

State of Colorado Oil and Gas Conservation Commission

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Document Number:

402512257

Receive Date:

10/16/2020

Report taken by:

ALEX FISCHER

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: <u>BERRY PETROLEUM COMPANY LLC</u>	Operator No: <u>10091</u>	Phone Numbers
Address: <u>5201 TRUXTUN AVENUE #100</u>		Phone: <u>(970) 285-5207</u>
City: <u>BAKERSFIELD</u>	State: <u>CA</u>	Zip: <u>90339</u>
Contact Person: <u>Don Wilbourn</u>	Email: <u>dwilbourn@bry.com</u>	Mobile: <u>(970) 210-6693</u>

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 15535 Initial Form 27 Document #: 402377242

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: <u>SPILL OR RELEASE</u>	Facility ID: <u>474500</u>	API #: _____	County Name: <u>GARFIELD</u>
Facility Name: <u>Long Ridge J15</u>		Latitude: <u>39.609861</u>	Longitude: <u>-108.038222</u>
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: <u>NW/SE</u>	Sec: <u>15</u>	Twp: <u>5S</u>	Range: <u>95W</u>
Meridian: <u>6</u>		Sensitive Area? <u>Yes</u>	

SITE CONDITIONS

General soil type - USCS Classifications ML Most Sensitive Adjacent Land Use grazing

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? No

Other Potential Receptors within 1/4 mile

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	SOILS	177 cu yds	Calculation of excavated soil

INITIAL ACTION SUMMARY

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

Excavated to dry soil and no smell or visable sighns of condensate. Excavated floor to bedrock.

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):

7 discrete samples were taken. Location of samples are on spill report. Analytical report attached.

Proposed Groundwater Sampling

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

Should groundwater be encountered within the proposed drilling depth a sample will be taken for analysis to determine compliance with Table 910-1 standards.

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):

Berry has successfully identified the the lateral extent of the contamination within the excavated area, however the vertical extent has not yet been identified. At COGCC's request Berry is planning to core/drill to determine vertical extent and any impacts to groundwater, if any. Berry's plans to utilize a waterwell drilling/coring rig to determine the vertical extent of the contamination. The rig will be mobilized to the southern end of the excavated area allowing for the borehole to initiate within the established lateral extent of the contamination plume. Berry will core the first 30 feet and drill the remaining depth to a total depth of 250' or contact with groundwater, whichever is shallower. Berry personnel and Dave Nicholson with Nicholson Geosolutions will be on site during drilling to visibly inspect cores and drill cuttings for signs of contamination. Additionally, representative samples will be sent to the lab for analysis. Should groundwater be encountered a water sample w

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 7

Number of soil samples exceeding 910-1 4

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

Approximate areal extent (square feet) 600

NA / ND

-- Highest concentration of TPH (mg/kg) 9372.1

-- Highest concentration of SAR 37.8

BTEX > 910-1 Yes

Vertical Extent > 910-1 (in feet) 8

Groundwater

Number of groundwater samples collected 0

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet)

Number of groundwater monitoring wells installed

Number of groundwater samples exceeding 910-1

-- Highest concentration of Benzene (µg/l) 7.63

-- Highest concentration of Toluene (µg/l) 119

-- Highest concentration of Ethylbenzene (µg/l) 14.5

-- Highest concentration of Xylene (µg/l) 188

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?

☐ 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?

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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.

Material was excavated and moved to adjoining location. Material was stockpiled on pit liner and will be spread out on location for landfarming operations. Following COGCC guidance Berry completed a single borehole directly south of the excavated area. The borehole was completed to a total depth of 60' completed with a 4" PVC liner grouted in place. The well has a roughly 13' fluid column composed entirely of produced water and condensate.

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.

Material will be spread on location and landfarmed until 910 standards are met. Plans to spread material and start landfarming will proceed as soon as approval is granted. An estimated 3 month time frame for soil to pass standards is expected. As an initial remediation step Berry intends to pump the well dry and monitor for any additional inflow this initial strategy serves to purposes, firstly the removal of produced fluids from the subsurface and, secondly, as a potential delineation of the vertical extent of the contamination. It is believed the fluid in the well originated around the 27' bgs mark and made its way down into the bottom of the wellbore prior to the placement of isolating materials around the liner. The removal of the fluid will be performed via a 1" pump which will deposit the fluids into a portable tank. The captured fluids will be taken to Berry's O29 E&P Waste Facility, processed through the gun barrel and placed into the impoundment. Samples of the fluid will be taken for chemical analysis.

