

State of Colorado Oil and Gas Conservation Commission

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Report taken by:

Jim Hughes

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 visible signs 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?

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 will be collected by Dave Nicholson and sent to a certified lab for analysis.

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)

_____ 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)

No _____ Chemical oxidation

Yes _____ Other _____ Landfarm _____

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.

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.

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

On July 21st, 2020 Berry drilled and completed an observation well in response to a request by COGCC to verify the vertical extent of contamination from an underground pipeline leak originating directly south of the J15 wellpad. The agreement with the COGCC had stated that the bore needed to run until it encountered groundwater or a total depth of roughly 250', so when water was observed in the bore hole at approximately 60' the decision was made to stop work and install a well liner as it appeared groundwater had potentially been reached. Since it was believed groundwater had been reached boring activities were ended and Berry proceeded with the installation of a monitoring well. Prior to installation of the liner, including grouting the PVC pipe in place, a fluid column of approximately 13' had built-up in the bore hole and has maintained within the completed well. A water sample was taken from the water column and sent of for analysis (see attached report), and based on the results Berry believes that groundwater was not encountered and the fluid in the column was entirely composed of produced fluids. Initial reports from the site appear to implicate the region 26-30' bgs as the source of the water so the well was grouted in place to isolate this zone in hopes of identifying it as the source by pumping out the fluid column in the well, additionally well screen was set from approximately 40-60 feet bgs to allow for any additional inflow if the fluid is intact from this deeper zone. If the well does not refill following pumping off then the isolated zone at 26-30' is likely the vertical extent of the contamination.

As an initial remediation step Berry is proposing to pump out the fluids contained in the well via a 1" pump and transfer line into a portable tank. Samples will be taken of the fluid for chemical analysis and the captured fluid will be transported to Berry's O29 E&P Waste Facility for processing through the gun barrel and ultimately placement into the O29 impoundment. Additionally, site reconnaissance of the downstream regions of this area will be performed by Nicholson Geosolutions to identify if there is any fluid migration to surface either on the cliff face or to any of the dry creekbeds at the lower elevations. If necessary Berry will complete a few additional borings to definitively identify horizontal and lateral extent of fluid migration.

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 Representative, Sr.

Submit Date: 08/06/2020

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: Jim Hughes

Date: 08/10/2020

Remediation Project Number: 15535

COA Type**Description**

| | |
|--|---|
| | The operator shall provide information regarding pumping rate, static fluid level, volume purged, and well conditions upon completion of the investigative efforts detailed in this report on a supplemental Form 27. |
| | The operator shall notify COGCC Environmental Staff no later than 24 hours in advance of implementing the course of action detailed in this supplemental Site Investigation and Remediation Workplan. |
| | Upon approval of this Supplemental Form 27 Site Investigation and Remediation Workplan, the operator shall submit a Supplemental Form 19 requesting closure of Spill/Release Point ID #474500, with work proceeding under Remediation Project #15535. |
| | This Supplemental Site Investigation and Remediation Workplan (Form 27) is conditionally approved; however, additional information and/or activities may be required during the course of remediation. |

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**

| | |
|-----------|--------------------------------|
| 402461780 | FORM 27-SUPPLEMENTAL-SUBMITTED |
| 402461781 | ANALYTICAL RESULTS |

Total Attach: 2 Files

General Comments**User Group****Comment****Comment Date**

| | | |
|--|--|---------------------|
| | | Stamp Upon Approval |
|--|--|---------------------|

Total: 0 comment(s)