

State of Colorado Oil and Gas Conservation Commission

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Report taken by:

CHRIS CANFIELD

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>Phillip Hamlin</u> | Email: <u>Phil.Hamlin@anadarko.com</u> | Mobile: <u>(970) 515-1161</u> |

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 9106 Initial Form 27 Document #: 2143456

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 checked="" 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>439681</u> | API #: _____ | County Name: <u>WELD</u> |
| Facility Name: <u>SPILL/RELEASE POINT</u> | | Latitude: <u>40.040113</u> | Longitude: <u>-104.872339</u> |
| ** correct Lat/Long if needed: Latitude: _____ | | Longitude: _____ | |
| QtrQtr: <u>SWNE</u> | Sec: <u>22</u> | Twp: <u>1N</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 Crop Land

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

An occupied building is located approximately 1,075 feet east-northeast of the release location. Livestock holding pens are located approximately 900 feet southeast and 1,020 feet northeast of the release location.

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 type="checkbox"/> Oil | <input type="checkbox"/> Tank Bottoms | |
| <input checked="" 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 | 58' (E-W) x 40' (N-S) x 10' 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 October 30, 2014, historical impacts were discovered during tank battery reconstruction activities at the Albert Sack Unit 1 production facility. The facility was shut in, associated infrastructure removed, and excavation activities were initiated. Groundwater was encountered in the excavation area at approximately 10 feet below ground surface (bgs). The COGCC has issued Spill/Release Point ID 439681 for this release. On February 9, 2018, a partially-buried produced water vessel was removed during facility abandonment activities.

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 in 2014 as described in the Initial Form 27. Based on the data presented, impacted soils in the 2014 excavation area were remediated to be in full compliance with State standards. On February 9, 2018, one soil sample (B01@5') was collected from the base of the sump removal excavation and submitted to Origins Laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total petroleum hydrocarbon (TPH) - gasoline range organics (GRO) by USEPA Method 8260C, TPH - diesel and oil range organics (DRO & ORO) by USEPA Method 8015, electrical conductivity (EC), and pH. Laboratory analytical data confirmed that constituent concentrations in sample B01@5' were in full compliance with State standards. The 2018 sump excavation soil sample location is illustrated on Figure 1, and soil sample analytical data is presented in Table 1. The laboratory analytical report is included in Attachment A.

Proposed Groundwater Sampling

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

Between April 2 and October 12, 2015, fourteen (14) temporary monitoring wells (BH01 - BH12, BH05R, BH11R) were installed to further assess the extent of groundwater impacts. Quarterly groundwater sampling was initiated on April 14, 2015; groundwater monitoring was temporarily ceased and the temporary monitoring wells were abandoned, pending the construction of a new well pad and production facility at this location. Following tank battery reconstruction activities, replacement monitoring wells will be installed, and groundwater samples will continue to be collected on a quarterly basis and analyzed for BTEX. The former groundwater sample locations are illustrated on Figure 2, and groundwater analytical data is presented in Table 2. Laboratory analytical reports are included in Attachment A.

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):

A partially-buried produced water vessel was removed during 2018 facility abandonment activities. All remaining groundwater monitoring wells at the site were temporarily abandoned on February 1, 2018; replacement wells will be installed once well pad and production facility construction activities have been completed.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 15
Number of soil samples exceeding 910-1 5
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 1020

NA / ND

-- Highest concentration of TPH (mg/kg) 1908
NA Highest concentration of SAR
BTEX > 910-1 Yes
Vertical Extent > 910-1 (in feet) 10

Groundwater

Number of groundwater samples collected 132
Was extent of groundwater contaminated delineated? No
Depth to groundwater (below ground surface, in feet) 10'
Number of groundwater monitoring wells installed 14
Number of groundwater samples exceeding 910-1 44

-- Highest concentration of Benzene (µg/l) 3140
-- Highest concentration of Toluene (µg/l) 1400
-- Highest concentration of Ethylbenzene (µg/l) 618
-- Highest concentration of Xylene (µg/l) 8040
NA Highest concentration of Methane (mg/l)

Surface Water

0 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?

Impacted groundwater has been detected in off-site temporary groundwater monitoring wells BH09 and BH11R.

☐ 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?

