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**west virginia department of environmental protection**

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## **ENGINEERING EVALUATION / FACT SHEET**

### **BACKGROUND INFORMATION**

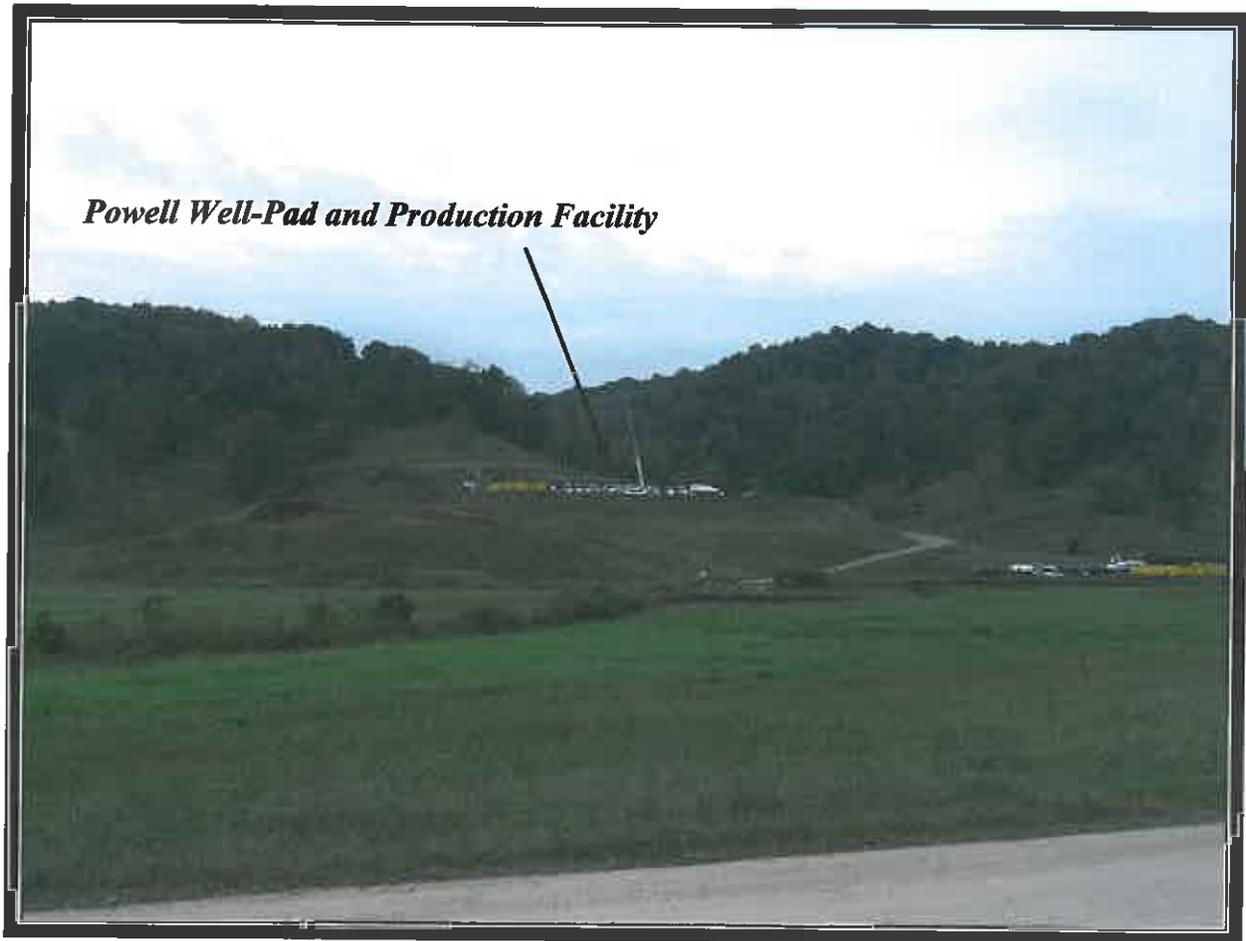
Application No.: G70-A045B  
Plant ID No.: 017-00061  
Applicant: Antero Resources Corporation  
Facility Name: Powell Natural Gas Production Facility  
Location: Near Smithburg, Doddridge County  
NAICS Code: 211111  
Application Type: Class II Administrative Update  
Received Date: February 20, 2015  
Engineer Assigned: Roy F. Kees, P.E.  
Fee Amount: \$300  
Date Received: February 27, 2015  
Complete Date: March 30, 2015  
Due Date: May 15, 2014  
Applicant Ad Date: March 3, 2015  
Newspaper: *The Herald Record*  
UTM's: Easting: 526.579 km Northing: 4,347.254 km Zone: 17  
Latitude/Longitude: 39.27422/-80.69185  
Description: Class II Administrative Update to remove flare and decrease condensate / produced water throughput.

