

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: KERR MCGEE OIL & GAS ONSHORE LP | Operator No: 47120 | Phone Numbers |
| Address: P O BOX 173779 | | Phone: (970) 336-3500 |
| City: DENVER | State: CO | Mobile: (970) 515-1161 |
| Zip: 80217-3779 | | |
| Contact Person: Phillip Hamlin | Email: Phil.Hamlin@anadarko.com | |

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 9567 Initial Form 27 Document #: 200439232

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: LOCATION | Facility ID: 330767 | API #: _____ | County Name: WELD |
| Facility Name: HSR-KUNZMAN-62N66W 5NESW | Latitude: 40.165330 | Longitude: -104.803360 | |
| ** correct Lat/Long if needed: Latitude: 40.162806 | | Longitude: -104.803558 | |
| QtrQtr: NESW | Sec: 5 | Twp: 2N | Range: 66W |
| Meridian: 6 | Sensitive Area? | Yes | |

SITE CONDITIONS

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

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

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 and laboratory analysis |
| Yes | SOILS | 110' (N-S) x 30' (E-W) x 19' bgs | Excavation, soil sampling, and laboratory 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.

On June 5, 2013, a dump line release was discovered during tank battery reconstruction activities at the HSR-Kunzman-62N66W5NESW production facility. The facility was shut in, associated underground infrastructure removed, and excavation activities commenced. Groundwater was encountered in the excavation between approximately 13 and 19 feet below ground surface (bgs). A Form 19 was submitted to the COGCC on June 21, 2013. The COGCC has issued Spill Tracking number 2145347 for this 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):

Soil samples were collected from the excavation as described in the Initial Form 27. Based on the data presented, impacted soils in the excavation area were remediated to below COGCC standards during the June 2013 excavation, with the exception of soil in the vicinity of sample SS05, which could not be removed due to the proximity to a third-party production line. Additional soil sampling was conducted on September 6, 2017, to determine if soil impacts remained in the area of SS05. Sample BH02A @ 7-8.5' was collected in the location of SS05, from the depth interval exhibiting the highest photoionization detector (PID) reading, and submitted to Origins Laboratory for analysis of BTEX and TPH. Analytical results indicated that constituent concentrations in sample BH02A @ 7-8.5' were below COGCC standards, due to natural attenuation of hydrocarbon impacts following source removal. Based on the data presented, impacted soils in the excavation area were remediated to below COGCC standards.

Proposed Groundwater Sampling

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

Groundwater samples were collected as described herein. Based on the data presented, groundwater concentrations were below the applicable COGCC Table 910-1 groundwater standards for a minimum of four consecutive quarters.

Proposed Surface Water Sampling

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

Surface water samples were collected from the irrigation canal west of the site, as described in the Initial Form 27. Laboratory analytical results indicated that no BTEX compounds were detected in any of the surface water samples, and therefore surface water was not impacted by this release.

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 11

Number of soil samples exceeding 910-1 3

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

Approximate areal extent (square feet) 3300

NA / ND

-- Highest concentration of TPH (mg/kg) 5470

NA Highest concentration of SAR

BTEX > 910-1 Yes

Vertical Extent > 910-1 (in feet) 19

Groundwater

Number of groundwater samples collected 76

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet) 17'

Number of groundwater monitoring wells installed 8

Number of groundwater samples exceeding 910-1 14

-- Highest concentration of Benzene (µg/l) 256

-- Highest concentration of Toluene (µg/l) 12

-- Highest concentration of Ethylbenzene (µg/l) 1420

-- Highest concentration of Xylene (µg/l) 16700

NA Highest concentration of Methane (mg/l)

Surface Water

3 Number of surface water samples collected

0 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.

On June 11, 2013, excavation activities commenced and approximately 1,130 cubic yards of impacted material were excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Soils were excavated into the phreatic zone to address potential hydrocarbon impacts that may have been present below the current groundwater table due to seasonal fluctuations. Laboratory analytical results indicated that constituent concentrations in the soil samples collected from the final lateral extent of the excavation area were below the applicable COGCC Table 910-1 soil standards, with the exception of SS05, which exceeded the TPH standard. Additional soil removal in the vicinity of SS05 could not be completed due to the presence of a third-party production line. Additional soil sampling was conducted on September 6, 2017, to determine if soil impacts remained in the area of SS05. Sample BH02A@7-8.5' was collected in the location of sample SS05, from the depth interval exhibiting the highest PID reading, and submitted to Origins Laboratory for analysis of BTEX and TPH. Analytical results received on September 7, 2017, indicated that constituent concentrations in sample BH02A@7-8.5' were below COGCC standards, due to natural attenuation of hydrocarbon impacts following source removal. Groundwater was encountered in the excavation area between approximately 13 and 19 feet bgs. A groundwater sample (GW01) was collected and submitted for laboratory analysis of BTEX. Analytical results received on June 13, 2013, indicated that the benzene concentration in sample GW01 was above the applicable COGCC groundwater standard. A second groundwater sample (GW02) was collected following the removal of approximately 60 barrels of groundwater from the excavation and submitted for laboratory analysis of BTEX. Groundwater analytical results received on June 20, 2013, indicated that constituent concentrations in sample GW02 were below the COGCC standards.

