

State of Colorado
Oil and Gas Conservation Commission

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



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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 & 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 #: 10503 Initial Form 27 Document #: 401395702

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>SPILL OR RELEASE</u> | Facility ID: <u>451306</u> | API #: _____ | County Name: <u>WELD</u> |
| Facility Name: <u>Thompson 13-33</u> | Latitude: <u>40.349113</u> | Longitude: <u>-104.905567</u> | |
| ** correct Lat/Long if needed: Latitude: _____ | | Longitude: _____ | |
| QtrQtr: <u>SWSW</u> | Sec: <u>33</u> | Twp: <u>5N</u> | Range: <u>67W</u> |
| Meridian: <u>6</u> | Sensitive Area? <u>Yes</u> | | |

SITE CONDITIONS

General soil type - USCS Classifications SM Most Sensitive Adjacent Land Use Agriculture and Residential

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 800 feet (ft) west, occupied building approximately 330 ft west-southwest, livestock approximately 400 ft southwest, and groundwater 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 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 | 43ft E-W x 16ft N-S x 4ft 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 June 2017, a dump line with a corrosion hole was encountered while excavating a surface stain at the Thompson 13-33 tank battery facility. The volume of the release is unknown. The petroleum hydrocarbon impacted soil was excavated.

In August 2017, groundwater with petroleum hydrocarbon impacts were encountered while removing the partially-buried produced water sump. The groundwater sample exceedance was associated with the June 2017 dump line corrosion hole release.

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):

Between June 26 and 29, 2017, 9 soil samples were collected from the excavation for laboratory analysis of total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and total xylenes (BTEX), pH, and specific conductivity (EC). Analytical results indicated that BTEX, TPH, pH, and EC levels were in full compliance with Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels at the lateral extent of the excavation.

In August 2017, soil sampling was conducted to determine if petroleum hydrocarbon impacts to subsurface soil resulted from operating a partially-buried produced water sump at the site. Soil samples were collected for BTEX, TPH, pH, and EC analysis. Laboratory analytical results indicated that BTEX, TPH, pH, and EC levels were in full compliance with COGCC Table 910-1 allowable levels at the lateral extent of the excavation. For additional details, please refer to the Sump Closure Report submitted to the COGCC on January 22, 2018.

Proposed Groundwater Sampling

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

On June 26, 2017, groundwater sample GW01 was collected from the excavation and submitted for laboratory analysis of BTEX. Laboratory analytical results indicated that benzene exceeded the COGCC Table 910-1 allowable level at a concentration of 1,320 micrograms per liter (µg/L). On June 30, 2017, following removal of impacted groundwater from the excavation, sample GW02 was collected for BTEX analysis. Laboratory analytical results for GW02 indicated that benzene exceeded the COGCC allowable level at a concentration of 16.4 µg/L. The groundwater analytical results are summarized on Table 1.

In August 2017, a groundwater sample was collected from the sump excavation which exceeded the COGCC Table 910-1 allowable level for benzene. The exceedance was determined to be associated with the June 2017 dump line corrosion hole release. For additional details of the sump excavation and analytical results, please refer to the Sump Closure Report submitted to the COGCC on January 22, 2018.

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 13
Number of soil samples exceeding 910-1 3
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 690

NA / ND

-- Highest concentration of TPH (mg/kg) 3795
NA Highest concentration of SAR
BTEX > 910-1 Yes
Vertical Extent > 910-1 (in feet) 4

Groundwater

Number of groundwater samples collected 19
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 2'
Number of groundwater monitoring wells installed 6
Number of groundwater samples exceeding 910-1 5

-- Highest concentration of Benzene (µg/l) 1790
-- Highest concentration of Toluene (µg/l) 273
-- Highest concentration of Ethylbenzene (µg/l) 92.5
-- Highest concentration of Xylene (µg/l) 800
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?

A background soil sample was submitted to the laboratory and placed on hold for analysis. Laboratory analytical results for excavation soil samples indicated that pH and EC levels were compliant at the extent of the excavation; therefore, the background soil sample was not run for laboratory analysis.

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.

In June 2017, approximately 110 cubic yards of petroleum hydrocarbon impacted soil were excavated and transported to Buffalo Ridge Landfill in Keenesburg, Colorado, for disposal. 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. Based on excavation groundwater samples exceeding COGCC Table 910-1 allowable levels, approximately 150 barrels of impacted groundwater were removed from the excavation using a vacuum truck and transported to the Aggregate Recycle Facility in Weld County, Colorado.

In August 2017, petroleum hydrocarbon impacted soil was not encountered in the partially-buried produced water sump excavation. The general site layout and excavation footprint are depicted on the Site Map provided as Figure 1.

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.

While backfilling the June 2017 excavation, 100 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 horizons.

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) 110
Name of Licensed Disposal Facility or COGCC Facility ID # _____
No Excavate and onsite remediation
_____ Land Treatment
_____ Bioremediation (or enhanced bioremediation)
_____ Chemical oxidation
_____ Other _____

Groundwater Remediation Summary

Yes Bioremediation (or enhanced bioremediation)
Yes Chemical oxidation
No Air sparge / Soil vapor extraction
Yes Natural Attenuation
Yes Other Groundwater Removal and
COGAC® 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.

Between June and August 2018, six groundwater monitoring wells (MW01 through MW06) were installed at the site. The monitoring well locations are depicted on Figure 1. Boring logs with monitoring well completion diagrams are attached.

Groundwater monitoring wells MW01 through MW06 are sampled on a quarterly basis for BTEX by United States Environmental Protection Agency Method 8260C. The Groundwater Elevation Contour Map generated using the March 2019 survey data is provided as Figure 2. The groundwater analytical results are summarized in Table 1, and the laboratory analytical reports for the June 2018 through March 2019 groundwater 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 _____

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 groundwater was transported to the Aggregate Recycle Facility in Weld County, Colorado, to be recycled.

Volume of E&P Waste (solid) in cubic yards _____ 110

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

COGCC Disposal Facility ID #, if applicable: _____

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

Volume of E&P Waste (liquid) in barrels _____ 150

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 excavation has been backfilled and restored to its pre-release grade. The Kerr-McGee tank battery 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. 06/27/2017

Actual Spill or Release date, if known. 06/27/2017

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 06/26/2017

Date of commencement of Site Investigation. 06/26/2017

Date of completion of Site Investigation. 09/06/2018

REMEDIAL ACTION DATES

Date of commencement of Remediation. 06/27/2017

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 Environmental Rep.

Submit Date: 05/10/2019

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: 05/15/2019

Remediation Project Number: 10503

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> |
|--------------------|--------------------------------|
| 402001351 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 402001552 | LOGS |
| 402002610 | ANALYTICAL RESULTS |
| 402016672 | SITE MAP |
| 402016674 | 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)