

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 INFORMATON

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>(970) 515-1161</u>

PROJECT, PURPOSE & SITE INFORMATION

**PROJECT INFORMATION**  
Remediation Project #: 4096 Initial Form 27 Document #: 1881462

**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 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 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 Facilites ( in accordance with Rule 909.c. )

Facility Type: <u>LOCATION</u>	Facility ID: <u>336120</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>BARCLAY-63N66W 27NWSW</u>	Latitude: <u>40.194760</u>	Longitude: <u>-104.771080</u>	
	** correct Lat/Long if needed: Latitude: <u>40.192674</u>	Longitude: <u>-104.769348</u>	
QtrQtr: <u>NWSW</u>	Sec: <u>27</u>	Twp: <u>3N</u>	Range: <u>66W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

**SITE CONDITIONS**

General soil type - USCS Classifications SP Most Sensitive Adjacent Land Use Pasture

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**

Surface water approximately 1,300 feet (ft) west and groundwater approximately 8 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 checked="" 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 Sampling/Lab Analysis
Yes	SOILS	80ft N-S x 23ft E-W x 16ft bgs	Soil Sampling/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 July 2007, historical petroleum hydrocarbon impacted soil was encountered while field crews were upgrading the Barclay 12-27/UPRR 22 Pan Am C #1 tank battery and replacing the partially buried produced water sump. The volume of the release is unknown. The petroleum hydrocarbon impacted soil was excavated.

## 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 ):

On July 19 and 23, 2007, six soil samples were collected from the excavation sidewalls and submitted for laboratory analysis of total petroleum hydrocarbons (TPH). Laboratory analytical results indicated that the TPH concentrations were in full compliance with the Colorado Oil and Gas Conservation Commission (COGCC) sensitive area allowable level of 1,000 milligrams per kilogram (mg/kg) at the lateral extent of the excavation. The soil samples were not analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) as the samples were collected prior to the April 1, 2009, COGCC rule changes. The general site layout, excavation footprint, and soil sample locations are depicted on the Excavation Site Map provided as 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 ):

On July 19, 2007, one groundwater sample (GW01) was collected from the open excavation for laboratory analysis of BTEX. Laboratory analytical results for groundwater sample GW01 indicated that the benzene and total xylenes concentrations exceeded the COGCC Table 910-1 allowable levels at 3,200 micrograms per liter (µg/L) and 5,400 µg/L, respectively. The excavation groundwater sample location is depicted on Figure 1. The groundwater sample analytical results are summarized in Table 2.

Groundwater monitoring proceeded on a quarterly basis in October 2007.

### 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 6  
Number of soil samples exceeding 910-1 2  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 1840

### NA / ND

-- Highest concentration of TPH (mg/kg) 8500  
NA Highest concentration of SAR           
BTEX > 910-1 No  
Vertical Extent > 910-1 (in feet) 15

### Groundwater

Number of groundwater samples collected 760  
Was extent of groundwater contaminated delineated? Yes  
Depth to groundwater (below ground surface, in feet) 8'  
Number of groundwater monitoring wells installed 24  
Number of groundwater samples exceeding 910-1 208

-- Highest concentration of Benzene (µg/l) 8100  
-- Highest concentration of Toluene (µg/l) 3.3  
-- Highest concentration of Ethylbenzene (µg/l) 1800  
-- Highest concentration of Xylene (µg/l) 19000  
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?

Petroleum hydrocarbon impacts to groundwater were encountered in the field east and northeast of the excavation.

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.

Approximately 1,090 cubic yards of petroleum hydrocarbon impacted soil were removed from the 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 groundwater table due to past seasonal fluctuations. The excavation footprint is depicted on the Site Map provided as Figure 2.

## REMEDICATION 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.

Prior to backfilling the excavation, ten gallons of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, were applied to the groundwater.

Due to persistent, elevated BTEX concentrations in multiple site monitoring wells, an air sparging (AS) and soil vapor extraction (SVE) system was installed at the site to remediate the dissolved-phase petroleum hydrocarbon plume. Pilot test wells AS01 and SVE01 were installed at the site on January 21, 2010, with pilot testing activities occurring on January 26, 2010.

