

State of Colorado Oil and Gas Conservation 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 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 INFORMATION

Name of Operator: GREAT WESTERN OPERATING COMPANY LLC	Operator No: 10110	Phone Numbers Phone: (720) 595-2078 Mobile: ()
Address: 1001 17TH STREET #2000		
City: DENVER	State: CO Zip: 80202	
Contact Person: Ben Huggins	Email: bhuggins@gwogco.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 12136

Initial Form 27 Document #: 401835745

PURPOSE INFORMATION

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

SITE INFORMATION

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

Facility Type: SPILL OR RELEASE	Facility ID: 458600	API #:	County Name: WELD
Facility Name: Colorado State #2 Flowline		Latitude: 40.615700	Longitude: -104.830620
** correct Lat/Long if needed: Latitude:		Longitude:	
QtrQtr: SW SW	Sec: 31	Twp: 8N	Range: 66W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications GM

Most Sensitive Adjacent Land Use Livestock Watering

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

Coalbank Creek drainage.

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
UNDETERMINED	GROUNDWATER	Unknown	Limited Subsurface Investigation
Yes	SOILS	50' E/W x 5' N/S x 3' deep	Limited Subsurface Investigation

INITIAL ACTION SUMMARY

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

The CO State #2 well and flowline were shut-in and excavation work began on 10/26/18. See the attached Figure 1 for a site location map. Following soil removal on 10/29/19, Olsson collected soil samples from the base of the excavation beneath the flowline at a depth of 6 feet bgs, and from the walls of the excavation at depths of 5 feet to 5.5 feet bgs. Origins Laboratory analyzed the samples for BTEX, GRO, DRO, and RRO to compare to the COGCC Table 910-1 concentration levels. The samples from the base and west wall of the excavation were also analyzed for pH, EC, and SAR. Concentrations of GRO, DRO, and RRO were added to calculate total petroleum hydrocarbons (TPH). TPH concentrations in samples SS1N @ 5.5', SS4B @ 6.0', and SS5W @ 5.0', and SAR concentrations in samples SS4B @ 6.0' and SS5W @ 5.0' were reported above their respective Table 910-1 concentration levels. Concentrations of GRO, DRO, RRO, pH, EC, and SAR in the remaining samples were either not detected at or above laboratory reporting limits or were reported below their respective Table 910-1 concentration levels.

Groundwater, encountered at 8 feet bgs during excavation, was displaced from the excavation by the backhoe. Water flowed out of the excavation toward Coal Bank Creek but did not reach the dry channel. Three soil samples were collected from the flow path at depths of 1 foot to 2.5 feet bgs. Two of the samples (SS6NW @ 2.5' and SS7W @ 1.0') were analyzed for BTEX, GRO, DRO, and RRO and one for pH, EC, and SAR (SS8 @ 1.0'). TPH concentrations in samples SS6NW @ 2.5' and SS7W @ 1.0' and SAR concentrations in sample SS8 @ 1.0' were reported above their respective Table 910-1 concentration levels. Concentrations of pH and EC in sample SS8 @ 1.0' were reported below their respective Table 910-1 concentration levels. Soil sample locations and analytical results are depicted on Figure 2. The analytical results are summarized on Table 1.

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):

To address elevated SAR concentrations reported in confirmation soil samples SS13 @ 2.5' and SS14 @ 1.5' collected in the flow path, Great Western plans to excavate the footprint of the flow path to 3 feet bgs and collect up to five (5) confirmation soil samples from the four walls and base of the excavation. The confirmation soil samples will be analyzed for SAR. See attached Figures 2 through 5 for an illustration of the flow path footprint. Based on the analytical results of the confirmation soil samples, a determination will be made regarding additional soil remediation or a request for closure of soil sampling requirements at the Site will be made.

Proposed Groundwater Sampling

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

Refer to the Groundwater Monitoring section in the Remedial Action Plan tab of this Form 27.

Proposed Surface Water Sampling

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

Surface water was not observed - Coalbank Creek is a dry wash.

Additional Investigative Actions

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

Olsson performed a limited subsurface investigation on 11/15/18. Nine direct-push borings were advanced in the vicinity of the excavation and four piezometers were constructed. No hydrocarbon staining or odors were observed in the borings. Nine soil samples, one from each boring, were collected at depths of 4.5 feet to 11 feet bgs and analyzed for BTEX, GRO, DRO, and RRO. Concentrations of BTEX, GRO, DRO, and RRO were not detected at or above laboratory reporting limits in any of the samples. Soil boring locations and analytical results are depicted on Figure 5. Analytical results are summarized on Table 3.