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.

Based on the analytical data presented herein, remediation is complete at this site and Kerr-McGee is requesting a No Further Action (NFA) determination for this release.

Soil Remediation Summary

☒ In Situ

_____ Bioremediation (or enhanced bioremediation)

_____ Chemical oxidation

_____ Air sparge / Soil vapor extraction

Yes _____ Natural Attenuation

_____ Other _____

☒ Ex Situ

Yes _____ Excavate and offsite disposal

_____ If Yes: Estimated Volume (Cubic Yards) _____ 1130

_____ 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

No _____ Bioremediation (or enhanced bioremediation)

No _____ Chemical oxidation

No _____ Air sparge / Soil vapor extraction

Yes _____ Natural Attenuation

No _____ Other _____

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 February 18, 2014 and September 10, 2015, eight (8) temporary groundwater monitoring wells (BH01 through BH07, and BH04R) were installed at the site to assess the extent of groundwater impacts. These wells were sampled on a quarterly basis and submitted for laboratory analysis of BTEX. Analytical results for the groundwater samples collected from the temporary monitoring wells confirmed that constituent concentrations were below the applicable COGCC Table 910-1 groundwater standards for a minimum of four consecutive quarters.

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 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:

NA

Volume of E&P Waste (solid) in cubic yards 1130

E&P waste (solid) description Hydrocarbon impacted soil

COGCC Disposal Facility ID #, if applicable: _____

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

Volume of E&P Waste (liquid) in barrels 60

E&P waste (liquid) description Hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Licensed 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 has been restored to its pre-release grade. Kerr-McGee's production facility remains on-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. _____

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 06/05/2013

Date of commencement of Site Investigation. 06/05/2013

Date of completion of Site Investigation. 09/06/2017

REMEDIAL ACTION DATES

Date of commencement of Remediation. 06/11/2013

Date of completion of Remediation. 04/11/2017

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____

Date of completion of Reclamation. _____

OPERATOR COMMENT

As described, laboratory analytical data for the soil samples collected from the final lateral extent of the excavation were below applicable COGCC Table 910-1 soil standards, with the exception of SS05, which exceeded the COGCC standard for TPH. Sample BH02A@7-8.5' was subsequently collected in the location of SS05, and laboratory analytical data indicated that constituent concentrations were below COGCC standards, due to natural attenuation of hydrocarbon impacts following source removal. Soil analytical results are summarized in Table 1, and soil sample locations are illustrated on Figure 1. The soil sample laboratory analytical reports are included in Attachment A. Laboratory analytical data indicate that surface water was not impacted by this release. Surface water analytical results are summarized in Table 2, and surface water and excavation groundwater sample locations are illustrated on Figure 2. The surface water sample laboratory analytical reports are included in Attachment A. Laboratory analytical data for the groundwater samples collected from the temporary monitoring wells confirmed that constituent concentrations were below applicable COGCC Table 910-1 standards for a minimum of four quarters. Groundwater analytical results are summarized in Table 3, temporary monitoring well locations are illustrated on Figure 3, and quarterly groundwater contour maps are presented as Figures 4 through 7. The groundwater sample laboratory analytical reports and temporary monitoring well completion diagrams are included in Attachments A and B, respectively. Based on the remediation activities completed at the site and the analytical results presented herein, Kerr-McGee is requesting a No Further Action (NFA) determination for this release.

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

Signed: ` Phillip Hamlin

Title: Senior HSE Representative

Submit Date: ` 09/29/2017

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: 10/03/2017

Remediation Project Number: 9567

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**

| | |
|-----------|--------------------------------|
| 401306222 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 401400743 | ANALYTICAL RESULTS |
| 401401330 | LOGS |
| 401414362 | ANALYTICAL RESULTS |
| 401414504 | SOIL SAMPLE LOCATION MAP |
| 401414510 | ANALYTICAL RESULTS |
| 401414595 | ANALYTICAL RESULTS |
| 401414835 | GROUND WATER SAMPLE LOCATION |
| 401414836 | GROUND WATER SAMPLE LOCATION |
| 401414837 | GROUND WATER ELEVATION MAP |

Total Attach: 10 Files

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

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

Total: 0 comment(s)