### **DESCRIPTION OF PROCESS**

Antero Resources Corporation (Antero) has submitted a Class II Administrative Update to remove the existing vapor combustor (FL-001) used to control working breathing and flashing emissions for the eight condensate / produced water tanks. The Powell Facility is currently permitted for 6,932,993 gallons per year of condensate and produced water. This update proposes to lower the total to 538,080 gallons per year. Due to this lower condensate / produced water production, the vapor flow from the tanks will be insufficient for the vapor combustor.

## **SITE INSPECTION**

On September 18, 2013, Joe Kessler conducted an inspection of the existing Powell natural gas production facility. The facility is located just south of United States (US) Route 50 approximately 2.50 miles east-northeast of Smithburg, Doddridge County, WV. While the location is generally rural in nature, in the immediate area around the site, there is much natural gas activity and storage areas (including the MarkWest Liberty Midstream & Resources LLC Sherwood Gas Plant immediately to the east of the site). At the time of the inspection four existing wells were producing and three more wells were in the process of being hydraulically fractured. The following is a picture of the Powell site taken on the day of the inspection:



*Directions:* [Latitude: 39.27422, Longitude: -80.69185] From the intersection of United States (US) Route 50 and Smithton Road (County Route (CR) 50/30), travel south on Smithton Road for approximately 0.2 miles and turn left onto Swisher Lane. Follow Swisher Lane to the facility entrance.

## **AIR EMISSIONS AND CALCULATION METHODOLOGIES**

Antero included in Attachment I of the permit registration air emissions calculations for the equipment and processes at the Powell natural gas production facility. The following will summarize the calculation methodologies used by Antero to calculate the potential-to-emit (PTE) of the facility.

### ***Gas-Fired Heaters***

Criteria Pollutant emissions from the natural gas-fired heaters (H001 to H009) were based on the emission factors provided for natural gas combustion as given in AP-42 (AP-42 is a database of emission factors maintained by USEPA) Section 1.4.

Hourly emissions were based on the maximum design heat input (MDHI) of each unit and annual emissions were based on an annual operation of 8,760 hours. A heat content of the gas of 1,150 Btu/scf was used in the calculations.

### ***Storage Tanks***

Uncontrolled working, breathing, and flashing emissions from the eight (8) 16,800-gallon condensate tanks were calculated using ProMax. Input and summary sheets were included in the permit application. Input variables were based on a September 25, 2013 liquids sample from the Moore well-pad (3.1 miles to the north).

As all emissions from the storage tanks formerly routed to the enclosed flare for control are now routed to the atmosphere, there will be 0% control efficiency. An annual throughput of 538,080 gallons of condensate and produced-water was used in the calculations for each storage tank

### ***Truck Loading***

Air emissions from condensate truck loading operations occur as fugitive emissions generated by displacement of vapors when loading trucks. The emission factor used to generate the VOC emissions is based on Equation (1) of AP-42 Section 5.2-1. In this equation, Antero used variables specific to the liquids loaded (the vapor pressure of the condensate and the molecular weight of the vapors was based on values calculated by the TANKS program using gasoline as a surrogate) and to the method of loading - in this case "submerged filling - dedicated normal service." Additionally, worst-case annual emissions were based on a maximum loading rate of 538,083 gal/year of condensate / produced water. As no maximum hourly pumping rate was provided, hourly emissions were based on 1,000 hours of loading per year.

