

State of Colorado
Energy & Carbon Management Commission

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Document Number:
403936100
Receive Date:
12/06/2024
Report taken by:
Kari Brown

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 ECOM 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: <u>CUB CREEK ENERGY LLC</u> | Operator No: <u>10542</u> | Phone Numbers |
| Address: <u>200 PLAZA DRIVE SUITE 100</u> | | |
| City: <u>HIGHLANDS RANCH</u> | State: <u>CO</u> | Zip: <u>80129</u> |
| Contact Person: <u>Christian Combs</u> | Email: <u>christian.combs@1876resources.com</u> | |
| | | Phone: <u>(303) 881-1530</u> |
| | | Mobile: <u>(303) 881-1530</u> |

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 34478 Initial Form 27 Document #: 403711249

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

Yes Multiple Facilities

| | | | |
|---|---|-------------------------------|---|
| Facility Type: <u>TANK BATTERY</u> | Facility ID: <u>481785</u> | API #: _____ | County Name: <u>WELD</u> |
| Facility Name: <u>Knight Pad Tank Battery</u> | Latitude: <u>40.197030</u> | Longitude: <u>-105.041390</u> | |
| | ** correct Lat/Long if needed: Latitude: <u>40.197140</u> | Longitude: <u>-105.042170</u> | |
| QtrQtr: <u>SWNE</u> | Sec: <u>30</u> | Twp: <u>3N</u> | Range: <u>68W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u> |
| Facility Type: <u>SPILL OR RELEASE</u> | Facility ID: <u>484607</u> | API #: _____ | County Name: <u>WELD</u> |
| Facility Name: <u>Well #21</u> | Latitude: <u>40.197030</u> | Longitude: <u>-105.041390</u> | |
| | ** correct Lat/Long if needed: Latitude: _____ | Longitude: _____ | |
| QtrQtr: <u>SWNE</u> | Sec: <u>30</u> | Twp: <u>3N</u> | Range: <u>68W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u> |

SITE CONDITIONS

General soil type - USCS Classifications SP

Most Sensitive Adjacent Land Use Occupied building

Is domestic water well within 1/4 mile? No

Is surface water within 1/4 mile? No

Is groundwater less than 20 feet below ground surface? Yes

Other Potential Receptors within 1/4 mile

Five water well permits were identified within a 1/2-mile radius of the release; however, three of these five well permits were listed as expired and the other two were listed as application denied. The closest constructed water well (Permit #12985) is a stock well located approximately 2,735 feet northeast of the release. The nearest surface water body and wetland were identified to be Union Reservoir located approximately 2,115 feet south of the release. High priority habitat identified by Colorado Parks and Wildlife is located approximately 1,700 feet south of the release. The nearest occupied building is located approximately 600 feet west of the release. Site Location map attached as Figure 1.

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 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 |
|--------------|----------------|------------------|--------------------------------------|
| UNDETERMINED | GROUNDWATER | Unknown | Collected GW sample, pending results |
| Yes | SOILS | Unknown | Soil sample collection |

INITIAL ACTION SUMMARY

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

@0850 (5/9/23) the lease operator on location noticed condensate daylighting at surface. Within 10 mins, impacted flowline identified & shut in. The spilled condensate was contained on location. On 5/10/23, ~1bbl of condensate was removed via a hydrovac. ~1 cubic yard of impacted soil was also excavated at that time and transported to Pawnee Waste, LLC, for offsite disposal.

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):

Operator will install one source area and two cross-gradient GW monitoring wells to monitor dissolved-phase contaminants and ensure GW impacts are fully delineated (Figure 2). The source area monitoring well will be installed following excavation backfill. At least one soil sample will be collected from each of the cross-gradient monitoring wells to be submitted for laboratory analysis of ECMC Table 915-1 (organics, soil suitability, & metals). A soil sample will not be collected from the source area monitoring well as the vadose zone in this area will be composed of clean fill.

