



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3332T
Plant ID No.: 025-00115
Applicant: BRC Operating Company, LLC (BRC)
Facility Name: MWV Rupert 3-1H
Location: Greenbrier County
SIC/NAICS Code: 9511/211111
Application Type: Temporary Construction
Received Date: July 21, 2016
Engineer Assigned: Joe Kessler
Fee Amount: \$2,000
Date Received: September 27, 2016
Complete Date: September 22, 2016
Due Date: November 6, 2016
Applicant Ad Date: August 27, 2016
Newspaper: *Mountain Messenger*
UTM's: Easting: 421.263 km Northing: 2,131.899 km Zone: 17
Latitude/Longitude: 38.15609/-80.54128
Description: Temporary permit for a natural-gas exploratory deep well in the Point Pleasant Formation (API Number 47-025-00044) controlled by flaring.

DESCRIPTION OF PROCESS/MODIFICATIONS

BRC Operating Company, LLC (BRC) has proposed the drilling of an exploratory vertical deep gas well (API Number 47-025-00044) at the MWV Rupert 3-1H well-pad located approximately 4.76 miles south of Richwood, Greenbrier County, West Virginia. Two formation zones will be individually tested at this well-site: identified as the Point Pleasant (TVD = 11,995' to 12,174') and the Rose Hill (TVD = 9,650' to 10,004') Formations. Well completions will be conducted through perforating of the vertical casing with hydraulic fracturing as separate operations for each formation zone, followed by flowback operations. As a first order of exploration, the Point Pleasant formation will be completed, followed by a two month test period. Then later be followed by completion of the Rose Hill formation with a two month test period. As flowback of the individual formations (after hydraulic fracturing) is completed along with production testing, the gas

will be vented to a horizontal 12,500 ft.³/min pressure-assisted flare (C-1) backed up by a vertical 4,861 ft.³/min pressure-assisted flare(C-2). Each flare will have a minimum hydrocarbon destruction efficiency of 98% by operating according to the provisions of §60.48. The duration of flaring will be extended during each of the individual test periods, for a minimum period of 60 days. The testing is necessary in order to determine the economic feasibility as to which of the two formations should be further developed as a horizontally drilled well.

Flaring is necessary during testing of the wells' resources because no natural gas pipelines are located nearby to receive the gas that is produced from the operation. If the natural gas resources are determined to be economically feasible, BRC will cease flaring, cap the wells, and install a natural gas pipeline to the well vicinity. If the wells are determined not to be economically feasible, then the well site will be closed. No further production at the site will occur unless the technology or economics of natural gas production from this area of the Marcellus shale zone changes.

Once hydraulically fractured, when the wells are in flowback, they will begin to produce natural gas (primarily methane). During this production phase, BRC will determine whether the natural gas supplies in the well vicinity are economically viable. BRC has proposed to control the release of natural gas, pursuant to 40 CFR 60, Subpart OOOOa, by flaring. Two flares will be utilized: a primary horizontal flare a vertical flare as a backup.

After fracturing the well in each formation, and during flowback, the well will produce both natural gas and water. The gas and the water will be sent to a three-phase separator. As stated above, the gas, when exiting the separator, is vented through a horizontal flare for combustion. A vertical flare will be constructed in parallel to the horizontal flare and will serves as an emergency backup flare. Both the horizontal flare and the vertical flare are designed to have a methane destruction efficiency of 98 percent by meeting the control device requirements given under 40 CFR §60.18 and, therefore, the emissions will be the same for the use of either flare. The horizontal flare is preferred as it minimizes the visible flame due to the lower combustion height of the flare.

The flowback water, which is separated from the natural gas in the three-phase separator, is sent to storage tanks before being hauled offsite for disposal. Fugitive particulate matter emissions from truck traffic at the site removing water from storage tanks will be controlled with a water truck. As the water has passed through the separator, the hydrocarbon content in the water is negligible and the water is not anticipated to be a significant source of emissions. Therefore, the storage tanks are not defined as emission units at the site. The wells are not expected to produce oils and heavy hydrocarbon liquids and, therefore, the three-phase separator does not produce oil that must be managed at this site.

