

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>KERR MCGEE OIL & GAS ONSHORE LP</u> | Operator No: <u>47120</u> | Phone Numbers |
| 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 #: 7534 Initial Form 27 Document #: 2516658

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 Facilities (in accordance with Rule 909.c.)

| | | | |
|--|----------------------------|---|-------------------------------|
| Facility Type: <u>TANK BATTERY</u> | Facility ID: <u>445530</u> | API #: _____ | County Name: <u>WELD</u> |
| Facility Name: <u>BIRKLE-63N67W 24SWSE</u> | | Latitude: <u>40.206366</u> | Longitude: <u>-104.836913</u> |
| | | ** correct Lat/Long if needed: Latitude: <u>40.206365</u> | Longitude: <u>-104.836938</u> |
| QtrQtr: <u>SWSE</u> | Sec: <u>24</u> | Twp: <u>3N</u> | Range: <u>67W</u> |
| | | Meridian: <u>6</u> | Sensitive Area? <u>Yes</u> |

SITE CONDITIONS

General soil type - USCS Classifications SW Most Sensitive Adjacent Land Use Agriculture and Pasture

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

A water well is located approximately 800 feet (ft) north, surface water is located approximately 1,100 ft west, livestock approximately 20 feet south, and groundwater is present approximately 2 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 Samples/Lab Results |
| Yes | SOILS | 15' N-S x 36' E-W x 4' bgs (max) | 2 Excavations; Soil Samples/Lab Results |

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 October 2012, field crews encountered soil with historical petroleum hydrocarbon impacts while replacing the separators and installing new dump lines. There was no indication that the existing dump lines, separators, or fittings were leaking. The volume of the release is unknown. The petroleum hydrocarbon impacted soil was excavated.

On August 6, 2013, an operator discovered a pinhole leak in an oil tank at the site. Approximately 2 gallons of oil and 3 gallons of produced water were released onto the ground surface. The petroleum hydrocarbon impacted soil was excavated.

A No Further Action (NFA) Status Request was originally submitted to the Colorado Oil and Gas Conservation Commission (COGCC) on March 20, 2015.

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 October 8, 2012, four soil samples were collected from the excavation sidewalls for TPH and BTEX analysis. The analytical results confirmed that TPH and BTEX concentrations were in full compliance with COGCC Table 910-1 allowable levels at the northern, eastern, and southern extents. TPH and benzene concentrations exceeded allowable levels in the western sidewall sample; however, excavation activities were suspended due to bald eagle nesting restrictions. In August 2013, once the bald eagle nesting restrictions were lifted and the remaining impacted soil was excavated, an additional western sidewall sample was collected and was in full compliance with allowable levels.

On August 6, 2013, four sidewall samples were collected for TPH and BTEX analysis. The analytical results indicated that TPH and BTEX concentrations were in full compliance with COGCC Table 910-1 allowable levels. The soil sample locations are depicted on Figure 1. The 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 October 8, 2012, groundwater sample GW01 was collected from the separator excavation and submitted for laboratory analysis of BTEX. Laboratory analytical results indicated sample GW01 exceeded the COGCC Table 910-1 allowable level for benzene at a concentration of 48 micrograms per liter (µg/L).

On August 6, 2013, groundwater sample GW01 was collected from the tank battery excavation and submitted for laboratory analysis of BTEX. Laboratory analytical results indicated sample GW01 exceeded the COGCC Table 910-1 allowable level for benzene at 66 µg/L. Following the removal of approximately 5 barrels of impacted groundwater, a second groundwater sample (GW02) was collected. Laboratory analytical results indicated sample GW02 exceeded the COGCC Table 910-1 allowable level for benzene and total xylenes at 36 µg/L and 2,200 µg/L, respectively. The excavation groundwater sample locations are depicted on Figure 1. The groundwater sample analytical results are summarized in Table 2.

