



Joe  
13-3106A  
017-00060



January 5, 2015

Joe Kessler  
WV Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

**RE: Antero Midstream LLC – New Milton Compressor Station  
West Virginia Department of Environmental Protection, Division of Air  
Quality, 45CSR13 Air Permit Modification R13-3106**

Dear Mr. Kessler,

On behalf of Antero Midstream LLC, please find attached the 45CSR13 Air Permit Modification for permit number R13-3106 for the New Milton Compressor Station (Facility ID 017-00060) located in Doddridge County, West Virginia. A summary of the modifications in this application include:

1. Updating compressor engine emissions to reflect actual operating conditions of the NSCR catalysts,
2. Updating tank emissions to reflect flashing only occurring in the settling tank and adding standing, working, and breathing emissions in all five (5) tanks,
3. Updating flare emissions for flare operation at maximum capacity,
4. Updating truck loading emissions to reflect the loadout of produced water,
5. Updating fugitive dust emissions to include haul road traffic,
6. Updating generator emissions by removing the buffer for rich gas, and
7. Updating greenhouse gas emissions to reflect current global warming potentials (GWPs).
8. Updated list of small storage tanks presented in Attachment G. Initially, six small storage tanks were anticipated (T06 – T11), however, only four needed to be installed (T06 – T09).

Attachment E shows the potential expansion of the New Milton Compressor Station. At this time, the expansion is not yet finalized or scheduled, therefore the future equipment is not included in this modification.

Lastly, the original permit application was submitted under the parent corporation, Antero Resources Corporation; however, the facility should now be permitted under Antero Midstream LLC. This was strictly an administrative change and no money was exchanged in this name change; thus, a permit transfer cover form was not filled out as there was no buyer or seller in this case and the facility itself did go through a name change.

Enclosed are copies of the entire permit application plus the original, including the permit application form and the required attachments. Per 45CSR22, a \$1,000 application fee is also enclosed, which covers the base 45CSR13 application fee.

## **Microturbine Generators**

## NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number <sup>1</sup>		16E		17E			
Engine Manufacturer and Model		Capstone C200 Standard		Capstone C200 Standard			
Manufacturer's Rated bhp/rpm		200 kWe		200 kWe			
Source Status <sup>2</sup>		ES		ES			
Date Installed/Modified/Removed <sup>3</sup>		February 2014		February 2014			
Engine Manufactured/Reconstruction Date <sup>4</sup>		2013		2013			
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) <sup>5</sup>		N/A		N/A			
Engine, Fuel and Combustion Data	Engine Type <sup>6</sup>	N/A		N/A			
	APCD Type <sup>7</sup>	N/A		N/A			
	Fuel Type <sup>8</sup>	PQ		PQ			
	H <sub>2</sub> S (gr/100 scf)	0		0			
	Operating kWe	200		200			
	BSFC (Btu/kWe)	10,300		10,300			
	Fuel throughput (ft <sup>3</sup> /hr)	1,879		1,879			
	Fuel throughput (MMft <sup>3</sup> /yr)	16.46		16.76			
	Operation (hrs/yr)	8,760		8,760			
Reference <sup>9</sup>	Potential Emissions <sup>10</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO <sub>x</sub>	0.08	0.35	0.08	0.35		
MD	CO	0.22	0.96	0.22	0.96		
MD	VOC	0.02	0.09	0.02	0.09		
AP	SO <sub>2</sub>	0.01	0.03	0.01	0.03		
AP	PM <sub>10</sub>	0.01	0.06	0.01	0.06		
AP	Formaldehyde	0.001	0.006	0.001	0.006		

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

3. Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.

4. Enter the date that the engine was manufactured, modified or reconstructed.
5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

**Provide a manufacturer's data sheet for all engines being registered.**

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas
----	------------------------------	----	-----------------

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other _____	(please list)

10. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

## C200 MicroTurbine High-pressure Natural Gas



World's largest air-bearing microturbine produces 200kW of clean, green, and reliable power.

- Ultra-low emissions
- One moving part – minimal maintenance and downtime
- Patented air bearing – no lubricating oil or coolant
- 5 and 9 year Factory Protection Plans available
- Remote monitoring and diagnostic capabilities
- Integrated utility synchronization and protection
- Small, modular design allows for easy, low-cost installation
- Proven technology with tens of millions of run hours and counting
- Internal fuel gas compressor available for low fuel pressure natural gas applications



C200 MicroTurbine

### Electrical Performance<sup>(1)</sup>

Electrical Power Output	200kW
Voltage	400–480 VAC
Electrical Service	3-Phase, 4 wire
Frequency	50/60 Hz, grid connect operation 10–60 Hz, stand alone operation
Maximum Output Current	290A RMS @ 400V, grid connect operation 240A RMS @ 480V, grid connect operation 310A RMS, stand alone operation <sup>(2)</sup>
Electrical Efficiency LHV	33%

### Fuel/Engine Characteristics<sup>(1)</sup>

Natural Gas HHV	30.7–47.5 MJ/m <sup>3</sup> (825–1,275 BTU/scf)
Inlet Pressure <sup>(3)</sup>	517–552 kPa gauge (75–80 psig)
Fuel Flow HHV	2,400 MJ/hr (2,280,000 BTU/hr)
Net Heat Rate LHV	10.9 MJ/kWh (10,300 BTU/kWh)

### Exhaust Characteristics<sup>(1)</sup>

NOx Emissions @ 15% O <sub>2</sub> <sup>(4)</sup>	< 9 ppmvd (18 mg/m <sup>3</sup> )
NOx / Electrical Output <sup>(4)</sup>	0.14 g/bhp-hr (0.4 lb/MWhe)
Exhaust Gas Flow	1.3 kg/s (2.9 lbm/s)
Exhaust Gas Temperature	280°C (535°F)
Exhaust Energy	1,420 MJ/hr (1,350,000 BTU/hr)

*Reliable power when and where you need it. Clean and simple.*

## Dimensions & Weight<sup>(5)</sup>

Width x Depth x Height <sup>(6)</sup>	1.7 x 3.8 x 2.5 m (67 x 150 x 98 in)
Weight – Grid Connect Model	2776 kg (6,120 lb)
Weight – Dual Mode Model	3413 kg (7,525 lb)

## Minimum Clearance Requirements<sup>(7)</sup>

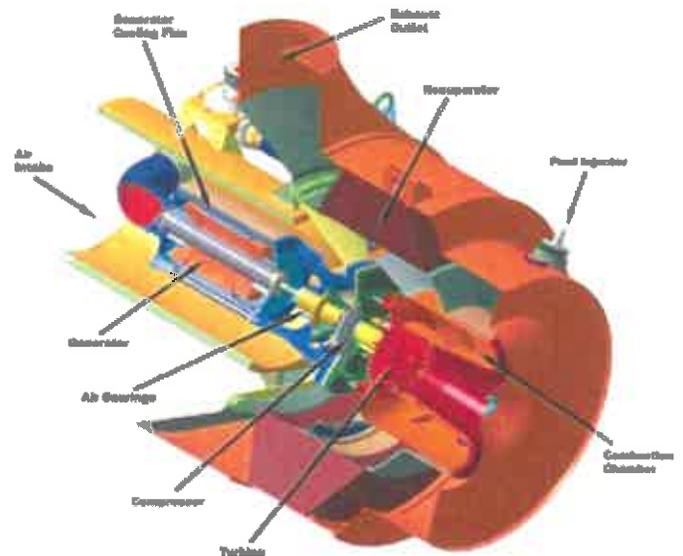
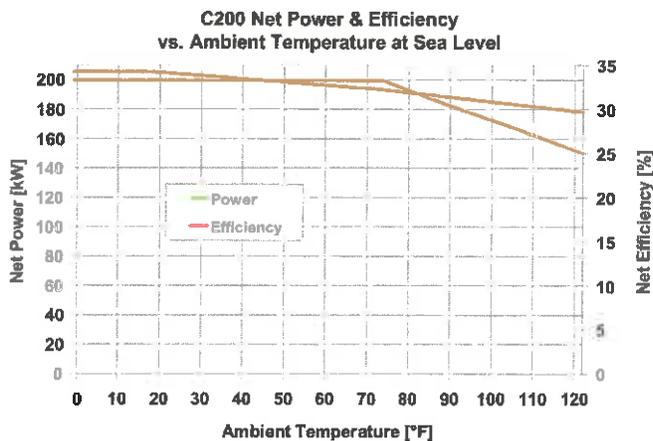
Vertical Clearance	0.6 m (24 in)
Horizontal Clearance	
Left & Right	1.1 m (42 in)
Front	1.1 m (42 in)
Rear	1.8 m (70 in)

## Sound Levels

Acoustic Emissions at Full Load Power	
Nominal at 10 m (33 ft)	65 dBA

## Certifications

- UL 2200 and UL 1741 natural gas operation<sup>(8)</sup>
- Complies with IEEE 1547 and meets statewide utility interconnection requirements for California Rule 21 and the New York State Public Service Commission
- CE certified



- (1) Nominal full power performance at ISO conditions: 59°F, 14.696 psia, 60% RH  
 (2) With linear load  
 (3) Inlet pressure for standard natural gas at 39.4 MJ/Nm<sup>3</sup> (1,000 BTU/scf) (HHV)  
 (4) Emissions for standard natural gas at 39.4 MJ/Nm<sup>3</sup> (1,000 BTU/scf) (HHV)  
 (5) Approximate dimensions and weight  
 (6) Height dimensions are to the roof line. Exhaust outlet extends at least 8 inches above the roof line  
 (7) Clearance requirements may increase due to local code considerations  
 (8) All natural gas models are planned to be UL Listed  
 Specifications are not warranted and are subject to change without notice.





# Technical Reference

## Capstone MicroTurbine™ Systems Emissions

### Summary

Capstone MicroTurbine™ systems are inherently clean and can meet some of the strictest emissions standards in the world. This technical reference is to provide customers with information that may be requested by local air permitting organizations or to compare air quality impacts of different technologies for a specific project. The preferred units of measure are "output based"; meaning that the quantity of a particular exhaust emission is reported relative to the useable output of the microturbine – typically in pounds per megawatt hour for electrical generating equipment. This technical reference also provides volumetric measurements in parts per million and milligrams per normal cubic meter. A conversion between several common units is also provided.

### Maximum Exhaust Emissions at ISO Conditions

Table 1 below summarizes the exhaust emissions at full power and ISO conditions for different Capstone microturbine models. Note that the fuel can have a significant impact on certain emissions. For example landfill and digester gas can be made up of a wide variety of fuel elements and impurities, and typically contains some percentage of carbon dioxide (CO<sub>2</sub>). This CO<sub>2</sub> dilutes the fuel, makes complete combustion more difficult, and results in higher carbon monoxide emissions (CO) than for pipeline-quality natural gas.

**Table 1. Emission for Different Capstone Microturbine Models in [lb/MWhe]**

Model	Fuel	NOx	CO	VOC <sup>(5)</sup>
C30 NG	Natural Gas <sup>(1)</sup>	0.64	1.8	0.23
CR30 MBTU	Landfill Gas <sup>(2)</sup>	0.64	22.0	1.00
CR30 MBTU	Digester Gas <sup>(3)</sup>	0.64	11.0	1.00
C30 Liquid	Diesel #2 <sup>(4)</sup>	2.60	0.41	0.23
C65 NG Standard	Natural Gas <sup>(1)</sup>	0.46	1.25	0.10
C65 NG Low NOx	Natural Gas <sup>(1)</sup>	0.17	1.30	0.10
C65 NG CARB	Natural Gas <sup>(1)</sup>	0.17	0.24	0.05
CR65 Landfill	Landfill Gas <sup>(2)</sup>	0.46	4.0	0.10
CR65 Digester	Digester Gas <sup>(3)</sup>	0.46	4.0	0.10
C200 NG	Natural Gas <sup>(1)</sup>	0.40	1.10	0.10
C200 NG CARB	Natural Gas <sup>(1)</sup>	0.14	0.20	0.04
CR200 Digester	Digester Gas <sup>(3)</sup>	0.40	3.6	0.10

**Notes:**

- (1) Emissions for standard natural gas at 1,000 BTU/scf (HHV) or 39.4 MJ/m<sup>3</sup> (HHV)
- (2) Emissions for surrogate gas containing 42% natural gas, 39% CO<sub>2</sub>, and 19% Nitrogen
- (3) Emissions for surrogate gas containing 63% natural gas and 37% CO<sub>2</sub>
- (4) Emissions for Diesel #2 according to ASTM D975-07b
- (5) Expressed as Methane

Table 2 provides the same output-based information shown in Table 1, but expressed in grams per horsepower hour (g/hp-hr).

**Table 2. Emission for Different Capstone Microturbine Models in [g/hp-hr]**

Model	Fuel	NOx	CO	VOC <sup>(5)</sup>
C30 NG	Natural Gas <sup>(1)</sup>	0.22	0.60	0.078
CR30 MBTU	Landfill Gas <sup>(2)</sup>	0.22	7.4	0.340
CR30 MBTU	Digester Gas <sup>(3)</sup>	0.22	3.7	0.340
C30 Liquid	Diesel #2 <sup>(4)</sup>	0.90	0.14	0.078
C65 NG Standard	Natural Gas <sup>(1)</sup>	0.16	0.42	0.034
C65 NG Low NOx	Natural Gas <sup>(1)</sup>	0.06	0.44	0.034
C65 NG CARB	Natural Gas <sup>(1)</sup>	0.06	0.08	0.017
CR65 Landfill	Landfill Gas <sup>(2)</sup>	0.16	1.4	0.034
CR65 Digester	Digester Gas <sup>(3)</sup>	0.16	1.4	0.034
C200 NG	Natural Gas <sup>(1)</sup>	0.14	0.37	0.034
C200 NG CARB	Natural Gas <sup>(1)</sup>	0.05	0.07	0.014
CR200 Digester	Digester Gas <sup>(3)</sup>	0.14	1.3	0.034

Notes: - same as for Table 1

Emissions may also be reported on a volumetric basis, with the most common unit of measurement being parts per million. This is typically a measurement that is corrected to specific oxygen content in the exhaust and without considering moisture content. The abbreviation for this unit of measurement is "ppmvd" (parts per million by volume, dry) and is corrected to 15% oxygen for electrical generating equipment such as microturbines. The relationship between an output based measurement like pounds per MWh and a volumetric measurement like ppmvd depends on the characteristics of the generating equipment and the molecular weight of the criteria pollutant being measured. Table 3 expresses the emissions in ppmvd at 15% oxygen for the Capstone microturbine models shown in Table 1. Note that raw measurements expressed in ppmv will typically be lower than the corrected values shown in Table 3 because the microturbine exhaust has greater than 15% oxygen.

