

State of Colorado
Energy & Carbon Management Commission

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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 ECMC 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	Phone Numbers
Address: 1001 17TH STREET #1600		Phone: (970) 640-6919
City: DENVER State: CO Zip: 80202		Mobile: (970) 640-6919
Contact Person: Blair Rollins	Email: brollins@caerusoilandgas.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 31518 Initial Form 27 Document #: 403479868

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: _____

SITE INFORMATION

No Multiple Facilities

Facility Type: SPILL OR RELEASE	Facility ID: 484391	API #: _____	County Name: RIO BLANCO
Facility Name: LOVE RANCH 8 Off-Location Flowline	Latitude: 39.891270	Longitude: -108.292690	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: SWNW	Sec: 9	Twps: 2S	Range: 97W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications GC Most Sensitive Adjacent Land Use Cropland

Is domestic water well within 1/4 mile? No 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

All wells within the area are associated with this remediation project or are registered water wells associated with oil and gas development activities.

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	To be determined	Laboratory analysis
Yes	SOILS	To be determined	Laboratory analysis
Yes	SURFACE WATER	To be determined	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.

Initial response activities can be found on COGCC Form 19 documents 403391282 and 403398312. Additional initial investigation activities can be found within the attached report of work completed included in this submittal document.

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):

Vertical and horizontal extent of contamination and confirmation soil samples will be collected in support of this project.

Proposed Groundwater Sampling

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

Groundwater monitoring will be included in the site investigation, but specific points for groundwater monitoring have yet to be established.

Proposed Surface Water Sampling

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

Continued surface water samples will be collected from the previously established points outlined in the attached report of work completed.

Additional Investigative Actions

Additional alternative investigative actions described in attached Site Investigation Plan (summary):

Additional investigation activities will be conducted as surface water elevation recedes allowing for additional access to the point of release. Additional investigation will include soil and water samples to determine the extent of contamination associated with the project.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 17

Number of soil samples exceeding 915-1 17

Was the areal and vertical extent of soil contamination delineated? Yes

Approximate areal extent (square feet) 10000

NA / ND

-- Highest concentration of TPH (mg/kg) 24.97
1

-- Highest concentration of SAR 18.4

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 8

Groundwater

Number of groundwater samples collected 55

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet) 5

Number of groundwater monitoring wells installed 8

Number of groundwater samples exceeding 915-1 45

-- Highest concentration of Benzene (µg/l) 157

ND Highest concentration of Toluene (µg/l)

ND Highest concentration of Ethylbenzene (µg/l)

ND Highest concentration of Xylene (µg/l)

NA Highest concentration of Methane (mg/l)

Surface Water

36 Number of surface water samples collected

0 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?

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?

Caerus plans to continue to determine the western boundary extent of soil and groundwater impacts associated with the project through laboratory analysis and will report findings to the CECMC on Supplemental Form 27s.

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.

Based on site conditions Caerus has selected in-situ injection of a carbon based remediation agent to trap and degrade hydrocarbon impacts in place at the point of release and in two downgradient permeable reactive barrier walls, see attached Love Ranch 8 Proposed Injection Figure. Upon UIC Permit approval, Caerus has tentatively scheduled to begin the injections starting October 21, 2024. The injectate is a mixture of primarily powdered activated carbon, nitrogen, calcium sulfate, bacteria, and other minor nutrient additives, according to the MSDS, all of which is mixed with potable water. The injectate will also include magnesium sulfate. Information from the supplier indicates that, based on site-specific geochemistry, there is a potential for temporary exceedances for nitrate (around 90 to 120 days) and sulfate (around 18 to 24 months) as they are introduced as part of electron-receptor compounds to be used in the remediation process. These electron-receptor compounds eventually get utilized by the bacteria in the biological degradation process.

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.