SITE INSPECTION

On October 18, 2016, the author conducted an announced site inspection of the proposed location of the new exploratory well. The primary contact for the inspection was Mr. Charles Brighton, a security contractor hired by BRC. The proposed site is located on a hill in a very remote part of Greenbrier County approximately 4.75 miles south of Richwood, WV. Observations from the site inspection:

- At the time of the inspection, the well had been perforated and capped, but no hydraulic fracturing had yet occurred;
- The vertical flare was on site, but had not been erected in its final position and was not hooked up. The horizontal flare was not yet on-site;
- No occupied residences were observed near the proposed location. As was noted above, the location is very remote. The nearest occupied residences are estimated to be approximately 3.0 miles north near Richwood;
- Due to the remote location of the site, it is unlikely there will be significant noise or sight pollution associated with the flaring operation. It is the view of the writer, however, that it may be possible, under the right weather conditions, to see a glow from the flaring operations from the Richwood area. But is not likely this will be significant.

The following is a picture of the well-site on the day of the inspection:



Directions: [Latitude: 38.15609, Longitude: -80.54128] From Richwood, travel south on Little Laurel Creek Road (County Route 39/18) for approximately 5.2 miles to the well-site access road on the left. When on C/R 39/18, continue to veer right until reaching the access road.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

Flaring

As stated above, gas produced by the fractured well, after the water is removed in the separator, is sent to a flare for destruction. The emissions from this flaring are based on, where appropriate both emission factors obtained from appropriate sections of AP-42 (AP-42 is a database of emission factors maintained by USEPA) or on mass balance calculations using constituent gas properties obtained from a gas analysis performed on well site Plum Creek South Fork Pad 2 - another exploratory well drilled in the same gas field. A 98% destruction efficiency (based on a requirement to meet the control device requirements given under 45CFR§60.18) was applied to the uncontrolled emissions of organic compounds. Hourly emissions were based on the maximum expected aggregate production of both wells of 360,000 scf/hour. Annual emissions were based on flaring a maximum of 1,200 MMscf of gas per year (expected to occur over a period not to exceed six months). A (saturated) gas heat content of 976.07 Btu/scf was used in the calculations.

The potential-to-emit (PTE) of flaring the gas produced from S-1 and S-2 and the emission factor/emission factor source are given in the following table:

Table 1: Flaring PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	0.31 lb/MMBtu	AP-42, Table 13.5-1	108.93	181.55
NO _x	0.068 lb/MMBtu	AP-42, Table 13.5-1	23.89	39.82
PM _{2.5} /PM ₁₀ /PM	7.6 lb/10 ⁶ scf	AP-42, Table 1.4-2	2.28	4.56
SO ₂	0.5674 grains/100 scf	Plum Creek South Fork Pad 2	0.49	0.97
VOC	Mass Balance	Plum Creek South Fork Pad 2	0.06	0.10

(1)

Haulroads

Fugitive particulate matter emissions generated by truck traffic were calculated using emission factors generated by the unpaved haulroad equations given in AP-42 Section 13.2.2. (11/06). Variables within the emission factor equations, including the control efficiency of the water truck (70%), were based on guidance provided by DAQ or on reasonable values of anticipated inherent material properties. Hourly emissions were based on the worst-case estimate of 10 trucks per hour

and annual emissions were based on a maximum of 730 trucks per year. Based on the above, BRC calculated the following PTE associated with unpaved haulroads:

Table 2: Unpaved Haulroad PTE

Pollutant	Hourly (lb/hr)	Annual (ton/yr)
PM _{2.5}	3.05	4.57
PM ₁₀	5.82	4.67
PM	13.18	4.94

REGULATORY APPLICABILITY

The proposed BRC site is subject to substantive requirements in the following state and federal air quality rules and regulations: 45CSR6, 45CSR13, and 40 CFR 60 Subpart OOOOa. Each applicable rule (and those that have questionable non-applicability but are determined not to be applicable), and BRC’s compliance therewith, will be discussed in detail below.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

BRC has proposed flaring for combusting natural gas produced from the exploratory wells. The flares meet the definition of an “incinerator” under 45CSR6 and are, therefore, subject to the requirements therein. The substantive requirements applicable to the flare are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

$$\text{Emissions (lb/hr)} = F \times \text{Incinerator Capacity (tons/hr)}$$

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

<u>Incinerator Capacity</u>	<u>Factor F</u>
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

The proposed flare will be required to be of “smokeless” design and should emit only trace amounts of particulate matter.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the flare has a 20% limit on opacity during operation. Proper design of the “smokeless” flare should prevent any opacity from the flares.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The flare, as limited by the draft permit, has the potential-to-emit of several regulated pollutants in excess of the thresholds under §45-13-2.24(b) that define the source as a “stationary source.” However, all regulated pollutants have a potential-to-emit less than the applicability thresholds that would define the proposed facility as a “major stationary source” under 45CSR14. Therefore, the permit application was reviewed pursuant to the provisions of 45CSR13.