Another volumetric unit of measurement expresses the mass of a specific criteria pollutant per standard unit of volume. Table 4 expresses the emissions in milligrams per normal cubic meter at 15% oxygen. Normal conditions for this purpose are expressed as one atmosphere of pressure and zero degrees Celsius. Note that both the ppmvd and mg/m<sup>3</sup> measurements are for specific oxygen content. A conversion can be made to adjust either unit of measurement to other reference oxygen contents, if required. Use the equation below to convert from one reference oxygen content to another:

$$\text{Emissions at New O}_2 = \frac{(20.9 - \text{New O}_2 \text{ Percent})}{(20.9 - \text{Current O}_2 \text{ Percent})} \times \text{Emissions at Current O}_2$$

For example, to express 9 ppmvd of NOx at 15% oxygen to ppmvd at 3% oxygen:

$$\text{Emissions at 3\% O}_2 = \frac{(20.9 - 3.0)}{(20.9 - 15.0)} \times 9 = 27 \text{ ppmvd}$$

## Greenhouse Gas Emissions

Many gasses are considered “greenhouse gasses”, and agencies have ranked them based on their global warming potential (GWP) in the atmosphere compared with carbon dioxide (CO<sub>2</sub>), as well as their ability to maintain this effect over time. For example, methane is a greenhouse gas with a GWP of 21. Criteria pollutants like NO<sub>x</sub> and organic compounds like methane are monitored by local air permitting authorities, and are subject to strong emissions controls. Even though some of these criteria pollutants can be more troublesome for global warming than CO<sub>2</sub>, they are released in small quantities – especially from Capstone microturbines. So the major contributor of concern is carbon dioxide, or CO<sub>2</sub>. Emission of CO<sub>2</sub> depends on two things:

1. Carbon content in the fuel
2. Efficiency of converting fuel to useful energy

It is for these reasons that many local authorities are focused on using clean fuels (for example natural gas compared with diesel fuel), achieving high efficiency using combined heat and power systems, and displacing emissions from traditional power plants using renewable fuels like waste landfill and digester gasses.

Table 5 shows the typical CO<sub>2</sub> emissions due to combustion for different Capstone microturbine models at full power and ISO conditions. The values do not include CO<sub>2</sub> that may already exist in the fuel itself, which is typical for renewable fuels like landfill and digester gas. These values are expressed on an output basis, as is done for criteria pollutants in Table 1. The table shows the pounds per megawatt hour based on electric power output only, as well as considering total useful output in a CHP system with total 70% efficiency (LHV). As for criteria pollutants, the relative quantity of CO<sub>2</sub> released is substantially less when useful thermal output is also considered in the measurement.

**Table 5. CO<sub>2</sub> Emission for Capstone Microturbine Models in [lb/MWh]**

Model	Fuel	CO <sub>2</sub>	
		Electric Only	70% Total CHP
C30 NG	Natural Gas <sup>(1)</sup>	1,690	625
CR30 MBTU	Landfill Gas <sup>(1)</sup>	1,690	625
CR30 MBTU	Digester Gas <sup>(1)</sup>	1,690	625
C30 Liquid	Diesel #2 <sup>(2)</sup>	2,400	855
C65 NG Standard	Natural Gas <sup>(1)</sup>	1,520	625
C65 NG Low NO <sub>x</sub>	Natural Gas <sup>(1)</sup>	1,570	625
C65 NG CARB	Natural Gas <sup>(1)</sup>	1,570	625
CR65 Landfill	Landfill Gas <sup>(1)</sup>	1,520	625
CR65 Digester	Digester Gas <sup>(1)</sup>	1,520	625
C200 NG	Natural Gas <sup>(1)</sup>	1,330	625
C200 NG CARB	Natural Gas <sup>(1)</sup>	1,330	625
CR200 Digester	Digester Gas <sup>(1)</sup>	1,330	625

**Notes:**

(1) Emissions due to combustion, assuming natural gas with CO<sub>2</sub> content of 117 lb/MMBTU (HHV)

(2) Emissions due to combustion, assuming diesel fuel with CO<sub>2</sub> content of 160 lb/MMBTU (HHV)

## **Fuel Gas Pre-Heater**

**Attachment L  
EMISSIONS UNIT DATA SHEET  
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*):

<p>1. Name or type and model of proposed affected source: 0.5 MMBtu/hr fuel gas pre-heater</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour: Natural gas as fuel - 613 scf/hr</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour: Heater is used to increase temperature of fuel gas to generators.</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Combustion process</p>

- \* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas as fuel - 613 scf/hr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Same as fuel gas analysis - see attached sheet

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

500,000 Btu/hr heater. Natural gas

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input:

× 10<sup>6</sup> BTU/hr.

7. Projected operating schedule:

24  
Hours/Day

7  
Days/Week

Weeks/Year  
52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia
a. NO <sub>x</sub>	0.061 lb/hr	grains/ACF
b. SO <sub>2</sub>	0.00037 lb/hr	grains/ACF
c. CO	0.051; lb/hr	grains/ACF
d. PM <sub>10</sub>	0.0047 lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	0.0034 lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
Total HAP (including formaldehyde)	0.0012 lb/hr	grains/ACF
CO <sub>2e</sub>	58.69 lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

**9. Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

**MONITORING**  
see Attachment O

**RECORDKEEPING**  
see Attachment O

**REPORTING**  
see Attachment O

**TESTING**  
see Attachment O

**MONITORING.** PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

**10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty**

## **Dehydrators**

## NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

<b>General Glycol Dehydration Unit Data</b>		<b>Manufacturer and Model</b>		Valerus GLY-CGR-1.5MM, 60 MMscfd	
		<b>Max Dry Gas Flow Rate (MMscf/day)</b>		<b>60</b>	
		<b>Design Heat Input (MMBtu/hr)</b>		<b>1.5</b>	
		<b>Design Type (DEG or TEG)</b>		<b>TEG</b>	
		<b>Source Status<sup>2</sup></b>		<b>ES</b>	
		<b>Date Installed/Modified/Removed<sup>3</sup></b>		<b>February 2014</b>	
		<b>Regenerator Still Vent APCD<sup>4</sup></b>		<b>FL</b>	
		<b>Fuel HV (Btu/scf)</b>		<b>1,096</b>	
		<b>H<sub>2</sub>S Content (gr/100 scf)</b>		<b>0</b>	
		<b>Operation (hrs/yr)</b>		<b>8,760</b>	
<b>Source ID #<sup>1</sup></b>	<b>Vent</b>	<b>Reference<sup>5</sup></b>	<b>Potential Emissions<sup>6</sup></b>	<b>lbs/hr</b>	<b>tons/yr</b>
<b>18E</b>	<b>Reboiler Vent</b>	AP	NO <sub>x</sub>	0.18	0.81
		AP	CO	0.15	0.68
		AP	VOC	0.01	0.04
		AP	SO <sub>2</sub>	0.001	0.005
		AP	PM <sub>10</sub>	0.01	0.06
<b>19E</b>	<b>Glycol Regenerator Still Vent</b>	ProMax™	VOC	1.10	4.83
		ProMax™	Benzene	0.02	0.10
		ProMax™	Ethylbenzene	0.01	0.07
		ProMax™	Toluene	0.12	0.52
		ProMax™	Xylenes	0.17	0.73
		ProMax™	n-Hexane	0.03	0.15

<b>General Glycol Dehydration Unit Data</b>		Manufacturer and Model		Valerus GLY-CGR-1.5MM, 60 MMscfd	
		Max Dry Gas Flow Rate (mmscf/day)		60	
		Design Heat Input (mmBtu/hr)		1.5	
		Design Type (DEG or TEG)		TEG	
		Source Status <sup>2</sup>		ES	
		Date Installed/Modified/Removed <sup>3</sup>		February 2014	
		Regenerator Still Vent APCD <sup>4</sup>		FL	
		Fuel HV (Btu/scf)		1,096	
		H <sub>2</sub> S Content (gr/100 scf)		0	
		Operation (hrs/yr)		8,760	
Source ID # <sup>1</sup>	Vent	Reference <sup>5</sup>	Potential Emissions <sup>6</sup>	lbs/hr	tons/yr
20E	Reboiler Vent	AP	NO <sub>x</sub>	0.18	0.81
		AP	CO	0.15	0.68
		AP	VOC	0.01	0.04
		AP	SO <sub>2</sub>	0.001	0.005
		AP	PM <sub>10</sub>	0.01	0.06
21E	Glycol Regenerator Still Vent	ProMax <sup>TM</sup>	VOC	1.10	4.83
		ProMax <sup>TM</sup>	Benzene	0.02	0.10
		ProMax <sup>TM</sup>	Ethylbenzene	0.01	0.07
		ProMax <sup>TM</sup>	Toluene	0.12	0.52
		ProMax <sup>TM</sup>	Xylenes	0.17	0.73
		ProMax <sup>TM</sup>	n-Hexane	0.03	0.15

- Enter the appropriate Source Identification Numbers for the glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent. The glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a *Glycol Dehydration Unit Data Sheet* shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.
- Enter the Source Status using the following codes:

NS	Construction of New Source	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source
- Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.
- Enter the Air Pollution Control Device (APCD) type designation using the following codes:

NA	None	CD	Condenser
FL	Flare	CC	Condenser/Combustion Combination
TO	Thermal Oxidizer		
- Enter the Potential Emissions Data Reference designation using the following codes:

MD Manufacturer's Data  
GR GRI-GLYCalc™

AP AP-42  
OT Other \_\_\_\_\_ (please list)

6. Enter the Reboiler Vent and glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc *Aggregate Calculations Report* to this *Glycol Dehydration Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

**Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.**

**\*An explanation of input parameters and examples, when using GRI-GLYCalc™ is available on our website.**

West Virginia Department of Environmental Protection

DIVISION OF AIR QUALITY : (304) 926-0475  
 WEB PAGE: <http://www.wvdep.org>

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.

<b>Section A: Facility Description</b>			
Affected facility actual annual average natural gas throughput (scf/day):	120,000,000		
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	279		
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
The affected facility is:	<input checked="" type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> a NG processing plant <input type="checkbox"/> prior to the point of custody transfer and there is no NG processing plant		
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
The affected facility exclusively processes, stores, or transfers black oil.	Yes	<input checked="" type="radio"/> No	
Initial producing gas-to-oil ratio (GOR): _____ scf/bbl      API gravity: _____ degrees			
<b>Section B: Dehydration Unit (if applicable) <sup>1</sup></b>			
Description: New Milton Compressor Station Dehydrators (RBV-1 & RBV-2)			
Date of Installation:	February 2014	Annual Operating Hours:	8,760      Burner rating (MMBtu/hr): 1.5
Exhaust Stack Height (ft):		Stack Diameter (ft):	Stack Temp. (°F):
Glycol Type:	<input checked="" type="checkbox"/> TEG <input type="checkbox"/> EG <input type="checkbox"/> Other:		
Glycol Pump Type:	<input type="checkbox"/> Electric <input checked="" type="checkbox"/> Gas	If gas, what is the volume ratio? <u>0.032</u> ACFM/gpm	
Condenser installed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Exit Temp. <u>200</u> °F      Condenser Pressure <u>0</u> psig	
Incinerator/flare installed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Destruction Eff. <u>98</u> %	
Other controls installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Describe:	
Wet Gas <sup>2</sup> : (Upstream of Contact Tower)	Gas Temp.: <u>120</u> °F      Gas Pressure <u>1,100</u> psig	Saturated Gas? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No      If no, water content _____ lb/MMSCF	
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate(MMSCFD)      Actual _____      Design <u>60</u> each _____	Water Content <u>5.0</u> lb/MMSCF	
Lean Glycol:	Circulation rate (gpm)      Actual <sup>3</sup> <u>TBD</u> Maximum <sup>4</sup> <u>7.5</u>	Pump make/model: Kimray 45015PV	
Glycol Flash Tank (if applicable):	Temp.: <u>80</u> °F      Pressure <u>5</u> psig      Vented?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If no, describe vapor control: Vent gas used in reboiler as fuel	
Stripping Gas (if applicable):	Source of gas: Dry gas, if used	Rate <u>9</u> scfm	

**Please attach the following required dehydration unit information:**

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream including mole percents of C<sub>1</sub>-C<sub>8</sub>, benzene, ethylbenzene, toluene, xylene and n-Hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

**Section C: Facility NESHAPS Subpart HH/HHH status**

	<input checked="" type="checkbox"/> Subject to Subpart HH - applies, but is exempt through < 1 tpy benzene exemption	
Affected facility	<input type="checkbox"/> Subject to Subpart HHH	
status:	<input checked="" type="checkbox"/> Not Subject	<input checked="" type="checkbox"/> < 10/25 TPY
(choose only one)	because:	<input type="checkbox"/> Affected facility exclusively handles black oil <input type="checkbox"/> The facility wide actual annual average NG throughput is < 650 thousand scf/day and facility wide actual annual average hydrocarbon liquid is < 250 bpd <input type="checkbox"/> No affected source is present

**Storage Tanks**  
**(Tanks 4.0.9d Runs Included in Attachment N)**

**Attachment L**  
**EMISSIONS UNIT DATA SHEET**  
**STORAGE TANKS**

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.html](http://www.epa.gov/tnn/tanks.html)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

**I. GENERAL INFORMATION (required)**

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Produced Water Tank 1
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T01	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 22E
5. Date of Commencement of Construction (for existing tanks) February 2014	
6. Type of change <input type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input checked="" type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) Adding standing, working, and breathing losses to emission totals.	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

**II. TANK INFORMATION (required)**

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	10B. Average Liquid Height (ft) 10
11A. Maximum Vapor Space Height (ft) 1	11B. Average Vapor Space Height (ft) 10
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 380 barrel	



<b>25F. Describe deck fittings; indicate the number of each type of fitting:</b>		
<b>ACCESS HATCH</b>		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
<b>AUTOMATIC GAUGE FLOAT WELL</b>		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
<b>COLUMN WELL</b>		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
<b>LADDER WELL</b>		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
<b>GAUGE-HATCH/SAMPLE PORT</b>		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
<b>ROOF LEG OR HANGER WELL</b>		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
<b>VACUUM BREAKER</b>		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
<b>RIM VENT</b>		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
<b>DECK DRAIN (3-INCH DIAMETER)</b>		
OPEN:	90% CLOSED:	
<b>STUB DRAIN</b>		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)		34B. Maximum (°F)	
35. Average operating pressure range of tank:			
35A. Minimum (psig)		35B. Maximum (psig)	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F)		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia)			
39G. Reid (psia)			
Months Storage per Year 39H. From			
39I. To			

**VI. EMISSIONS AND CONTROL DEVICE DATA (required)**

40. Emission Control Devices (check as many as apply):  Does Not Apply

Carbon Adsorption<sup>1</sup>

Condenser<sup>1</sup>

Conservation Vent (psig)

Vacuum Setting Pressure Setting

Emergency Relief Valve (psig)

Inert Gas Blanket of

Insulation of Tank with

Liquid Absorption (scrubber)<sup>1</sup>

Refrigeration of Tank

Rupture Disc (psig)

Vent to Incinerator<sup>1</sup>

Other<sup>1</sup> (describe): Vapor Recovery Unit and vapors recycled back into system

<sup>1</sup> Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method <sup>1</sup>
		Amount	Units		
VOC	0.0005	0.0011	lb/hr	13.5	EPA - TANKS 4.0.9
Emissions are controlled values					

<sup>1</sup> EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

## Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.htm](http://www.epa.gov/tnn/tanks.htm)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Produced Water Tank 2
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T02	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 23E
5. Date of Commencement of Construction (for existing tanks) February 2014	
6. Type of change <input type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input checked="" type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) Adding standing, working, and breathing losses to emission totals.	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <p style="text-align: center;">400 barrel</p>	
9A. Tank Internal Diameter (ft) <p style="text-align: center;">12</p>	9B. Tank Internal Height (or Length) (ft) <p style="text-align: center;">20</p>
10A. Maximum Liquid Height (ft) <p style="text-align: center;">19</p>	10B. Average Liquid Height (ft) <p style="text-align: center;">10</p>
11A. Maximum Vapor Space Height (ft) <p style="text-align: center;">1</p>	11B. Average Vapor Space Height (ft) <p style="text-align: center;">10</p>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <p style="text-align: center;">380 barrel</p>	



