



**west virginia** department of environmental protection

Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304  
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: G70-A007A  
Plant ID No.: 095-00032  
Applicant: Antero Resources Corporation  
Facility Name: Graff Wellpad  
Location: near Alma, Tyler County  
NAICS Code: 211111  
Application Type: G70-A Modification  
Received Date: December 15, 2014  
Engineer Assigned: Laura Jennings  
Fee Amount: \$1,500.00  
Date Received: December 19, 2014  
Complete Date: January 15, 2014  
Due Date: March 1, 2014  
Applicant Ad Date: December 24, 2014  
Newspaper: *Tyler Star News* (Tyler County Publication)  
UTM's: Easting: 512.97987 km Northing: 4,364.64029 km Zone: 17  
Lat/Long: Latitude: 39.431200 Longitude: -80.849194  
Description: Modification of a natural gas production facility to increase condensate production, add two wells, two GPU heaters, four condensate storage tanks, and add a Kubota compressor engine.

**DESCRIPTION OF PROCESS**

The following process description was taken from Modification Application G70-A007A:

A mixture of condensate and entrained gas from the wells enters the facility through a low pressure separator where the gas phase is separated from the liquid phase. Gas Processing Units (GPU) heaters (H001-H003) are used in conjunction with the separator to help separate the gas from the liquid phases. These heaters are fueled by a slip stream of the separated gas. The compressed gas is then metered and sent to the sales gas pipeline. The separated condensate and water from the separators flow to their respective storage tanks (TANKCOND001-006 and TANKPW001-002).

**Promoting a healthy environment.**

The facility has six (6) tanks (TANKCOND001-006) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. Flashing, working, and breathing losses from the tanks are sent to the flare (FL001) to control the emissions. The flare is designed to achieve a VOC destruction efficiency of 98 percent.

Condensate and produced water are transported off site on an as needed basis via tanker truck. Truck loading connections are in place to pump condensate (L001) and produced water (L002) from the storage tanks into tanker trucks. Emissions from the loading operations are vented to the atmosphere.

Emissions from the facility’s emission source were calculated using the extended analysis of the condensate from Sweeney No. 2H, one of the wells on the Forest Pad. This extended analysis is considered representative of the materials from Graff, being the same Marcellus rock formation and both are considered wet gas areas. The Sweeney No. 2H condensate sample was selected because the natural gas BTU value (1250) is expected to be similar in heating value to the proposed wells on the Graff well pad. Additionally, the gas analysis from Jonathan Davis was used for the modeling calculations and fugitive calculations and is considered representative of the Graff well pad due to anticipated similarities in natural gas flow, composition, and BTU value.

The two new wells that are being added to this modification application are not scheduled to be drilled until 2017.

The new emission units are shown in the following table.

**Emission Units Table:**

<b>Emission Unit ID</b>	<b>Emission Point ID</b>	<b>Emission Unit Description</b>	<b>Year Installed/ Modified</b>	<b>Design Capacity</b>	<b>Control Device</b>
H002, H003	EP-H002, EP-H003	Gas Production Unit Heater	New	1.5 MMBtu/hr (each)	None
TANKCOND003-TANKCOND006	FL001	Condensate Tanks	New	400 bbl (each)	FL001
ENG001	EP-ENG001	Kubota DG972-E2 Engine (Family: DKBXS.9622HP)	New	24 HP	None

SITE INSPECTION

This is a modification to an existing general permit registration. Site inspections are not required for modifications to existing facilities. As such, a site inspection was not conducted.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The emissions associated with this modification include the emissions increase as a result of the increased throughput of condensate and produced water, the addition of four (4) condensate storage tanks for a total of six (6) condensate storage tanks, the addition of two (2) GPU heaters

for a total of three (3), and the addition of a compressor engine. There was also an increase in the component count and pneumatic control valves resulting in a corresponding increase in fugitive emissions.

The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology
H001, H002, H003	GPU Heaters	AP-42, Chapter 1, Section 1.4
F001	Fugitives	EPA's Protocol for Equipment Leak Emission Estimates November 1995, EPA 4532, R-95-017, Table 2-4
PCV	Pneumatic Control Valves	Based on Gas Analysis and PCV bleed rate provided in the application
TANKCOND001-006	Condensate Tanks	ProMax 3.2 Simulation Program
TANKPW001-002	Produced Water Tanks	ProMax 3.2 Simulation Program
FL001	Vapor Combustor	AP-42, Chapter 1, Section 1.4, 98% Control Efficiency, ProMax 3.2 Simulation Program
L001	Condensate Loading	AP-42, Chapter 5, Section 5.2-4
L002	Produced Water Loading	AP-42, Chapter 5, Section 5.2-4
ENG001	Kubota DG972-E2 Compressor Engine	CO - EPA certification data; NO <sub>x</sub> - 40CFR 1054 standard on EPA's Certificate of Conformity; Others - AP-42, Section 3.2

The following table indicates the control device efficiencies that are required for this facility:

Emission Unit	Pollutant	Control Device	Control Efficiency*
Condensate & Produced Water Tanks TANKCOND001-002 TANKPW001-002	Volatile Organic Compounds	Vapor Combustor (FL001)	98 %
	Total HAPs		98 %

\*Control efficiency based on manufacturer's guarantee.

