FORM 27 Rev 3/16

State of Colorado
Oil and Gas Conservation Commission

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Document Number: 401995479
Receive Date: 04/16/2019
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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 INFORMATON

Name of Operator: KERR MCGEE OIL & GAS ONSHORE LP Operator No: 47120
Address: P O BOX 173779
City: DENVER State: CO Zip: 80217-3779
Contact Person: Phillip Hamlin Email: Phil.Hamlin@anadarko.com

Phone Numbers
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PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 9670 Initial Form 27 Document #: 200439560

PURPOSE INFORMATION

- [ ] 901.e. Sensitive Area Determination
- [ ] 909.c.(1), Rule 905: Pit or PW vessel closure
- [x] 909.c.(2), Rule 906: Spill/Release Remediation
- [ ] 909.c.(3), Rule 907.e.: Land treatment of oily waste
- [ ] 909.c.(4), Rule 908.g.: Centralized E&P Waste Management Facility closure
- [x] 909.c.(5), Rule 910.b.(4): Remediation of impacted ground water
- [ ] Rule 909.e.(2)A.: Notice completion of remediation in accordance with Rule 909.b.
- [ ] Rule 909.e.(2)B.: Closure of remediation project
- [ ] Rule 906.c.: Director request
- [ ] Other

SITE INFORMATION

N Multiple Facilites (in accordance with Rule 909.c.)

Facility Type: LOCATION Facility ID: 318952 API #: County Name: WELD
Facility Name: WARNER-62N66W 24NWNE Latitude: 40.128030 Longitude: -104.720690
** correct Lat/Long if needed: Latitude: Longitude:
QtrQtr: NWNE Sec: 24 Twp: 2N Range: 66W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SC
Most Sensitive Adjacent Land Use Non-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? No

Other Potential Receptors within 1/4 mile

A livestock pen is located approximately 1,075 feet northwest of the release location. A building is located approximately 1,125 feet northwest of the release location.

SITE INVESTIGATION PLAN

TYPE OF WASTE:

- [x] **E&P Waste**
  - [x] Produced Water
  - [x] Oil
  - [ ] Condensate
  - [ ] Drilling Fluids
  - [ ] Drill Cuttings
- [ ] **Other E&P Waste**
  - [ ] Workover Fluids
  - [ ] Tank Bottoms
  - [ ] Pigging Waste
  - [ ] Rig Wash
  - [ ] Spent Filters
  - [ ] Pit Bottoms
  - [ ] Other (as described by EPA) _____
- [ ] **Non-E&P Waste** _____

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	See attached data	Groundwater sampling and laboratory analysis
Yes	SOILS	70' (N-S) x 60' (E-W) x 26' bgs	Soil boring, 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.

Between March 13 and 15, 2013, a Limited Phase II Site Assessment was conducted at the Warner 62N66W24NWNE production facility. Historical hydrocarbon impacts to soil and groundwater were discovered during this investigation, and groundwater was encountered in soil borings at approximately 26 feet below ground surface (bgs). The COGCC has issued Spill/Release Point ID 2232616 for this release.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

- [x] Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

Soil samples were collected during the Limited Phase II Site Assessment and subsequent soil boring activities, as described in the Initial Form 27 (COGCC Document No. 2526257). Based on the data presented, impacted soil remains at the site, adjacent to soil boring locations SB02, SB03, and SB07.

Proposed Groundwater Sampling

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

Between March 13, 2013 and February 11, 2019, twenty-three (23) temporary monitoring wells (SB01 - SB18, SB03R, SB04R, SB04R2, SB05R, SB06R) were installed to assess the extent of groundwater impacts. Quarterly groundwater monitoring was initiated on August 5, 2013, and is ongoing at the eighteen (18) temporary monitoring wells remaining at the site; wells SB03 - SB06 and SB04R were consistently dry or have been destroyed, and were subsequently replaced. Groundwater samples are collected from the temporary monitoring wells on a quarterly basis and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX). The groundwater sample locations are illustrated on Figure 1, and groundwater analytical data is presented in Table 1. The laboratory analytical reports for the previous four quarters of groundwater monitoring are provided as 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):

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected	17	--	Highest concentration of TPH (mg/kg) 3309
Number of soil samples exceeeding 910-1	3	NA	Highest concentration of SAR
Was the areal and vertical extent of soil contamination delineated?	Yes		BTEX > 910-1 No
Approximate areal extent (square feet)	4200		Vertical Extent > 910-1 (in feet) 26

Groundwater

Number of groundwater samples collected	165	--	Highest concentration of Benzene (µg/l) 730
Was extent of groundwater contaminated delineated?	Yes	--	Highest concentration of Toluene (µg/l) 31
Depth to groundwater (below ground surface, in feet)	28`	--	Highest concentration of Ethylbenzene (µg/l) 1160
Number of groundwater monitoring wells installed	23	--	Highest concentration of Xylene (µg/l) 12700
Number of groundwater samples exceeding 910-1	82	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?