Proposed Groundwater Sampling

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

Operator will install one source area and two cross-gradient GW monitoring wells to monitor dissolved-phase contaminants and ensure GW impacts are fully delineated (Figure 2). A top-of-casing survey will be completed and cross-gradient GW monitoring wells will be installed perpendicular to GW flow. GW samples to be collected from all monitoring wells on a quarterly basis and analyzed for full ECMC Table 915-1 & dissolved barium until four consecutive quarters indicate compliance with ECMC Table 915-1 standards or site-specific clean up levels, post excavation backfill.

Proposed Surface Water Sampling

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

Surface water sample SW01 was collected from the surface pond located approximately 700 feet upgradient of the release to evaluate the dissolved and total barium. Laboratory analytical results indicated barium was elevated in the surface pond with dissolved barium at 35.6 ug/L and total barium at 32.1 ug/L. Following the collection of GW samples from MW-01, MW-02, MW-03, & MW-04, a second surface water sample (SW01) was collected from the surface pond and was submitted for laboratory analysis of TDS, chloride, & sulfate to investigate the elevated concentrations. TDS, chloride, & sulfate results for SW01 will be reported on a Form 27 supplemental.

Additional Investigative Actions

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

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

NA / ND

Number of soil samples collected 9 -- Highest concentration of TPH (mg/kg) 9.56
 Number of soil samples exceeding 915-1 3 -- Highest concentration of SAR 9.27
 Was the areal and vertical extent of soil contamination delineated? Yes BTEX > 915-1 Yes
 Approximate areal extent (square feet) 240 Vertical Extent > 915-1 (in feet) 10

Groundwater

Number of groundwater samples collected 5 Highest concentration of Benzene (µg/l) _____
 Was extent of groundwater contaminated delineated? No ND Highest concentration of Toluene (µg/l) _____
 Depth to groundwater (below ground surface, in feet) 10 ND Highest concentration of Ethylbenzene (µg/l) _____
 Number of groundwater monitoring wells installed 4 ND Highest concentration of Xylene (µg/l) _____
 Number of groundwater samples exceeding 915-1 2 ND Highest concentration of Methane (mg/l) _____

Surface Water

2 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?
 Nine background samples were collected from three soil sample locations (BG01, BG02, & BG03 [Figure 2]) and analyzed for soil suitability, arsenic, barium, & selenium and two background soil samples (BG1876#1@0.5 & BG1876#2@0.5 [Figure 4]) were collected and analyzed for soil suitability and metals per ECMC Table 915-1. Site-specific clean up levels were established for boron, SAR, EC, pH, arsenic, barium, & selenium (Analytical Tables). pH (S01@10) and barium (SS03@6 and W02@6) exceed the site-specific clean up levels established using analytical results from background samples.
 Monitoring wells MW-01 and MW-04 installed upgradient (Figure 2) of the release were used to establish site-specific clean up levels for TDS, chloride, and sulfate (Analytical Tables).

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?
 Operator will install one source area and two cross-gradient GW monitoring wells to monitor dissolved-phase contaminants and ensure GW impacts are fully delineated (Figure 2). A top-of-casing survey will be completed and cross-gradient GW monitoring wells will be installed perpendicular to GW flow. GW samples to be collected from all monitoring wells on a quarterly basis and analyzed for full ECMC Table 915-1 & dissolved barium until four consecutive quarters indicate compliance with ECMC Table 915-1 standards or site-specific clean up levels, post excavation backfill.

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.
 Benzene & barium were identified as contaminants of concern in release characterization samples SS02@6 & SS03@6. Benzene delineated in all directions as SS02@6 was the only sample that exceeded for benzene.
 Barium horizontally delineated north (N02@6), east (E01@6), & south (S01@10). Barium not horizontally delineated to below ECMC Table 915-1 Protective of Groundwater Soil Screening Level (PGSSL - 82 mg/kg) or site-specific clean up level (415 mg/kg); however, W02@6 (500 mg/kg) is below the ECMC Table 915-1 Residential Soil Screening Level (RSSL - 15,000 mg/kg) and barium is naturally elevated in the area (332 mg/kg); therefore, operator requests ECMC not consider barium a contaminant of concern associated with the release and approve temporarily leaving soil exceeding the ECMC Table 915-1 PGSSL in-situ until facility decommissioning.
 The excavation extent is approximately 30 feet x 13 feet, to a depth of 8 feet bgs with sloping due to unstable soil/sidewalls. Unsafe to extend excavation west due to flowline integrity. Excavation unsafe to extend south or deeper due to separator integrity. Impacted soil is currently staged onsite in disposal bins and will be hauled offsite for disposal.