### ***Fugitives***

Antero based their fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates." Emission factors were taken from Table 2-4 and no control efficiency, as based on a Leak Detection and

Repair (LDAR) protocol, was applied. Emissions of Greenhouse Gases (GHGs) were based on Subpart W of 40 CFR 98 - Federal GHG Reporting Rule. Input variables were based on a September 25, 2013 liquids sample from the Moore well-pad.

### ***Emissions Summary***

Based on the above estimation methodology, which is determined to be appropriate, the PTE of the Powell natural gas production facility is given in the following tables:

**Table 1: Facility-Wide Aggregate Hourly (lb/hr) Criteria Pollutant PTE Summary.**

Source	CO	NO <sub>x</sub>	PM <sup>(1)</sup>	SO <sub>2</sub>	VOCs	HAPs
Heaters <sup>(2)</sup>	0.47	0.56	0.04	<0.01	0.03	0.01
Tanks <sup>(3)</sup>	0.00	0.00	0.00	0.00	0.79	0.03
Equipment Leaks	0.00	0.00	0.00	0.00	3.51	0.28
Truck Loading <sup>(4)</sup>	0.00	0.00	0.00	0.00	0.56	~0.00
<b>Facility-Wide Totals →</b>	<b>0.47</b>	<b>0.56</b>	<b>0.04</b>	<b>0.01</b>	<b>4.89</b>	<b>0.32</b>

- (1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
- (2) Aggregate emission rate of all such units.
- (3) Includes pass-through emissions generated by storage tanks.
- (4) As a maximum hourly pump rate was not provided, hourly emissions based on 1,000 hours/year.

**Table 2: Facility-Wide Aggregate Annual (ton/yr) Criteria Pollutant/GHG PTE Summary.**

Source	CO	NO <sub>x</sub>	PM <sup>(1)</sup>	SO <sub>2</sub>	VOCs	HAPs	CO <sub>2</sub> e <sup>(2)</sup>
Heaters <sup>(3)</sup>	2.07	2.46	0.19	0.01	0.14	0.05	2,967.83
Tanks <sup>(4)</sup>	0.00	0.00	0.00	0.00	3.47	0.13	23.29
Equipment Leaks	0.00	0.00	0.00	0.00	15.36	1.21	344.89
Truck Loading	0.00	0.00	0.00	0.00	0.01	~0.00	0.00
<b>Facility-Wide Totals →</b>	<b>2.07</b>	<b>2.46</b>	<b>0.19</b>	<b>0.01</b>	<b>18.98</b>	<b>1.39</b>	<b>3,336.01</b>

- (1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
- (2) Based on multiplying the mass amount of emissions for each of the six greenhouse gases by the gas's associated global warming potential published at Table A-1 to Subpart A of 40 CFR Part 98 - Global Warming Potentials. Used to determine major source status of facilities under 45CSR14.
- (3) Aggregate emission rate of all such units.
- (4) Includes both pass-through emissions generated by storage tanks.

## **REGULATORY APPLICABILITY**

The proposed Antero natural gas production facility is subject to substantive requirements in the following state and federal air quality rules and regulations: 45CSR6, 45CSR13, and 40 CFR 60 Subpart OOOO. Each applicable rule (and ones that have reasoned non-applicability), and Antero's compliance therewith, will be discussed in detail below.

### ***45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers - (NON APPLICABILITY)***

The heaters each have been determined to not meet the definition of a "fuel burning unit" under 45CSR2 - they do not use indirect heat transfer - and are not, therefore, subject to the applicable requirements therein.

