FORM 27 Rev 4/21

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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Report taken by: Candice (Nikki) Graber

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 INFORMATON

Name of Operator: GREAT WESTERN OPERATING COMPANY LLC Operator No: 10110
Address: 1001 17TH STREET #2000
City: DENVER State: CO Zip: 80202
Contact Person: Jason Davidson Email: jdavidson@gwp.com

Phone Numbers
Phone: (720) 595-2132
Mobile: ( )

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 17902 Initial Form 27 Document #: 402674196

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.
- [X] 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: TANK BATTERY Facility ID: 463941 API #: County Name: WELD
Facility Name: Kielian 2-2 battery Latitude: 40.335184 Longitude: -104.850155
** correct Lat/Long if needed: Latitude: 40.335184 Longitude: -104.850155
QtrQtr: SESE Sec: 2 Twp: 4N Range: 67W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications GM
Most Sensitive Adjacent Land Use Residential
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? Yes

Other Potential Receptors within 1/4 mile

The Kielian 2-2 battery is surrounded by private ranching and agricultural mixed-use properties in all directions. There are residential properties ~400' west and ~300' southeast. The wellhead is located ~250' northwest of the battery. A small pond is in place ~60' west of the battery and a gravel pit is in place ~600' east. The Thompson and Platte Ditch is in place ~1,180' south of the battery. There is 1 groundwater well mapped within a ¼ mile of the battery. Groundwater depth is unknown but is expected to be encountered at <20' bgs. The 100-year floodplain of the Big Thompson River drainage is mapped ~260' north of the battery. The battery is located within a Mule Deer Severe Winter Range Buffer and an Aquatic Native Species Conservation Waters buffer is mapped ~1,050' northwest of the battery.

SITE INVESTIGATION PLAN

TYPE OF WASTE:

- [X] **E&P Waste**
  - [X] Produced Water
  - [X] Oil
  - [X] Condensate
  - [ ] Drilling Fluids
  - [ ] Drill Cuttings
- [ ] **Other E&P Waste**
  - [ ] Workover Fluids
  - [ ] Tank Bottoms
  - [ ] Pigging Waste
  - [ ] Rig Wash
  - [ ] Spent Filters
  - [ ] Pit Bottoms
  - [ ] Other (as described by EPA) _____
- [ ] **Non-E&P Waste** _____

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	Area surrounding MW-1	Site Investigation Activities
Yes	SOILS	50' E/W x 65' N/S x 7' deep	Site Investigation Activities

INITIAL ACTION SUMMARY

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

During facility closure activities, soil and potential groundwater impacts were observed in test pits advanced to groundwater below the partially buried produced water tank and below the horizontal separator on May 5, 2021. The historic release was reported under Form 19 document number 402681821. Please refer to the Site Characterization Workplan submitted with the COGCC approved Supplemental Form 27 Document Number 402708417 and to the Geoprobe Investigation Workplan submitted with the COGCC approved Supplemental Form 27 Document Number 402756750 for a summary of the initial actions conducted at the Site.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

[X] Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

Please refer to the attached Drilling Investigation, Well Installation, and Groundwater Monitoring Report for a summary of the proposed soil sampling activities at the Site.

Proposed Groundwater Sampling

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

Please refer to the attached Drilling Investigation, Well Installation, and Groundwater Monitoring Report for a summary of the proposed groundwater sampling activities at the Site.

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: 12

Number of soil samples exceeeding 915-1: 5

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

Approximate areal extent (square feet): 3250

NA / ND

-- Highest concentration of TPH (mg/kg): 63.4

NA Highest concentration of SAR:

BTEX > 915-1: Yes

Vertical Extent > 915-1 (in feet): 7

Groundwater

Number of groundwater samples collected: 6

Was extent of groundwater contaminated delineated? Yes

Depth to groundwater (below ground surface, in feet): 3`

Number of groundwater monitoring wells installed: 6

Number of groundwater samples exceeding 915-1: 1

-- Highest concentration of Benzene (µg/l): 14.7

ND Highest concentration of Toluene (µg/l):

-- Highest concentration of Ethylbenzene (µg/l): 11

ND Highest concentration of Xylene (µg/l):

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?

Please refer to the Site Characterization Workplan submitted with the COGCC approved Supplemental Form 27 Document Number 402708417 and to the Geoprobe Investigation Workplan submitted with the COGCC approved Supplemental Form 27 Document Number 402756750 for a discussion of the background sampling activities conducted at the Site.

☐ 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 refer to the attached Drilling Investigation, Well Installation, and Groundwater Monitoring Report for a summary of the proposed source removal activities to be conducted at the Site.

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.

Please refer to the attached Drilling Investigation, Well Installation, and Groundwater Monitoring Report for a summary of the proposed remediation activities to be conducted at the Site.

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

_____ 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.

Please refer to the attached Drilling Investigation, Well Installation, and Groundwater Monitoring Report for a summary of the proposed groundwater monitoring activities to be conducted at the Site.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☐ Quarterly ☐ Semi-Annually ☐ Annually ☒ Other Within 90 days following the completion of excavation activities

☐ **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 Remediation Summary Report

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:

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 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.

