

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>(720) 929-6368</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>()</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 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>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? 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 approximately 1,300 feet (ft) west and excavation groundwater approximately 15 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 tank battery and replacing the 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):

Please refer to the Form 27 submitted to the Colorado Oil and Gas Conservation Commission (COGCC) on November 29, 2007.

Proposed Groundwater Sampling

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

Quarterly groundwater monitoring has been conducted at the site since 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 655
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) 110
-- 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?

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.

Please refer to the Form 27 submitted to the COGCC on November 29, 2007.

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.

Due to persistent, elevated benzene, toluene, ethylbenzene, and total xylenes (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 between March 2010 and October 2016. The system is comprised of 27 AS wells and 21 SVE wells connected by a combination of surface and subsurface high-density polyethylene piping to a remediation trailer powered by an electrical power drop. Two AS wells and one SVE well were added in October 2016 to increase system influence. The remediation system included valves at all of the 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 Site Map attached as Figure 2. Boring logs for the AS and SVE wells are attached.

The remediation system is currently inactive to allow for a period of static monitoring.

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

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.

Groundwater monitoring wells MW01 through MW19, MW23, and MW24 are sampled on a quarterly basis and submitted for laboratory analysis for benzene, toluene, ethylbenzene, and total xylenes by United States Environmental Protection Agency (USEPA) Method 8260C. In June 2016, monitoring wells MW01, MW03, MW07, MW08, MW13, and MW19, which were previously removed from the quarterly groundwater monitoring program in 2009, were reinstated into the program. The monitoring well locations are depicted on Figure 1. A Groundwater Elevation Contour Map generated using the April 2017 survey data is provided as Figure 3. The groundwater analytical results are summarized in Table 1, and the laboratory analytical reports for the third quarter 2017 groundwater monitoring events are attached.

As of the August 2017 groundwater monitoring event, all monitoring wells were compliant with COGCC Table 910-1 allowable levels. 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 soil was transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado.

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? 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? No _____

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 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. 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. _____

REMEDIAL ACTION DATES

Date of commencement of Remediation. 07/18/2007

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: 10/02/2017

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: 4096

COA Type

Description

| | |
|--|---|
| | Submit reports of site investigation and progress of remediation including results of sampling and analysis on an annual basis or more often until remediation is closed. |
|--|---|

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

| | |
|-----------|--------------------------------|
| 401354163 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 401354413 | LOGS |
| 401376891 | SITE MAP |
| 401403019 | GROUND WATER ELEVATION MAP |
| 401403402 | MAP |
| 401403406 | ANALYTICAL RESULTS |

Total Attach: 6 Files

General Comments

User Group

Comment

Comment Date

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

Total: 0 comment(s)