<b>25F. Describe deck fittings; indicate the number of each type of fitting:</b>		
<b>ACCESS HATCH</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>AUTOMATIC GAUGE FLOAT WELL</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>COLUMN WELL</b>		
<b>BUILT-UP COLUMN – SLIDING COVER, GASKETED:</b>	<b>BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:</b>	<b>PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:</b>
<b>LADDER WELL</b>		
<b>PIP COLUMN – SLIDING COVER, GASKETED:</b>	<b>PIPE COLUMN – SLIDING COVER; UNGASKETED:</b>	
<b>GAUGE-HATCH/SAMPLE PORT</b>		
<b>SLIDING COVER, GASKETED:</b>	<b>SLIDING COVER, UNGASKETED:</b>	
<b>ROOF LEG OR HANGER WELL</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	<b>SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)</b>
<b>VACUUM BREAKER</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>RIM VENT</b>		
<b>WEIGHTED MECHANICAL ACTUATION GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>DECK DRAIN (3-INCH DIAMETER)</b>		
<b>OPEN:</b>	<b>90% CLOSED:</b>	
<b>STUB DRAIN</b>		
<b>1-INCH DIAMETER:</b>		
<b>OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)</b>		

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)		34B. Maximum (°F)	
35. Average operating pressure range of tank:			
35A. Minimum (psig)		35B. Maximum (psig)	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F)		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			



## Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.html](http://www.epa.gov/tnn/tanks.html)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Settling Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T03	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 24E
5. Date of Commencement of Construction (for existing tanks)      February 2014	
6. Type of change <input type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input checked="" type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) Adding standing, working, and breathing losses to emission totals.	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <p style="text-align: center;">400 barrel</p>	
9A. Tank Internal Diameter (ft) <p style="text-align: center;">12</p>	9B. Tank Internal Height (or Length) (ft) <p style="text-align: center;">20</p>
10A. Maximum Liquid Height (ft) <p style="text-align: center;">19</p>	10B. Average Liquid Height (ft) <p style="text-align: center;">10</p>
11A. Maximum Vapor Space Height (ft) <p style="text-align: center;">1</p>	11B. Average Vapor Space Height (ft) <p style="text-align: center;">10</p>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <p style="text-align: center;">380 barrel</p>	



25F. Describe deck fittings; indicate the number of each type of fitting:		
<b>ACCESS HATCH</b>		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
<b>AUTOMATIC GAUGE FLOAT WELL</b>		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
<b>COLUMN WELL</b>		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
<b>LADDER WELL</b>		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
<b>GAUGE-HATCH/SAMPLE PORT</b>		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
<b>ROOF LEG OR HANGER WELL</b>		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
<b>VACUUM BREAKER</b>		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
<b>RIM VENT</b>		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
<b>DECK DRAIN (3-INCH DIAMETER)</b>		
OPEN:	90% CLOSED:	
<b>STUB DRAIN</b>		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)	34B. Maximum (°F)		
35. Average operating pressure range of tank:			
35A. Minimum (psig)	35B. Maximum (psig)		
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)		
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)		
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)		
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia)			
39G. Reid (psia)			
Months Storage per Year 39H. From			
39I. To			

**VI. EMISSIONS AND CONTROL DEVICE DATA (required)**

40. Emission Control Devices (check as many as apply):  Does Not Apply

Carbon Adsorption<sup>1</sup>

Condenser<sup>1</sup>

Conservation Vent (psig)

Vacuum Setting Pressure Setting

Emergency Relief Valve (psig)

Inert Gas Blanket of

Insulation of Tank with

Liquid Absorption (scrubber)<sup>1</sup>

Refrigeration of Tank

Rupture Disc (psig)

Vent to Incinerator<sup>1</sup>

Other<sup>1</sup> (describe): Vapor Recovery Unit and vapors recycled back into system

<sup>1</sup> Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method <sup>1</sup>
		Amount	Units		
VOC	0.0049	0.023	lb/hr	13,139.20	O-flashing emissions by ProMax, EPA – working and breathing by EPA Tanks 4.0.9d
Emissions are controlled values				*Annual Loss includes flash emissions	

<sup>1</sup> EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

## Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.html](http://www.epa.gov/tnn/tanks.html)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Condensate Tank 1
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T04	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 25E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change <input type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input checked="" type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) Addition of standing, working, and breathing losses to emission totals.	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <p style="text-align: center;">400 barrel</p>	
9A. Tank Internal Diameter (ft) <p style="text-align: center;">12</p>	9B. Tank Internal Height (or Length) (ft) <p style="text-align: center;">20</p>
10A. Maximum Liquid Height (ft) <p style="text-align: center;">19</p>	10B. Average Liquid Height (ft) <p style="text-align: center;">10</p>
11A. Maximum Vapor Space Height (ft) <p style="text-align: center;">1</p>	11B. Average Vapor Space Height (ft) <p style="text-align: center;">10</p>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <p style="text-align: center;">380 barrel</p>	



<b>25F. Describe deck fittings; indicate the number of each type of fitting:</b>		
<b>ACCESS HATCH</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>AUTOMATIC GAUGE FLOAT WELL</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>COLUMN WELL</b>		
<b>BUILT-UP COLUMN – SLIDING COVER, GASKETED:</b>	<b>BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:</b>	<b>PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:</b>
<b>LADDER WELL</b>		
<b>PIP COLUMN – SLIDING COVER, GASKETED:</b>	<b>PIPE COLUMN – SLIDING COVER, UNGASKETED:</b>	
<b>GAUGE-HATCH/SAMPLE PORT</b>		
<b>SLIDING COVER, GASKETED:</b>	<b>SLIDING COVER, UNGASKETED:</b>	
<b>ROOF LEG OR HANGER WELL</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	<b>SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)</b>
<b>VACUUM BREAKER</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>RIM VENT</b>		
<b>WEIGHTED MECHANICAL ACTUATION GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>DECK DRAIN (3-INCH DIAMETER)</b>		
<b>OPEN:</b>	<b>90% CLOSED:</b>	
<b>STUB DRAIN</b>		
<b>1-INCH DIAMETER:</b>		
<b>OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)</b>		

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)		34B. Maximum (°F)	
35. Average operating pressure range of tank:			
35A. Minimum (psig)		35B. Maximum (psig)	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F)		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			



## Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.html](http://www.epa.gov/tnn/tanks.html)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Condensate Tank 2
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T05	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 26E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change <input type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input checked="" type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) Addition of standing, working, and breathing losses to emission totals.	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <p style="text-align: center;">400 barrel</p>	
9A. Tank Internal Diameter (ft) <p style="text-align: center;">12</p>	9B. Tank Internal Height (or Length) (ft) <p style="text-align: center;">20</p>
10A. Maximum Liquid Height (ft) <p style="text-align: center;">19</p>	10B. Average Liquid Height (ft) <p style="text-align: center;">10</p>
11A. Maximum Vapor Space Height (ft) <p style="text-align: center;">1</p>	11B. Average Vapor Space Height (ft) <p style="text-align: center;">10</p>
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <p style="text-align: center;">380 barrel</p>	



<b>25F. Describe deck fittings; indicate the number of each type of fitting:</b>		
<b>ACCESS HATCH</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>AUTOMATIC GAUGE FLOAT WELL</b>		
<b>BOLT COVER, GASKETED:</b>	<b>UNBOLTED COVER, GASKETED:</b>	<b>UNBOLTED COVER, UNGASKETED:</b>
<b>COLUMN WELL</b>		
<b>BUILT-UP COLUMN – SLIDING COVER, GASKETED:</b>	<b>BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:</b>	<b>PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:</b>
<b>LADDER WELL</b>		
<b>PIP COLUMN – SLIDING COVER, GASKETED:</b>	<b>PIPE COLUMN – SLIDING COVER, UNGASKETED:</b>	
<b>GAUGE-HATCH/SAMPLE PORT</b>		
<b>SLIDING COVER, GASKETED:</b>	<b>SLIDING COVER, UNGASKETED:</b>	
<b>ROOF LEG OR HANGER WELL</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	<b>SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)</b>
<b>VACUUM BREAKER</b>		
<b>WEIGHTED MECHANICAL ACTUATION, GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>RIM VENT</b>		
<b>WEIGHTED MECHANICAL ACTUATION GASKETED:</b>	<b>WEIGHTED MECHANICAL ACTUATION, UNGASKETED:</b>	
<b>DECK DRAIN (3-INCH DIAMETER)</b>		
<b>OPEN:</b>	<b>90% CLOSED:</b>	
<b>STUB DRAIN</b>		
<b>1-INCH DIAMETER:</b>		
<b>OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)</b>		

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam:	
<input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)		34B. Maximum (°F)	
35. Average operating pressure range of tank:			
35A. Minimum (psig)		35B. Maximum (psig)	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F)		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			



## **Bulk Loading and Fugitives**

**Attachment L  
EMISSIONS UNIT DATA SHEET  
BULK LIQUID TRANSFER OPERATIONS**

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on <i>Equipment List Form</i> ): EPLOR	
1. Loading Area Name: Produced Fluids Loadout	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): <input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input checked="" type="checkbox"/> Tank Trucks	
3. Loading Rack or Transfer Point Data:	
Number of pumps	None – use truck pumps
Number of liquids loaded	Two – Condensate & Produced Water
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	Four as each tank has a connection, but not likely that there will be four at one time. T03 does not have a loading connection.
4. Does ballasting of marine vessels occur at this loading area? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Does not apply	
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: N/A	
6. Are cargo vessels pressure tested for leaks at this or any other location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, describe:	

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	10	10	10	10
days/week	5	5	5	5
weeks/quarter	all	all	all	all

8. Bulk Liquid Data (add pages as necessary):						
Pump ID No.		N/A	N/A			
Liquid Name		Condensate	Produced Water			
Max. daily throughput (1000 gal/day)		8.82	2.90			
Max. annual throughput (1000 gal/yr)		3,219	1,058			
Loading Method <sup>1</sup>		SUB	SUB			
Max. Fill Rate (gal/min)		TBD	TBD			
Average Fill Time (min/loading)		TBD	TBD			
Max. Bulk Liquid Temperature (°F)		73.25	73.25			
True Vapor Pressure <sup>2</sup>		6.66	0.67			
Cargo Vessel Condition <sup>3</sup>		U	U			
Control Equipment or Method <sup>4</sup>		None	None			
Minimum control efficiency (%)		0	0			
Maximum Emission Rate	Loading (lb/hr)	53.92	5.39			
	Annual (lb/yr)	15,900	520			
Estimation Method <sup>5</sup>		EPA	EPA			
<sup>1</sup> BF = Bottom Fill    SP = Splash Fill    SUB = Submerged Fill						
<sup>2</sup> At maximum bulk liquid temperature						



**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

**Attachment L  
EMISSIONS UNIT DATA SHEET  
CHEMICAL PROCESS**

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- Emergency Vent Summary Sheet*
- Leak Sources Data Sheet*
- Toxicology Data Sheet*
- Reactor Data Sheet*
- Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)  
Piping for Entire Facility. Piping not contained in equipment form.

2. Standard Industrial Classification Codes (SICs) for process(es)  
1311

3. List raw materials and  attach MSDSs  
Wet Natural Gas

4. List Products and Maximum Production and  attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)
Dry Natural Gas	5 MMscf/hour	43,800 MMscf/year
Condensate	8.75 barrels/hour	76,650 barrels/year
Produced Water	2.875 barrels/hour	25,185 barrels/year

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

Leak Detection Plan yet to be determined. Not subject to any federal regulations.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.

Will reference approved Spill Prevention, Control and Countermeasure (SPCC) plan.

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:  
Carrier: \_\_\_\_\_ Phone: \_\_\_\_\_

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum	24	7	52
10B. Typical	24	7	52

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**  
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING  see Attachment O	RECORDKEEPING  see Attachment O
REPORTING  see Attachment O	TESTING  see Attachment O

**MONITORING.** Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

**RECORDKEEPING.** Please describe the proposed recordkeeping that will accompany the monitoring.

**REPORTING.** Please describe the proposed frequency of reporting of the recordkeeping.

**TESTING.** Please describe any proposed emissions testing for this process equipment or air pollution control device.

14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

## **INFORMATION REQUIRED FOR CHEMICAL PROCESSES**

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provide enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

### **Process Description**

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe each process step. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
  - a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
  - b. continuous emissions (in-stack) monitoring plan
  - c. ambient monitoring plan
  - d. emergency response plan

### **Regulatory Discussion**

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
  - a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
  - b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
  - c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60 60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

### **Emissions Summary and Calculations**

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all batch processes provide the following
  - a. Emissions of each pollutant in pound(s) per batch, from each process step
  - b. Annual emissions based on number of batches requested per year
  - c. The total time for each process step and the duration of the emissions during the process step
  - d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

**LEAK SOURCE DATA SHEET**

Source Category	Pollutant	Number of Source Components <sup>1</sup>	Number of Components Monitored by Frequency <sup>2</sup>	Average Time to Repair (days) <sup>3</sup>	Estimated Annual Emission Rate (lb/yr) <sup>4</sup>
Pumps <sup>5</sup>	light liquid VOC <sup>6,7</sup>				
	heavy liquid VOC <sup>8</sup>				
	Non-VOC <sup>9</sup>				
Valves <sup>10</sup>	Gas VOC	761	TBD	1	9,160 – EE
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves <sup>11</sup>	Gas VOC				
	Non VOC				
Open-ended Lines <sup>12</sup>	VOC				
	Non-VOC				
Sampling Connections <sup>13</sup>	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	Gas VOC	1,555	TBD	1	1,620 – EE
	Light Liquid VOC				
	Non-VOC				
Other	VOC				
	Non-VOC				

<sup>1-13</sup> See notes on the following page.

## Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:  
  
Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)  
  
If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR §51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.
9. LIST CO, H<sub>2</sub>S, mineral acids, NO, NO<sub>2</sub>, SO<sub>3</sub>, etc. DO NOT LIST CO<sub>2</sub>, H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

**Attachment L  
EMISSIONS UNIT DATA SHEET  
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Fugitive so no number assigned

<p>1. Name or type and model of proposed affected source:</p> <p>Fugitive emissions from venting episodes such as plant shutdowns and compressor blowdowns.</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <ul style="list-style-type: none"><li>- compressor blowdown - 0.054 tons VOC per event, 6.46 tons CO<sub>2</sub>e per event</li><li>- plant shutdown - 0.355 tons VOC per event, 43.07 tons CO<sub>2</sub>e per event</li><li>- pigging venting - 0.004 tons VOC per event, 0.43 tons CO<sub>2</sub>e per event</li></ul>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>none</p>

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input:

× 10<sup>6</sup> BTU/hr.