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.

Upon ECMC-approval to backfill the excavation, operator to apply carbon amendment to excavation prior backfill to address benzene in soil (0.305 mg/kg) and GW (1,910 ug/L) and 1,2,4-trimethylbenzene (653 ug/L) and 1,3,5-trimethylbenzene (166 ug/L) in GW. Once the carbon amendment has been applied, operator to backfill excavation. Barium exceedances to be addressed during facility decommissioning as these concentrations do not present a threat to the environment, groundwater, human health, or the environment.

Operator will install one source area and two cross-gradient GW monitoring wells to monitor dissolved-phase contaminants and ensure GW impacts are fully delineated (Figure 2). A top-of-casing survey will be completed and cross-gradient GW monitoring wells will be installed perpendicular to GW flow. GW samples to be collected from all monitoring wells on a quarterly basis and analyzed for full ECMC Table 915-1 & dissolved barium until four consecutive quarters indicate compliance with ECMC Table 915-1 standards or site-specific clean up levels, post excavation backfill.

Soil Remediation Summary

In Situ

Ex Situ

Yes Bioremediation (or enhanced bioremediation)

Yes Excavate and offsite disposal

Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) 22

Air sparge / Soil vapor extraction

Name of Licensed Disposal Facility or ECMC Facility ID # _____

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.

Grab GW sample GW01 collected from excavation (Figure 2) and submitted for ECMC Table 915-1 (BTEX, Napth, TMBs, TDS, chloride, & sulfate). Analytical results for GW01 (Knight Pad Tank Battery) indicated benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and chloride exceeded ECMC Table 915-1 standards/site-specific clean up levels. GW samples were collected from existing GW monitoring wells to establish points-of-compliance. Operator will install one source area and two cross-gradient GW monitoring wells to monitor dissolved-phase contaminants and ensure GW impacts are fully delineated (Figure 2). A top-of-casing survey will be completed and cross-gradient GW monitoring wells will be installed perpendicular to GW flow. GW samples to be collected from all monitoring wells on a quarterly basis and analyzed for full ECMC Table 915-1 & dissolved barium until four consecutive quarters indicate compliance with ECMC Table 915-1 standards or site-specific clean up levels, post excavation backfill.

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 Propose soil and groundwater assessment results

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.

Cub Creek (1876 Resources) has sufficient insurance and bonding to fully address the anticipated costs of remediation, including the remaining estimated costs for this project. Cub Creek (1876 Resources) has general liability insurance and financial assurance in-compliance with ECMC rules. The cost for remediation is a preliminary estimate only, costs may change upwards or downward based on site-specific information. Cub Creek (1876 Resources) makes no representation or guarantees as to the accuracy of the preliminary estimate.

Operator anticipates the remaining cost for this project to be: \$ 20000

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:

NA

Volume of E&P Waste (solid) in cubic yards 22

E&P waste (solid) description Contaminated soil

ECMC Disposal Facility ID #, if applicable: _____

Non-ECMC Disposal Facility: Pawnee Waste, LLC

Volume of E&P Waste (liquid) in barrels 19

E&P waste (liquid) description Contaminated soil

ECMC Disposal Facility ID #, if applicable: _____

Non-ECMC Disposal Facility: Pawnee Waste, LLC

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? No

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? No

Is additional groundwater monitoring to be conducted? Yes

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.

Impacted soil to be excavated and transported offsite for disposal. Once impacted soil removed, excavation will be backfilled with clean fill and returned to current grade of production pad.

