

**State of Colorado**  
**Oil and Gas Conservation Commission**

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Document Number:  
403101293

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.

Closure request is not available for an Initial Site Investigation and Remediation Workplan.

**OPERATOR INFORMATION**

Name of Operator: CAERUS PICEANCE LLC	Operator No: 10456	<b>Phone Numbers</b>
Address: 1001 17TH STREET #1600		Phone: (970) 778-2314
City: DENVER State: CO Zip: 80202		Mobile: (970) 778-2314
Contact Person: Jake Janicek	Email: jjanicek@cerusoilandgas.com	

**PROJECT, PURPOSE & SITE INFORMATION**

**PROJECT INFORMATION**

Remediation Project #: 17035 Initial Form 27 Document #: 402582867

**PURPOSE INFORMATION**

- Rule 913.c.(1): Pit or Cuttings Trench closure.
- Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
- Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
- Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
- Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
- Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
- Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
- Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
- Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
- Rule 913.g: Changes of Operator.
- Rule 915.b: Request to leave elevated inorganics in situ.
- Other: 2Q 2022 update to REM # 17035

**SITE INFORMATION**

No Multiple Facilities

Facility Type: LOCATION	Facility ID: 334872	API #:	County Name: GARFIELD
Facility Name: SAMPLE-67S92W 17SENW	Latitude: 39.444880	Longitude: -107.686440	
	** correct Lat/Long if needed: Latitude: 39.444597	Longitude: -107.686826	
QtrQtr: NWSE	Sec: 17	Twp: 7S	Range: 92W Meridian: 6 Sensitive Area? Yes

**SITE CONDITIONS**

General soil type - USCS Classifications OH Most Sensitive Adjacent Land Use Rangeland

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**

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# 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	30x30	Lab Analysis
Yes	SOILS	60x60x70	Lab 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.

Please see COGCC Document 403009409 for a description of activities completed prior to 4/5/2022.

Please see the two attached Report of Work Completed (ROWCs) summarizing, the stockpile bench testing activities, quarterly groundwater sampling, continued operations and maintenance (O&M) of a soil vapor extraction (SVE)/ air sparge (AS) remediation system to remediate hydrocarbons associated with the dumpline release during the second quarter (2Q) 2022.

## **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 ):

At this time no additional soil sampling is needed to delineate impacts related to the source area (at a later date sampling will be required to determine effectiveness of SVE/AS remediation approach). Additionally, no soil samples will be collected to further characterize the impacted soil stockpiled onsite. When future soil sampling takes place all samples will be submitted for laboratory analysis of arsenic, barium, cadmium, chromium VI, nickel, selenium, pH, SAR, TPH, BTEX, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, fluorene, and naphthalene per the COGCC's approval via COGCC Document 402619378. Please see the two attached ROWCs summarizing, the stockpile bench testing activities, quarterly groundwater sampling, continued O&M of a SVE/ AS remediation system to remediate hydrocarbons associated with the dumpline release during the second quarter 2022.

### **Proposed Groundwater Sampling**

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

Caerus will continue to gauge and sample all groundwater monitoring wells on a quarterly basis. All groundwater samples will be submitted for the analysis of BTEX-only per the Directors approval in COGCC Document 402853537.

### **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 8  
Number of soil samples exceeding 915-1 7  
Was the areal and vertical extent of soil contamination delineated? Yes  
Approximate areal extent (square feet) 2500

**NA / ND**

-- Highest concentration of TPH (mg/kg) 747.5  
NA Highest concentration of SAR \_\_\_\_\_  
BTEX > 915-1 No  
Vertical Extent > 915-1 (in feet) 0

**Groundwater**

Number of groundwater samples collected 11  
Was extent of groundwater contaminated delineated? Yes  
Depth to groundwater (below ground surface, in feet) 63  
Number of groundwater monitoring wells installed 11  
Number of groundwater samples exceeding 915-1 0

ND Highest concentration of Benzene (µg/l) \_\_\_\_\_  
ND Highest concentration of Toluene (µg/l) \_\_\_\_\_  
ND Highest concentration of Ethylbenzene (µg/l) \_\_\_\_\_  
-- Highest concentration of Xylene (µg/l) 1.45  
NA Highest concentration of Methane (mg/l) \_\_\_\_\_

**Surface Water**

0 Number of surface water samples collected  
\_\_\_\_\_ Number of surface water samples exceeding 915-1  
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?

Background samples were collected from SB01 on the southeast side of the pad location from undisturbed soil. Data and sampling details can be referenced in COGCC Document Number 402582867.

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.

Please see " Remediation Summary".

**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.

Full delineation of the plume has been determined.

Please refer to COGCC Remediation Number 17035 for all assessment and remediation activities completed at the site prior to April 5, 2022.

