

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) 929-6726</u>
City: <u>DENVER</u>	State: <u>CO</u>	Zip: <u>80217-3779</u>
Contact Person: <u>Paul Schneider</u>	Email: <u>Paul.Schneider@Anadarko.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION
Remediation Project #: 9079 Initial Form 27 Document #: 2143220

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: <u>WELL</u>	Facility ID: _____	API #: <u>123-16270</u>	County Name: <u>WELD</u>
Facility Name: <u>SANDAU 24-34</u>	Latitude: <u>40.262750</u>	Longitude: <u>-104.766450</u>	
	** correct Lat/Long if needed: Latitude: <u>40.263204</u>	Longitude: <u>-104.768976</u>	
QtrQtr: <u>SESW</u>	Sec: <u>34</u>	Twp: <u>4N</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 Water well approximately 500' southeast

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

Occupied building approximately 1,025 feet (ft) southwest, water well approximately 500 ft southeast, wetlands and surface water approximately 1,700 ft east, and groundwater encountered in the excavation at approximately 5 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 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	Collected groundwater samples for laboratory analysis
Yes	SOILS	70' N-S x 62' E-W x 6' bgs	Collected soil samples for 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.

During an inspection of the Sandau 24-34 facility, an operator found oil pooled on the ground surface above a corrosion hole in the flowline. The petroleum hydrocarbon impacted soil was excavated. Groundwater was encountered in the excavation at approximately 5 ft bgs. Kerr-McGee contracted LT Environmental, Inc. (LTE) to document excavation activities, collect excavation soil and groundwater samples, install groundwater monitoring wells, conduct quarterly groundwater monitoring, and track the laboratory analytical results.

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):

Between April 26 and May 3, 2012, soil samples were collected from the excavation and submitted for total petroleum hydrocarbon (TPH) analysis by United States Environmental Protection Agency (USEPA) Methods 8015 and 8260B, and benzene, toluene, ethylbenzene, and total xylenes (BTEX) analysis by USEPA Method 8260B. Laboratory analytical results indicated that TPH and BTEX concentrations were compliant with the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels at the lateral extent of the excavation. The general site layout, excavation footprint, and excavation soil sample locations are depicted on the Excavation Site Map provided as Figure 1. The excavation soil sample analytical results are summarized in Table 1.

Proposed Groundwater Sampling

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

Groundwater was encountered in the excavation at approximately 5 ft bgs. On April 27, 2012, one groundwater sample (GW01) was collected from the excavation and submitted for laboratory analysis of BTEX by USEPA Method 8260B. The laboratory analytical results for groundwater sample GW01 indicated that concentrations of benzene, toluene, and total xylenes exceeded COGCC Table 910-1 allowable levels at concentrations of 1,600 micrograms per liter ($\mu\text{g/L}$), 2,500 $\mu\text{g/L}$, and 3,400 $\mu\text{g/L}$, respectively. The general site layout, excavation footprint, and excavation groundwater sample location are depicted on the Excavation Site Map provided as Figure 1. The excavation groundwater sample analytical results are summarized in Table 2.

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 25
Number of soil samples exceeding 910-1 17
Was the areal and vertical extent of soil contamination delineated? Yes
Approximate areal extent (square feet) 4340

NA / ND

-- Highest concentration of TPH (mg/kg) 1530
NA Highest concentration of SAR
BTEX > 910-1 Yes
Vertical Extent > 910-1 (in feet) 6

Groundwater

Number of groundwater samples collected 17
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 5'
Number of groundwater monitoring wells installed 4
Number of groundwater samples exceeding 910-1 1

-- Highest concentration of Benzene (µg/l) 1600
-- Highest concentration of Toluene (µg/l) 2500
-- Highest concentration of Ethylbenzene (µg/l) 180
-- Highest concentration of Xylene (µg/l) 3400
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.

Based on excavation groundwater samples that exceeded COGCC Table 910-1 allowable levels, approximately 30 barrels of impacted groundwater were removed from the excavation and transported to a licensed injection facility for disposal using a vacuum truck. 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 past seasonal fluctuations. Approximately 1,000 cubic yards of impacted soil were excavated and transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado. The general site layout and excavation footprint are depicted on the Site Map provided as Figure 2.

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.

While backfilling the excavation, five gallons of MicroBlaze®, a concentrated solution of facultative microbes, nutrients, and surfactants designed to bioremediate petroleum hydrocarbons, was applied to the excavation groundwater. The excavation area was restored to its pre-release grade and the Sandau 24-34 well remains at the site.

Soil Remediation Summary

In Situ

Ex Situ

_____ Bioremediation (or enhanced bioremediation)

Yes _____ Excavate and offsite disposal

_____ Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) _____ 1000

_____ 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

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.

On March 4, 2016, four soil borings were advanced at the site and completed as monitoring wells MW01 through MW04. The soil boring locations were cleared to six ft bgs using a hand auger. The soil borings were then continuously sampled and field screened from six ft bgs to total depth using a track-mounted GeoProbe® rig and photo-ionization detector (PID). Groundwater monitoring continued on a quarterly basis. Soil descriptions, PID headspace readings, and well completion diagrams are recorded on the attached field boring logs. The monitoring well locations are depicted on Figure 2.

On March 14, 2016, monitoring wells MW01 through MW04 were surveyed to obtain relative groundwater and well elevation data. The groundwater elevation data indicates the groundwater flow direction at the site is to the northwest. Groundwater Elevation Contour Maps for the March 2016 through January 2017 quarterly monitoring events are provided as Figures 3A through 3D. The relative groundwater elevations are provided in Table 2.

As of the January 2017 quarterly monitoring event, BTEX concentrations in monitoring wells MW01 through MW04 have been compliant with COGCC Table 910-1 allowable levels for four consecutive quarterly groundwater monitoring events. The groundwater analytical results are summarized in Table 2. Laboratory analytical reports for the four compliant groundwater monitoring events are attached.

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 Status 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:

The impacted soil was transported to the Kerr-McGee Land Treatment Facility in Weld County, Colorado.

Volume of E&P Waste (solid) in cubic yards 1000

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 30

E&P waste (liquid) description Petroleum hydrocarbon impacted groundwater

COGCC Disposal Facility ID #, if applicable: 159255

Non-COGCC 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 excavation area was restored to its pre-release grade and the Sandau 24-34 well remains at the site. Interim reclamation planning was completed to 1000 series rules post-excavation.

Is the described reclamation complete? Yes

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. 04/26/2012

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 04/26/2012

Date of commencement of Site Investigation. 04/26/2012

Date of completion of Site Investigation. 03/31/2016

REMEDIAL ACTION DATES

Date of commencement of Remediation. 04/26/2012

Date of completion of Remediation. 01/12/2017

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: Paul Schneider _____

Title: HSE Manager _____

Submit Date: 03/17/2017 _____

Email: Paul.Schneider@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: 03/17/2017 _____

Remediation Project Number: 9079 _____

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.
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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**

401209190	FORM 27-SUPPLEMENTAL-SUBMITTED
401209241	LOGS
401212712	ANALYTICAL RESULTS
401226872	SOIL SAMPLE LOCATION MAP
401226875	SITE MAP
401226878	GROUND WATER ELEVATION MAP

Total Attach: 6 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)