Hydrocarbon impacted groundwater remains at the site. Groundwater monitoring activities are currently on hold, pending the construction of a new well pad and production facility at this location. Following tank battery reconstruction activities, replacement groundwater monitoring wells will be installed, and groundwater monitoring activities will resume. The temporary groundwater monitoring wells will be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with State standards for four consecutive quarters. Additional temporary monitoring wells will be installed as necessary to maintain point of compliance (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.

Between October 30 and November 14, 2014, approximately 500 cubic yards of impacted soil were excavated and transported to the Front Range Regional Landfill in Erie, Colorado for disposal. Approximately 80 barrels of impacted groundwater were removed from the excavation via vacuum truck and transported to a licensed disposal facility.

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.

Laboratory data indicate that impacted soils in the excavation areas have been remediated to be in full compliance with State standards. Prior to backfilling the excavation, approximately 264 pounds of activated carbon were added to the groundwater within the 2014 excavation area to mitigate remaining hydrocarbon impacts in groundwater. Bi-weekly mobile air sparge / enhanced fluid recovery (AS/EFR) events were conducted at the site between October 19, 2016 and January 26, 2018. To-date, a total of approximately 233 barrels of impacted groundwater have been removed during mobile AS/EFR events. Quarterly groundwater monitoring and AS/EFR events have been placed on hold, pending the construction of a new well pad and production facility at this location. Following tank battery reconstruction activities, replacement monitoring wells will be installed, and groundwater monitoring activities will resume. The temporary groundwater monitoring wells will be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with State standards for four consecutive quarters. Additional potential remediation measures, including restarting mobile AS/EFR events, are currently under evaluation to address remaining groundwater impacts. Estimated time to attain NFA is TBD based on the review of groundwater concentrations, the extent of impacted groundwater, and the efficacy of selected remedial technologies.

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) 500
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
Yes _____ Air sparge / Soil vapor extraction
Yes _____ Natural Attenuation
Yes _____ Other Groundwater removal, activated carbon adsorption, mobile EFR/AS events

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 April 2 and October 12, 2015, a total of 14 temporary groundwater monitoring wells were installed at the site to assess the extent of groundwater impacts. The remaining 12 groundwater monitoring wells were abandoned on February 1, 2018, in preparation for the construction of a new well pad and production facility at this location. Following tank battery reconstruction activities, replacement monitoring wells will be installed, and groundwater monitoring activities will resume. The temporary groundwater monitoring wells will be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with State standards for four consecutive quarters. Additional temporary monitoring wells will be installed as necessary to maintain POC. The former groundwater sample locations are illustrated on Figure 2, and a potentiometric surface contour map for the First Quarter 2018 is presented as Figure 3. Well completion logs for the former temporary monitoring wells at the site are included as Attachment B.

REMEDATION 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:

NA

Volume of E&P Waste (solid) in cubic yards 500

E&P waste (solid) description Hydrocarbon impacted soil

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Front Range Regional Landfill - Erie, Colorado

Volume of E&P Waste (liquid) in barrels 313

E&P waste (liquid) description Hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Licensed disposal facility

REMEDATION COMPLETION REPORT

REMEDATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No

Do all soils meet Table 910-1 standards? _____

Does the previous reply indicate consideration of background concentrations? _____

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? _____

Is additional groundwater monitoring to be conducted? _____

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. A new Kerr-McGee production facility will be constructed at the site. Kerr-McGee will consult with the surface owner to determine reclamation specifics to properly conduct reclamation activities in accordance with COGCC 1000 Series Rules.

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). 10/30/2014

Date of commencement of Site Investigation. 10/30/2014

Date of completion of Site Investigation. _____

REMEDIAL ACTION DATES

Date of commencement of Remediation. 10/30/2014

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: ` Phillip Hamlin

Title: Senior HSE Representative

Submit Date: ` 03/27/2018

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: CHRIS CANFIELD

Date: 03/27/2018

Remediation Project Number: 9106

COA Type

Description

| | |
|--|--|
| | |
|--|--|

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

| | |
|-----------|--------------------------------|
| 401563094 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 401564928 | ANALYTICAL RESULTS |
| 401564961 | ANALYTICAL RESULTS |
| 401565005 | ANALYTICAL RESULTS |
| 401579864 | SOIL SAMPLE LOCATION MAP |
| 401579868 | GROUND WATER SAMPLE LOCATION |
| 401579875 | GROUND WATER ELEVATION MAP |
| 401579987 | LOGS |

Total Attach: 8 Files

General Comments

User Group

Comment

Comment Date

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

Total: 0 comment(s)