BRC applied for a temporary permit under the provisions of Section 11 of 45CSR13. Pursuant to §45-13-11.2(a), BRC placed a Class I legal advertisement in a “newspaper of general circulation in the area where the source is . . . located.” The ad ran on August 27, 2016 in the *Mountain Messenger*. The affidavit of publication for this legal advertisement was submitted on September 22, 2016.

Pursuant to §45-13-11.2, the “Secretary may issue temporary permits for periods up to six (6) months (which may be extended in writing for up to twelve (12) additional months at the Secretary’s discretion) upon the submission of a written application for such extension to the Secretary by the owner or operator.” The draft permit will have an initial effective period of six (6) months.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration - (NON APPLICABILITY)

The natural-gas exploratory well-site is not a source listed under §45-14-2.43.a and, therefore pursuant to 2.43.b., would meet the definition of a “major stationary source” if any regulated pollutant has a potential-to-emit in excess of 250 TPY. The facility, as limited by the draft permit, does not have a PTE (See Tables 1 and 2 above) of any regulated pollutant in excess of 250 TPY and is, therefore, not defined as a major stationary source and is not subject to the provisions of 45CSR14.

45CSR17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

45CSR17 requires facilities to “prevent and control particulate matter air pollution from materials handling, preparation, storage and other sources of fugitive particulate matter.” Specifically, §45-17-3.2b requires “[a]pplication of . . . water or suitable chemicals on unpaved roads. . . and other surfaces which can create airborne particulate matter.” BRC has proposed the use of a water truck on the unpaved (gravel) roads on the pad site to control fugitive dust emissions generated by primarily the truck traffic associated with transporting the used fracturing water.

45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The natural-gas exploratory well-

site is defined under Title V as a “major source” and by rule, therefore, the Title V (45CSR30) application will be due within twelve (12) months after the commencement date of any operation authorized by this permit. However, as this proposed permit expires on April 24, 2016, if no extension is granted, the facility will no longer exist 12 months after the commencement date of facility operation and no Title V application will be required.

40CFR60 Subpart OOOOa: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after September 18, 2015

EPA published 40 CFR 60, Subpart OOOO - its New Source Performance Standards (NSPS) for the oil and gas sector - on August 16, 2012. EPA published amendments to Subpart OOOO on September 23, 2013 and June 3, 2016. 40 CFR 60, Subpart OOOOa, published on June 3, 2016 (effective date August 2, 2016) establishes emission standards and compliance schedules for the control of greenhouse gases (GHG) and incorporates all affected sources regulated under Subpart OOOO that construct, reconstruct, or modify after September 18, 2015. The GHG standard in Subpart OOOOa is in the form of a limitation on emissions of methane from applicable affected facilities. The Subpart continues to establish emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO₂) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015.

Gas Wells - §60.5375a

The substantive requirements for gas wells are given under §60.5375(a) of the rule. It requires that flowback emissions (gas produced from the well after fracturing) that are technically infeasible to be routed into a gas flow line or collection system, re-injected into the well or another well, used as an onsite fuel source, or used for another useful purpose that a purchased fuel or raw material would serve, must be “captured and directed . . . to a completion combustion device” A flare does meet the definition of a “completion combustion device.” Therefore, BRC’s proposed use of a flare to combust the gas produced from the wells meets the substantive requirement of Subpart OOOOa. Other requirements pertaining to the gas well include:

- BRC must maintain a log for each well completion operation at each well affected facility. The log must be completed on a daily basis for the duration of the well completion operation and must contain the records specified in §60.5420a(c)(1)(iii).
[40CFR§60.5375a(b)]
- BRC must demonstrate initial compliance with the standards that apply to well affected facilities as required by §60.5410a(a).
[40CFR§60.5375a(c)]
- BRC must demonstrate continuous compliance with the standards that apply to well affected facilities as required by §60.5415a(a).
[40CFR§60.5375a(d)]

- BRC must perform the required notification, recordkeeping and reporting as required by §60.5420a(a)(2), (b)(1) and (2), and (c)(1).
[40CFR§60.5375a(e)]

Storage Tanks - §60.5395a

Pursuant to §60.5365a(e), “[e]ach storage vessel affected facility, which is a single storage vessel with the potential for VOC emissions equal to or greater than 6 tpy” is subject to Subpart OOOOa. BRC stated in the application that “The flowback water, which has been separated from the natural gas, is sent to storage tanks prior to hauling offsite for disposal. As water passed through the three-phase separator, the hydrocarbon content in the water is negligible and the water is not anticipated to be a significant source of emission. The well is not expected to produce oils and heavy hydrocarbon liquids; therefore the separator does not produce oil requiring management at the site.” Therefore, it is not expected that any storage tank at the MWV Rupert 3-1H Site will have VOC emissions in excess of 6 TPY and be subject to the control requirements.