Based on site conditions Caerus has selected in-situ injection of a carbon based remediation agent to trap and degrade hydrocarbon impacts in place at the point of release and in two downgradient permeable reactive barrier walls, see attached Love Ranch 8 Proposed Injection Figure. Upon UIC Permit approval, Caerus has tentatively scheduled to begin the injections starting October 21, 2024. The injectate is a mixture of primarily powdered activated carbon, nitrogen, calcium sulfate, bacteria, and other minor nutrient additives according to the MSDS all of which is mixed with potable water. The injectate will also include magnesium sulfate. Information from the supplier indicates that, based on site-specific geochemistry, there is a potential for temporary exceedances for nitrate (around 90 to 120 days) and sulfate (around 18 to 24 months) as they are introduced as part of electron-receptor compounds to be used in the remediation process. These electron-receptor compounds eventually get utilized by the bacteria in the biological degradation process.

The existing groundwater monitoring network will be sampled after the injection events and the locations of the wells allow for the detection of movement of the dissolved phase plume. Additionally, there have been no detections of LNAPL within any of the wells. At all times, the flow rates and pressures of the injectate will be monitored and adjusted so that daylighting or surfacing of the injectate is minimized and the injection sequence will be from exterior areas of low concentration impacts towards interior high concentration areas of impact to minimize contaminant plume migration.

Soil Remediation Summary

In Situ

Ex Situ

Yes _____ Bioremediation (or enhanced bioremediation)

_____ Excavate and offsite disposal

_____ Chemical oxidation

_____ If Yes: Estimated Volume (Cubic Yards) _____

_____ Air sparge / Soil vapor extraction

_____ Name of Licensed Disposal Facility or ECMC Facility ID # _____

_____ Natural Attenuation

_____ Excavate and onsite remediation

_____ Other _____

_____ 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

_____ 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.

Caerus continues to conduct surface water monitoring and boom deployment to ensure impacts to surface water are contained. Caerus will continue to conduct surface water monitoring at the outlined monitoring stations found on the attached report of work completed, and will report these results to the CECMC on a quarterly basis. Groundwater monitoring will continue to be conducted throughout the site and will be reported to the CECMC on a quarterly basis.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

Quarterly Semi-Annually Annually Other

Request Alternative Reporting Schedule:

Semi-Annually Annually Other

Rule 913.e:

After initial approval of a Form 27, the Operator will provide quarterly update reports in a Supplemental Form 27 to document progress of site investigation and remediation, unless an alternative reporting schedule has been requested by the Operator and approved by the Director. The Director may request a more frequent reporting schedule based on site-specific conditions.

Report Type: Groundwater Monitoring Land Treatment Progress Report O&M Report
 Other 2024 Q2 & Q3 REM update

Adequacy of Operator's General Liability Insurance and Financial Assurance

Describe the adequacy of the Operator's general liability insurance and Financial Assurance to fully address the anticipated costs of Remediation, including the estimated remaining cost for this project (below).

If this information has been provided on a Form 27 within the last 12 months, provide the Document Number of that form.

Per Rule 705.b, and in line with guidance laid out in the SBAP, Caerus has general liability insurance in the amount of \$1M, and Caerus has umbrella insurance, which sits over the general liability insurance in the amount of \$75M. The umbrella and general liability insurance covers property damage, bodily injury to third parties, and sudden or accidental pollution under a combined \$76M.

Operator anticipates the remaining cost for this project to be: \$ 300000

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 _____

ECMC Disposal Facility ID #, if applicable: _____

Non-ECMC Disposal Facility: _____

Volume of E&P Waste (liquid) in barrels _____

E&P waste (liquid) description _____

ECMC Disposal Facility ID #, if applicable: _____

Non-ECMC Disposal Facility: _____

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No _____

If YES:

Compliant with Rule 913.h.(1).

Compliant with Rule 913.h.(2).

Compliant with Rule 913.h.(3).

Do all soils meet Table 915-1 standards? _____

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? _____

Is additional groundwater monitoring to be conducted? _____

Operator shall comply with the ECMC 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.

Caerus will reclaim all impacted areas in accordance with the COGCC 1000 series regulations

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 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. _____

Actual Spill or Release date, or date of discovery. _____

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 05/02/2023

Proposed site investigation commencement. 05/02/2023

Proposed completion of site investigation. 07/31/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 08/30/2023

Proposed date of completion of Remediation. 12/30/2024

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

The attached report of work completed summarizes surface water monitoring, groundwater monitoring, and site investigation results for Q2 and Q3 of 2024.

