FORM 27 Rev 3/16

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: Kari Oakman

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 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 #: 10344 Initial Form 27 Document #: 401312875

PURPOSE INFORMATION

- [ ] 901.e. Sensitive Area Determination
- [ ] 909.c.(1), Rule 905: Pit or PW vessel closure
- [x] 909.c.(2), Rule 906: Spill/Release Remediation
- [ ] 909.c.(3), Rule 907.e.: Land treatment of oily waste
- [ ] 909.c.(4), Rule 908.g.: Centralized E&P Waste Management Facility closure
- [ ] 909.c.(5), Rule 910.b.(4): Remediation of impacted ground water
- [ ] Rule 909.e.(2)A.: Notice completion of remediation in accordance with Rule 909.b.
- [ ] Rule 909.e.(2)B.: Closure of remediation project
- [ ] Rule 906.c.: Director request
- [ ] Other

SITE INFORMATION

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

Facility Type: LOCATION Facility ID: 336384 API #: County Name: WELD
Facility Name: STANLEY OLSON-62N68W 14SWNE Latitude: 40.141470 Longitude: -104.966310
** correct Lat/Long if needed: Latitude: 40.141467 Longitude: -104.965974
QtrQtr: SWNE Sec: 14 Twp: 2N Range: 68W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications SC
Most Sensitive Adjacent Land Use Agriculture
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

Oil and gas operations in place directly south. Rural residential properties in place 1,100 feet to the northeast, east, and southeast.

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	Unknown	Site Investigation Activities
Yes	SOILS	Unknown	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.

Soil and groundwater impacts were discovered during initial subsurface investigation activities associated with due diligence. A subsurface investigation was attempted on 7/5/17; however, shallow groundwater was encountered at 1 foot to 2 feet bgs from irrigation activities in the area, which prohibited the investigation. A Supplemental Form 27 proposing to postpone the investigation until late-fall/early-winter 2017 was approved on 8/17/17. A limited subsurface investigation was conducted on 12/6-7/17 to delineate hydrocarbon-impacted soil and groundwater at the site. 29 soil borings were advanced with a Geoprobe and 3 monitoring wells were installed. An additional limited subsurface investigation was conducted on 3/13/18 to further delineate source area impacts. 3 soil borings were advanced and 1 additional monitoring well was installed. 20 discreet soil samples were collected during the limited subsurface investigations conducted on 12/6-7/17 and 3/13/18. The samples were analyzed for total petroleum hydrocarbons (TPH)- gasoline range organics (GRO) and TPH- diesel range organics (DRO). Groundwater samples were collected on 12/7/17, 1/18/18, 3/26/18, and 6/21/18. 1 additional monitoring well (MW-4) was installed during the limited subsurface investigation conducted on 3/13/18. Groundwater samples were collected from MW-4 on 3/26/18 and 6/21/18. All samples were analyzed for benzene, toluene, ethylbenzene, and total xylene (BTEX).

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):

Great Western proposes to conduct an additional subsurface investigation to further delineate the horizontal and vertical extent of the hydrocarbon impacted soil and groundwater at the Site. Up to ten soil borings are proposed to be advanced using a Geoprobe. Soil samples will be collected and analyzed for BTEX, TPH-GRO, and TPH-DRO based on the highest field screening measurements using a PID and visual and olfactory observations. Soil borings will be advanced to approximately 15 feet bgs. The locations of the proposed soil borings are illustrated on the attached Fremont Environmental Figure 11 but are subject to change based on field observations during soil boring activities. Site investigation activities will commence within 60 days of approval of this Form 27.

Proposed Groundwater Sampling

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

Please refer to the Groundwater Monitoring section under the Remedial Action Plan tab of this Form 27 for a description of the proposed groundwater sampling activities.

Proposed Surface Water Sampling

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

Additional Investigative Actions

- [x] Additional alternative investigative actions described in attached Site Investigation Plan (summary):

On March 30, 2020, 15 test pits were excavated at the Site to depths ranging from 8 feet to 13 feet bgs to further define the vertical and horizontal extent of hydrocarbon-impacted soil following the plugging and abandonment of the facility. Varying degrees of soil staining and petroleum odors were observed in each test pit and groundwater was encountered across the Site at approximately 8 feet bgs. Soil and groundwater samples were not submitted for laboratory analysis during the test pit investigation. The test pit locations, field soil screening results, and field observations are illustrated on the attached Figure 10.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected: 6

Number of soil samples exceeeding 910-1: 1

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

Approximate areal extent (square feet): 2750

NA / ND

-- Highest concentration of TPH (mg/kg): 2791

NA Highest concentration of SAR:

BTEX > 910-1: Yes

Vertical Extent > 910-1 (in feet): 13

Groundwater

Number of groundwater samples collected: 24

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet): 8`

Number of groundwater monitoring wells installed: 3

Number of groundwater samples exceeding 910-1: 7

-- Highest concentration of Benzene (µg/l): 179

ND Highest concentration of Toluene (µg/l):

-- Highest concentration of Ethylbenzene (µg/l): 184

-- Highest concentration of Xylene (µg/l): 1070

NA Highest concentration of Methane (mg/l):

Surface Water

0 Number of surface water samples collected

0 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?

Please refer to the Proposed Soil Sampling section under the Site Investigation Plan tab and the Groundwater Monitoring section under the Remedial Action Plan tab of this Form 27 for a description of the proposed groundwater sampling activities.

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.

Great Western will either dig and haul or treat any soils onsite that exceed Table 910-1 concentration levels.

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.