7. Projected operating schedule:

Hours/Day	not a regular schedule	Days/Week	not a regular schedule	Weeks/Year	not a regular schedule
-----------	---------------------------	-----------	---------------------------	------------	---------------------------

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

	@ venting events are uncontrolled	°F and	psia
a. NO <sub>x</sub>		lb/hr	grains/ACF
b. SO <sub>2</sub>		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM <sub>10</sub>		lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs		lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

**9. Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

**MONITORING**

see Attachment O

**RECORDKEEPING**

see Attachment O

**REPORTING**

see Attachment O

**TESTING**

see Attachment O

**MONITORING.** PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

**10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty**

N/A

## Attachment L FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

*UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)*

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	4.8	4.8
p =	Number of days per year with precipitation >0.01 in.	160	160

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Condensate Tank Truck	4	40	--	1.63	1	365	NA	NA
2	Produced Water Tank Truck	4	40	--	1.63	1	365	NA	NA
3									
4									
5									
6									
7									
8									

**Source:** AP-42 Fifth Edition – 13.2.2 Unpaved Roads

$$E = k \times 5.9 \times (s + 12) \times (S + 30) \times (W + 3)^{0.7} \times (w + 4)^{0.5} \times ((365 - p) + 365) = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	4.8	4.8
S =	Mean vehicle speed (mph)	---	---
W =	Mean vehicle weight (tons)	40	40
w =	Mean number of wheels per vehicle	4	4
p =	Number of days per year with precipitation >0.01 in.	160	160

For lb/hr:  $[\text{lb} + \text{VMT}] \times [\text{VMT} + \text{trip}] \times [\text{Trips} + \text{Hour}] = \text{lb/hr}$

For TPY:  $[\text{lb} + \text{VMT}] \times [\text{VMT} + \text{trip}] \times [\text{Trips} + \text{Hour}] \times [\text{Ton} + 2000 \text{ lb}] = \text{Tons/year}$

### SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	0.32	1.38	0.32	1.38	0.08	0.35	0.08	0.35
2	0.32	1.38	0.32	1.38	0.08	0.35	0.08	0.35
3								
4								
5								
6								
7								
8								
TOTALS								

## FUGITIVE EMISSIONS FROM PAVED HAULROADS

*INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)*

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1							
2							
3							
4							
5							
6							
7							
8							

**Source:** AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads

$$E = 0.077 \times I \times (4 + n) \times (s + 10) \times (L + 1000) \times (W + 3)^{0.7} = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr:  $[\text{lb} + \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} + \text{Hour}] = \text{lb/hr}$

For TPY:  $[\text{lb} + \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} + \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

### SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY
1				
2				
3				
4				
5				
6				
7				
8				
<b>TOTALS</b>				

**Attachment M.**  
**Air Pollution Control Device Sheets**

## **NSCR Catalysts**

**Attachment M**  
**Air Pollution Control Device Sheet**  
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C-02 – C-07

**Equipment Information**

1. Manufacturer: EMIT Technologies Model No. ELH-4200-1616F-6CEE-361	2. Control Device Name: C-02 – C-07 – Catalysts for CE-01 through CE-06 Type: NSCR Catalyst
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: N/A – no capture of pollutants	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume:                      8,924                      ACFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. Replace Catalyst elements when necessary	

**Gas Stream Characteristics**

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	<b>Maximum</b>	<b>Typical</b>	
Pressure (mmHg):	Not specified		
Heat Content (BTU/scf):	1,400	1,096	
Oxygen Content (%):	Not specified		
Moisture Content (%):	Not specified		
Relative Humidity (%):	Not specified		

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO <sub>x</sub> <input type="checkbox"/> Odor		<input checked="" type="checkbox"/> Other NO <sub>x</sub> , CO, VOC, HCHO, CH <sub>4</sub>				
<input type="checkbox"/> Particulate (type):						
17. Inlet gas velocity:	121 ft/sec	18. Pollutant specific gravity:				
19. Gas flow into the collector: 8,924 ACF @ 1,226°F and PSIA		20. Gas stream temperature: Inlet: 1,226 °F Outlet: 1,226 °F				
21. Gas flow rate: Design Maximum: 8,924 ACFM Average Expected: TBD ACFM		22. Particulate Grain Loading in grains/scf: N/A Inlet: Outlet:				
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A NO <sub>x</sub>	50.00		--	2.00		96
B CO	47.41		--	1.90		96
C VOC	1.22		--	0.61		50
D HCHO	0.19		--	0.04		76
E CH <sub>4</sub>	5.78		--	1.73		70
24. Dimensions of stack:		Height TBD	ft.	Diameter	1.10	ft.
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

**Particulate Distribution**

Particulate Size Range (microns)	26. Complete the table:	
	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
	Weight % for Size Range	Weight % for Size Range
0 - 2		
2 - 4		
4 - 6		
6 - 8		
8 - 10		
10 - 12		
12 - 16		
16 - 20		
20 - 30		
30 - 40		
40 - 50		
50 - 60		
60 - 70		
70 - 80		
80 - 90		
90 - 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system: Catalyst elements can be cleaned and/or replaced; materials are not disposed on site.

29. Have you included **Other Collectores Control Device** in the Emissions Points Data Summary Sheet? yes

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**  
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: see Attachment O

RECORDKEEPING: see Attachment O

REPORTING: see Attachment O

TESTING: see Attachment O

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.  
RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.  
REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.  
TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
NOx: 96%, CO: 96%, VOC: 50%, HCHO: 76%, CH4: 70%.  
Due to variable load conditions, the catalyst efficiency may vary. The catalyst efficiencies listed above are typical based on expected operating conditions.

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. Inlet temperature range is 750 F – 1250 F. Engine must be operated between 50 – 100 % load. A/F ratio controller must be set properly with fuel heating value of around 1400 Btu/scf. Engine lube oil shall contain less than 0.5 wt% sulfated ash. Catalyst must not be exposed to the following: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, zinc.



10497 Town & Country Way, Ste. 940  
Houston, TX 77024  
Office: 307.673.0883 | Direct: 307.675.5078  
bwaggener@emittechnologies.com

Prepared For:  
Luz Slauter  
ANTERO RESOURCES

QUOTE: QUO-14219-S7R9

### INFORMATION PROVIDED BY WAUKESHA

Engine:	L7044GSI
Horsepower:	1680
RPM:	1200
Compression Ratio:	8.0
Exhaust Flow Rate:	8924 CFM
Exhaust Temperature:	1226 °F
Reference:	N/A
Fuel:	Natural Gas
Annual Operating Hours:	8760

### Uncontrolled Emissions

	<u>g/bhp-hr</u>
NOx:	13.50
CO:	12.80
THC:	2.40
NMHC:	0.79
NMNEHC:	0.33
HCHO:	0.05
CH4:	1.56

### POST CATALYST EMISSIONS

	<u>% Reduction</u>	<u>g/bhp-hr</u>
NOx:	>96 %	<0.54
CO:	>96 %	<0.51
VOC:	>50 %	<0.17
HCHO:	>76 %	<0.01
CH4:	>70%	<0.47

### CONTROL EQUIPMENT

#### Catalyst Housing

Model:	ELH-4200-1616F-65CEE-361
Manufacturer:	EMIT Technologies, Inc
Element Size:	Rectangle 36" x 15" x 3.5"
Element Qty:	5 Elements
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	16" Flat Face Flange
Outlet Connections:	16" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA

#### NOTES:

Variable engine operation will impact the minimum achievable post catalyst emissions.

The information in this quotation, and any files transmitted with it, is confidential and may be legally privileged. It is intended only for the use of individual(s) within the company named above. If you are the intended recipient, be aware that your use of any confidential or personal information may be restricted by state and federal privacy laws

[www.emittechnologies.com](http://www.emittechnologies.com)



10497 Town & Country Way, Ste. 940  
Houston, TX 77024  
Office: 307.673.0883 | Direct: 307.675.5078  
bwaggener@emittechnologies.com

## WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash loading due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalyst/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 800°F for oxidation catalyst and 750 °F for NSCR catalyst, and a maximum of 1250°F.

If a properly functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250°F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft<sup>3</sup>. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following known poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damage during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions, Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

The information in this quotation, and any files transmitted with it, is confidential and may be legally privileged. It is intended only for the use of individual(s) within the company named above. If you are the intended recipient, be aware that your use of any confidential or personal information may be restricted by state and federal privacy laws

[www.emittechnologies.com](http://www.emittechnologies.com)

**Flare**

**Attachment M**  
**Air Pollution Control Device Sheet**  
**(FLARE SYSTEM)**

Control Device ID No. (must match Emission Units Table): C-01

**Equipment Information**

<p>1. Manufacturer: Superior Fabrication, Inc.</p> <p>Model No. 60", 4.8 MMBtu/hr</p>	<p>2. Method: <input checked="" type="checkbox"/> Elevated flare  <input type="checkbox"/> Ground flare  <input type="checkbox"/> Other  Describe</p>
<p>3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.</p>	
<p>4. Method of system used:  <input type="checkbox"/> Steam-assisted      <input type="checkbox"/> Air-assisted      <input type="checkbox"/> Pressure-assisted      <input checked="" type="checkbox"/> Non-assisted</p>	
<p>5. Maximum capacity of flare:  72.97 scf/min  4,378 scf/hr</p>	<p>6. Dimensions of stack:  Diameter 5 ft.  Height 15 ft.</p>
<p>7. Estimated combustion efficiency:  (Waste gas destruction efficiency)  Estimated: 98 %  Minimum guaranteed: 98 %</p>	<p>8. Fuel used in burners:  <input checked="" type="checkbox"/> Natural Gas  <input type="checkbox"/> Fuel Oil, Number  <input type="checkbox"/> Other, Specify:</p>
<p>9. Number of burners:  Rating: 4,800,000 BTU/hr</p>	<p>11. Describe method of controlling flame:  Enclosed flare</p>
<p>10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	
<p>12. Flare height: 15 ft</p>	<p>14. Natural gas flow rate to flare pilot flame per pilot light:  0.27 scf/min  16.4 scf/hr</p>
<p>13. Flare tip inside diameter: 5 ft</p>	
<p>15. Number of pilot lights: 1  Total 17,980 BTU/hr</p>	<p>16. Will automatic re-ignition be used?  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>
<p>17. If automatic re-ignition will be used, describe the method:</p>	
<p>18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  If yes, what type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red  <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room  <input type="checkbox"/> Other, Describe:</p>	
<p>19. Hours of unit operation per year: 8,760</p>	



**44. Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

**MONITORING:**  
**see Attachment O**

**RECORDKEEPING:**  
**see Attachment O**

**REPORTING:**  
**see Attachment O**

**TESTING:**  
**see Attachment O**

**MONITORING:** Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

**RECORDKEEPING:** Please describe the proposed recordkeeping that will accompany the monitoring.

**REPORTING:** Please describe any proposed emissions testing for this process equipment on air pollution control device.

**TESTING:** Please describe any proposed emissions testing for this process equipment on air pollution control device.

**45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.**

**N/A – no capture efficiency**

**46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.**

**98% control efficiency for VOCs, HAPs, C1, C2**

**47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.**

**Flare Tip Velocity cannot exceed 10 ft/s.**

**Gas heating value must range between 200 Btu/scf and 3,500 Btu/scf**

**Inlet Pressure must range between 2 ounces and 25 ounces**

# SFI

SUPERIOR FABRICATION, INC.

801 S. Eastern Avenue, Elk City, OK 73644  
Phone: (580) 243-5693 Fax: (580) 243-5507

## VOC Shielded Flare



## SPECIFICATIONS AND TECHNICAL INFO:

- Dimensions

Flare Tip Diameter	Height (Std Model)	Inlet Connection	Min Capacity	Max Capacity	# of Burner Tips
48"	12'-2"	2" FNPT	0	2.1 mm BTU/hr	210
60"	15'-2"	3" FNPT	0	4.8 mm BTU/hr	480
72"	17'-2"	3" FNPT	0	7.0 mm BTU/hr	720

- Pilot

- Constant burning pilot
- 3.5 – 5.0 psig
- Gas consumption is 16.4 scfh at 5.0 psig
- #70 Drill orifice, (0.028" dia.)

- Monitoring System

- SVC True-Lite Igniter. Provides ignition & monitoring via a thermocouple
- 12/24 volt options
- Dry contacts for external communication, (12/24 volt)
- Solar charging, no utility required
- See [www.superiorfab.com](http://www.superiorfab.com) for more information on the True-Lite Igniter

- Flare Tip Velocity, 10 fps max.

- Gas heating value, 200 Btu/ft<sup>3</sup>. minimum and 3500 Btu/ ft<sup>3</sup> maximum
- Recommended distance from tanks, 75 ft. minimum (see detailed installation instructions)
- Inlet Pressure 2 oz. minimum, 25 oz. maximum

**Superior Fabrication, Inc.**

801 S. Eastern, PO Box 429

Elk City, OK 73644

Phone: (580) 243-5693

Fax: (580) 243-5507

[superiorfab@superiorfab.com](mailto:superiorfab@superiorfab.com)

[www.superiorfab.com](http://www.superiorfab.com)





## SUPERIOR FABRICATION, INC.

801 S Eastern Avenue, Elk City, OK 73644  
(580) 243-5693 Fax: (580) 243-5507

### Shielded Flare Gas Capacity Chart

Gas Heating Value	48" Shielded Flare (2.1 MM BTU/hr)		60" Shielded Flare (4.8 MM BTU/hr)		72" Shielded Flare (7.0 MM BTU/hr)	
	BTU/ft <sup>3</sup>	CFH	MCFD	CFH	MCFD	CFH
600	3,500	84	8,000	192	11,667	280
700	3,000	72	6,857	165	10,000	240
800	2,625	63	6,000	144	8,750	210
900	2,333	56	5,333	128	7,778	187
1,000	2,100	50	4,800	115	7,000	168
1,100	1,909	46	4,364	105	6,364	153
1,200	1,750	42	4,000	96	5,833	140
1,300	1,615	39	3,692	89	5,385	129
1,400	1,500	36	3,429	82	5,000	120
1,500	1,400	34	3,200	77	4,667	112
1,600	1,313	32	3,000	72	4,375	105
1,700	1,235	30	2,824	68	4,118	99
1,800	1,167	28	2,667	64	3,889	93
1,900	1,105	27	2,526	61	3,684	88
2,000	1,050	25	2,400	58	3,500	84
2,100	1,000	24	2,286	55	3,333	80
2,200	955	23	2,182	52	3,182	76
2,300	913	22	2,087	50	3,043	73
2,400	875	21	2,000	48	2,917	70
2,500	840	20	1,920	46	2,800	67
2,600	808	19	1,846	44	2,692	65
2,700	778	19	1,778	43	2,593	62
2,800	750	18	1,714	41	2,500	60

BTU/ft<sup>3</sup> = British Thermal Units per cubic foot

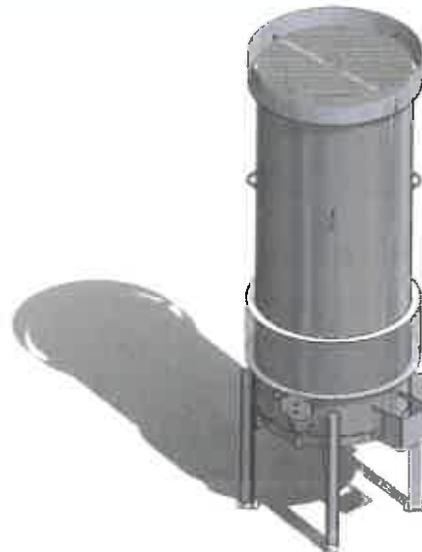
CFH = Cubic Feet per Hour

MCFD = Thousand Cubic Feet per Day

**Example:**

Maximum capacity of a 48" Flare with 1,050 BTU/cu.ft. gas:

$$\frac{2,100,000}{1,050} \times 24 = 48,000 \text{ cu. ft./Day (48 MCFD)}$$



## **Vapor Recovery Unit**

**Attachment M**  
**Air Pollution Control Device Sheet**  
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C-08 (VRU)

**Equipment Information**

1. Manufacturer: Hybon Model No. HB-NK60-15-36DV	2. Control Device Name: C-08 (VRU) Type: Vapor Recovery Unit for Storage Tanks
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: closed loop system, however claiming 98% efficiency. C-08 is the primary VRU to collect storage tank vapors and C-09 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown. In the unlikely event that both C-08 and C-09 are under maintenance or are shutdown, a bypass system is in place to route tank vapors to the facility inlet. The VRU compressor is equipped to recover wet and dry gas and has a VFD to adapt the operating speed for varying environmental pressures and temperatures. Lastly, both VRUs are equipped with automatic monitoring, shutdown, and alert systems with sensors to detect temperature, pressure, liquid levels, suction pressure, and motor overload.	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 65 Mscfd	10. Capacity: 65 Mscfd
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. Collected materials get recycled back into gas system – closed loop	

**Gas Stream Characteristics**

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	<b>Maximum</b>	<b>Typical</b>	
Pressure (mmHg):	0.01 psig		
Heat Content (BTU/scf):	Not specified		
Oxygen Content (%):	Not specified		
Moisture Content (%):	Not specified		
Relative Humidity (%):	Not specified		

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO <sub>x</sub> <input type="checkbox"/> Odor <input type="checkbox"/> Particulate (type): <input checked="" type="checkbox"/> Other VOC, HAPs, C1, C2				
17. Inlet gas velocity:                      N/A      ft/sec	18. Pollutant specific gravity:			
19. Gas flow into the collector: TBD      ACF @ ambient and      TBD      PSIA	20. Gas stream temperature: Inlet:              ambient              °F Outlet:             ambient              °F			
21. Gas flow rate: Design Maximum:              45.14      ACFM Average Expected:             45.14      ACFM	22. Particulate Grain Loading in grains/scf: N/A Inlet: Outlet:			
23. Emission rate of each pollutant (specify) into and out of collector:				
<b>Pollutant</b>	<b>IN Pollutant</b>	<b>Emission Capture Efficiency %</b>	<b>OUT Pollutant</b>	<b>Control Efficiency %</b>
	<b>lb/hr</b>	<b>grains/acf</b>	<b>lb/hr</b>	<b>grains/acf</b>
A VOC	77.13		1.54	N/A
B HAPs	1.10		0.02	N/A
C CO <sub>2e</sub>	551		11.01	N/A
D				
E				
24. Dimensions of stack:                      Height NA      ft.                      Diameter      NA ft.				
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.				

