wells (AS01 through AS08) connected by a combination of surface and subsurface high-density polyethylene piping to a remediation trailer powered by a natural gas generator. When the gas supply at the well ceased, another system was utilized with a Kohler gasoline generator. The remediation system included a manifold with valves to allow for uninterrupted flow control, measurement, and adjustment. AS is accomplished using a 5 horsepower GAST regenerative blower and a 1.5 horsepower GAST regenerative blower. The AS system layout is depicted on Figure 1. Boring logs for the AS and observation wells are attached.

In September 2018, Noble deconstructed the facility, and additional impacted soil was excavated beneath the former tank battery. The AS remediation activities were stopped and AS wells AS04, AS07, and AS08 were abandoned prior to the September 2018 excavation activities. There are currently no plans for additional AS activities.

While backfilling the 2018 excavation, 200 pounds of COGAC®, a carbon-based bioremediation product designed to capture and degrade petroleum hydrocarbons via chemical oxidation and passive bio-stimulation, were applied to the clean backfill in a series of lifts in the capillary and phreatic horizon.

### Soil Remediation Summary

<input type="checkbox"/> In Situ	<input checked="" type="checkbox"/> Ex Situ
_____ Bioremediation ( or enhanced bioremediation )	Yes _____ Excavate and offsite disposal
_____ Chemical oxidation	_____ If Yes: Estimated Volume (Cubic Yards) _____ 2070
_____ Air sparge / Soil vapor extraction	_____ Name of Licensed Disposal Facility or COGCC Facility ID # _____ 149007
_____ Natural Attenuation	No _____ Excavate and onsite remediation
_____ Other _____	_____ Land Treatment
	_____ Bioremediation (or enhanced bioremediation)
	_____ Chemical oxidation
	_____ Other _____

### Groundwater Remediation Summary

Yes _____	Bioremediation ( or enhanced bioremediation )
No _____	Chemical oxidation
Yes _____	Air sparge / Soil vapor extraction
Yes _____	Natural Attenuation
Yes _____	Other Groundwater Removal, MicroBlaze® Application (2010), and COGAC® Application (2018)

### 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.

Since the submittal of the eForm 27 Supplemental to the COGCC on May 7, 2018, replacement monitoring well MW01R and additional point of compliance monitoring wells MW09 and MW10 were installed at the site following completion of the 2018 excavation activities. Boring logs with well completion diagrams are attached.

Groundwater monitoring wells MW01R through MW07, MW09, and MW10 are sampled on a quarterly basis and submitted for laboratory analysis of BTEX. The monitoring well locations are depicted on Figure 1. The Groundwater Elevation Contour Map generated using the first quarter 2019 survey data is provided as Figure 2. The groundwater analytical results are summarized in Table 1, and the laboratory analytical reports for the monitoring events are attached.

Groundwater monitoring will continue on a quarterly basis until a No Further Action status request is warranted.

## REMEDIATION PROGRESS UPDATE

### PERIODIC REPORTING

Frequency:  Quarterly  Semi-Annually  Annually  Other \_\_\_\_\_

Report Type:  Groundwater Monitoring  Land Treatment Progress Report  O&M Report  
 Other Remediation Update \_\_\_\_\_

### 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:

The petroleum hydrocarbon impacted soil was transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado, for recycling.

Volume of E&P Waste (solid) in cubic yards 2070

E&P waste (solid) description Petroleum hydrocarbon impacted soil

COGCC Disposal Facility ID #, if applicable: 149007

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

Volume of E&P Waste (liquid) in barrels 1140

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

COGCC Disposal Facility ID #, if applicable: 434766

Non-COGCC 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? Yes

Does the previous reply indicate consideration of background concentrations? No

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? Yes

Is additional groundwater monitoring to be conducted? Yes

## 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 Noble production facility was deconstructed in 2018. The site was restored to its pre-release grade.

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. \_\_\_\_\_  
 Actual Spill or Release date, if known. 12/01/2010

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 12/07/2010  
 Date of commencement of Site Investigation. 12/07/2010  
 Date of completion of Site Investigation. 11/09/2018

### REMEDIAL ACTION DATES

Date of commencement of Remediation. 12/07/2010  
 Date of completion of Remediation. \_\_\_\_\_

### SITE RECLAMATION DATES

Date of commencement of Reclamation. \_\_\_\_\_  
 Date of completion of Reclamation. \_\_\_\_\_

### OPERATOR COMMENT

The partially-buried produced water sump was permanently removed. A sump closure report will be provided by Noble Energy, Inc.

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Phil Hamlin Title: Senior Environmental Rep.  
 Submit Date: 02/20/2019 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: Candice (Nikki) Graber Date: 02/21/2019  
 Remediation Project Number: 5604

### COA Type

### Description

<u>COA Type</u>	<u>Description</u>

## 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>
401872955	FORM 27-SUPPLEMENTAL-SUBMITTED
401872976	LOGS
401917864	ANALYTICAL RESULTS
401945179	SITE MAP
401945188	GROUND WATER ELEVATION MAP

Total Attach: 5 Files

## General Comments

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

Total: 0 comment(s)