

State of Colorado
Energy & Carbon Management Commission

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403707881
Receive Date:
03/05/2024

Report taken by:
Chris Sanchez

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: <u>STRACHAN EXPLORATION INC</u>	Operator No: <u>83130</u>	Phone Numbers Phone: <u>(303) 330-1921</u> Mobile: <u>()</u>
Address: <u>992 S 4TH AVE SUITE 100-461</u>		
City: <u>BRIGHTON</u>	State: <u>CO</u>	Zip: <u>80601</u>
Contact Person: <u>Jason Harms</u>	Email: <u>jason@strachanexploration.com</u>	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 31976 Initial Form 27 Document #: 403542430

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>WELL</u>	Facility ID: _____	API #: <u>099-06191</u>	County Name: <u>PROWERS</u>
Facility Name: <u>STATE 4-8</u>	Latitude: <u>38.151078</u>	Longitude: <u>-102.492836</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>SWNE</u>	Sec: <u>8</u>	Twp: <u>22S</u>	Range: <u>45W</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

Facility Type: <u>SPILL OR RELEASE</u>	Facility ID: <u>484923</u>	API #: _____	County Name: <u>PROWERS</u>
Facility Name: <u>1300' due East of the wellsite</u>	Latitude: <u>38.150798</u>	Longitude: <u>-102.488193</u>	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>SWNE</u>	Sec: <u>8</u>	Twp: <u>22S</u>	Range: <u>45w</u> Meridian: <u>6</u> Sensitive Area? <u>Yes</u>

SITE CONDITIONS

General soil type - USCS Classifications SP

Most Sensitive Adjacent Land Use Grassland

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

Closest Domestic Well – 1.87 miles southeast
Additional Domestic Wells – none
Nearest Surface Water – Big Sandy Creek ~100' E
Nearest Occupied Building – 1.43 miles southwest
Additional Occupied Buildings – 2.0 miles northeast
Within 100-Year Effective Floodplain Buffer
Inside Aquatic Native Species Conservation Waters Buffer
Mule Deer Severe Winter Range Buffer mapped 0.27 miles south
Inside Lesser Prairie Chicken Connectivity Area Buffer
Inside Lesser Prairie Chicken Estimated Occupied Range Buffer
No other potential receptors are located within ¼ mile of the Site
Above distances are approximations

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	Unknown	Grab Groundwater Sample
Yes	SOILS	Unknown	Soil Sampling

INITIAL ACTION SUMMARY

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

On 8/3/23, a leak was discovered along the flowline of the State 4-8 well, approximately 1,200' east of the facility and 100' east of Big Sandy Creek. The State 4-8 well was shut-in at the time of discovery. On 8/3/23, the line was daylighted and repaired with a standard pipeline clamp, which was centered on the less than ¼" hole. The hole was non-corrosive and located in the 6 o'clock position on the line. To prevent future releases, this section of flowline will be converted to polyline.

Waste characterization soil sample WC01@4 was collected adjacent to the flowline leak and was submitted for analysis of full Table 915-1 analytes. Additional soil samples (EX01@5, SS1@4 and SS2@5) were collected for vertical and lateral delineation of organic compounds and were submitted for BTEXN, TMBs and TPH. Two background samples (BG1@4, BG2@5) were collected and submitted for analysis of pH, EC, SAR, boron, arsenic, barium and selenium. One grab groundwater sample (GW01) was collected from groundwater encountered at 6 ft-bgs, below the flowline leak, and was submitted for analysis of BTEXN and TMBs.

Benzene, toluene, pH, arsenic, barium and selenium were reported above their respective Table 915-1 protection of groundwater soil screening level concentrations (GWSSLs) in waste characterization sample WC01@4. BTEX and TMB exceedances were reported in vertical delineation soil sample EX01@5 and lateral delineation soil sample SS2. Table 915-1 organics (excluding PAHs) were not detected in lateral delineation soil sample SS1.

