

# 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:

Report taken by:

## 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>EXTRACTION OIL &amp; GAS INC</u>	Operator No: <u>10459</u>	<b>Phone Numbers</b>
Address: <u>370 17TH STREET SUITE 5300</u>		Phone: <u>(720) 481-2362</u>
City: <u>DENVER</u>	State: <u>CO</u>	Zip: <u>80202</u>
Contact Person: <u>Blake Ford</u>	Email: <u>bford@extractionOG.com</u>	Mobile: <u>( )</u>

### PROJECT, PURPOSE & SITE INFORMATION

#### PROJECT INFORMATION

Remediation Project #: 10759Initial Form 27 Document #: 401448412

#### 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 checked="" 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 checked="" type="checkbox"/> Other <u>Final decommissioning in support of final reclamation.</u>    |

#### SITE INFORMATION

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

Facility Type: <u>LOCATION</u>	Facility ID: <u>320318</u>	API #: <u></u>	County Name: <u>ADAMS</u>
Facility Name: <u>MORRISON 33-1-61S68W 1NWSE</u>		Latitude: <u>39.991475</u>	Longitude: <u>-104.947475</u>
		** correct Lat/Long if needed: Latitude: <u>39.991684</u>	Longitude: <u>-104.947656</u>
QtrQtr: <u>NWSE</u>	Sec: <u>1</u>	Twp: <u>1S</u>	Range: <u>68W</u>
		Meridian: <u>6</u>	Sensitive Area? <u>Yes</u>

#### SITE CONDITIONS

General soil type - USCS Classifications SMMost Sensitive Adjacent Land Use Big Dry CreekIs 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:

☒ E&P Waste

☐ Other E&P Waste

☐ Non-E&P Waste

☒ Produced Water

☐ Workover Fluids

☐ Oil

☐ Tank Bottoms

☐ Condensate

☐ Pigging Waste

☐ Drilling Fluids

☐ Rig Wash

☐ Drill Cuttings

☐ Spent Filters

☐ Pit Bottoms

☐ Other (as described by EPA)

## DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	BH01, BH02, BH04 and BH06	Laboratory analysis
Yes	SOILS	50ft X 45ft X 8ft	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.

This form has been prepared to support the removal and closure of a partially buried produced water vessel. Per COGCC Rule 905.b, soil and groundwater (if present) samples will be collected when a buried or partially buried produced water vessel is removed from service to confirm compliance with COGCC Table 910-1. The initial investigation will be conducted using excavation equipment.

## 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 ):

Extraction Oil and Gas (XOG) proposes to install bore holes at the Morrison 33-1 4 site. Target depths for the bore holes will be approximately 16 feet bgs; however, depths will be determined based on field observations. At each bore hole location, the soil will be logged and field-screened using a PID, and at least one grab sample will be collected from each boring and/or from the interval immediately above the groundwater saturated zone.

### Proposed Groundwater Sampling

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

Extraction Oil and Gas (XOG) proposes to install borings to complete the delineation of the site. The borings will be converted to temporary wells based on the results of the soil analysis. Groundwater quality will be analyzed for BTEX and compared to the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentration levels.

### 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 31

Number of soil samples exceeding 910-1 6

Was the areal and vertical extent of soil contamination delineated? No

Approximate areal extent (square feet) 1548

### NA / ND

-- Highest concentration of TPH (mg/kg) 2570

-- Highest concentration of SAR 2.76

BTEX > 910-1 Yes

Vertical Extent > 910-1 (in feet) 8

### Groundwater

Number of groundwater samples collected 33

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet) 4'

Number of groundwater monitoring wells installed 11

Number of groundwater samples exceeding 910-1 10

-- Highest concentration of Benzene (µg/l) 450

-- Highest concentration of Toluene (µg/l) 1.3

-- Highest concentration of Ethylbenzene (µg/l) 280

-- Highest concentration of Xylene (µg/l) 250

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.

Once a release was discovered (and confirmed through soil screening and/or laboratory analysis) below the partially buried water vessel, impacted soil was removed and transported to a disposal facility. Transport and disposal records will be kept on file under usual and customary practice and are available upon request. Soil samples were collected and analyzed for organic constituents (TPH and BTEX) and inorganics (SAR, EC, and pH). Following conclusion of soil remediation efforts in December 2017, the decision was made to distribute phosphorus fertilizer into the excavation to promote groundwater hydrocarbon bioremediation and natural attenuation, and then backfill the excavation.

## 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.

As described previously, phosphorous fertilizer was distributed into the excavation to promote groundwater hydrocarbon bioremediation and natural attenuation. Extraction Oil and Gas (XOG) installed eleven soil borings to complete the delineation of the site. The borings were converted into semi-permanent monitoring wells and groundwater quality was then analyzed for BTEX and compared to the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentration levels. While Monitored Natural Attenuation has shown to be an effective remediation tool at this site, XOG proposes to decrease the time frame to achieve site closure by employing enhanced bioremediation and/or chemical oxidation injections. XOG is researching the options for application methods, injection density, and the types of oxidizer that would be best suited to the site conditions. After the oxidizer is selected and the injections are completed, quarterly monitoring will continue until four quarters of groundwater results are shown to be within Table 910-1 allowable limits for BTEX.

## Soil Remediation Summary

☒ In Situ

Yes Bioremediation ( or enhanced bioremediation )  
Yes Chemical oxidation  
Air sparge / Soil vapor extraction  
Yes 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

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

Extraction Oil and Gas (XOG) installed 11 temporary monitoring wells at the Morrison 33-1 4 site, consisting of one well in the source area and ten wells outside of the footprint of the remediation excavation. Groundwater was discovered at approximately 4ft BGS. At each bore hole location, the soil was logged and field-screened using a PID, and at least one grab sample was collected from each boring. Collected groundwater samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (total) (BTEX) using Method 8260B. Soil and groundwater analytical data is attached, as well as groundwater contour maps, and soil boring logs. Please note there are no soil borings for BH10 and BH11 because they were installed using a hand auger. As discussed above, after the oxidizer is selected and the injections are completed, quarterly monitoring will continue until four quarters of groundwater results are shown to be within Table 910-1 allowable limits for BTEX.

## 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? \_\_\_\_\_

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? No \_\_\_\_\_

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? No \_\_\_\_\_

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.

Reclamation activities will be completed in accordance with 1000 Series Rules, in collaboration with the landowner, and reported in a Form 4 (Sundry Notice) with proper documentation to demonstrate compliance with requirements for final reclamation.

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). 11/02/2017

Date of commencement of Site Investigation. 10/17/2017

Date of completion of Site Investigation. 10/04/2018

### REMEDIAL ACTION DATES

Date of commencement of Remediation. \_\_\_\_\_

Date of completion of Remediation. \_\_\_\_\_

### SITE RECLAMATION DATES

Date of commencement of Reclamation. \_\_\_\_\_

Date of completion of Reclamation. \_\_\_\_\_

### OPERATOR COMMENT

This form serves as an annual update to the remediation activities performed at this site under Remediation Project #10759, as well as to propose an additional groundwater remediation strategy. Please find attached a topographic map, groundwater contour maps, recent lab results summary tables, soil boring logs, and copies of the recent analytical results.

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

Signed: Maggie Graham

Title: Senior Project Manager

Submit Date: \_\_\_\_\_

Email: maggie.graham@apexcos.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: \_\_\_\_\_

Date: \_\_\_\_\_

Remediation Project Number: 10759

### COA Type

### Description

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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

402222499	OTHER
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Total Attach: 1 Files

### General Comments

### User Group

### Comment

### Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)