To date, Caerus has installed one AS well and one SVE well within the release footprint. By using a 1/8 horsepower (hp) blower mounted to a solar trailer skid connected to SVE1 (remediation trailer setup on December 20, 2021), the blower is pulling entrained hydrocarbons from the subsurface soils to remediate dissolved phase hydrocarbons (this system is currently offsite for maintenance). Additionally, Caerus utilizes their SVE/AS pilot skid trailer on a weekly basis when not being used at other locations to assist with pulling and effectively removing entrained hydrocarbons from the subsurface soils to remediate dissolved phase hydrocarbons. The AS and SVE well locations can be referenced in the enclosed Figure 2 of the attached ROWC. Additional remedial activities are summarized in the attached ROWCs.

Caerus completed a pilot bench test during the 2Q 2022 to explore remediating low level PAH exceedances remaining in the impacted material stockpiled onsite. Clean imported soil was brought in to mix with the two stockpiles onsite (clean and impacted) in an attempt to lower the 1- methylnaphthalene, 2 methylnaphthalene, and naphthalene concentrations below the COGCC PGSSLCs. Due to the low levels of these three analytes when compared to the PGSSLCs standards it has been determined these levels are unattainable using remediation approaches of natural attenuation and soil dilution/mixing.

Please see the two separately attached ROWCs summarizing, the stockpile bench testing activities, quarterly groundwater sampling, continued O&M of a SVE/ AS remediation system to remediate hydrocarbons associated with the dumpline release during the second quarter 2022.

### Soil Remediation Summary

In Situ

Ex Situ

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

\_\_\_\_\_ Excavate and offsite disposal

\_\_\_\_\_ Chemical oxidation

\_\_\_\_\_ If Yes: Estimated Volume (Cubic Yards) \_\_\_\_\_

Yes \_\_\_\_\_ Air sparge / Soil vapor extraction

\_\_\_\_\_ Name of Licensed Disposal Facility or COGCC Facility ID # \_\_\_\_\_

\_\_\_\_\_ Natural Attenuation

\_\_\_\_\_ Excavate and onsite remediation

\_\_\_\_\_ Other \_\_\_\_\_

No \_\_\_\_\_ Land Treatment

No \_\_\_\_\_ Bioremediation (or enhanced bioremediation)

No \_\_\_\_\_ Chemical oxidation

No \_\_\_\_\_ Other \_\_\_\_\_

### Groundwater Remediation Summary

\_\_\_\_\_ Bioremediation ( or enhanced bioremediation )

\_\_\_\_\_ Chemical oxidation

\_\_\_\_\_ Air sparge / Soil vapor extraction

\_\_\_\_\_ 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.

Delineation of the groundwater plume is confirmed in all cardinal directions. Moving forward Caerus will continue to gauge and sample all groundwater monitoring wells on a quarterly basis. Per the approval of COGCC Document Number 402853537 all groundwater samples will be submitted for BTEX.



Does Groundwater meet Table 915-1 standards? No

Is additional groundwater monitoring to be conducted? Yes

Operator shall comply with the COGCC 1000-Series Reclamation Requirements for all impacted and disturbed areas.

## 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.

Full delineation of the plume has been determined. Once Caerus determines a path forward with the treatment/use of the impacted soil onsite, the former excavation footprint will be backfilled to existing grade.

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 provide the seed mix? \_\_\_\_\_

If YES, does the seed mix comply with local soil conservation district recommendations? \_\_\_\_\_

Did the local soil conservation district provide the seed mix? \_\_\_\_\_

### SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. \_\_\_\_\_

Proposed date of completion of Reclamation. \_\_\_\_\_

## IMPLEMENTATION SCHEDULE

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

### PRIOR DATES

Date of Surface Owner notification/consultation, if required. 11/17/2020

Actual Spill or Release date, or date of discovery. \_\_\_\_\_

### SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 11/17/2020

Proposed site investigation commencement. 11/17/2020

Proposed completion of site investigation. 10/14/2021

### REMEDIAL ACTION DATES

Proposed start date of Remediation. 01/07/2021

Proposed date of completion of Remediation. \_\_\_\_\_

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

**OPERATOR COMMENT**

Many pilot tests have been conducted on the remaining stockpiled material onsite. None of the approaches have yielded results that give us a clear path forward. The one approach that yielded acceptable removal of 1-methylnaphthalene 2-methylnaphthalene and naphthalene also increased the pH of the stockpile material to approximately 13.5, the SAR to approximately 300, and EC to 92 mmhos/cm. Caerus requests that the COGCC provide some direction advising us on the feasibility of this approach given the known increases in EC, SAR, and pH concentrations.

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

Signed: Dustin Held

Title: Sr. Consultant, Geologist

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

Email: dustin.held@wsp.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: 17035

**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**

403101434	SITE INVESTIGATION REPORT
403104966	REMEDIATION PROGRESS REPORT

Total Attach: 2 Files

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

		Stamp Upon Approval
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Total: 0 comment(s)