The total facility potential to emit (PTE) for the Graff Pad including fugitive emissions is shown in the following table:

Pollutant	Current Facility Wide PTE (tons/year)	Proposed Facility Wide PTE (tons/year)	PTE Increase
Nitrogen Oxides	0.83	4.73	3.84
Carbon Monoxide	0.74	27.53	26.79
Volatile Organic Compounds	6.65	28.86	22.20
Particulate Matter-10/2.5	0.09	0.26	0.17
Sulfur Dioxide	0.003	0.01	0.01
Total HAPs	0.53	1.46	0.94
Carbon Dioxide Equivalent	1,683	7,397	5,714

Maximum detailed controlled point source emissions were calculated by Antero and checked for accuracy by the writer and are summarized in the table on the next page.

**Antero Resources Corporation – Graff Facility (G70-A007A)**

Emission Unit ID#	Source	NOx		CO		VOC		PM-10/2.5		SOx		Total HAPs		CO2e	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
F001	VOC Fugitives	-	-	-	-	1.09	4.78	-	-	-	-	0.08	0.33	25.10	110
PCV	Pneumatic Control Valves	-	-	-	-	0.03	0.13	-	-	-	-	<0.01	0.01	2.74	12.00
L001, L002	Loading Emissions	-	-	-	-	6.30	1.44	-	-	-	-	0.03	0.01	7.66	4.24
H001 – H003	Heater Treaters	0.37	1.61	0.31	1.36	0.02	0.09	0.03	0.12	<0.01	0.01	0.01	0.03	444.56	1,947
FL001	Vapor Combustor	0.40	1.73	0.33	1.45	5.11	22.39	0.03	0.13	<0.01	<0.01	0.24	1.06	1,188	5,205
ENG001	Combustion Engine	0.32	1.38	5.64	24.72	0.01	0.03	<0.01	0.01	<0.01	<0.01	0.01	0.02	27.22	119.2
Proposed Facility Wide PTE		1.08	4.73	6.29	27.53	6.26	28.86	0.06	0.26	<0.01	0.01	0.33	1.46	1,695	7,739.7
Current Facility Wide PTE		0.2019	0.883	0.1693	0.742	8.589	6.6524	0.01949	0.087	0.001008	0.003033	0.6175	0.525	390.6533	1,683.156
PTE Increase		-	3.84	-	26.79	-	22.20	-	0.17	-	0.01	-	0.94	-	5,714

## REGULATORY APPLICABILITY

The following rules apply to the modification of the facility:

### *State Regulations*

#### **45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)**

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.

45CSR2 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of the proposed two new fuel burning units (H002, H003) are both below 10 MMBTU/hr (1.5 MMBtu/hr). Therefore, these units are exempt from the aforementioned sections of 45CSR2. However, Antero would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

#### **45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)**

45CSR10 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of the two new proposed fuel burning units (H002, H003) are both below 10 MMBTU/hr (1.5 MMBtu/hr). Therefore, these units are exempt from the aforementioned sections of 45CSR10.

#### **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)**

Antero meets the definition of a modification under § 2.17 because the increase in emissions of CO and VOC exceed 6 lb/hr and 10 tpy.

Antero has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee. The Class I legal advertisement ran in the Tyler County newspaper, *Tyler Star News*, on January 2, 2015.

**45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)**

45CSR16 applies to this source because the new compressor engine [ENG01] is subject to 40CFR60 Subpart JJJJ and the two new proposed wells are subject to Subpart OOOO.

**45CSR34 (Emission Standards for Hazardous Air Pollutants)**

Antero Resources is subject to 45CSR34 because they are subject to the area source requirements of 40 CFR 63, Subpart ZZZZ described in more detail in the Federal Regulations section.

*Federal Regulations*

**40CFR60, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)**

The Kubota DG792-E2 engine (ENG001) has a rating of 24 HP @ 3600 rpm and a manufacture date of 2013. The engine is subject to 40CFR60, Subpart JJJJ because it is a stationary spark ignition internal combustion engine less than or equal to 25 hp that was constructed after June 12, 2006 and manufactured on or after July 1, 2008.

Antero Resources has demonstrated compliance with the emission standards by purchasing a certified engine. The certificate number provided in the application is DKBXS.9622HP-002 and covers engine family DKBXS.9622HP. Antero Resources is required to operate and maintain the certified SI internal combustion engine according to the manufacturer's emission-related written instructions to operate in a certified manner and maintain records of conducted maintenance to demonstrate compliance. There are no performance testing requirements for certified engines being operated and maintained in a certified manner.

**40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)**

EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO<sub>2</sub>) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

- a. Each gas well affected facility, which is a single natural gas well.