### ***45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides - (NON APPLICABILITY)***

45CSR10 has requirements limiting SO<sub>2</sub> emissions from "fuel burning units," limiting in-stack SO<sub>2</sub> concentrations of "manufacturing processes," and limiting H<sub>2</sub>S concentrations in process gas streams. The only potential applicability of 45CSR10 to the Powell natural gas production facility is the limitations on fuel burning units. The heaters each have been determined to not meet the definition of a "fuel burning unit" under 45CSR10 - they do not use indirect heat transfer - and are not, therefore, subject to the applicable requirements therein.

### ***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 update of the Powell natural gas production facility does not have an uncontrolled potential to emit of any regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY and, therefore, pursuant to §45-13-2.24, the facility is not defined as a "stationary source" under 45CSR13 using that definition. Since the changes will be below Modification thresholds, these changes can be made using a Class II Administrative Update. Therefore, Antero is required to obtain a permit or register with an appropriate general permit under 45CSR13 for the update and operation of the natural gas production facility.

As required under §45-13-8.3 ("Notice Level A"), Antero placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on March 3, 2015 in *The Herald Record* and the affidavit of publication for this legal advertisement was submitted on March 16, 2015.

### ***45CSR14 (NON APPLICABILITY)***

The facility-wide potential-to-emit of the Powell natural gas production facility (see Table 2 above) is below the levels that would define the source as "major" under 45CSR14, Section 2.43 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

## Potential Source Aggregation

Classifying multiple facilities as one “stationary source” under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of “Building, structure, facility, or installation” as given in §45-14-2.13 and §45-19-2.12. The definition states:

“Building, Structure, Facility, or Installation” means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same “Major Group” (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

The Powell natural gas production facility will be located approximately 1.2 miles from the known nearest other Antero facility (Pearl Jean Pad). Pennington shares the same major industrial grouping (by SIC code) as Powell and is owned by Antero. Therefore, the potential classification of the Powell facility as one stationary source with Pennington depends on the determination if these stations are considered “contiguous or adjacent properties.”

"Contiguous or Adjacent" determinations are made on a case by case basis. These determinations are proximity-based, and it is important to focus on this and whether or not it meets the common sense notion of one stationary source. The terms "contiguous" or "adjacent" are not defined by USEPA. Contiguous has a dictionary definition of being in actual contact; *touching along a boundary or at a point*. Adjacent has a dictionary definition of not distant; nearby; *having a common endpoint or border*.

The Powell natural gas production facility is not located contiguous with, or *directly* adjacent to the Pennington facility. As noted above, the facilities are 1.2 miles apart. Facilities separated by this distance do not meet the common sense notion of a single plant. Therefore, the Powell and Pennington facilities are not considered to be on contiguous or adjacent property.

### ***45CSR30: Requirements for Operating Permits - (NON APPLICABILITY)***

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 proposed facility does not meet the definition of a "major source under § 112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. However, as the facility is subject to a New Source Performance Standard (NSPS) - 40 CFR 60, Subpart OOOO - the facility would, in most cases, be subject to Title V as a “deferred source.” However, pursuant to §60.5370(c), as a non-major source (see Table 3), Antero is not required to obtain a Title V permit for the proposed facility. Therefore, the Powell natural gas production facility is not subject to 45CSR30.

### ***Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 - (NON APPLICABILITY)***

Pursuant to §60.110b, 40 CFR 60, Subpart Kb applies to “each storage vessel with a capacity greater than or equal to 75 cubic meters (m<sup>3</sup>) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.” The storage tanks located at the Powell facility are each 16,800 gallons, or 64 m<sup>3</sup>. Therefore, Subpart Kb does

not apply to the storage tanks.

***40 CFR 60, Subpart OOOO: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution***

On April 27, 2012, the USEPA issued a final rule (with amendments finalized on August 16, 2012) that consists of federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that currently were previously not regulated at the federal level. Each potentially applicable section of Subpart OOOO is discussed below.