PLEASE REFER TO THE OPERATOR COMMENTS SECTION OF THIS FORM 27 FOR FURTHER DISCUSSION OF ADDITIONAL INVESTIGATION ACTIONS CONDUCTED AT THE SITE.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 23

Number of soil samples exceeding 910-1 8

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

Approximate areal extent (square feet) 250

NA / ND

-- Highest concentration of TPH (mg/kg) 16162

-- Highest concentration of SAR 415.2
3

BTEX > 910-1 No

Vertical Extent > 910-1 (in feet) 3

Groundwater

Number of groundwater samples collected 9

Was extent of groundwater contaminated delineated? No

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

Number of groundwater monitoring wells installed 4

Number of groundwater samples exceeding 910-1 5

-- Highest concentration of Benzene (µg/l) 3.36

-- Highest concentration of Toluene (µg/l) 2.54

-- Highest concentration of Ethylbenzene (µg/l) 11.4

-- Highest concentration of Xylene (µg/l) 83.9

NA Highest concentration of Methane (mg/l)

Surface Water

0 Number of surface water samples collected

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?

One background soil sample (SS9 @ 0-0.2') was collected and analyzed for pH, EC, and SAR. Concentrations of pH, EC, and SAR in the background sample were reported below their respective Table 910-1 concentration levels. The background soil sample location and analytical results are depicted on Figure 2. The analytical results are summarized on Table 1.

☐ 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.

Great Western will excavate any soils that exceed Table 910-1 concentration levels for offsite disposal at a licensed facility.

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.

Refer to the Proposed Soil Sampling section in the Site Investigation Plan tab of this Form 27.

Soil Remediation Summary

☐ In Situ

_____ Bioremediation (or enhanced bioremediation)

_____ Chemical oxidation

_____ Air sparge / Soil vapor extraction

_____ Natural Attenuation

_____ Other _____

☒ Ex Situ

Yes _____ Excavate and offsite disposal

If Yes: Estimated Volume (Cubic Yards) _____ 30

Name of Licensed Disposal Facility or COGCC Facility ID # _____

No _____ 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.

One groundwater monitoring well will be installed in the source area, down-gradient of the flowline release area. The proposed location of the monitoring well is depicted on Figure 6.

Following well development activities, Olsson will sample the monitoring well for BTEX and inorganic compounds including pH, TDS, alkalinity, major anions (bromide, chloride, fluoride, sulfate, and nitrate), and major cations (calcium, iron, magnesium, manganese, potassium, and sodium).

In addition, Olsson will collect grab groundwater samples from the four existing piezometers for analysis of the inorganic compounds described above. Based on the analytical results, a determination will be made regarding next steps for groundwater monitoring at the Site or a request for closure of groundwater monitoring requirements will be made.

REMEDATION PROGRESS UPDATE

PERIODIC REPORTING

Frequency: ☐ Quarterly ☐ Semi-Annually ☐ Annually ☒ Other Following soil excavation and groundwater sampling activities

Report Type: ☒ Groundwater Monitoring ☐ Land Treatment Progress Report ☐ O&M Report
☒ Other Remediation Progress Report

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:

None

Volume of E&P Waste (solid) in cubic yards 72

E&P waste (solid) description Hydrocarbon-impacted soil

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Waste Management - North Weld Landfill, Ault, CO

Volume of E&P Waste (liquid) in barrels 160

E&P waste (liquid) description Groundwater

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: Waste Management - Conservation Services Landfill, Bennett, CO

REMEDATION COMPLETION REPORT

REMEDATION 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. 10/26/2018

Actual Spill or Release date, if known. _____

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 10/26/2018

Date of commencement of Site Investigation. 11/15/2018

Date of completion of Site Investigation. _____

REMEDIAL ACTION DATES

Date of commencement of Remediation. 11/30/2018

Date of completion of Remediation. _____

SITE RECLAMATION DATES

Date of commencement of Reclamation. _____

Date of completion of Reclamation. _____

OPERATOR COMMENT

On 11/30/19, Great Western completed over excavation activities to the north and west of the flowline release to a depth of 8 feet bgs. Olsson collected confirmation soil re-samples from the excavation walls following over excavation activities. The samples were analyzed for BTEX, GRO, DRO, and RRO. Sample SS-10N @ 6.0' was collected from the same location as sample SS1N @ 5.5' and sample SS-11W @ 6.0' was collected from the same location as sample SS5W @ 5.0'. Concentrations of BTEX, GRO, DRO, and RRO were either not detected at or above laboratory reporting limits or were reported below their respective Table 910-1 concentration levels in both confirmation re-samples. Soil sample locations and analytical results are depicted on Figure 2. Analytical results are summarized on Table 1.