**Particulate Distribution**

26. Complete the table:	<b>Particle Size Distribution at Inlet to Collector</b>	<b>Fraction Efficiency of Collector</b>
<b>Particulate Size Range (microns)</b>	<b>Weight % for Size Range</b>	<b>Weight % for Size Range</b>
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): **None**

28. Describe the collection material disposal system: **Closed loop system – vapors get recycled back into system**

29. Have you included **Other Collectores Control Device** in the Emissions Points Data Summary Sheet? **Yes**

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**  
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: <b>see Attachment O</b>	RECORDKEEPING: <b>see Attachment O</b>
-------------------------------------	--

REPORTING: <b>see Attachment O</b>	TESTING: <b>see Attachment O</b>
------------------------------------	----------------------------------

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
**100% - Closed loop system**

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
**100% - Closed loop system**

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.  
**None – system has automatic monitoring, shutdown and alerts systems for malfunctions.**

**Attachment M**  
**Air Pollution Control Device Sheet**  
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C-09 (VRU)

**Equipment Information**

1. Manufacturer: Hybon Model No. HB-NK60-15-36DV	2. Control Device Name: C-09 (VRU) Type: Back-up Vapor Recovery Unit for Storage Tanks
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: <b>closed loop system, however claiming 98% efficiency.</b> <b>C-08 is the primary VRU to collect storage tank vapors and C-09 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown. In the unlikely event that both C-08 and C-09 are under maintenance or are shutdown, a bypass system is in place to route tank vapors to the facility inlet. The VRU compressor is equipped to recover wet and dry gas and has a VFD to adapt the operating speed for varying environmental pressures and temperatures. Lastly, both VRUs are equipped with automatic monitoring, shutdown, and alert systems with sensors to detect temperature, pressure, liquid levels, suction pressure, and motor overload.</b>	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume:                      65 Mscfd	10. Capacity: 65 Mscfd
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. <b>Collected materials get recycled back into gas system – closed loop</b>	

**Gas Stream Characteristics**

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	<b>Maximum</b>	<b>Typical</b>	
Pressure (mmHg):	0.01 psig		
Heat Content (BTU/scf):	Not specified		
Oxygen Content (%):	Not specified		
Moisture Content (%):	Not specified		
Relative Humidity (%):	Not specified		

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO <sub>x</sub> <input type="checkbox"/> Odor		<input checked="" type="checkbox"/> Other VOC, HAPs, C1, C2				
<input type="checkbox"/> Particulate (type):						
17. Inlet gas velocity:	N/A	ft/sec	18. Pollutant specific gravity:			
19. Gas flow into the collector: TBD    ACF @ ambient and    TBD    PSIA		20. Gas stream temperature: Inlet:            ambient            °F Outlet:           ambient            °F				
21. Gas flow rate: Design Maximum:            45.14    ACFM Average Expected:            45.14    ACFM		22. Particulate Grain Loading in grains/scf: N/A Inlet: Outlet:				
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A VOC	77.13		98	1.54		N/A
B HAPs	1.10		98	0.02		N/A
C CO <sub>2e</sub>	551		98	11.01		N/A
D						
E						
24. Dimensions of stack:		Height NA	ft.	Diameter	NA	ft.
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

**Particulate Distribution**

26. Complete the table:	Particle Size Distribution at Inlet to Collector		Fraction Efficiency of Collector
	Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2			
2 – 4			
4 – 6			
6 – 8			
8 – 10			
10 – 12			
12 – 16			
16 – 20			
20 – 30			
30 – 40			
40 – 50			
50 – 60			
60 – 70			
70 – 80			
80 – 90			
90 – 100			
>100			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): <b>None</b>	
28. Describe the collection material disposal system: <b>Closed loop system – vapors get recycled back into system</b>	
29. Have you included <b>Other Collectores Control Device</b> in the Emissions Points Data Summary Sheet? <b>Yes</b>	
30. <b>Proposed Monitoring, Recordkeeping, Reporting, and Testing</b> Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: <b>see Attachment O</b>	RECORDKEEPING: <b>see Attachment O</b>
REPORTING: <b>see Attachment O</b>	TESTING: <b>see Attachment O</b>
MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. <b>100% - Closed loop system</b>	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. <b>100% - Closed loop system</b>	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. <b>None – system has automatic monitoring, shutdown and alerts systems for malfunctions.</b>	

**Attachment N.  
Supporting Emissions Calculations**

## **Emission Calculations**

### Emissions Summary Total

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia

#### UNCONTROLLED POTENTIAL EMISSION SUMMARY

Source	NOx		CO		VOC		SO <sub>2</sub>		PM-10		HAPs		Formaldehyde		CO <sub>2</sub> e	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy	
<b>Engines</b>																
Compressor Engine 1	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
Compressor Engine 2	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
Compressor Engine 3	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
Compressor Engine 4	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
Compressor Engine 5	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
Compressor Engine 6	50.00	219.42	47.41	208.04	1.22	5.36	0.006	0.04	0.27	1.19	0.35	1.54	0.19	0.81	8,171	
<b>Turbines</b>																
Microturbine Generator 1	0.08	0.35	0.22	0.86	0.02	0.09	0.01	0.03	0.01	0.08	0.002	0.01	0.001	0.008	1,168	
Microturbine Generator 2	0.08	0.35	0.22	0.86	0.02	0.09	0.01	0.03	0.01	0.08	0.002	0.01	0.001	0.008	1,168	
Fuel Gas Pre-Heater	0.08	0.27	0.05	0.29	0.003	0.01	0.0004	0.002	0.005	0.02	0.001	0.006	0.00005	0.0002	257	
<b>Dehydrator</b>																
TEG Dehydrator 1	---	---	---	---	55.14	241.50	---	---	---	---	17.71	77.57	---	---	8,963	
TEG Dehydrator 2	---	---	---	---	55.14	241.50	---	---	---	---	17.71	77.57	---	---	8,963	
Reboiler 1	0.18	0.81	0.15	0.66	0.01	0.04	0.001	0.005	0.01	0.06	0.003	0.02	0.0001	0.0006	771	
Reboiler 2	0.18	0.81	0.15	0.66	0.01	0.04	0.001	0.005	0.01	0.06	0.003	0.02	0.0001	0.0006	771	
<b>Combustors</b>																
Flare and Pilot	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
<b>Hydrocarbon Loading</b>																
Truck Loadout	---	---	---	---	59.31	8.21	---	---	---	---	0.86	0.12	---	---	58.6	
<b>Fugitive Emissions</b>																
Component Leak Emissions	---	---	---	---	1.23	5.36	---	---	---	---	0.007	0.03	---	---	103	
Venting Emissions	---	---	---	---	---	8.61	---	---	---	---	---	0.05	---	---	1,039	
Haul Road Dust Emissions	---	---	---	---	---	---	---	---	0.18	0.70	---	---	---	---	---	
<b>Storage Tanks</b>																
Produced Water Tanks	---	---	---	---	0.15	0.67	---	---	---	---	0.002	0.01	---	---	4.81	
Separator Tank	---	---	---	---	75.00	328.49	---	---	---	---	1.07	4.89	---	---	2,348	
Condensate Tanks	---	---	---	---	1.98	8.66	---	---	---	---	0.03	0.12	---	---	62	
<b>Total Facility PTE =</b>	<b>300.59</b>	<b>1,319.00</b>	<b>286.24</b>	<b>1,291.75</b>	<b>252.34</b>	<b>875.48</b>	<b>0.07</b>	<b>0.29</b>	<b>1.85</b>	<b>8.11</b>	<b>39.49</b>	<b>168.45</b>	<b>1.11</b>	<b>4.89</b>	<b>80,887</b>	

### Emissions Summary Total

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia

#### CONTROLLED POTENTIAL EMISSION SUMMARY

Source	NOx		CO		VOC		SO <sub>2</sub>		PM-10		HAPs		Formaldehyde		CO <sub>2e</sub> tpy
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
<b>Engines</b>															
Compressor Engine 1	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
Compressor Engine 2	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
Compressor Engine 3	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
Compressor Engine 4	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
Compressor Engine 5	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
Compressor Engine 6	2.00	8.76	1.90	8.32	0.61	2.68	0.008	0.04	0.27	1.18	0.21	0.93	0.04	0.20	8,727
<b>Turbines</b>															
Microturbine Generator 1	0.08	0.35	0.22	0.96	0.02	0.09	0.01	0.03	0.01	0.08	0.002	0.01	0.001	0.01	1,166
Microturbine Generator 2	0.08	0.35	0.22	0.96	0.02	0.09	0.01	0.03	0.01	0.08	0.002	0.01	0.001	0.01	1,166
Fuel Gas Pre-Heater	0.06	0.27	0.05	0.23	0.003	0.01	0.0004	0.002	0.005	0.02	0.001	0.005	0.00005	0.0002	257
<b>Dehydrator</b>															
TEG Dehydrator 1	--	--	--	--	1.10	4.83	--	--	--	--	0.35	1.58	--	--	404
TEG Dehydrator 2	--	--	--	--	1.10	4.83	--	--	--	--	0.35	1.58	--	--	404
Reboiler 1	0.18	0.81	0.15	0.88	0.01	0.04	0.001	0.005	0.01	0.08	0.003	0.02	0.0001	0.0008	771
Reboiler 2	0.18	0.81	0.15	0.88	0.01	0.04	0.001	0.005	0.01	0.08	0.003	0.02	0.0001	0.0008	771
<b>Combustion</b>															
Flare and Pilot	0.33	1.44	1.78	7.79	0.0001	0.0004	0.00001	0.00005	0.0001	0.0006	0.00003	0.0001	--	--	2,465
<b>Hydrocarbon Loading</b>															
Truck Loadout	--	--	--	--	69.31	8.21	--	--	--	--	0.85	0.12	--	--	58
<b>Fugitive Emissions</b>															
Component Leak Emissions	--	--	--	--	1.23	5.39	--	--	--	--	0.007	0.03	--	--	103
Venting Emissions	--	--	--	--	--	8.61	--	--	--	--	--	0.05	--	--	1,039
Heavy Road Dust Emissions	--	--	--	--	--	--	--	--	0.16	0.70	--	--	--	--	--
<b>Storage Tanks</b>															
Produced Water Tanks	--	--	--	--	0.003	0.01	--	--	--	--	0.00004	0.0002	--	--	0.10
Solvent Tank	--	--	--	--	1.50	8.57	--	--	--	--	0.02	0.09	--	--	47
Condensate Tanks	--	--	--	--	0.04	0.17	--	--	--	--	0.0006	0.002	--	--	1.24
<b>Total Facility PTE =</b>	<b>12.82</b>	<b>56.68</b>	<b>13.96</b>	<b>61.22</b>	<b>68.02</b>	<b>54.99</b>	<b>0.07</b>	<b>0.29</b>	<b>1.85</b>	<b>8.11</b>	<b>2.84</b>	<b>9.94</b>	<b>0.27</b>	<b>1.18</b>	<b>81,617</b>

## Compressor Engine Emission Calculations

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Compressor Engines

### Source Information-Per Engine

Emission Unit ID:	CE-01 - CE-06
Engine Make/Model:	Waukesha 7D44 GSI
Service:	Compression
Controls - Y or N / Type:	Y NSCR/AFRC
Site Horsepower Rating <sup>1</sup> :	1,960 hp
Fuel Consumption (BSEC) <sup>1</sup> :	8,324 Blu/(hp-hr)
Heat Rating <sup>2</sup> :	13.88 MMBlu/yr
Fuel Consumption <sup>2,3</sup> :	111.85 MMblu/yr
Fuel Consumption <sup>3</sup> :	12,780 acf/yr
Fuel Heating Value:	1,098 Blu/acf
Operating Hours:	8,760 hrs/yr

#### Notes:

1. Values from Waukesha specification sheet
2. Calculated value
3. Annual fuel consumption is maximum fuel consumption at 100% load.

