

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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Receive Date:

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Report taken by:

Kari Oakman

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>GREAT WESTERN OPERATING COMPANY LLC</u>	Operator No: <u>10110</u>	Phone Numbers
Address: <u>1001 17TH STREET #2000</u>		Phone: <u>(720) 595-2078</u>
City: <u>DENVER</u>	State: <u>CO</u>	Zip: <u>80202</u>
Contact Person: <u>Ben Huggins</u>	Email: <u>bhuggins@gwp.com</u>	Mobile: <u>()</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 15473Initial Form 27 Document #: 402380471

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 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 checked="" 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>NONFACILITY</u>	Facility ID: <u>475912</u>	API #: _____	County Name: <u>WELD</u>
Facility Name: <u>Morales Water Well</u>		Latitude: <u>40.007119</u>	Longitude: <u>-104.798120</u>
		** correct Lat/Long if needed: Latitude: _____	Longitude: _____
QtrQtr: <u>NWSE</u>	Sec: <u>32</u>	Twp: <u>1N</u>	Range: <u>66W</u>
		Meridian: _____	Sensitive Area? <u>Yes</u>

SITE CONDITIONS

General soil type - USCS Classifications SCMost Sensitive Adjacent Land Use Rural residential propertiesIs domestic water well within 1/4 mile? YesIs surface water within 1/4 mile? YesIs groundwater less than 20 feet below ground surface? Yes

Other Potential Receptors within 1/4 mile

SITE INVESTIGATION PLAN

TYPE OF WASTE:

<input type="checkbox"/> E&P Waste	<input type="checkbox"/> Other E&P Waste	<input checked="" type="checkbox"/> Non-E&P Waste
<input type="checkbox"/> Produced Water	<input type="checkbox"/> Workover Fluids	Not applicable
<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	Unknown	Site Investigation

INITIAL ACTION SUMMARY

Description of initial action or emergency response measures take to abate, investigate, and/or remediate impacts associated with E&P Waste.

Please refer to the attached Sampling Summary Report.

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):

Proposed Groundwater Sampling

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

Please refer to the attached Sampling Summary Report.

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 0
Number of soil samples exceeding 910-1
Was the areal and vertical extent of soil contamination delineated?
Approximate areal extent (square feet)

NA / ND

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

Groundwater

Number of groundwater samples collected 12
Was extent of groundwater contaminated delineated? Yes
Depth to groundwater (below ground surface, in feet) 374'
Number of groundwater monitoring wells installed 0
Number of groundwater samples exceeding 910-1 2

ND Highest concentration of Benzene (µg/l)
ND Highest concentration of Toluene (µg/l)
ND Highest concentration of Ethylbenzene (µg/l)
ND Highest concentration of Xylene (µg/l)
-- Highest concentration of Methane (mg/l) 26

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.

See the Remediation Summary section below.

REMEDICATION 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.

Great Western Operating Company, LLC and PDC Energy, Inc. (Operators) will install a methane water treatment system (System) connected to the water well, Permit No. 137465, Receipt No. 0248601 (Water Well). The System will be designed to treat water that is brought to the surface by the Water Well to reduce levels of methane to a target level of less than 10 milligrams per liter (mg/L).

The equipment will consist of a vent at the wellhead, a new tank equipped with an enclosed mister, a new carbon filter, and a new pressure tank. With the exception of the vent stack at the wellhead, all treatment equipment will be enclosed within a wooden shed placed directly over the existing exterior cellar. The System will be installed in accordance with professional engineer stamped drawings, using qualified contractors and a licensed electrician. Please refer to the attached Process and Instrumentation Drawing and System Enclosure Layout.

The Operators and their contractors will sample the water entering and exiting the System and perform maintenance on the System for a period of three years after the System is operational and confirmed to be treating water to less than 10 mg/L of methane. Sampling of the water entering and exiting the System will be performed with reasonable frequency to ensure proper start-up of the System, and thereafter on a quarterly schedule. All samples will be collected according to COGCC's Model Sampling and Analysis Plan - Version 2 - April 2020 and will be analyzed for dissolved gases (methane, ethane, and propane) by US Environmental Protection Agency (EPA) Method RSK 175. Operators will provide all water sample results to the Property owners and to the COGCC on a quarterly basis.

Soil Remediation Summary

☐ In Situ

_____ Bioremediation (or enhanced bioremediation)
_____ Chemical oxidation
_____ Air sparge / Soil vapor extraction
_____ Natural Attenuation
_____ 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

☐ _____ Bioremediation (or enhanced bioremediation)
☐ _____ Chemical oxidation
☐ _____ Air sparge / Soil vapor extraction
☐ _____ Natural Attenuation
Yes _____ Other _____ See the Remediation Summary section above.

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.

See the Remediation Summary section above.

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? 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: _____

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.