If necessary, the site will be reclaimed in accordance with COGCC 1000-Series Rules.

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. 04/13/2021

Actual Spill or Release date, or date of discovery.

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 04/30/2021

Proposed site investigation commencement. 08/16/2021

Proposed completion of site investigation. 08/17/2021

REMEDIAL ACTION DATES

Proposed start date of Remediation. 02/07/2022

Proposed date of completion of Remediation. 02/11/2022

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

Great Western (GWOC) would like to respond to COA #1 and COA #2 associated with the COGCC approved Form 27 Supplemental Work Plan, Document #402871073.

COA #1: “All excavation confirmation samples shall be analyzed for BTEXN, TMBs, TPH (C6-36), acenaphthene, anthracene, chrysene, pyrene, and boron.”

Boron was reported in waste characterization sample SS3@7-9’ at a concentration of 1.6 milligrams per kilogram (mg/kg), below the applicable COGCC Table 915-1 standard of 2.0 mg/kg. GWOC requests boron to be removed from the sampling suite for future excavation soil confirmation samples.

COA#2 “Operator shall remediate soils in compliance with Table 915-1 Protection of Groundwater Soil Screening Level Concentrations. Footnote 7 on Table 915-1 may not be used on documented impacts to groundwater.”

GWOC respectfully requests that the COGCC reconsider, or delay, the decision to implement PGWSSL standards at the Site for the reasons outlined below.

Footnote 7 states: If there is no pathway for communication with Groundwater, then residential soil screening levels apply for organic compounds and metals. If the Director determines that a pathway to Groundwater exists, then the protection of Groundwater soil screening levels will apply, secondary to actual measured concentrations of the contaminants of concern in Groundwater.

Results for soil sample MW05-6 reported concentrations of naphthalene, 1,2,4-trimethylbenzene, 1-methylnaphthalene, and 2-methylnaphthalene above applicable Table 915-1 PGWSSLs. Subsequent groundwater monitoring results in MW05 demonstrated compliance with applicable Table 915-1 standards, thus satisfying footnote 7 at this location.

The COGCC Table 915-1 PGWSSLs are based on a dilution attenuation factor (DAF) of 1, which results in the most conservative standards to protect groundwater from residual soil contamination for all hydrogeologic settings. The site specific hydrogeologic setting consists of fine-grained moist clay with medium plasticity from ground surface to approximately 6 feet below ground surface (ft-bgs) across the Site, overlying coarse grained water saturated sand. Fine grained clayey soils with low permeability, such as those found overlying the water bearing zone at the Site, are known to have low infiltration rates which yield a DAF higher than 1, thus the Table 915-1 PGWSSLs overestimate the actual site-specific risk of residual soil impact to affect groundwater.

Soil data, groundwater data, and process knowledge of the Site indicate the release occurred from surface equipment in the location of the proposed excavation, where impacted soil was observed in shallow surficial soil and extended into groundwater. Excavating the source area soil, and confirming compliance with RSSLs, will remove the majority of hydrocarbon mass in soil with the potential to impact groundwater. To mitigate the identified impacts to groundwater, COGACTM or Insitu Chemical Oxidation (ISCO) amendments will be applied to the groundwater table during excavation activities. The request to implement Footnote 7 and use RSSLs for soil compliance is contingent upon post-excavation groundwater monitoring results. If 4 consecutive quarters of compliant groundwater monitoring analytical results for BTEXN and TMBs is achieved within 3 years post-excavation, GWOC believes adequate data is being provided to reasonably request implementation of Footnote 7 and use of RSSLs to determine soil compliance. If 4- consecutive quarters of compliant groundwater monitoring is not achieved within 3 years post-excavation, then additional remedial measures will be taken to mitigate impact at the Site.

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

Signed:` Jason Davidson Title: Senior EHS Specialist

Submit Date:` 11/19/2021 Email: jdavidson@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: Candice (Nikki) Graber Date: 11/30/2021

Remediation Project Number: 17902

Condition of Approval

COA Type	Description
	Operator may remove boron from sampling.
	COGCC stance on COA#2 “Operator shall remediate soils in compliance with Table 915-1 Protection of Groundwater Soil Screening Level Concentrations. Footnote 7 on Table 915-1 may not be used on documented impacts to groundwater.” Removing "the majority" of impacted soil, which has already been proven to have migrated to groundwater (as documented by Operator) is not allowed by COGCC regulations.COGCC does not believe this plan provided by operator is protective of public health, safety, welfare, or the environment.
2 COAs	

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
402876762	FORM 27-SUPPLEMENTAL-SUBMITTED

Total Attach: 1 Files

General Comments

User Group	Comment	Comment Date
Environmental	Passing the subject Form 27 serves to acknowledge receipt of the attached information by the COGCC and does not imply approval of any requests therein. COGCC's review of and response to such requests will be made separately.	11/30/2021

Total: 1 comment(s)