Soil Remediation Summary

☒ In Situ

_____ Bioremediation (or enhanced bioremediation)

Yes _____ 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

No _____ Bioremediation (or enhanced bioremediation)

Yes _____ Chemical oxidation

Yes _____ Other _____ Landfarm

Groundwater Remediation Summary

☐ _____ Bioremediation (or enhanced bioremediation)

Yes _____ 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.

At this time Berry does not believe groundwater has been impacted by this spill. However the spill does appear to be contained within a perched area of Long Ridge where recharge waters could be impacted by any residual TPH located in the fractures below the pipeline leak. Berry is proposing to use a chemical oxidant to clean up the bottom of the excavation area and then wash the remaining chemical down into the fractures underneath the pipeline to clean up any residual contamination from the affected fracture network.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Frequency: ☐ Quarterly ☐ Semi-Annually ☐ Annually ☒ Other monthly

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.

Berry plans to landfarm the contaminated soil at the adjacent J15 wellpad. Once the landfarmed material meets the 910-1 standards Berry will return this material to the excavated locatoin to serve as fill. The returned material will then be covered with topsoil and graded to match the surrounding contours of the pipeline right-of-way. The graded top soil will then be covered with an approved seed mixture and reclaimed to its previous condition.

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? Yes _____

IMPLEMENTATION SCHEDULE

PRIOR DATES

Date of Surface Owner notification/consultation, if required. 03/30/2020

Actual Spill or Release date, if known. 03/30/2020

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 03/30/2020

Date of commencement of Site Investigation. 03/30/2020

Date of completion of Site Investigation. 04/01/2020

REMEDIAL ACTION DATES

Date of commencement of Remediation. 04/01/2020

Date of completion of Remediation.

SITE RECLAMATION DATES

Date of commencement of Reclamation.

Date of completion of Reclamation.

OPERATOR COMMENT

Berry is submitting this Form 27 with attached documents to both provide an update on the progress of the J15 spill cleanup as well as present our plan for additional bore locations to fully delineate the underground contamination and propose an in-situ remediation using a chemical oxidant.

Berry has pumped fluid from its extraction well from Aug 25 to Sep 4 until the pumped burned up. Due to the short life of the pump Berry sought out a pump better suited to the fluid mixture and the 60' of hydraulic head. Additionally, in order to pump greater volumes per day Berry also looked into solar and battery storage coupled with a pump timer. The setup was put in place on Oct 6 with the timer set to pump in 15 minute intervals 8 times a day. The new pump and setup have been quite successful as daily pumped volumes have increased from 5 gal/day to 50 gal/day. As of today the total pumped volume is 265 gal comprised of 22 gals condensate and 243 gal produced water. On Aug 31st Dave Nicholson, Berry's consultant was on site to pull samples of the pumped fluid and perform reconnaissance of downstream waterways. The analyticals are attached in the J15 supplemental groundwater investigation report. A summary of the field recon is also included in this report, which states that at the time of inspection there were no seeps downgradient of the spill and all creeks were dry.

As mentioned above, following a break to obtain required equipment Berry has been pumping continuously since 10/6 and has removed 265 gallons from the well and has seen the static fluid level drop a little less than two feet. To increase fluid removal beneath the spill Berry is proposing to drill a second extraction well in the excavated area to the south of the pipeline. This proposed borehole is shown on the boring plan in the J15Spill_Additional_GWInvestigation_Oct2020 file attached to this submission. Berry hopes the additional well almost directly beneath the spill will allow for faster fluid removal as we face the impending winter.

In addition to the above mentioned work Berry is proposing additional borin in order to fully delineate the vertical and horizontal extent of the spill outside of the spill area. Berry is proposing three offset boreholes to delineate the lateral extent of the subsurface contamination. These wells will be drilled to 60 feet unless there is evidence contamination could be deeper. Should these wells fail to delineate the contamination additional wells will be drilled. All of the proposed borings can be found in the attached report.