Between April 1 and 9, 2019, Remington excavated approximately 580 cubic yards of hydrocarbon-impacted source area soil from the surface to approximately 6 feet to 9 feet bgs for onsite landfarm treatment with chemical oxidizer. Source removal by excavation was conducted, based on visual and olfactory observations, field soil screening, and laboratory analysis. Six excavation confirmation soil samples (1 base and 5 sidewall) and 9 landfarm confirmation soil samples (3 from each lift) were collected during excavation and treatment activities and submitted for laboratory analysis of BTEX, TPH-GRO, and TPH-DRO. Concentrations of BTEX, TPH-GRO, and TPH-DRO were all reported either below laboratory reporting limits or below COGCC Table 910-1 concentrations levels, except for sample SWSE-07, collected from the south sidewall at 7 feet bgs. Concentrations of benzene, TPH-GRO, and TPH-DRO were all reported above their respective Table 910-1 concentration levels. Excavation did not progress further south in the area of sample SWSE-07 due to the presence of Anadarko's gas meter equipment and associated buried utilities. This area will be addressed during future remediation efforts. To treat the dissolved phase contamination, 2,600 pounds of Chemically Oxidized Granular Activated Carbon (COGAC™) was applied to the bottom of the excavation prior to backfill with the treated soil. Following backfill, a trench was dug to 8 feet bgs in the southeast corner of the excavation and 1,000 pounds of Granular Activated Carbon (GAC) were applied to the base of the trench to build a permeable barrier wall between the clean excavation and source material left in place to the south, beneath Anadarko's gas meter equipment. See Operator Comments for a continued discussion of remediation activities at the Site.

Soil Remediation Summary

☐ **In Situ**

- ____ Bioremediation (or enhanced bioremediation)
- ____ Chemical oxidation
- ____ Air sparge / Soil vapor extraction
- ____ Natural Attenuation
- ____ Other ____

☒ **Ex Situ**

- No Excavate and offsite disposal
  - If Yes: Estimated Volume (Cubic Yards) ____
  - Name of Licensed Disposal Facility or COGCC Facility ID # ____
- Yes Excavate and onsite remediation
  - Yes Land Treatment
  - Yes Bioremediation (or enhanced bioremediation)
  - Yes Chemical oxidation
  - No Other ____

Groundwater Remediation Summary

- Yes 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.

Groundwater at the Site has been sampled for BTEX analysis on a quarterly schedule since December 7, 2017. Monitoring wells MW-1 and MW-4 were destroyed during excavation activities in April 2019. Replacement monitoring well MW-4R was installed on May 30, 2019. Great Western proposes to install replacement monitoring well MW-1R and up to 9 additional monitoring wells during the proposed site investigation to determine the extent of groundwater impacts at the Site. Following development, the wells will be sampled, along with MW-1, MW-2 and MW-4R, on a quarterly schedule and analyzed for BTEX. Based on survey elevation data and groundwater levels collected during quarterly sampling events, groundwater at the Site flows to the northwest. Monitoring wells MW-2 and MW-3 will be used as points of compliance. The existing well locations and analytical results are depicted on the attached Figure 1 and the analytical results are summarized on the attached Table 2. Copies of the laboratory analytical reports from the September 27, 2018 through March 12, 2020 sampling events are also attached. Groundwater flow direction during the seven quarterly events is illustrated on the attached Potentiometric Surface Figures 2 through 8. The boring log for monitoring well MW-4R is also included. The proposed monitoring well locations are depicted on the attached Fremont Environmental Figure 1 but are subject to change based on field observations during site investigation activities. Monitoring will continue until four consecutive quarters of analytical results below Table 910-1 concentration levels for BTEX are obtained. Monitoring wells will remain in place until project closure, at which time they will be abandoned in accordance with State standards.

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? _____

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? _____

Does Groundwater meet Table 910-1 standards? _____

Is additional groundwater monitoring to be conducted? _____

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? 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. 06/22/2017

Actual Spill or Release date, if known.

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 07/05/2017

Date of commencement of Site Investigation. 12/06/2017

Date of completion of Site Investigation.

REMEDIAL ACTION DATES

Date of commencement of Remediation. 04/01/2019

Date of completion of Remediation.

SITE RECLAMATION DATES

Date of commencement of Reclamation.

Date of completion of Reclamation.

OPERATOR COMMENT

Following decommission, 4 background confirmation soil samples were collected from the native soil beneath the landfarm and submitted for laboratory analysis of BTEX, TPH-GRO, and TPH-DRO. Concentrations of BTEX, TPH-GRO, and TPH-DRO were all reported either below laboratory reporting limits or below Table 910-1 concentrations levels. The excavation and landfarm confirmation soil sample locations are illustrated on the attached Figure 9 and the analytical results are summarized on the attached Table 1. Copies of the laboratory analytical reports and Remington's Soil Excavation and Treatment Report are also attached.

Following site investigation activities, a remedial action plan will be developed. Implementation will commence following Anadarko's removal of their gas metering equipment and/or when the groundwater table returns to its natural level. Groundwater monitoring will continue on a quarterly schedule with the next event planned for mid-June 2020.

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:` 04/02/2020 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: Kari Oakman Date: 04/03/2020

Remediation Project Number: 10344

COA Type	Description

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
402349145	FORM 27-SUPPLEMENTAL-SUBMITTED
402359129	LOGS
402359136	ANALYTICAL RESULTS
402359139	ANALYTICAL RESULTS
402359143	GROUND WATER SAMPLE LOCATION
402359152	GROUND WATER ELEVATION MAP
402359154	SOIL SAMPLE LOCATION MAP
402359155	SOIL SAMPLE LOCATION MAP
402359156	REMEDIATION PROGRESS REPORT
402359157	ANALYTICAL RESULTS
402359158	ANALYTICAL RESULTS
402360259	SITE INVESTIGATION PLAN

Total Attach: 12 Files

General Comments

User Group	Comment	Comment Date
		Stamp Upon Approval

Total: 0 comment(s)