

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:
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 INFORMATON

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 #: 4185 Initial Form 27 Document #: 1981599

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 Facilites (in accordance with Rule 909.c.)

Facility Type: <u>TANK BATTERY</u>	Facility ID: <u>446441</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>HSR SARCHET 7-33A & 8-33A BATTERY</u>	Latitude: <u>40.188376</u>	Longitude: <u>-104.774008</u>	
** correct Lat/Long if needed: Latitude: <u>40.188470</u>		Longitude: <u>-104.774072</u>	
QtrQtr: <u>NENE</u>	Sec: <u>33</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 SC Most Sensitive Adjacent Land Use Agriculture

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

Water well approximately 480 feet (ft) northwest, surface water approximately 140 ft north, buildings approximately 450 ft northwest, and groundwater approximately 4 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 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 Results
Yes	SOILS	100' N-S x 140' E-W x 8' bgs (max)	2 Excavations in 2007 and 4 Excavations in 2018; Soil Samples/Lab Results

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 November 2007, due to human error, the partially-buried produced water sump overflowed at the Sarchet 7, 8-33A, UPRR 22 Pan Am M #1 facility, spilling approximately 10 barrels (bbls) of produced water within the earthen containment berm. A vacuum truck was used to recover approximately 7 bbls of produced water. The petroleum hydrocarbon impacted soil was excavated from the release area and from an area north of the water sump where historical impacts associated with the broken concrete sump was discovered.

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):

In December 2007, seventeen soil samples were collected from the base and sidewalls of the two excavations and submitted for laboratory analysis of total petroleum hydrocarbons (TPH). Laboratory analytical results indicated that the TPH concentrations were in full compliance with the Colorado Oil and Gas Conservation Commission (COGCC) sensitive area allowable level of 1,000 milligrams per kilogram (mg/kg) at the lateral extent of the excavations. The soil samples were not analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) as the samples were collected prior to the April 1, 2009, COGCC rule changes.

Proposed Groundwater Sampling

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

On December 13, 2007, one groundwater sample (GW01) was collected from the base of the southern excavation for laboratory analysis of BTEX. Laboratory analytical results for groundwater sample GW01 indicated that the benzene and total xylenes concentrations exceeded the COGCC Table 910 -1 allowable levels at 56 micrograms per liter (µg/L) and 7,700 µg/L, respectively. The excavation groundwater sample location is depicted on Figure 1. The groundwater sample analytical results are summarized in Table 1.

Groundwater monitoring has been performed on a quarterly basis since February 2008.

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 18
Number of soil samples exceeding 910-1 11
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 7320

NA / ND

-- Highest concentration of TPH (mg/kg) 8100
NA Highest concentration of SAR
BTEX > 910-1 No
Vertical Extent > 910-1 (in feet) 8

Groundwater

Number of groundwater samples collected 474
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 4'
Number of groundwater monitoring wells installed 31
Number of groundwater samples exceeding 910-1 186

-- Highest concentration of Benzene (µg/l) 13400
-- Highest concentration of Toluene (µg/l) 207
-- Highest concentration of Ethylbenzene (µg/l) 903
-- Highest concentration of Xylene (µg/l) 7700
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?

Groundwater impacts were detected in the adjoining agricultural field west of the tank battery.

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? Yes _____

SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

In November 2007, approximately 215 cubic yards of impacted soil were excavated and transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado, for recycling. 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.

Due to persistent benzene and total xylenes exceedances in multiple monitoring wells, additional impacted soil was excavated at the site. Between December 18 and 28, 2018, excavation commenced at the locations of destroyed monitoring well MW05R and temporary monitoring wells TMW03, TMW04, TMW06, TMW10, and TMW14, which had already been removed for the previous harvest season. The excavation dimensions were determined based on an estimation from the monitoring well boring logs and groundwater concentrations. The locations were dug to the extent of the impact based on field screening for volatile organic compounds using a photoionization detector and field observations. The 2018 excavations were designed to target saturated and smear zone impacts. Approximately 2,180 cubic yards of impacted soil were excavated and transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado, for recycling.

The 2007 and 2018 excavation footprints are depicted on the Site Map provided as Figure 1.

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.

Prior to backfilling the 2007 excavation, five gallons of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, were applied to the groundwater in the excavation.

While backfilling the 2018 excavations, 750 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

Ex Situ

_____ Bioremediation (or enhanced bioremediation)	Yes	Excavate and offsite disposal
_____ Chemical oxidation		If Yes: Estimated Volume (Cubic Yards) _____ 2395
_____ 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

No _____ Air sparge / Soil vapor extraction

Yes _____ Natural Attenuation

Yes _____ Other MicroBlaze® Application (2007)
and COGAC® Application
(2018)

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 MW04R and MW09 are sampled on a quarterly basis for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency (USEPA) Method 8260C. Temporary groundwater monitoring wells TMW01 through TMW07 and TMW09 through TMW18 are installed and sampled on a quarterly basis when crops in the adjacent agricultural field are out (i.e., late fall to early spring). The temporary groundwater monitoring wells are also sampled for BTEX by USEPA Method 8260C. The monitoring well and temporary monitoring well locations are depicted on Figure 1. The Groundwater Elevation Contour Map generated using the April 2018 survey data (collected prior to the seasonal abandonments of the temporary monitoring wells) is provided as Figure 2. The groundwater analytical results are summarized in Table 1, and the laboratory analytical reports for the groundwater monitoring events are attached.

A replacement monitoring well for MW05R and replacement temporary monitoring wells will be installed following land access approval. 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 Remediation Update _____

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, for recycling.

Volume of E&P Waste (solid) in cubic yards _____ 2395

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, and the production facility remains at the location.

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. 11/27/2007

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 11/27/2007

Date of commencement of Site Investigation. 11/27/2007

Date of completion of Site Investigation. 11/22/2016

REMEDIAL ACTION DATES

Date of commencement of Remediation. 11/27/2007

Date of completion of Remediation. _____

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____

Date of completion of Reclamation. _____

OPERATOR COMMENT

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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 HSE Representative

Submit Date: 02/12/2019

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: 02/12/2019

Remediation Project Number: 4185

COA Type

Description

<u>COA Type</u>	<u>Description</u>
	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

<u>Att Doc Num</u>	<u>Name</u>
401814398	FORM 27-SUPPLEMENTAL-SUBMITTED
401903439	ANALYTICAL RESULTS
401903469	SITE MAP
401914283	GROUND WATER ELEVATION MAP

Total Attach: 4 Files

General Comments

User Group

Comment

Comment Date

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
		Stamp Upon Approval

Total: 0 comment(s)