Benzene was reported above Table 915-1 standard in grab groundwater sample GW01. All other Table 915-1 organics in groundwater were reported as compliant with their respective standards.

Analytical results are provided in Table 2, Table 3, Table 4 and Table 5, and are displayed on Figure 2. Analytical reports and a photographic log of sampling activities are also attached.

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):

Excavation is tentatively planned for impacted soils at the site. During the proposed excavation activities, soil samples will be collected every 20 lateral feet from the sidewalls of the excavation and submitted for analysis of analytes proposed in the Operator Comments section below. Soil samples will be collected and analyzed until the horizontal extents of excavation above groundwater are within respective Table 915-1 GWSSLs. Groundwater is expected to be encountered between 5 and 6 ft-bgs during proposed excavation activities. In lieu of collecting saturated soil samples from the floor of the excavation, the excavation will be backfilled, groundwater monitoring wells will be installed, and groundwater monitoring will continue on a quarterly basis.

Proposed Groundwater Sampling

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

Following the installation of groundwater monitoring wells at the site, groundwater samples will be submitted for laboratory analysis of Table 915-1 organic compounds in groundwater and groundwater inorganic parameters. Following the initial groundwater monitoring event, inorganics will be compared to the upgradient point of compliance well and if inorganics are determined to be representative of background levels, a reduced analyte request will be submitted for organic compounds in groundwater only.

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):

During each monitoring well installation, soils will be logged and field-screened using a photo-ionization detector (PID), and at least one grab soil sample will be collected from each boring for analysis of full Table 915-1 soil constituents, or a reduced analyte list if approved prior to sampling activities. Soil sample intervals for laboratory analysis will be determined based on either the highest PID reading within the vadose zone from each boring, or if no impacts are suspected, from the interval determined to be just above the groundwater interface. One confirmation soil sample will be collected at suspected compliance depth in the "source area" monitoring well to delineate the vertical extents of soil impacts.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil	NA / ND
Number of soil samples collected <u>19</u>	-- Highest concentration of TPH (mg/kg) <u>64</u>
Number of soil samples exceeding 915-1 <u>10</u>	-- Highest concentration of SAR <u>21.2</u>
Was the areal and vertical extent of soil contamination delineated? <u>No</u>	BTEX > 915-1 <u>Yes</u>
Approximate areal extent (square feet) <u>1200</u>	Vertical Extent > 915-1 (in feet) <u>5</u>
Groundwater	
Number of groundwater samples collected <u>2</u>	-- Highest concentration of Benzene (µg/l) <u>1200</u>
Was extent of groundwater contaminated delineated? <u>No</u>	-- Highest concentration of Toluene (µg/l) <u>110</u>
Depth to groundwater (below ground surface, in feet) <u>4</u>	-- Highest concentration of Ethylbenzene (µg/l) <u>120</u>
Number of groundwater monitoring wells installed <u>0</u>	-- Highest concentration of Xylene (µg/l) <u>200</u>
Number of groundwater samples exceeding 915-1 <u>1</u>	NA Highest concentration of Methane (mg/l) <u></u>
Surface Water	
<u>0</u> Number of surface water samples collected	
<u></u> 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?

Four background samples (BG1@4, BG2@5, BKG03@3.5, BKG04@3.5) were collected from four sample locations undisturbed by oil and gas activities near the State 4-8 flowline release. Background analytical results demonstrate that EC, SAR, pH, boron, arsenic, barium, cadmium, lead and selenium concentrations exist naturally at this location above Table 915-1 Protection of Groundwater Soil Screening Level (GWSSLs). The highest reported analytical results for background samples were used to establish a baseline background concentration of 10.70 mmhos/cm for EC, 18.0 for SAR, 8.40 for pH, and 2.13 mg/l for boron. Highest reported analytical results were multiplied by 1.25 to establish baseline concentration of 7.60 mg/kg for arsenic, 118.50 mg/kg for barium, 0.45 mg/kg for cadmium, 14.88 mg/kg for lead, and 0.99 mg/kg for selenium. Additional background sampling may be conducted to further investigate native conditions of Table 915-1 inorganics.

