

State of Colorado  
Oil and Gas Conservation Commission

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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> Phone: (970) 336-3500 Mobile: ( )
Address: P O BOX 173779		
City: DENVER	State: CO Zip: 80217-3779	
Contact Person: Phil Hamlin	Email: Phil.Hamlin@anadarko.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 5604 Initial Form 27 Document #: 2524527

PURPOSE INFORMATION

- 901.e. Sensitive Area Determination
- 909.c.(1), Rule 905: Pit or PW vessel closure
- 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
- 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 Facilities ( in accordance with Rule 909.c. )

Facility Type: LOCATION	Facility ID: 327892	API #: _____	County Name: WELD
Facility Name: HSR-BOTT-64N65W 23NENW		Latitude: 40.303850	Longitude: -104.632990
		** correct Lat/Long if needed: Latitude: 40.304738	Longitude: -104.630559
QtrQtr: NENW	Sec: 23	Twp: 4N	Range: 65W Meridian: 6 Sensitive Area? Yes

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. The Site Map 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.

### Proposed Groundwater Sampling

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

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 217  
Was extent of groundwater contaminated delineated? No  
Depth to groundwater (below ground surface, in feet) 3'  
Number of groundwater monitoring wells installed 8  
Number of groundwater samples exceeding 910-1 45

-- 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?

Based on the surveyed groundwater flow direction, point of compliance (POC) has not been established. Additional monitoring wells will be installed north of the tank battery in an attempt to obtain POC.

# 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.

Please refer to the Form 27 submitted to the COGCC on March 2, 2011.

## 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.

While backfilling the excavation, fifteen gallons of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, was applied to the excavation groundwater immediately prior to backfilling. The excavation area was restored to its pre-release grade.

Due to persistent, elevated benzene concentrations in multiple site 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 observation wells OW01 through OW04 were installed at the site 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 and 1.5 horsepower GAST regenerative blower. The layout of the AS system is depicted on Figure 2. Boring logs for the AS and observation wells are attached.

## Soil Remediation Summary

In Situ

Ex Situ

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

Yes \_\_\_\_\_ Excavate and offsite disposal

\_\_\_\_\_ Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_ 1600

\_\_\_\_\_ 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 and  
MicroBlaze® Application

## 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 monitoring wells MW01 through MW07 are sampled on a quarterly basis and submitted for laboratory analysis of BTEX. Monitoring well MW08 was removed from monitoring program in August 2015, following COGCC approval. The monitoring well locations are depicted on Figure 1. The Groundwater Elevation Contour Map generated using the January 2018 survey data is provided as Figure 3. The groundwater analytical results are summarized in Table 1. The laboratory analytical report for the January 2018 monitoring event is 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 \_\_\_\_\_

## 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 \_\_\_\_\_ 1600

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 \_\_\_\_\_ 600

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

COGCC Disposal Facility ID #, if applicable: \_\_\_\_\_ 159255

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? No \_\_\_\_\_

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 site was restored to its pre-release grade. The Noble Energy production facility was reconstructed.

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. \_\_\_\_\_

### 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

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 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: 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>
401549656	ANALYTICAL RESULTS
401553212	SITE MAP
401553217	GROUND WATER ELEVATION MAP
401573293	LOGS
401578420	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)