### Potential Emissions per Engine

Pollutant	Uncontrolled					Controlled					Source of Emissions Factors
	Emission Factor (lb/MMBtu)	(g/bhp-hr)	(lb/hr)	Estimated Emissions <sup>4</sup> (t/yr) <sup>4</sup>	(t/yr) <sup>4</sup>	Emission Factor (lb/MMBtu)	(g/bhp-hr)	(lb/hr)	Estimated Emissions <sup>4</sup> (t/yr) <sup>4</sup>	(t/yr) <sup>4</sup>	
NOx <sup>1,2</sup>	—	13.0	60.00	—	216.42	—	0.64	2.00	—	8.78	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
CO <sup>1,2</sup>	—	12.8	47.41	—	208.04	—	0.51	1.90	—	8.32	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
VOC <sup>1</sup>	—	0.33	1.22	—	6.36	—	0.17	0.61	—	2.68	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
SO <sub>2</sub>	5.88E-04	—	0.082	—	0.04	5.88E-04	—	0.062	—	0.04	AP-42, Chapter 3.2, Table 3.2-3
PM <sub>2.5</sub> /PM <sub>10</sub>	1.94E-02	—	0.27	—	1.19	1.94E-02	—	0.27	—	1.19	AP-42, Chapter 3.2, Table 3.2-3
Total PM	1.94E-02	—	0.27	—	1.19	1.94E-02	—	0.27	—	1.19	AP-42, Chapter 3.2, Table 3.2-3
1,1,2,2-Tetrachloroethane	2.83E-05	—	0.0004	3.11	0.002	2.83E-05	—	0.0004	3.11	0.002	AP-42, Chapter 3.2, Table 3.2-3
1,3-Butadiene	6.63E-04	—	0.008	81.37	0.04	6.63E-04	—	0.008	81.37	0.04	AP-42, Chapter 3.2, Table 3.2-3
Acetaldehyde	2.78E-03	—	0.04	342.43	0.17	2.78E-03	—	0.04	342.43	0.17	AP-42, Chapter 3.2, Table 3.2-3
Acrolein	2.83E-03	—	0.04	322.78	0.16	2.83E-03	—	0.04	322.78	0.16	AP-42, Chapter 3.2, Table 3.2-3
Benzene	1.58E-03	—	0.02	193.92	0.10	1.58E-03	—	0.02	193.92	0.10	AP-42, Chapter 3.2, Table 3.2-3
Ethylbenzene	2.48E-06	—	0.0003	3.04	0.002	2.48E-06	—	0.0003	3.04	0.002	AP-42, Chapter 3.2, Table 3.2-3
Formaldehyde <sup>1</sup>	—	0.05	0.19	1,625	0.81	—	0.01	0.04	390.06	0.20	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
Methanol	3.08E-03	—	0.04	375.97	0.19	3.08E-03	—	0.04	375.97	0.19	AP-42, Chapter 3.2, Table 3.2-3
Methylene Chloride	4.12E-05	—	0.0008	5.08	0.003	4.12E-05	—	0.0008	5.08	0.003	AP-42, Chapter 3.2, Table 3.2-3
PAH	1.41E-04	—	0.002	17.31	0.009	1.41E-04	—	0.002	17.31	0.009	AP-42, Chapter 3.2, Table 3.2-3
Toluene	5.68E-04	—	0.008	88.49	0.09	5.68E-04	—	0.008	88.49	0.03	AP-42, Chapter 3.2, Table 3.2-3
Xylenes	1.86E-04	—	0.003	23.93	0.01	1.86E-04	—	0.003	23.93	0.01	AP-42, Chapter 3.2, Table 3.2-3
Other HAPs <sup>3</sup>	2.10E-04	—	0.003	26.75	0.01	2.10E-04	—	0.003	26.75	0.01	AP-42, Chapter 3.2, Table 3.2-3
<b>Total HAPs</b>			<b>0.35</b>	<b>3,088</b>	<b>1.54</b>			<b>0.21</b>	<b>1,853</b>	<b>0.83</b>	

Pollutant	Emission Factor		Estimated Emissions <sup>4</sup>			Emission Factor		Estimated Emissions <sup>4</sup>			Source of Emissions Factors
	(lb/MMBtu)	(g/bhp-hr)	(lb/hr)	(t/yr) <sup>4</sup>	(t/yr) <sup>4</sup>	(lb/MMBtu)	(g/bhp-hr)	(lb/hr)	(t/yr) <sup>4</sup>	(t/yr) <sup>4</sup>	
CO <sub>2</sub> <sup>1</sup>	—	525	1,944	—	8,533	—	525	1,944	—	8,533	Manufacturer's Specs
CH <sub>4</sub> <sup>1,2</sup>	—	1.58	5.78	—	25.35	—	0.47	1.73	—	7.81	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
N <sub>2</sub> O	0.0001	—	0.003	—	0.01	0.0001	—	0.003	—	0.01	40 CFR Part 98, Subpart C, Table C-2
CO <sub>2e</sub> <sup>2</sup>	—	—	2,050	—	9,171	—	—	1,968	—	8,727	40 CFR Part 98, Subpart A, Table A-1, effective January 2014

#### Notes:

4. Annual Emissions are based on engine operating with 100% fuel of total fuel usage.
5. Due to variable load conditions, the catalyst efficiency may vary. The catalyst efficiencies used in the emissions are typical based on expected operating conditions.

#### Example Calculations

$$\text{lb/hr} = (\text{g/bhp-hr}) * (\text{hp}) * (1 \text{ lb}/453.6 \text{ g}) * (\text{lb/MMBtu}) * (\text{MMBlu/hr})$$

$$\text{t/yr} = (\text{MMblu/yr}) * (\text{Blu/acf}) * (1 \text{ lb}/453.6 \text{ g}) * (\text{g/bhp-hr}) * (\text{Blu/hp-hr}) * (1 \text{ lb}/453.6 \text{ g}) * (1 \text{ ton}/2000 \text{ lb}) \text{ or } (\text{MMblu/yr}) * (\text{Blu/acf}) * (\text{lb/MMBtu}) * (1 \text{ ton}/2000 \text{ lb})$$

### Microturbine Generator Emission Calculations

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Microturbine Generators

**Source Information**

Emission Unit ID:	GEN-1 & GEN-2	
Make/Model:	Capstone C200 Standard	
Microturbine Rating <sup>1</sup>	200	kWe
Number of Microturbines <sup>2</sup>	2	units
Net Heat Rate	10,300	Btu/kWh
Heat Input <sup>1</sup>	2.06	MMBtu/hr
Operating Hours <sup>2</sup>	8,760	hr/yr

Note:

1) Calculated

2) There will be two (2) generators onsite each rated at 200 kWe. Only 200 kWe will be operational at any time while the other 200 kWe unit will be on standby for the full year. Individual units may switch between primary and standby status depending on their need for maintenance. Emissions were calculated based on both units (400 kWe total) operating at full load for 8,760 hours per year, so as to be conservative.

**Potential Emissions per Generator**

Pollutant	Uncontrolled					Controlled					Source of Emissions Factors
	Emission Factor		Estimated Emissions <sup>1</sup>			Emission Factor		Estimated Emissions <sup>1</sup>			
	(lb/MMBtu)	(lb/MWh)	(lb/hr)	(lb/yr)	(tpy)	(lb/MMBtu)	(lb/MWh)	(lb/hr)	(lb/yr)	(tpy)	
NOx	—	0.40	0.08	—	0.35	—	0.40	0.08	—	0.35	Manufacturer Specifications
CO	—	1.10	0.22	—	0.96	—	1.10	0.22	—	0.96	Manufacturer Specifications
VOC	—	0.10	0.02	—	0.09	—	0.10	0.02	—	0.09	Manufacturer Specifications
SO <sub>2</sub>	3.40E-03	—	0.01	—	0.03	3.40E-03	—	0.01	—	0.03	AP-42, Chapter 3.1, Table 3.1-2a
PM <sub>2.5</sub> /PM <sub>10</sub>	6.80E-03	—	0.01	—	0.06	6.80E-03	—	0.01	—	0.06	AP-42, Chapter 3.1, Table 3.1-2a
1,3-Butadiene	4.30E-07	—	8.68E-07	0.01	3.88E-06	4.30E-07	—	8.68E-07	0.008	3.88E-06	AP-42, Chapter 3.1, Table 3.1-3
Acetaldehyde	4.00E-05	—	8.24E-05	0.72	3.81E-04	4.00E-05	—	8.24E-05	0.72	3.81E-04	AP-42, Chapter 3.1, Table 3.1-3
Acrolein	8.40E-06	—	1.32E-05	0.12	5.77E-05	8.40E-06	—	1.32E-05	0.12	5.77E-05	AP-42, Chapter 3.1, Table 3.1-3
Benzene	1.20E-05	—	2.47E-05	0.22	1.08E-04	1.20E-05	—	2.47E-05	0.22	1.08E-04	AP-42, Chapter 3.1, Table 3.1-3
Ethylbenzene	3.20E-05	—	6.59E-05	0.58	2.89E-04	3.20E-05	—	6.59E-05	0.58	2.89E-04	AP-42, Chapter 3.1, Table 3.1-3
Formaldehyde	7.10E-04	—	1.46E-03	12.81	6.41E-03	7.10E-04	—	1.46E-03	12.81	6.41E-03	AP-42, Chapter 3.1, Table 3.1-3
Naphthalene	1.30E-06	—	2.68E-06	0.02	1.17E-05	1.30E-06	—	2.68E-06	0.023	1.17E-05	AP-42, Chapter 3.1, Table 3.1-3
PAH	2.20E-08	—	4.58E-08	0.04	1.99E-08	2.20E-08	—	4.58E-08	0.04	1.99E-08	AP-42, Chapter 3.1, Table 3.1-3
Propylene Oxide	2.90E-05	—	5.97E-05	0.52	2.82E-04	2.90E-05	—	5.97E-05	0.52	2.82E-04	AP-42, Chapter 3.1, Table 3.1-3
Toluene	1.30E-04	—	2.68E-04	2.35	1.17E-03	1.30E-04	—	2.68E-04	2.35	1.17E-03	AP-42, Chapter 3.1, Table 3.1-3
Xylenes	6.40E-05	—	1.32E-04	1.15	5.77E-04	6.40E-05	—	1.32E-04	1.15	5.77E-04	AP-42, Chapter 3.1, Table 3.1-3
Total HAPS			0.002	18.54	0.01			0.002	18.54	0.01	
Pollutant	Emission Factor		Estimated Emissions <sup>1</sup>			Emission Factor		Estimated Emissions <sup>1</sup>			Source of Emissions Factors
	(kg/MMBtu)	(lb/MWh)	(lb/hr)	(lb/yr)	(tpy)	(kg/MMBtu)	(lb/MWh)	(lb/hr)	(lb/yr)	(tpy)	
CO <sub>2</sub>	—	1,330	266	—	1,165	—	1,330	266	—	1,165	Manufacturer Specifications
CH <sub>4</sub>	0.001	—	0.005	—	0.02	0.001	—	0.005	—	0.02	40 CFR Part 98, Subpart C, Table C-2
N <sub>2</sub> O	0.0001	—	0.0005	—	0.002	0.0001	—	0.0005	—	0.002	40 CFR Part 98, Subpart C, Table C-2
CO <sub>2e</sub>	—	—	266	—	1,166	—	—	266	—	1,166	40 CFR Part 98, Subpart A, Table A-1, effective January 2014

**Example Calculations**

lb/hr = (lb/MWh) \* kWe \* (1 MWh/1000 kWe) or (lb/MMBtu) \* (MMBtu/hr) or (kg/MMBtu) \* (MMBtu/hr) \* (2.21 lb/kg)

tpy = (lb/hr) \* (hr/yr) \* (ton/2000 lb)

## Natural Gas Fueled Pre-Heater Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Location:	Doddridge County, West Virginia
Source Description:	Fuel Gas Pre-Heater

### Source Information

Emission Unit ID:	HT-1	
Source Description:	Fuel Gas Pre-Heater	
Hours of Operation	8,760	hr/yr
Design Heat Rate	0.50	MMBtu/hr
Heater Efficiency	80%	
Fuel Heat Value	1,020	Btu/scf
Fuel Use	5.37	MMscf/yr

### Emission Calculations per Heater

Pollutant	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
NO <sub>x</sub>	100	0.061	0.27	AP-42 Ch. 1.4 Table 1.4-1
CO	84	0.051	0.23	AP-42 Ch. 1.4 Table 1.4-1
VOC	5.5	0.0034	0.015	AP-42 Ch. 1.4 Table 1.4-2
PM <sub>10</sub>	7.6	0.0047	0.020	AP-42 Ch. 1.4 Table 1.4-2
SO <sub>2</sub>	0.6	0.00037	0.0016	AP-42 Ch. 1.4 Table 1.4-2
Formaldehyde	0.075	0.000046	0.00020	AP-42 Ch. 1.4 Table 1.4-3
Total HAPs (including HCHO) <sup>1</sup>	1.9	0.0012	0.0051	AP-42 Ch. 1.4 Table 1.4-3
Pollutant	Emission Factor (kg/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
Carbon Dioxide	53.06	58.63	257	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.0011	0.0048	40 CFR Part 98, Subpart C, Table C-2
Nitrous Oxide	0.0001	0.00011	0.00048	40 CFR Part 98, Subpart C, Table C-2
CO <sub>2</sub> e	---	58.69	257	40 CFR Part 98, Subpart A, Table A-1

1. Only those HAP pollutants above detection thresholds were included.

### Sample Calculations:

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MMBtu/hr)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{Heater Efficiency}}$$

$$\text{Emissions (tons/yr)} = \frac{\text{Emission Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)}}{2,000 \text{ (lbs/ton)}}$$

# Dehydrator Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Dehydrator Units

## Potential Emissions per Dehydrator

Pollutant	Emission Unit ID: RSV-1 & RSV-2	
	Dehydrator Still Vent (lb/hr)	(tpy)
<b>Uncontrolled Emissions</b> <sup>1</sup>		
VOC	55.14	241.50
Total HAPs	17.71	77.57
Benzene	1.12	4.91
Toluene	5.85	25.63
Ethylbenzene	0.76	3.33
Xylenes	8.27	36.22
n-Hexane	1.71	7.48
Methane	81.8	358.24
Carbon Dioxide	1.64	7.20
CO <sub>2</sub> e	2,046	8,963
<b>Controlled Emissions</b> <sup>2,3</sup>		
VOC	1.10	4.83
Total HAPs	0.35	1.56
Benzene	0.02	0.10
Toluene	0.12	0.52
Ethylbenzene	0.01	0.07
Xylenes	0.17	0.73
n-Hexane	0.03	0.15
Methane	3.62	15.87
Carbon Dioxide	1.64	7.20
CO <sub>2</sub> e	92.23	404

<sup>1</sup>Output from ProMax for both the still vent and flash tank gas emissions

<sup>2</sup>Controlled emissions assume that the glycol still vent is equipped with a condenser and is controlled by a combustor with 98% control efficiency.

<sup>3</sup>Flash tank gas is used in the reboiler as the primary fuel source. Assumed 95% combustion of flash tank gas.