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?

Yes, additional soil samples will be collected during monitoring well installation as discussed in the Additional Investigative Actions section above.

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.

Excavation activities were conducted in the area of the former flowline release during the week of 11/27/2023. Suspected impacted soils were removed from above the groundwater interface and transported for disposal at Otero Landfill. Suspected impacted saturated soils from below groundwater was excavated and removed for disposal as much as safely practical. Transport and disposal records will be kept on file and will be available upon request. Excavation was conducted until suspected lateral compliance was achieved above groundwater. Confirmation soil samples were collected approximately every 20 feet along the perimeter of excavation and were submitted for analysis of full Table 915-1 soil constituents. Additional background sampling and/or excavation may be conducted to demonstrate if naturally occurring and/or remove any remaining inorganic (Soil Suitability for Reclamation Parameters and Metals in Soils) impacted soils identified in laboratory results. Final laboratory reports and analytical summary tables are attached. A map displaying the current excavation extents and confirmation soil and groundwater sample locations is attached as Figure 2.

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.

Strachan Exploration conducted excavation with conventional equipment to remove presumably impacted soils from above groundwater until the lateral extents were compliant with Table 915-1 organic concentrations. Suspected impacted saturated soils from below groundwater was excavated and removed for disposal as much as safely practical. At least five groundwater monitoring wells will be installed as proposed in Figure 3, and groundwater will be monitored for the natural attenuation of saturated soils and impacted groundwater until groundwater analytical results are compliant with ECMC Table 915-1 levels for four consecutive quarters, as discussed in the Groundwater Monitoring section below.

During excavation activities, approximately 500 pounds of Chemically Oxygenated Granulated Activated Carbon (COGAC) groundwater amendment was added to the groundwater interface, in the bottom of the excavation, to begin "trap and treat" biological remediation processes of any residual hydrocarbons remaining in soils below groundwater at the site.

Proposed soil boring sampling during monitoring well installation is discussed in Additional Investigation Activities section above. Groundwater well installation and monitoring is discussed in the Groundwater Monitoring section below.

Soil Remediation Summary

In Situ

Ex Situ

Yes Bioremediation (or enhanced bioremediation)

Yes Excavate and offsite disposal

Yes Chemical oxidation

If Yes: Estimated Volume (Cubic Yards) 1120

 Air sparge / Soil vapor extraction

Name of Licensed Disposal Facility or ECMC Facility ID #

Yes 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

Yes

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.

A minimum of 5 groundwater monitoring wells will be installed at the site: one well in the source area of the release, and four wells outside of the footprint of remedial excavation to define to upgradient, downgradient and cross-gradient extents of groundwater impacts. Proposed groundwater monitoring well locations are displayed on Figure 3. Additional wells may be needed to delineate the extents of groundwater impacts. During each monitoring well installation, soils will be logged and at least one soil sample per monitoring well will be collected and submitted for laboratory analysis as discussed in the Additional Investigative Actions section above.

Groundwater will be monitored for natural attenuation until groundwater analytical results are within Table 915-1 concentrations for four consecutive quarters. All groundwater samples shall be analyzed for Table 915-1 Organic Compounds in Groundwater and Groundwater Inorganic Parameters.

Per high priority habitat restrictions for Lesser Prairie Chicken and Colorado Parks and Wildlife's (CPW) Recommendations to Avoid and Minimize Impacts to Wildlife from Land Use Development in Colorado, monitoring well installation will occur in third quarter 2024, after July 15th.

REMEDATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

Quarterly Semi-Annually Annually Other

A Sup Form 27 will be submitted within 90 days of receipt of groundwater analytical results

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 _____

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.

Operator does not have site-specific financial assurance for this project; however, Operator has surface, plugging, and gas facility bonding including Surety IDs 20170089, 20170088, 20160134, 20160133 and 20150065, as well as commercial general liability and/or umbrella/excess insurance meeting the requirements of Rule 705.b.