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? No

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

Did the local soil conservation district provide the seed mix? No

SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. 01/03/2025

Proposed date of completion of Reclamation. 01/31/2025

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. 05/10/2023

Actual Spill or Release date, or date of discovery. 05/09/2023

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 05/09/2023

Proposed site investigation commencement. 04/03/2024

Proposed completion of site investigation. 03/31/2026

REMEDIAL ACTION DATES

Proposed start date of Remediation. 04/03/2024

Proposed date of completion of Remediation. 03/31/2025

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:

Site investigation completion date revised to allow for four quarters of groundwater monitoring following the installation of additional monitoring wells.
Remediation completion date revised to allow for ECMC-approval to backfill the excavation and the application of a carbon amendment prior to backfilling.

OPERATOR COMMENT

Operator has removed contaminants of concern to the maximum extent practicable as further excavation south or deeper would undermine the integrity of active process equipment (separators). Further excavation west would undermine the integrity of the active flowline. The excavation extent is approximately 30 feet x 13 feet, to a depth of 8 feet bgs with sloping due to unstable soil/sidewalls.

Benzene & barium were identified as contaminants of concern in release characterization samples SS02@6 & SS03@6. Benzene delineated in all directions as SS02@6 (0.305 mg/kg) was the only sample that exceeded for benzene. Upon ECMC-approval to backfill the excavation, operator to apply carbon amendment to excavation prior backfill to address benzene in soil (0.305 mg/kg) and GW (1,910 ug/L) and 1,2,4-trimethylbenzene (653 ug/L) and 1,3,5-trimethylbenzene (166 ug/L) in GW.

Barium horizontally delineated north (N02@6), east (E01@6), & south (S01@10). Barium not horizontally delineated to the west to below ECMC Table 915-1 Protective of Groundwater Soil Screening Level (PGSSL - 82 mg/kg) or site-specific clean up level (415 mg/kg); however, W02@6 (500 mg/kg) is below the ECMC Table 915-1 Residential Soil Screening Level (RSSL - 15,000 mg/kg) and barium is naturally elevated in background soil samples (332 mg/kg) and in the upgradient surface water pond (35.6 ug/L); therefore, operator requests ECMC not consider barium a contaminant of concern associated with the release and approve temporarily leaving soil exceeding the ECMC Table 915-1 PGSSL for barium in-situ until facility decommissioning as these concentrations do not present a threat to the environment, groundwater, human health, or the environment.

GW samples to be collected from all monitoring wells on a quarterly basis and analyzed for full ECMC Table 915-1 & dissolved barium until four consecutive quarters indicate compliance with ECMC Table 915-1 standards or site-specific clean up levels, post excavation backfill.

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

Signed: Michael A. Wicker, P.G.

Title: Senior Geologist

Submit Date: 12/06/2024

Email: mwickercdhconsult.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: Kari Brown

Date: 02/03/2025

Remediation Project Number: 34478

COA Type

Description

| | |
|--------|---|
| | Operator will provide notice to the ECMC Area EPS via email at least 48 hours prior to sample collection or monitoring well installation. |
| | Operator will install monitoring wells (within the spill/release area, cross-gradient, downgradient, and up-gradient) to properly characterize groundwater pursuant to Rule 915 and determine hydraulic gradient, as required by Rule 915.e.(3)A.ii. All monitoring wells shall be constructed as permanent monitoring wells in accordance with the State Engineer's Water Well Construction and Permitting Rules |
| 2 COAs | |

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

| | |
|-----------|--------------------------------|
| 403936100 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 404005908 | ANALYTICAL RESULTS |
| 404005910 | ANALYTICAL RESULTS |
| 404005913 | ANALYTICAL RESULTS |
| 404005915 | ANALYTICAL RESULTS |
| 404005916 | ANALYTICAL RESULTS |
| 404005918 | ANALYTICAL RESULTS |
| 404005919 | ANALYTICAL RESULTS |
| 404005922 | ANALYTICAL RESULTS |
| 404005939 | ANALYTICAL RESULTS |
| 404005949 | MAP |
| 404011209 | SITE MAP |
| 404011210 | SOIL SAMPLE LOCATION MAP |

Total Attach: 14 Files

General Comments

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

Total: 0 comment(s)