## Natural Gas Fueled Dehydrator Reboiler Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Location:	Doddridge County, West Virginia
Source Description:	Dehydrator Reboilers

### Source Information

Emission Unit ID:	RBV-1 & RBV-2	
Source Description:	Dehydrator Reboiler	
Hours of Operation	8,760	hr/yr
Design Heat Rate	1.5	MMBtu/hr
Heater Efficiency	0.8	
Fuel Heat Value	1,020	Btu/scf
Fuel Use	16.1	MMscf/yr

### Emission Calculations per Reboiler

Pollutant	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
NO <sub>x</sub>	100	0.18	0.81	AP-42 Ch. 1.4 Table 1.4-1
CO	84	0.15	0.68	AP-42 Ch. 1.4 Table 1.4-1
VOC	5.5	0.01	0.04	AP-42 Ch. 1.4 Table 1.4-2
PM <sub>10</sub>	7.6	0.01	0.06	AP-42 Ch. 1.4 Table 1.4-2
SO <sub>2</sub>	0.6	0.001	0.005	AP-42 Ch. 1.4 Table 1.4-2
Formaldehyde	0.075	0.0001	0.0006	AP-42 Ch. 1.4 Table 1.4-3
Total HAPs (including HCHO)	1.9	0.003	0.02	AP-42 Ch. 1.4 Table 1.4-3
Pollutant	Emission Factor (kg/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
Carbon Dioxide	53.06	175.89	770	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.003	0.015	40 CFR Part 98, Subpart C, Table C-2
Nitrous Oxide	0.0001	0.0003	0.0015	40 CFR Part 98, Subpart C, Table C-2
CO <sub>2e</sub>	---	176.08	771	40 CFR Part 98, Subpart A, Table A-1

### Sample Calculations:

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MMBtu/hr)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{Heater Efficiency}}$$

$$\text{Emissions (tons/yr)} = \frac{\text{Emission Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)}}{2,000 \text{ (lbs/ton)}}$$

# Flare Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Flare for Dehydrator Still Vent Gas
Emission Unit ID:	C-01

### Combusted Gas Emissions

Flare Heat Input :	4.80	MMBtu/hr
Vent Gas to Flare Rate:	4,378	scf/hr
Gas Heating Value:	1,096	Btu/scf
Hours of Operation:	8,760	hr/yr

Pollutant	Emission Factor <sup>1</sup> (lb/MMBtu)	Emissions (lbs/hr)	Emissions (tons/yr)
Particulate Matter (PM/PM <sub>10</sub> /PM <sub>2.5</sub> )	N/A - Smokeless Design		
Nitrogen Oxides (NO <sub>x</sub> )	0.068	0.33	1.43
Carbon Monoxide (CO)	0.37	1.78	7.78

<sup>1</sup> Emission Factors from Table 13.5-1 of AP-42 Section 13.5 (Sept 1991)

### Pilot Emissions

Pilot Heating Value:	1,096	Btu/scf
Hours of Operation:	8,760	hr/yr
Total Pilot Natural Gas Usage:	1.64E-05	MMscf/hr

Pollutant	Emission Factor (lb/MMscf)	Emissions (lbs/hr)	Emissions (tons/yr)
Particulate Matter (PM/PM <sub>10</sub> /PM <sub>2.5</sub> ) <sup>2</sup>	7.6	1.34E-04	5.87E-04
Nitrogen Oxides (NO <sub>x</sub> )	100	1.76E-03	7.72E-03
Sulfur Dioxide (SO <sub>2</sub> ) <sup>2</sup>	0.6	1.06E-05	4.63E-05
Carbon Monoxide (CO) <sup>2</sup>	84	1.48E-03	6.49E-03
Volatile Organic Compounds (VOC) <sup>2</sup>	5.5	9.69E-05	4.25E-04
Total HAPs <sup>2,3</sup>	1.88	3.31E-05	1.45E-04

<sup>2</sup> Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98).

<sup>3</sup> Sum of Emissions Factors published for pollutants classified as "HAPS" under AP-42 Table 1.4-3.

### Total Flare Emissions

Pollutant	Total Potential Emission Rate (tons/year)
Particulate Matter (PM/PM <sub>10</sub> /PM <sub>2.5</sub> )	5.87E-04
Nitrogen Oxides (NO <sub>x</sub> )	1.44
Sulfur Dioxide (SO <sub>2</sub> )	4.63E-05
Carbon Monoxide (CO)	7.79
Volatile Organic Compounds (VOC)	4.25E-04
Total HAPs	1.45E-04

### Greenhouse Gas Emissions

Pollutant	Emission Factor (kg/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
Carbon Dioxide	53.06	562.86	2,465	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.01	0.05	40 CFR Part 98, Subpart C, Table C-2
Nitrogen Dioxide	0.0001	0.001	0.005	40 CFR Part 98, Subpart C, Table C-2
CO <sub>2</sub> e	---	562.86	2,465	40 CFR Part 98, Subpart A, Table A-1

## Storage Tank Flashing Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Settling Tank
Emission Unit ID:	T03

Daily Settling Tank Throughput:	279	BBL/D
Annual Settling Tank Throughput:	4,277,070	GAL/YR
Daily Condensate Throughput:	210	BBL/D
Annual Condensate Throughput:	3,219,300	GAL/YR
Daily Produced Water Throughput:	69	BBL/D
Annual Produced Water Throughput:	1,057,770	GAL/YR

1. The condensate is routed first to the "Settling Tank", T03 where it is assumed flashing occurs.
2. Liquids are stabilized in the settling tank prior to transfer to the condensate tanks and produced water tanks.

Uncontrolled Total Flash Emissions						
	VOCs		HAPs		CO2e	
Hourly Uncontrolled Emissions from Flashing:	73.56	lb/hr	1.05	lb/hr	525.46	lb/hr
Annual Uncontrolled Emissions from Flashing:	322.21	tons/yr	4.60	tons/yr	2,301.52	tons/yr

Controlled Total Flash Emissions						
	VOCs		HAPs		CO2e	
Hourly Controlled Emissions from Flashing:	1.47	lb/hr	0.02	lb/hr	10.51	lb/hr
Annual Controlled Emissions from Flashing:	6.44	tons/yr	0.09	tons/yr	46.03	tons/yr

Note: Flashing emissions from ProMax simulation, stream #43 (settling tank flash).

**Notes:**

3. Methane emissions estimated assuming 70% VOC and 20% CH4 in tank vent gas.
4. HAP emissions estimated assuming 1% HAPs in the tank vent gas.
5. Tanks are controlled by a VRU with assumed 98% capture efficiency; but will likely be higher as vapors are recycled back into the system.
6. C-08 is the primary VRU to collect storage tank vapors and C-09 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown. In the unlikely event that both C-08 and C-09 are under maintenance or are shutdown, a bypass system is in place to route tank vapors to the facility inlet. The VRU compressor is equipped to recover wet and dry gas and has a VFD to adapt the operating speed for varying environmental pressures and temperatures. Lastly, both VRUs are equipped with automatic monitoring, shutdown, and alert systems with sensors to detect temperature, pressure, liquid levels, suction pressure, and motor overload.

## Storage Tank Working and Breathing Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Condensate, Settling, and Produced Water Tanks
Emission Unit ID:	T01, T02, T03, T04, and T05

TANK DESCRIPTION	Uncontrolled VOC Emissions <sup>1</sup> (tons/yr)	Uncontrolled CH <sub>4</sub> Emissions <sup>3</sup> (tons/yr)	Uncontrolled CO <sub>2</sub> e Emissions (tons/yr)	Uncontrolled HAP Emissions <sup>4</sup> (tons/yr)
400 bbl Hydrocarbon Storage Tank (T04)	4.33	1.24	30.94	0.06
400 bbl Hydrocarbon Storage Tank (T05)	4.33	1.24	30.94	0.06
400 bbl Settling Tank (T03)	6.27	1.79	44.76	0.09
400 bbl Produced Water Storage Tank <sup>2</sup> (T01)	0.34	0.10	2.41	0.005
400 bbl Produced Water Storage Tank <sup>2</sup> (T02)	0.34	0.10	2.41	0.005
<b>TOTAL</b>	<b>15.60</b>	<b>4.46</b>	<b>111.46</b>	<b>0.22</b>

TANK DESCRIPTION	Controlled VOC Emissions <sup>5</sup> (tons/yr)	Controlled CH <sub>4</sub> Emissions <sup>5</sup> (tons/yr)	Controlled CO <sub>2</sub> e Emissions <sup>5</sup> (tons/yr)	Controlled HAP Emissions <sup>5</sup> (tons/yr)
400 bbl Hydrocarbon Storage Tank (T04)	0.09	0.02	0.62	0.001
400 bbl Hydrocarbon Storage Tank (T05)	0.09	0.02	0.62	0.001
400 bbl Settling Tank (T03)	0.13	0.04	0.90	0.002
400 bbl Produced Water Storage Tank <sup>2</sup> (T01)	0.007	0.002	0.05	0.0001
400 bbl Produced Water Storage Tank <sup>2</sup> (T02)	0.007	0.002	0.05	0.0001
<b>TOTAL</b>	<b>0.31</b>	<b>0.09</b>	<b>2.23</b>	<b>0.004</b>

Notes:

1. Tanks 4.0.9d used to calculate standing, working, and breathing (S,W,B) emissions.
2. Produced water assumed to have no more than 10% hydrocarbon liquid.
3. Methane emissions estimated assuming 70% VOC and 20% CH<sub>4</sub> in tank vent gas.
4. HAP emissions estimated assuming 1% HAPs in the tank vent gas.
5. Tanks are controlled by a VRU with assumed 98% capture efficiency; but will likely be higher as vapors are recycled back into the system.
6. C-08 is the primary VRU to collect storage tank vapors and C-09 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown. In the unlikely event that both C-08 and C-09 are under maintenance or are shutdown, a bypass system is in place to route tank vapors to the facility inlet. The VRU compressor is equipped to recover wet and dry gas and has a VFD to adapt the operating speed for varying environmental pressures and temperatures. Lastly, both VRUs are equipped with automatic monitoring, shutdown, and alert systems with sensors to detect temperature, pressure, liquid levels, suction pressure, and motor overload.

## Truck Loading Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Production Liquids Truck Loadout
Emission Unit ID:	EPLOR

**AP - 42, Chapter 5.2**  $L_L = 12.46 \times S \times P \times M / T$

$L_L$  = Loading Loss Emission Factor (lbs VOC/1000 gal loaded)  
 S = Saturation Factor  
 P = True Vapor Pressure of the Loaded Liquid (psia)  
 M = Vapor Molecular Weight of the Loaded Liquid (lbs/lbmol)  
 T = Temperature of Loaded Liquid (°R)

**VOC Emissions (tpy)** =  $L_L$  (lbs VOC/1000 gal) \* 42 gal/bbl \* 365 days/year \* production (bbl/day)  
 1000 gal \* 2000 lbs/ton

Source	S <sup>1</sup>	P (psia) <sup>2</sup>	M <sup>3</sup>	T (°F) <sup>4</sup>	T (°R)	L <sub>L</sub> (lb/1000 gal)	Production (bbl/day)	Uncontrolled		
								VOC (tpy)	HAP <sup>6</sup> (tpy)	CO <sub>2</sub> e <sup>7</sup> (tpy)
Condensate	0.6	5.2	66	60	519.67	4.94	210	7.95	0.11	56.77
Produced Water <sup>5</sup>	0.6	5.2	66	60	519.67	0.49	69	0.26	0.004	1.87

- Notes:
- Saturation factor from AP-42, Table 5.2-1 (Submerged loading (bottom loading): dedicated normal service).
  - True vapor pressure is estimated from AP-42, Table 7.1-2 assuming an average daily temperature of 60 deg F and an RVP of 10.
  - Molecular weight liquid vapor is estimated from AP-42, Table 7.1-2 assuming an RVP of 10.
  - Temperature based on the annual average temperature for Charleston, West Virginia.
  - Produced water assumed to have no more than 10% hydrocarbon liquid.
  - HAP emissions estimated from % HAP/%VOC from condensate vent gas.
  - CO<sub>2</sub>e emissions estimated from % CH<sub>4</sub>/%VOC from condensate vent gas.

Assume 1 truck loaded per hour, 260 bbl truck, for short term emissions

Source	S <sup>1</sup>	P (psia) <sup>2</sup>	M <sup>3</sup>	T (°F) <sup>4</sup>	T (°R)	L <sub>L</sub> (lb/1000 gal)	Loading bbl/hr	Uncontrolled		
								VOC (lb/hr)	HAP <sup>6</sup> (lb/hr)	CO <sub>2</sub> e <sup>7</sup> (lb/hr)
Condensate	0.6	5.2	66	60	519.67	4.94	260	53.92	0.77	385.1
Produced Water <sup>5</sup>	0.6	5.2	66	60	519.67	0.49	260	5.39	0.08	38.51

## Component Fugitive Emissions

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Fugitive Emissions - Component Leaks

VOC Fugitive Emissions						
Equipment Type and Service	Number of Units <sup>1</sup>	Hours of Operation (hours/yr)	THC Emission Factor <sup>2</sup> (kg/hr-unit)	VOC Weight Fraction <sup>3</sup>	THC Emissions (tpy)	VOC Emissions (tpy)
Flanges - Gas Service	1,555	8,760	3.90E-04	0.14	5.87	0.81
Valves - Gas Service	761	8,760	4.50E-03	0.14	33.15	4.58
<b>Total Emissions (tons/yr)</b>					<b>39.02</b>	<b>5.39</b>

HAPs Fugitive Emissions								
Equipment Type and Service	Benzene Weight Fraction <sup>3</sup>	Benzene Emissions (tpy)	Toluene Weight Fraction <sup>2</sup>	Toluene Emissions (tpy)	Ethylbenzene Weight Fraction <sup>2</sup>	Ethylbenzene Emissions (tpy)	Xylene Weight Fraction <sup>2</sup>	Xylene Emissions (tpy)
Flanges - Gas Service	7.66E-05	0.0004	2.82E-04	0.0017	4.19E-05	0.0002	3.82E-04	0.0022
Valves - Gas Service	7.66E-05	0.003	2.82E-04	0.009	4.19E-05	0.0014	3.82E-04	0.013
<b>Total Emissions (tons/yr)</b>		<b>0.003</b>		<b>0.01</b>		<b>0.002</b>		<b>0.01</b>

1) Component counts from Engineering Lists.

2) API average emission factors are for oil and gas production operations - Table 2.4, EPA Protocol for Equipment Leak Emission Estimates - 1995.

3) Gas weight fractions from representative analyses from nearby facility.

GHG Fugitive Emissions								
Equipment Type	Number of Units <sup>1</sup>	Hours of Operation (hours/yr)	Emission Factor <sup>2</sup> (scf/hr-unit)	CH <sub>4</sub> Concentration <sup>3</sup>	CO <sub>2</sub> Concentration <sup>3</sup>	CH <sub>4</sub> Emissions (tpy)	CO <sub>2</sub> Emissions (tpy)	CO <sub>2</sub> e Emissions (tpy)
Flanges	1,555	8,760	0.003	0.98	0.011	0.77	0.02	19.15
Valves	761	8,760	0.027	0.98	0.011	3.37	0.10	84.34
<b>Total Emissions (tons/yr)</b>						<b>4.13</b>	<b>0.13</b>	<b>103.49</b>

1) Component counts from Engineering Lists.

2) Emission factors from 40 CFR Part 98 Subpart W, Table W1-A; Gas service.

3) CH<sub>4</sub> and CO<sub>2</sub> concentrations as defined in 40 CFR Part 98.233(r).

## Fugitive Emissions From Venting Episodes

Company:	Antero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Fugitive Emissions-Venting Episodes

VOC Venting Emissions						
Type of Event <sup>1</sup>	Number Of Events (event/yr)	Amount Vented per Event (scf/event)	Molecular Weight of Vented Gas (lb/lb-mol)	Total Emissions (ton/yr)	VOC Weight Fraction <sup>3</sup>	VOC Emissions (ton/yr)
Compressor Blowdown <sup>2</sup>	144	15,000	19.81	56.37	0.14	7.71
Plant Shutdown	2	100,000	19.81	5.22	0.14	0.71
Pigging Venting	52	1,000	19.81	1.36	0.14	0.19
<b>Total Emissions (tons/yr)</b>						<b>8.61</b>

HAPs Venting Emissions								
Type of Event <sup>1</sup>	Benzene Weight Fraction <sup>3</sup>	Benzene Emissions (tpy)	Toluene Weight Fraction <sup>3</sup>	Toluene Emissions (tpy)	Ethylbenzene Weight Fraction <sup>3</sup>	Ethylbenzene Emissions (tpy)	Xylene Weight Fraction <sup>3</sup>	Xylene Emissions (tpy)
Compressor Blowdown <sup>2</sup>	7.59E-05	0.004	0.00028	0.016	4.15E-05	0.0023	3.78E-04	0.021
Plant Shutdown	7.59E-05	0.000	0.00028	0.001	4.15E-05	0.0002	3.78E-04	0.0020
Pigging Venting	7.59E-05	0.0001	0.00028	0.0004	4.15E-05	0.00006	3.78E-04	0.00051
<b>Total Emissions (tons/yr)</b>		<b>0.005</b>		<b>0.02</b>		<b>0.003</b>		<b>0.02</b>

GHG Venting Emissions								
Type of Event <sup>1</sup>	Number Of Events (event/yr)	Amount Vented per Event (scf/event)	Molecular Weight of Vented Gas (lb/lb-mol)	CH <sub>4</sub> Weight Fraction <sup>3</sup>	CO <sub>2</sub> Weight Fraction <sup>3</sup>	CH <sub>4</sub> Emissions (ton/yr)	CO <sub>2</sub> Emissions (ton/yr)	CO <sub>2</sub> e Emissions (tpy)
Compressor Blowdown <sup>2</sup>	144	15,000	19.81	0.66	0.0040	37.20	0.23	930.27
Plant Shutdown	2	100,000	19.81	0.66	0.0040	3.44	0.02	86.14
Pigging Venting	52	1,000	19.81	0.66	0.0040	0.90	0.005	22.40
<b>Total Emissions (tons/yr)</b>						<b>41.54</b>	<b>0.25</b>	<b>1,038.80</b>

1) Estimated number of events and venting per event from engineering based on other facilities.