In brief: Field observations and analytical results for surface water monitoring showed no indications of impacts. Eight (8) new monitoring wells were installed at the site down-gradient of the release location and incorporated into the quarterly sampling program. Analytical results for groundwater monitoring showed elevated concentrations of benzene in four (4) wells. Soil samples collected during new monitoring well installation (10 samples) and ongoing site characterization (7 samples) showed hydrocarbons above Table 915-1 cleanup concentrations in two (2) borings and elevated levels of inorganic analytes in many or all samples.

Based on field observations and analytical results presented herein, Caerus requests CECMC approval to:

- Install two additional monitoring wells, west and northwest, of MW09 and MW10 to confirm western boundary of dissolved phase-plume.
- Reduce the surface water monitoring frequency from monthly to quarterly as field observations and laboratory analytical results have shown no indications of remaining impacts to surface water.
- Reduce the locations included in the surface water monitoring program to one up-gradient at ST-PC-UG02 and one down-gradient at ST-PC-DG11.
- Reduce the analyte suite for the surface water monitoring program to BTEX only.

Caerus plans to continue to determine the extent of soil, groundwater, and surface water impacts associated with the project through laboratory analysis and will report findings to the CECMC on Supplemental Form 27s. Caerus will continue to conduct quarterly surface water and groundwater sampling in support of the project and will provide updates to the CECMC on Supplemental Form 27 documentation.

Based on site conditions Caerus has selected in-situ injection of a carbon based remediation agent to trap and degrade hydrocarbon impacts in place at the point of release and in two downgradient permeable reactive barrier walls, see attached Love Ranch 8 Proposed Injection Figure. Upon UIC Permit approval, Caerus has tentatively scheduled to begin the injections starting October 21, 2024. The injectate is a mixture of primarily powdered activated carbon, nitrogen, calcium sulfate, bacteria, and other minor nutrient additives according to the MSDS all of which is mixed with potable water. The injectate will also include magnesium sulfate. Information from the supplier indicates that, based on site-specific geochemistry, there is a potential for temporary exceedances for nitrate (around 90 to 120 days) and sulfate (around 18 to 24 months) as they are introduced as part of electron-receptor compounds to be used in the remediation process. These electron-receptor compounds eventually get utilized by the bacteria in the biological degradation process.

The existing groundwater monitoring network will be sampled after the injection events and the locations of the wells allow for the detection of movement of the dissolved phase plume. Additionally, there have been no detections of LNAPL within any of the wells. At all times, the flow rates and pressures of the injectate will be monitored and adjusted so that daylighting or surfacing of the injectate is minimized and the injection sequence will be from exterior areas of low concentration impacts towards interior high concentration areas of impact to minimize contaminant plume migration.

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

Signed: Blair Rollins _____

Title: EHS Specialist _____

Submit Date: _____

Email: brollins@caerusoilandgas.com _____

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with ECMC Rules and applicable orders and is hereby approved.

ECMC Approved: _____

Date: _____

Remediation Project Number: 31518 _____

COA Type

Description

0 COA	
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ATTACHMENT 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

403954003	ANALYTICAL RESULTS
403954004	ANALYTICAL RESULTS
403954010	ANALYTICAL RESULTS
403954012	ANALYTICAL RESULTS
403954013	ANALYTICAL RESULTS
403954015	ANALYTICAL RESULTS
403954016	ANALYTICAL RESULTS
403954017	ANALYTICAL RESULTS

403954018	ANALYTICAL RESULTS
403954019	ANALYTICAL RESULTS
403954020	ANALYTICAL RESULTS
403954021	ANALYTICAL RESULTS
403954022	ANALYTICAL RESULTS
403954023	ANALYTICAL RESULTS
403954024	ANALYTICAL RESULTS
403954037	MONITORING REPORT
403956913	SITE INVESTIGATION REPORT
403956993	MAP

Total Attach: 18 Files

General Comments

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

Total: 0 comment(s)