Installation of the full-scale AS/SVE system occurred in March and April 2010. The system was initially comprised of 25 AS wells and 20 SVE wells connected by a combination of surface and subsurface high-density polyethylene piping to a remediation trailer powered by an electrical power drop. In October 2016, two AS wells and one SVE well were added to increase system influence. The remediation system included valves at all AS wellheads to allow for uninterrupted flow control, measurement, and adjustment. AS was accomplished using a 10-horsepower-driven Rietschle Thomas DLR 100 rotary-claw compressor and SVE was accomplished using passive wind turbines and a Roots 47 U-RAI DSL rotary-lobe blower housed within the remediation trailer. The as-built layout of the full-scale AS/SVE system is depicted on the Remediation System Layout attached as Figure 3. Boring logs for the AS and SVE 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) \_\_\_\_\_ 1090

\_\_\_\_\_ 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 \_\_\_\_\_ 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.

Monitoring wells MW01 through MW24 were installed at the site between August 2007 and December 2008. Monitoring wells MW01, MW03, MW07, MW08, MW13, and MW19 were temporarily removed from the groundwater monitoring program in July 2009, as approved by the COGCC in the letter dated July 1, 2009. Monitoring wells MW20 through MW22 were removed from the groundwater monitoring program in July 2012, as approved by the COGCC in the letter dated May 24, 2012. In June 2016, monitoring wells MW01, MW03, MW07, MW08, MW13, and MW19 were reinstated into the program. Groundwater monitoring continued on a quarterly basis. The monitoring well locations are depicted on Figure 2.

On November 18, 2013, monitoring wells MW01 through MW24 were surveyed to obtain the relative groundwater and top-of-casing well elevation data. The survey data indicated the groundwater flow direction at the site is to the northeast. Relative groundwater elevations are provided in Table 2. Groundwater Elevation Contour Maps for the first quarter 2018 through fourth quarter 2018 monitoring events are provided as Figures 4A through 4D, respectively.

As of the October 2018 quarterly monitoring event, BTEX concentrations in monitoring wells MW01 through MW19, MW23, and MW24 were in full compliance with COGCC Table 910-1 allowable levels for four consecutive quarterly monitoring events. The groundwater analytical results are summarized in Table 2. The analytical reports for the four compliant groundwater monitoring events are attached.

# REMEDIATION PROGRESS UPDATE

## PERIODIC REPORTING

Frequency:  Quarterly  Semi-Annually  Annually  Other Final Report  
Report Type:  Groundwater Monitoring  Land Treatment Progress Report  O&M Report  
 Other NFA Status Request

## 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 1090

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 0

E&P waste (liquid) description

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility:

## REMEDIATION COMPLETION REPORT

### REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? Yes

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? No

## 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 Kerr-McGee production facility remains at the site.

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? No

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

# IMPLEMENTATION SCHEDULE

## **PRIOR DATES**

Date of Surface Owner notification/consultation, if required. \_\_\_\_\_

Actual Spill or Release date, if known. 07/18/2007

## **SITE INVESTIGATION DATES**

Date of Initial Actions described in Site Investigation Plan (start date). 07/18/2007

Date of commencement of Site Investigation. 07/18/2007

Date of completion of Site Investigation. 12/16/2008

## **REMEDIAL ACTION DATES**

Date of commencement of Remediation. 07/18/2007

Date of completion of Remediation. 10/10/2018

## **SITE RECLAMATION DATES**

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

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

**OPERATOR COMMENT**

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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: 12/10/2018 \_\_\_\_\_

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: PETER GINTAUTAS \_\_\_\_\_

Date: 12/11/2018 \_\_\_\_\_

Remediation Project Number: 4096 \_\_\_\_\_

**COA Type****Description**

	Based on the information presented, it appears that no further action is necessary at this time and the COGCC approves the closure request. However, should future conditions at the site indicate contaminant concentrations in soils exceeding COGCC standards or if ground water is found to be impacted, then further investigation and/or further remediation activities may be required. In addition, the surface area disturbed by the remediation activity shall be reclaimed in accordance with the 1000 Series Reclamation Rules.
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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**

401729405	FORM 27-SUPPLEMENTAL-SUBMITTED
401800214	LOGS
401854777	SOIL SAMPLE LOCATION MAP
401854778	SITE MAP
401854780	MAP
401854782	GROUND WATER ELEVATION MAP
401864537	ANALYTICAL RESULTS

Total Attach: 7 Files

**General Comments****User Group****Comment****Comment Date**

		Stamp Upon Approval
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Total: 0 comment(s)