Fugitive Emissions Components

Pursuant to §60.5365a(j), “[t]he collection of fugitive emissions components at a well site, as defined in §60.5430a, is an affected facility.” The Leak Detection and Repair (LDAR) requirements for a well site are given under §60.5497a.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from MWV Rupert 3-1H and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM₁₀ and PM_{2.5}), and Sulfur Dioxide (SO₂). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal and programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs for the modified sources were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. BRC did not identify any substantive amounts of non-criteria regulated pollutants that will be emitted from the well site MWV Rupert 3-1H.

AIR QUALITY IMPACT ANALYSIS

The estimated maximum emissions of the natural-gas exploratory wellsite are less than applicability thresholds that would define the proposed changes as a “major modification” under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature of the proposed construction, modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

The following substantive monitoring, compliance demonstration, and record-keeping requirements (MRR) shall be required:

- For the purposes of demonstrating compliance with maximum natural gas combustion limitations set forth in 4.1.3(b), BRC shall be required to monitor and record the daily, monthly, and rolling twelve month total of natural gas combusted (in scf) by the flares.
- BRC shall be required to maintain records of the date, time, and duration each time the permittee does not detect the presence of a flare pilot flame in either flare.
- BRC shall be required to maintain records of all visual emission observations pursuant to the testing required under 4.2.5. including any corrective action taken.
- BRC shall be required to maintain records of all startups, shutdowns, and/or malfunctions of each flare. These records shall include the date, time, and duration of each event.
- For the purposes of demonstrating compliance with visible emissions limitations set forth in 4.1.3(g), BRC shall be required to:
 - a. Conduct an initial Method 22 visual emission observation on both flares to determine the compliance with the visible emission provisions. BRC shall be required to take a minimum of two (2) hours of visual emissions observations on both flares.
 - b. Conduct daily Method 22 visible emission observations of both flare stacks to ensure proper operation for a minimum of ten (10) minutes each day the flares are in operation.
 - c. In the event visible emissions are observed in excess of the limitations given under 4.1.3(g), the permittee shall take immediate corrective action.
- BRC shall be required to meet all applicable Monitoring, Compliance Demonstration and Source-Specific Recordkeeping Requirements as given under 45CSR6 and 40 CFR 60, Subpart OOOOa.

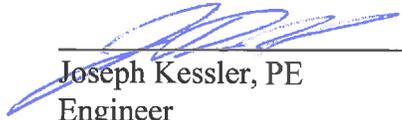
PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- Within sixty (60) days of production of natural gas in S-1, in accordance with the provisions of 3.3 of the draft permit, BRC shall be required to perform or have performed a gas analysis to determine the constituent properties of the gas. The gas analysis shall, at a minimum, include the same components as the analysis performed on the MWV Rupert 3-1H well that were used as a basis of the emissions included in the permit application. If the gas analysis shows gas properties that, on an emissions basis, are worse than those used in the permit application, BRC shall be required to limit the annual amount of natural gas combusted in the flare to less than an amount that would cause an violation of the annual emission limits as given under 4.1.3(a) as based on the same calculation methodology used in the permit application.
- Within sixty (60) days of production of natural gas in S-1, in accordance with the provisions of 3.3 of this permit, BRC shall be required to perform or have performed an analysis on the liquids removed from the gas stream to determine the percent-by weight of hydrocarbons. If more than trace amounts of hydrocarbons are present, BRC shall be required to, using any generally accepted model or calculation methodology, determine the emissions of VOCs from handling and storage of the liquids.
- BRC shall be required to meet all applicable Testing Requirements as given under 45CSR6 and 40 CFR 60, Subpart OOOOa.

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-3332T indicates that compliance with all applicable regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-3332T to BRC Operating Company, LLC for the temporary operation of an exploratory well located at the MWV Rupert 3-1H well-pad located near Richwood, Greenbrier County, WV.



Joseph Kessler, PE
Engineer

10/27/16

Date

Fact Sheet R13-3332T
BRC Operating Company, LLC
MWV Rupert 3-1H