In addition to the boring work Berry is also proposing to treat the floor of the excavated area with sodium persulfate to bring it within Table 910-1 standards. Following the oxidation treatment of the floor the chemical will be flushed into the fractures below the excavation area with clean produced water to oxidize any residual petroleum constituents in the subsurface fractures. Following exidation treatment and passing analyticals the northern portion of the excavation will be backfilled to protect the pipeline through the winter.

Finally, Berry is proposing additional reconnaissance and surface water sampling in the spring. Groundwater that originates as recharge in our spill area likely daylights at this drainage or down the adjacent drainage to the east and discharges into Ben Good Creek or the East Fork of Parachute Creek. Nicholson Geosolutions will conduction additional hydrologic reconnaissance of both drainages to look for seeps or springs in Spring 2021 and will sample if flow is present. Additionally, Nicholson Geosolutions will perform surface water sampling when flow is present from three locations on Ben Good Creek and the East Fork. The drainage areas and sampling locations are included in the attached report.

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

Signed: Jon Armstrong

Title: EH&S Rep, Sr.

Submit Date: 10/16/2020

Email: jarmstrong@bry.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: ALEX FISCHER

Date: 10/20/2020

Remediation Project Number: 15535

<u>COA Type</u>	<u>Description</u>
	Provide an explanation for discrepancies of the 8260 analysis from the 7/21/2020 sampling event to the 8/31/2020 sampling event.
	On the chain of custody, please clarify what the constituents are that are listed after VOCs 8260 + ??IX, and MEETAC. It is assumed that MEETAC is for the methanol and ethanol analysis.
	Field reconnaissance of the two (2) prominent drainages to the north-northwest and north-northeast shall be performed in addition to those that discharge into Ben Good Creek and the East Fork of Parachute Creek. Any springs or seeps observed shall be analyzed for Table 910-1, as well as constituents listed under Rule 609, EPA method 8260, and 8270.
	Under the Remediation Progress Update Tab, the Report Type "Land Treatment Progress" is checked. The various attachments to this Supplemental F27 do not address any of the land farming activities. The operator shall provide a Supplemental F27 addressing the land farming activities to include the volume of material being landfarmed, frequency of tilling or disking, admendments added (if any), frequency of sampling for Table 910-1 constituents, and analytical results to determine the effectiveness and progress of the land farming activities.
	Under the Remediation Progress Update Tab, the COGCC has changed the reporting period frequency from quarterly to monthly. This will be re-evaluated upon full delineation of subsurface and groundwater impact.
	Provide construction details and surveyed elevation of MW-1 in a Supplemental F27.
	Groundwater samples from all monitoring well and surface water locations (springs, seeps, etc.) shall be analyzed for Table 910-1, as well as constituents listed under Rule 609, EPA method 8260, and 8270.
	Operator has implied remediation cleanup standards to Colorado Aquatic Life Standards. Remediation cleanup standards shall be those standards in Table 910-1.
	Operator shall provide documentation in determining background concentrations for the inorganic constituents.
	The operator shall provide a time line of proposed remediation efforts as soon as practicable. The delineation of this release shall be completed prior to the end of the calendar year. Notify the COGCC 72-hours prior to the field work.
	Shallow suspect zone from initial boring shall be isolated to determine influence in at least one of the proposed monitoring wells.
	Free product encountered in investigative borings shall be removed upon discovery.
	Additional investigative borings shall be drilled to determine the lateral and vertical extent. Per Rule 909.b.2, samples shall be collected and analyzed to determine the horizontal and vertical extent of any contamination in excess of the concentrations in Table 910-1.

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>
402512257	FORM 27-SUPPLEMENTAL-SUBMITTED
402512543	ANALYTICAL RESULTS
402512545	REMEDIAL ACTION PLAN

Total Attach: 3 Files

General Comments

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
Environmental	<p>It is stated, "Approximately 13 gallons are pumped from the well in a few minutes and then the well goes dry. This indicates that the water is contained only in fractures within the sandstone bedrock at the site and that only the sand pack around the well is saturated with water."</p> <p>Does this mean then that the MW is being recharged from the fractured sandstone bedrock?</p>	10/20/2020

Total: 1 comment(s)