One grab groundwater sample was collected from the base of the excavation for BTEX analysis. Concentrations of BTEX were reported below their respective Table 910-1 concentration levels, serving as confirmation that impacted soils at the base of the excavation (SS4B @ 6.0') have been successfully removed. The analytical results are summarized on Table 2 and depicted on Figure 3.

Olsson collected grab groundwater samples from the four piezometers for analysis of BTEX and inorganic compounds. BTEX concentrations in the groundwater samples were not detected at or above laboratory reporting limits. The analytical results for inorganic compounds and BTEX are summarized on Table 2 and depicted on Figure 3.

On 4/3/19, Olsson collected additional grab groundwater samples from the four piezometers for analysis of chloride, sulfate, and TDS. The analytical results are summarized on Table 2 and depicted on Figure 4.

Three confirmation soil re-samples were collected from the flow path. Sample SS12 @ 3.0' was collected from the same location as sample SS6NW @ 2.5' and sample SS14 @ 1.5' was collected from the same location as sample SS7W @ 1.0'. Both samples were analyzed for GRO, DRO, RRO, and SAR. Concentrations of GRO, DRO, and RRO were not detected at or above laboratory reporting limits in both samples. Concentrations of SAR were reported below Table 910-1 concentration levels in sample SS12 @ 3.0' and above Table 910-1 concentration levels in sample SS14 @ 1.5'. Sample SS13 @ 2.5' was collected from the same location as sample SS8 @ 1.0' and analyzed for SAR only. Concentrations of SAR were reported below Table 910-1 concentration levels. The analytical results are summarized on Table 1 and depicted on Figure 2.

COPIES OF THE WASTE MANIFESTS AND A GROUNDWATER FLOW DIRECTION / POTENTIOMETRIC SURFACE CONTOUR MAP WILL BE INCLUDED WITH THE FORM 27 CLOSURE REQUEST. GREAT WESTERN PLANS TO CONDUCT EXCAVATION, CONFIRMATION SOIL SAMPLING, WELL INSTALLATION, AND GROUNDWATER SAMPLING ACTIVITIES SUMMARIZED ABOVE AND IN THE PROPOSED SOIL AND GROUNDWATER SAMPLING SECTIONS IN THE SITE INVESTIGATION PLAN TAB OF THIS FORM 27 IN LATE-MAY / EARLY-JUNE 2019.

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 Geologist

Submit Date: _____

Email: jdavidson@olsson.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: 12136

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.

<u>Att Doc Num</u>	<u>Name</u>
402025067	AERIAL IMAGE
402025077	SOIL SAMPLE LOCATION MAP
402025081	GROUND WATER SAMPLE LOCATION
402025083	GROUND WATER SAMPLE LOCATION
402025087	SOIL SAMPLE LOCATION MAP
402025093	ANALYTICAL RESULTS
402025096	ANALYTICAL RESULTS
402025098	ANALYTICAL RESULTS
402025102	ANALYTICAL RESULTS
402025105	ANALYTICAL RESULTS
402025107	ANALYTICAL RESULTS
402025108	ANALYTICAL RESULTS
402052720	LOGS
402053119	ANALYTICAL RESULTS
402053186	OTHER

Total Attach: 15 Files

General Comments

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
Environmental	<p>Return to DRAFT for Operator to address:</p> <ol style="list-style-type: none"> 1.No near source monitoring well has been installed. Address how the source area of the release will be monitored. 2. Provide lithologic logs and well construction for soil borings advanced and monitoring wells installed 3.Provide a calculated groundwater flow direction / potentiometric contours on a map. 4.Provide additional information in the Form 27 for the additional excavation between October 29 and November 30. It can be inferred from the table that additional excavation happened, but it is not explicit in the Form 27. 5.Br and F were not analyzed. Include these analytes along with the other major cations and anions in future sampling events. 	05/21/2019

Total: 1 comment(s)