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 9

Number of soil samples exceeding 910-1 1

Was the areal and vertical extent of soil contamination delineated? Yes

Approximate areal extent (square feet) 379

NA / ND

-- Highest concentration of TPH (mg/kg) 1240

NA Highest concentration of SAR

BTEX > 910-1 Yes

Vertical Extent > 910-1 (in feet) 2

Groundwater

Number of groundwater samples collected 51

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet) 2'

Number of groundwater monitoring wells installed 8

Number of groundwater samples exceeding 910-1 3

-- Highest concentration of Benzene (µg/l) 66

-- Highest concentration of Toluene (µg/l) 250

-- Highest concentration of Ethylbenzene (µg/l) 140

-- Highest concentration of Xylene (µg/l) 2200

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)

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 20 cubic yards of impacted soil were removed from the 2012 excavation and approximately 15 cubic yards of impacted soil were removed from the 2013 excavation. The petroleum hydrocarbon impacted soil from the 2012 and 2013 excavations was transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado. 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. Approximately 40 barrels of impacted groundwater were removed from the 2012 excavation and approximately 5 barrels of impacted groundwater were removed from the 2013 excavation. The general site layout and excavation footprint are depicted on the Site Map provided as Figure 2.

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.

Prior to backfilling the 2012 and 2013 excavations, 10 gallons (5 gallons per excavation) of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, were applied to the groundwater immediately prior to backfilling each excavation.

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) _____ 35
Name of Licensed Disposal Facility or COGCC Facility ID # _____ 149007
No Excavate and onsite remediation
_____ Land Treatment
_____ Bioremediation (or enhanced bioremediation)
_____ Chemical oxidation
_____ Other _____

Groundwater Remediation Summary

Yes Bioremediation (or enhanced bioremediation)
No Chemical oxidation
No 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.

Monitoring wells MW01 through MW08 were installed between November 2011 and October 2013. Groundwater monitoring continued on a quarterly basis. Field boring logs with well completion diagrams are attached. The monitoring well locations are depicted on Figure 2.

On October 24, 2013, monitoring wells MW01 through MW04 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 northwest. On December 27, 2013, monitoring wells MW05 through MW08 were tied in to the survey data. The survey data confirmed the groundwater flow direction at the site was to the northwest. Relative groundwater elevations are provided in Table 2. Groundwater Elevation Contour Maps for the fourth quarter 2013 through the third quarter 2014 monitoring events are provided as Figures 3A through 3D, respectively.

As of the September 2014 quarterly monitoring event, BTEX concentrations in wells MW01 through MW08 were compliant 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 from the 2012 and 2013 excavations was transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado, for recycling.

Volume of E&P Waste (solid) in cubic yards 35

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 45

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? 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? _____

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. 10/09/2012

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 10/08/2012

Date of commencement of Site Investigation. 10/08/2012

Date of completion of Site Investigation. 12/26/2013

REMEDIAL ACTION DATES

Date of commencement of Remediation. 10/08/2012

Date of completion of Remediation. 09/24/2014

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____

Date of completion of Reclamation. _____

OPERATOR COMMENT

The original NFA Status Request was submitted to the COGCC as a letter report on March 20, 2015. We are re-submitting the NFA Status Request in the new eForm 27 format, and we are including the original NFA Status Request as an attachment, per COGCC's request.

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: 03/15/2018

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: 03/16/2018

Remediation Project Number: 7534

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. |
|--|---|

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**

| | |
|-----------|--------------------------------|
| 401552742 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 401552811 | LOGS |
| 401553639 | ANALYTICAL RESULTS |
| 401567529 | SOIL SAMPLE LOCATION MAP |
| 401567530 | SITE MAP |
| 401567532 | GROUND WATER ELEVATION MAP |
| 401575521 | SITE INVESTIGATION REPORT |

Total Attach: 7 Files

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

| | | |
|--|--|---------------------|
| | | Stamp Upon Approval |
|--|--|---------------------|

Total: 0 comment(s)