- Excavation and sampling activities have been conducted.
- Monitoring well installation and sampling activities have not been conducted.

Costs included herein are estimates only and may change over time based on numerous factors. Accordingly, Operator makes no guarantees as to the accuracy of such cost estimates, thus providing an estimate for the next year below.

Operator anticipates the remaining cost for this project to be: \$ 10000 _____

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 _____

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: _____

REMEDATION COMPLETION REPORT

REMEDATION 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 reseeded program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing.

Following excavation activities, the location will be backfilled, compacted, and re-contoured to match pre-existing conditions. The location will be reclaimed in accordance with the COGCC 1000 series.

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. 08/03/2023

Actual Spill or Release date, or date of discovery. 08/03/2023

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 08/16/2023

Proposed site investigation commencement. 11/13/2023

Proposed completion of site investigation. _____

REMEDIAL ACTION DATES

Proposed start date of Remediation. 11/13/2023

Proposed date of completion of Remediation. _____

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

This Form is being submitted in response to Condition of Approval issued under Form 27 Document number 403644164 to "provide a detailed Remediation Plan outlining the Remediation and Removal of impacted soils. Additionally, the Operator shall provide a detailed timeline for the installation of the Groundwater Monitor Wells due within 45 days of approval of this Form 27."

Strachan Exploration conducted excavation with conventional equipment to remove presumably impacted soils from above groundwater until the lateral extents were compliant with Table 915-1 organic constituent limits, as discussed in the Source Removal and Remediation Summary sections above. At least five groundwater monitoring wells will be installed to monitor the natural attenuation of saturated soils and groundwater as discussed in the Groundwater Monitoring section above. Additional soil sampling will be completed during the installation of groundwater monitoring wells to delineate the vertical and horizontal extents of soil impacts. If impacts are observed during monitoring well installation or during quarterly groundwater sampling, step-out monitoring well(s) shall be installed to define the horizontal extent of impacts to soil and groundwater within 45 days— or an alternative timeline will be proposed.

Additional background sampling and/or excavation may be conducted to demonstrate as naturally occurring and/or remove any remaining inorganic (Soil Suitability for Reclamation Parameters and Metals in Soils) impacted soils identified in laboratory results.

Per high priority habitat restrictions for Lesser Prairie Chicken and Colorado Parks and Wildlife's (CPW) Recommendations to Avoid and Minimize Impacts to Wildlife from Land Use Development in Colorado, monitoring well installation will occur in third quarter 2024, after July 15th.

Please find attached a general location map in Figure 1, a map displaying the excavation extents and confirmation soil sample locations in Figure 2, and a map with proposed groundwater monitoring well locations shown in Figure 3. Sample location information is provided in Table 1 and the analytical results are summarized in Table 2, Table 3 and Table 4. Laboratory analytical reports and a photolog of excavation activities are also attached.

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

Signed: Ryan Finley

Title: Senior Project Geologist

Submit Date: 03/05/2024

Email: rfinley@entradainc.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: Chris Sanchez

Date: 04/15/2024

Remediation Project Number: 31976

COA Type

Description

	Operator shall continue quarterly groundwater monitoring for the duration of the remediation project. All groundwater samples shall be analyzed for Table 915-1 Organic Compounds in Groundwater and Groundwater Inorganic Parameters. Additionally, Operator shall provide all analytical reports, groundwater analytical summary tables and a potentiometric map depicting groundwater flow direction and gradient on each subsequent Quarterly Monitoring Report.
	Operator will continue quarterly reporting until the site investigation is complete and Full Table 915-1 standards are met within the remediation area
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

403707881	INVESTIGATION/REMEDATION WORKPLAN (SUPPLEMENTAL)
403707934	MAP
403707935	SOIL SAMPLE LOCATION MAP
403707936	MAP
403707940	PHOTO DOCUMENTATION
403707944	ANALYTICAL RESULTS
403707947	ANALYTICAL RESULTS

Total Attach: 8 Files

General Comments

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

Total: 0 comment(s)