Not applicable

Is the described reclamation complete? _____

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). 03/24/2020

Date of commencement of Site Investigation. 04/15/2020

Date of completion of Site Investigation. 06/23/2020

REMEDIAL ACTION DATES

Date of commencement of Remediation. 07/10/2020

Date of completion of Remediation. _____

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____

Date of completion of Reclamation. _____

OPERATOR COMMENT

The EDDs associated with the twelve samples collected have been uploaded under Olsson's Operator #200168.
The Operators have initiated discussions with the owner of water well, Permit No. 268360, Receipt No. 3601941 to conduct similar remediation activities.

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Ben Huggins

Title: EHS Director

Submit Date: 07/17/2020

Email: bhuggins@gwp.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: Kari Oakman

Date: 10/19/2020

Remediation Project Number: 15473

COA Type

Description

	5.To better understand local and formation variability if gas composition and isotopic ratios, gas samples from nearby producing wells in the Sussex and J Sand may be useful. COGCC staff may be able to assist in this as GWOC is not the operator of these wells.
	4.The Dittmer wells have common surface casing depths of greater than 1700 feet. Please evaluate/calculate what has been called a Shoe Pressure Failure calculation at the minimum depth of surface casing on the Dittmer pad. An example shoe pressure breakdown calculation using Leak Off Test data from wells in the vicinity of another investigation (from another operator) can be found as document 402460050 under remediation project 15833. A soil gas survey for methane may be performed around the locations of the well bores at the Dittmer pad as part of the evaluation of these well bores as a possible vertical migration pathway for thermogenic gas up the well bores to shallower formations with a particular emphasis on well bores that have experienced BDH pressures greater than 50psi including the following wells: 123-43445 (65psi), 123-43446 (167psi), 123-43447 (312psi), 123-43450 (158), 123-43454 (271psi), 123-43455 (77psi), 123-43457 (195psi), 123-43458 (316psi), 123-43459 (67psi) and 123-43460 (434psi).

	<p>3.Further evaluation of possible sources of thermogenic gases present in the two water wells is needed from engineering review and interpretation as well as by forensic geochemical evaluation of analytical data done as part of this investigation or available from other sources. A basic step with respect to the forensic geochemical evaluation would be to compare BDH gas samples with the production gas samples from the same well. For example the BDH and production gas samples from 123-43447 have similar isotopic ratios for gasses heavier than methane and both likely from the producing zone of that well which implies there is not adequate zonal isolation present downhole. Hydrocarbon liquids have vented from the BDH at three of the Dittmer wells (123-43454, 123-43458 and 123-43460). A comparison of the composition determined by whole oil analysis between hydrocarbon production liquids and hydrocarbon BDH liquids to determine if the producing zone is not adequately isolated is need for each of the three wells from which hydrocarbon liquids flowed from the BDH. If remedial procedures such as cementing to achieve zonal isolation were conducted at any of the Dittmer wells following submission of the initial wellbore diagrams and these remedial process have not been documented in updated wellbore diagrams then submit updated wellbore diagrams for any such wells. Sampling and analysis of production and BDH gases (when possible) from each of the wells listed below with any BDH pressure over 50psi is required if not already done in the last two years. Sampling and analysis of production and BDH gases (when possible) from the three wells from which hydrocarbon liquids flowed from the BDH is required if not already performed in the last two years. Sampling and analysis of production and BDH gases (when possible) from the well from which aqueous liquids flowed from the BDH (123-44450) is required if not already performed in the last two years.</p>
	<p>2.Quarterly sampling and analysis of Morales and Roland water wells for gas composition and isotopic ratio analysis. List of analytes can be provided by COGCC staff. This is needed to better understand if the source(s) of thermogenic gases is still active, increasing, decreasing or possibly has ceased.</p>
	<p>1.Prepare structure contour map of the bottom of the Fox Hills Fm. under and adjacent to the 0.75 mile radius study area around the Morales water well. The structure contour may be based on geologic data or suitable geophysical marker layers in the upper part of the Pierre Shale. An example map from a current investigation is document 402460029 under remediation project 15833.</p>

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.

<u>Att Doc Num</u>	<u>Name</u>
402444533	FORM 27-SUPPLEMENTAL-SUBMITTED
402444536	MONITORING REPORT
402444537	OTHER

Total Attach: 3 Files

General Comments

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
Environmental	<p>The general questions that have not been answered by the operators at this stage of the investigation are as follows:</p> <p>A.Define the possible source(s) of thermogenic gases in the two water wells is the primary objective.</p> <p>B.Determine if the source(s) is still active.</p> <p>C.If the source(s) is still active develop a plan to remediate/stop the source.</p> <p>D.The fourth step of this investigation is to ensure that the well owners have a source of water that does not pose a concern to safety in enclosed spaces. From supplemental form 27s submitted the safety issue appears to already have been addressed at both water wells.</p>	10/19/2020

Total: 1 comment(s)