*The two new gas wells that will exist at the Graff will be drilled principally for the production of natural gas and will be done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart. The compliance date for these hydraulically fractured wells is October 15, 2012. Antero is required under §60.5410 to submit an initial notification, initial annual*

*report, maintain a log of records for each well completion, and maintain records of location and method of compliance. §60.5420 requires Antero to demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.*

b. Pneumatic Controllers

- 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 which commenced construction after August 23, 2011, and is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not located at a natural gas processing plant.
- Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller which commenced construction after August 23, 2011, and is located at a natural gas processing plant.

*There are additional PCVs at Graff facility associated with this modification. The registrant has stated that the bleed rate for the PCVs is 6.6 scf/day for (12) twelve PCVs. The bleed rate is not greater than 6 scfh and therefore, there are no applicable requirements regarding pneumatic controllers under 40 CFR 60 Subpart OOOO that would apply.*

c. Each 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.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

- Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.
- Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
- Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup. The compliance date for applicable storage vessels is October 15, 2013.

*The four (4) new condensate storage vessels located at the Graff facility are considered Group 2 storage vessels (constructed after April 2013). The storage vessels at the site will be controlled by flare that reduces the emissions by 98%. Antero will be subject to Section 14 of General Permit G70-A for control devices not subject to 40CFR60 Subpart OOOO. Total VOC emissions from the six (6) condensate tanks are 22.09 tpy and the emissions from the two (2) produced water tanks are 0.30 tpy. Therefore, the emission rate from each of the tanks is below the 6 tpy limit.*

**40CFR63, Subpart ZZZZ** (National Emission Standards for Hazardous Air Pollutants for Source Categories from Stationary Reciprocating Internal Combustion Engines – Area Source)

Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

A stationary RICE located at an area source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.

The compressor engine (ENG001) at the Graff Well Pad is considered a new engine located at an area source of HAP emissions and is therefore subject to this subpart. Compliance with Subpart ZZZZ is demonstrated with compliance to 40 CFR 60, Subpart JJJJ previously discussed. The registrant has applied to Section 15 of the G70-A General Permit.

*The following rules do not apply to the modification of the facility:*

**45CSR30** (Title V Operating Permits)

The Graff facility continues to be a minor source because they do not meet the major source definition as defined in § 2.26.

**TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS**

There are no new hazardous air pollutants associated with this modification.

## AIR QUALITY IMPACT ANALYSIS

Modeling was not required of this source because the modification does not meet the definition of a major modification according to the definitions provided in 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants).

## SOURCE AGGREGATION

“Building, structure, facility, or installation” is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

The emissions calculations of potential to emit for the Graff well pad included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emissions source will be the Dale Pad, approximately 0.7 miles west of the facility (DAQ facility ID 095-00053). Antero has applied for G70-A registration for the Dale Pad; however, at the time of this evaluation G70-A126 has not yet been issued.

1. The Graff facility will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells operated by Antero that share the same two-digit major SIC code of 13 for oil and gas exploration and production. The Graff facility will share the same SIC code as the Dale Wellpad.
2. “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 a plant. 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 Graff facility is located approximately 0.7 miles from the Dale Wellpad facility. The application states that the Dale and Graff well pads are not considered to be on contiguous or adjacent properties.

3. Both of the facilities are owned and operated by Antero.

DAQ Conclusion: The Graff facility does share common control and the same industrial grouping with the Dale Wellpad; however, they are not located on contiguous or adjacent properties according to the application. Therefore, the emissions from these two (2) facilities (Graff and Dale) should not be aggregated in determining major source (Title V) or PSD status.

## MONITORING OF OPERATIONS

Antero will be required to perform the following additional monitoring for the modifications associated with this permit application:

- Monitoring, Recordkeeping, and Reporting requirements for the natural-gas fired engines (Section 10 of the G70-A), including the NSPS, Subpart JJJJ requirements (Section 13 of the G70-A).

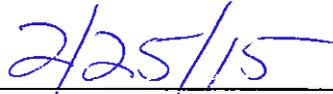
## CHANGES TO G70-A007

- Changes related to the registration revision
- Updated NSPS, Subpart JJJJ and GACT, Subpart ZZZZ applicability
- Registration to Sections 10, 13, and 15 have been added
- Updated emission units table as discussed in this evaluation
- Updated oil and natural gas wells table as discussed in this evaluation
- Updated the emission limitations as discussed in this evaluation
- Revised the throughput limitations for the condensate storage tanks and loading
- Removed throughput limitations for the produced water storage tanks and loading to be consistent with direction provided to industry regarding produced water limits.
- Added the RICE information as discussed in this evaluation

## RECOMMENDATION TO DIRECTOR

The information provided in the modification application indicates Antero's Graff site meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Tyler County location should be granted a G70-A Registration Modification for this proposed permitting action.

  
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Laura M. Jennings  
NSR Permit Engineer

  
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Date