**Gas Wells - §60.5370**

Antero has drilled gas wells at the Powell well-pad and, therefore, these are defined as “affected facilities” under Subpart OOOO and subject to applicable provisions. The substantive requirements for gas wells drilled prior to January 1, 2015 are given under §60.5375(a)(3) of the rule. It requires that flowback emissions (gas produced from the well after fracturing) must be directed to the flow line or a completion combustion device. Other requirements pertaining to the gas wells include:

- Antero must maintain a log for each well completion operation at each gas 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 §60.5420(c)(1)(iii).  
*[40CFR§60.5375(b)]*
- Antero must demonstrate initial compliance with the standards that apply to gas well affected facilities as required by §60.5410.  
*[40CFR§60.5375(c)]*
- Antero must demonstrate continuous compliance with the standards that apply to gas well affected facilities as required by §60.5415.  
*[40CFR§60.5375(d)]*
- Antero must perform the required notification, recordkeeping and reporting as required by §60.5420.  
*[40CFR§60.5375(e)]*

**Storage Tanks - §60.5395 (NON APPLICABILITY)**

Pursuant to §60.5365(e), for “[e]ach storage vessel affected facility, which is a single storage vessel, located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment” that is constructed after August 23, 2011 and, pursuant to §60.5395 has “VOC emissions equal to or greater than 6 tpy” must meet the control requirements under §60.5395 by “October 15, 2013 for Group 1 storage vessels and by April 15, 2014, or 30 days after startup (whichever is later) for Group 2 storage vessels.” The substantive

requirement is to “reduce VOC emissions by 95.0 percent or greater.” Based on a letter from USEPA to the American Petroleum Institute dated September 28, 2012, applicability of storage vessels to Subpart OOOO is based on individual tank PTE - which includes federally enforceable control devices.

The eight (8) condensate / produced-water storage tanks are each calculated to have a PTE of less than 6 TPY of VOCs and, therefore, are not subject to Subpart OOOO.

Pneumatic Controllers

Pursuant to §60.5365(d)(2), “[f]or the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh” that is constructed after August 23, 2011 is subject to the applicable provisions of Subpart OOOO. The substantive requirements for pneumatic controllers are given under §60.5390. While not identified, it is assumed the facility will use pneumatic controllers and will be required to meet this requirement.

**TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS**

This section provides an analysis for those regulated pollutants that may be emitted from the Powell natural gas production facility and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO<sub>x</sub>), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM<sub>10</sub>), Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>). 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 programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs 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. Antero included the following HAPs as emitted in substantive amounts in their emissions estimate: n-Hexane, Benzene, Toluene, Ethylbenzene, and Xylenes. The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**Table 4: Potential HAPs - Carcinogenic Risk**

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data

<b>Benzene</b>	VOC	Yes	Category A - Known Human Carcinogen
<b>Toluene</b>	VOC	No	Inadequate Data
<b>Ethylbenzene</b>	VOC	No	Category D - Not Classifiable
<b>Xylenes</b>	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

### **AIR QUALITY IMPACT ANALYSIS**

The estimated maximum emissions from the proposed Powell natural gas production facility are less than applicability thresholds that would define the proposed facility as a “major stationary source” 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) are required under the G70-A General Permit:

- For each gas well affected facility, compliance must be demonstrated by submitting reports of this permit and maintaining the records for each completion operation. Reporting requirements are defined in Section 5.4.1 of the general permit;
- Monitor on a monthly and yearly basis the aggregate throughput for the storage tanks;
- Monitor on a monthly and yearly basis the actual emissions from the storage tanks;
- Monitor on a monthly and yearly basis the emissions from each storage tank is below 6 tpy;
- Monitor on a monthly and yearly basis the amount of natural gas consumed in the heaters and the hours of operation;
- At the request of the Director, conduct Method 9 emission observations for the purpose of

demonstrating compliance with 45CSR§2-3.1;

- Monitor the throughput on a monthly and yearly basis of the truck loading facility;

**RECOMMENDATION TO DIRECTOR**

The information provided in permit application G70-A045B indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of General Permit Registration G70-A045B to Antero Production Company for the update and operation of the Powell natural gas production facility located near Smithburg, Doddridge County, WV.

  
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Roy F. Kees, P.E.  
Engineer - NSR Permitting

4/20/15  
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Date