Soil impacts have been identified in off-site soil borings SB02 and SB07. Impacted groundwater has been detected in off-site temporary groundwater monitoring wells SB02, SB04R, SB07, SB08, and SB10 - SB12.

☐ 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 soil and groundwater remain at the site. The 18 temporary groundwater monitoring wells remaining at the site will continue to be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with COGCC standards for four consecutive quarters. Additional confirmation soil samples will be collected from the final extent of the impacted soil area, to verify that all soils are compliant with COGCC standards.

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.

Soil and groundwater impacts in the source area will be addressed as described below.

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.

Between August 4 and 8, 2014, an initial round of in-situ chemical oxidation (chemox) injections was performed at temporary monitoring wells SB02, SB03, and SB09 - SB12. Chemox injections were suspended due to formation back-pressure and oxidant surfacing at SB03 and SB09. In the Fourth Quarter 2014, light non-aqueous phase liquid (LNAPL) was observed in well SB07. A passive LNAPL recovery bailer was installed in well SB07; bi-weekly LNAPL gauging and recovery events were initiated on December 3, 2014, and are ongoing. To date, approximately 1.8 gallons of LNAPL have been removed from temporary monitoring well SB07 via LNAPL bailing. Quarterly groundwater monitoring is ongoing and will be continued until concentrations remain in full compliance with COGCC standards for four consecutive quarters. Additional remediation measures, including in-situ and ex-situ technologies, are currently under evaluation to address remaining soil and groundwater impacts at the site. Estimated time to attain NFA is TBD based on the soil and groundwater concentrations, the extent of soil and groundwater impacts, and the efficacy of the selected remedial technologies.

Soil Remediation Summary

☒ **In Situ**

- No — Bioremediation (or enhanced bioremediation)
- Yes — Chemical oxidation
- No — Air sparge / Soil vapor extraction
- Yes — Natural Attenuation
- No — Other

☐ **Ex Situ**

- Excavate and offsite disposal
  - If Yes: Estimated Volume (Cubic Yards)
  - Name of Licensed Disposal Facility or COGCC Facility ID #
- Excavate and onsite remediation
  - Land Treatment
  - Bioremediation (or enhanced bioremediation)
  - Chemical oxidation
  - Other

Groundwater Remediation Summary

- No — Bioremediation (or enhanced bioremediation)
- Yes — Chemical oxidation
- No — Air sparge / Soil vapor extraction
- Yes — Natural Attenuation
- Yes — Other: LNAPL Recovery

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 March 13, 2013 and February 11, 2019, a total of 23 temporary monitoring wells (SB01 - SB18, SB03R, SB04R, SB04R2, SB05R, SB06R) were installed to assess the extent of groundwater impacts; wells SB03 - SB06 and SB04R were consistently dry or have been destroyed, and were subsequently replaced. The 18 temporary groundwater monitoring wells remaining at the site will continue to be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain in full compliance with COGCC standards for four consecutive quarters. Groundwater sample locations are illustrated on Figure 1, and a potentiometric surface contour map for the First Quarter 2019 is presented as Figure 2. Well completion logs for the temporary monitoring wells are included as Attachment B.

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? No

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

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

E&P waste (solid) description _____

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: _____

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

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? _____

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.

Minimal disturbance to the site has occurred during the assessment and remediation activities conducted to-date. Kerr-McGee's production facility remains at the site. Following the completion of additional remediation activities, 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). 03/13/2013

Date of commencement of Site Investigation. 03/13/2013

Date of completion of Site Investigation.

REMEDIAL ACTION DATES

Date of commencement of Remediation. 08/04/2014

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:` 04/16/2019

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: PETER GINTAUTAS

Date: 04/16/2019

Remediation Project Number: 9670

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
401995479	FORM 27-SUPPLEMENTAL-SUBMITTED
401995529	ANALYTICAL RESULTS
401995530	ANALYTICAL RESULTS
402003203	GROUND WATER SAMPLE LOCATION
402003210	GROUND WATER ELEVATION MAP
402003258	LOGS

Total Attach: 6 Files

General Comments

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)