2) Total number of compressor blowdowns based on 12 blowdowns per compressor.

3) Weight Fraction is from a gas analysis that will be typical for the facility.

## Fugitive Dust Emissions

Company:	Artero Midstream LLC
Facility Name:	New Milton Compressor Station
Facility Location:	Doddridge County, West Virginia
Source Description:	Fugitive Dust Emissions

Gravel Access Road	Loaded Truck Weight <sup>1</sup>	Trips per year <sup>2</sup>	Trips per day <sup>2</sup>	Distance per round trip (truck in and out) <sup>3</sup>		VMT per year <sup>4</sup>
	tons			feet	miles	miles
Condensate Tank Truck	40.00	365	1.0	8,600	1.63	595
Produced Water Tank Truck	40.00	365	1.0	8,600	1.63	595

Equation Parameter	PM-10/PM2.5	PM-Total
E, annual size-specific emission factor for PM <sub>10</sub> & PM <sub>2.5</sub> (upaved industrial roads) extrapolated for natural mitigation <sup>5</sup>	see table below	see table below
k, Particle size multiplier for particle size range (PM <sub>10</sub> ), (lb/VMT) (Source: AP-42 Table 13.2.2-2)	1.5	4.9
k, Particle size multiplier for particle size range (PM <sub>2.5</sub> ), (lb/VMT) (Source: AP-42 Table 13.2.2-2)	0.15	
s, surface material silt content, (%) (Source: AP-42 Table 13.2.2-1)	4.8	4.8
W, mean weight (tons) of the vehicles traveling the road	40.00	40.00
a, constant for PM <sub>10</sub> and PM <sub>2.5</sub> on industrial roads (Source: AP-42 Table 13.2.2-2)	0.9	0.7
b, constant for PM <sub>10</sub> and PM <sub>2.5</sub> on industrial roads (Source: AP-42 Table 13.2.2-2)	0.45	0.45
P, number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, based on AP-42 Figure 13.2.2-1.	160	160

$$E = \left[ k \left( \frac{s}{12} \right)^a \times \left( \frac{W}{3} \right)^b \right] \times (365 - P/365)$$

Source of Equation: AP-42 Section 13.2.2

### PM<sub>10</sub> Emissions

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr) <sup>4</sup>	Annual Uncontrolled PM <sub>10</sub> Emissions (tpy)
1.18	1,189.02	0.70

### PM<sub>2.5</sub> Emissions (tons/yr)

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr) <sup>4</sup>	Annual Uncontrolled PM <sub>2.5</sub> Emissions (tpy)
0.118	1,189.02	0.070

### PM- Total Emissions (tons/yr)

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr) <sup>4</sup>	Annual Uncontrolled PM-Total Emissions (tpy)
4.65	1,189.02	2.76

#### Table Notes:

1. Loaded truck weight is based on typical weight limit for highway vehicles.
2. Based on production, it's assumed a maximum of one condensate truck (200 bbl truck) and one produced water truck (200 bbl truck) will be onsite per day.
3. Distance per round trip is based on the proposed site layout. The one way distance is measured as 4,300 feet for the gravel access road (see plot plan).
4. VMT/yr = Trips/yr x Roundtrip Distance
5. Hourly emissions determined from tons per year calculation using 2,000 lb/ton and 8,760 hours per year.

# Facility Gas Analysis

	MOL %	MW	Component Weight lb/lb-mol	Wt. Fraction
Methane	81.496	16.04	13.07	0.660
Ethane	12.745	30.07	3.83	0.193
Propane	3.210	44.10	1.42	0.071
i-Butane	0.412	58.12	0.24	0.012
n-Butane	0.686	58.12	0.40	0.020
i-Pentane	0.183	72.15	0.13	0.007
n-Pentane	0.154	72.15	0.11	0.006
Hexanes	0.122	74.65	0.09	0.005
Heptanes	0.123	77.65	0.10	0.005
Octanes	0.109	80.65	0.09	0.004
Nonanes	0.053	84.65	0.045	0.002
Decanes	0.036	86.15	0.03	0.002
n-Hexane	0.063	74.15	0.05	0.002
Benzene	0.002	75.15	0.00	0.0001
Toluene	0.007	79.15	0.01	0.0003
Ethylbenzene	0.001	82.15	0.00	0.00004
Xylenes	0.009	83.15	0.01	0.0004
Nitrogen	0.409	28.02	0.11	0.006
Carbon Dioxide	0.180	43.99	0.08	0.004
Water	0.000	18.02	0.00	0.000
Totals	100.0		19.81	1.00

Heating Value (Btu/scf)            1,096.30  
Molecular weight                        19.81

VOC weight fraction                    0.1368  
Methane weight fraction                0.6599  
THC weight fraction                    0.9902  
VOC of THC wt fraction                0.1381  
CH4 of THC wt fraction                0.666  
Benzene of THC wt fraction            0.0001  
Toluene of THC wt fraction            0.0003  
E-benzene of THC wt fraction        0.00004  
Xylene of THC wt fraction             0.0004  
n-Hexane of THC wt fraction         0.0024

**Tanks 4.0.9d**  
**Condensate Tanks (T-04 and T-05)**

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification: New Milton Compressor Station  
City:   
State: West Virginia  
Company:   
Type of Tank: Vertical Fixed Roof Tank  
Description: One (1) 400-bbl Condensate Tank

**Tank Dimensions**

Shell Height (ft): 20.00  
Diameter (ft): 12.00  
Liquid Height (ft) : 19.00  
Avg. Liquid Height (ft): 10.00  
Volume (gallons): 16,074.56  
Turnovers: 100.14  
Net Throughput(gal/yr): 1,609,650.00  
Is Tank Heated (y/n): N

**Paint Characteristics**

Shell Color/Shade: Gray/Medium  
Shell Condition: Good  
Roof Color/Shade: Gray/Medium  
Roof Condition: Good

**Roof Characteristics**

Type: Dome  
Height (ft) 1.00  
Radius (ft) (Dome Roof) 12.00

**Breather Vent Settings**

Vacuum Settings (psig): -0.03  
Pressure Settings (psig) 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Liquid Contents of Storage Tank**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	63.43	53.80	73.25	66.06	5.5366	4.5731	8.6830	86.0000			92.00	Option 4: RVP=10, ASTM Slope=3

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

**Annual Emission Calculations**

<b>Standing Losses (lb):</b>	<b>2,130.7222</b>
Vapor Space Volume (cu ft):	1,188.0458
Vapor Density (lb/cu ft):	0.0851
Vapor Space Expansion Factor:	0.3081
Vented Vapor Saturation Factor:	0.2448
<b>Tank Vapor Space Volume:</b>	
Vapor Space Volume (cu ft):	1,188.0458
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.5046
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.5046
<b>Roof Outage (Dome Roof)</b>	
Roof Outage (ft):	0.5046
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
<b>Vapor Density</b>	
Vapor Density (lb/cu ft):	0.0851
Vapor Molecular Weight (lb/lb-mole):	86.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5386
Daily Avg. Liquid Surface Temp. (deg. R):	523.0982
Daily Average Ambient Temp. (deg. F):	64.9833
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	517.7383
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
<b>Vapor Space Expansion Factor</b>	
Vapor Space Expansion Factor:	0.3081
Daily Vapor Temperature Range (deg. R):	39.3148
Daily Vapor Pressure Range (psia):	2.0888
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5386
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.5731
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	6.8830
Daily Avg. Liquid Surface Temp. (deg R):	523.0982
Daily Min. Liquid Surface Temp. (deg R):	513.2675
Daily Max. Liquid Surface Temp. (deg R):	532.9249
Daily Ambient Temp. Range (deg. R):	21.6333
<b>Vented Vapor Saturation Factor</b>	
Vented Vapor Saturation Factor:	0.2448
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5386
Vapor Space Outage (ft):	10.5046
<b>Working Losses (lb):</b>	<b>8,533.2582</b>
Vapor Molecular Weight (lb/lb-mole):	86.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5386
Annual Net Throughput (gal/yr):	1,608,850.0000
Annual Turnovers:	193.1385
Turnover Factor:	0.4683
Maximum Liquid Volume (gal):	16,074.5828
Maximum Liquid Height (ft):	18.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
<b>Total Losses (lb):</b>	<b>8,663.9804</b>

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	6,533.26	2,130.72	8,663.98

**Tanks 4.0.9d**  
**Produced Water Tanks (T-01 and T-02)**

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	New Milton Compressor Station
City:	
State:	West Virginia
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	One (1) 400-bbl Produced Water Tank

**Tank Dimensions**

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	19.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,074.56
Turnovers:	32.90
Net Throughput(gal/yr):	528,885.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	Gray/Medium
Shell Condition:	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

**Roof Characteristics**

Type:	Dome
Height (ft)	1.00
Radius (ft) (Dome Roof)	12.00

**Breather Vent Settings**

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Liquid Contents of Storage Tank**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mcl. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mcl. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	63.43	53.60	73.25	58.08	5.5386	4.5731	6.6630	86.0000			92.00	Option 4: RVP=10, ASTM Slope=3

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

**Annual Emission Calculations**

<b>Standing Losses (lb):</b>	<b>2,130.7222</b>
Vapor Space Volume (cu ft):	1,188.0458
Vapor Density (lb/cu ft):	0.0651
Vapor Space Expansion Factor:	0.3061
Vented Vapor Saturation Factor:	0.2446
<b>Tank Vapor Space Volume:</b>	
Vapor Space Volume (cu ft):	1,188.0458
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.5048
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.5048
<b>Roof Outage (Dome Roof)</b>	
Roof Outage (ft):	0.5048
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
<b>Vapor Density</b>	
Vapor Density (lb/cu ft):	0.0651
Vapor Molecular Weight (lb/lb-mole):	86.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5388
Daily Avg. Liquid Surface Temp. (deg. R):	523.0982
Daily Average Ambient Temp. (deg. F):	54.9533
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	517.7333
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insolation Factor (Btu/hr-ft day):	1,250.5726
<b>Vapor Space Expansion Factor</b>	
Vapor Space Expansion Factor:	0.3061
Daily Vapor Temperature Range (deg. R):	39.3148
Daily Vapor Pressure Range (psia):	2.0589
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5388
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.5731
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	8.8830
Daily Avg. Liquid Surface Temp. (deg R):	523.0982
Daily Min. Liquid Surface Temp. (deg R):	519.2675
Daily Max. Liquid Surface Temp. (deg R):	532.9248
Daily Ambient Temp. Range (deg. R):	21.5333
<b>Vented Vapor Saturation Factor</b>	
Vented Vapor Saturation Factor:	0.2446
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5388
Vapor Space Outage (ft):	10.5048
<b>Working Losses (lb):</b>	<b>4,603.9807</b>
Vapor Molecular Weight (lb/lb-mole):	86.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5388
Annual Net Throughput (gal/yr.):	528,885.0000
Annual Turnovers:	32.9020
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	18,074.5828
Maximum Liquid Height (ft):	19.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
<b>Total Losses (lb):</b>	<b>6,734.7029</b>

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 10)	4,603.98	2,130.72	6,734.70

**Tanks 4.0.9d**  
**Settling Tank (T-03)**

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	New Milton Compressor Station
City:	West Virginia
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	One (1) 400-bbl Settling Tank

**Tank Dimensions**

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	19.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,074.56
Turnovers:	266.08
Net Throughput(gal/yr):	4,277,070.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	Gray/Medium
Shell Condition:	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

**Roof Characteristics**

Type:	Dome
Height (ft)	1.00
Radius (ft) (Dome Roof)	12.00

**Breather Vent Settings**

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Liquid Contents of Storage Tank**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	63.43	53.60	73.25	58.06	5.5388	4.5731	6.8630	68.0000			92.00	Option 4: RVP=10, ASTM Slope=3

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Annual Emission Calculations	
Standing Losses (lb):	2,130.7222
Vapor Space Volume (cu ft):	1,168.0456
Vapor Density (lb/cu ft):	0.0651
Vapor Space Expansion Factor:	0.3081
Vented Vapor Saturation Factor:	0.2448
<b>Tank Vapor Space Volume:</b>	
Vapor Space Volume (cu ft):	1,168.0456
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.5046
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.5046
<b>Roof Outage (Dome Roof)</b>	
Roof Outage (ft):	0.5046
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
<b>Vapor Density</b>	
Vapor Density (lb/cu ft):	0.0651
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5396
Daily Avg. Liquid Surface Temp. (deg. R):	523.0982
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	617.7333
Tank Paint Solar Absorptance (Shell):	0.6600
Tank Paint Solar Absorptance (Roof):	0.6600
Daily Total Solar Insulation Factor (Btu/req ft day):	1,250.5726
<b>Vapor Space Expansion Factor</b>	
Vapor Space Expansion Factor:	0.3081
Daily Vapor Temperature Range (deg. R):	39.3149
Daily Vapor Pressure Range (psia):	2.0699
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5396
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.5731
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	6.6630
Daily Avg. Liquid Surface Temp. (deg R):	523.0982
Daily Min. Liquid Surface Temp. (deg R):	513.2875
Daily Max. Liquid Surface Temp. (deg R):	532.9249
Daily Ambient Temp. Range (deg. R):	21.5333
<b>Vented Vapor Saturation Factor</b>	
Vented Vapor Saturation Factor:	0.2448
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5396
Vapor Space Outage (ft):	10.5046
<b>Working Losses (lb):</b>	
Working Losses (lb):	10,403.2710
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.5396
Annual Net Throughput (gal/yr.):	4,277,070.0000
Annual Turnovers:	286.0769
Turnover Factor:	0.2794
Maximum Liquid Volume (gal):	16,074.6628
Maximum Liquid Height (ft):	16.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
<b>Total Losses (lb):</b>	<b>12,533.9932</b>

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**New Milton Compressor Station - Vertical Fixed Roof Tank**

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	10,403.27	2,130.72	12,533.99

**Attachment O.**  
**Monitoring, Recordkeeping, Reporting, and Testing Plans**

# Monitoring, Recordkeeping, Reporting, and Testing Plans

The following is a summary of the methods to comply with the requirements of West Virginia Division of Air Quality (WVDAQ) 45CSR13 rules and regulations for the New Milton Compressor Station, including federal and state regulatory requirements.

## 1. Summary of Key Operational Throughput Limits

- a. Maximum wet gas throughput into each Dehy: 60 MMscf/day or 21,900 MMscf/year.
- b. Maximum liquids loaded out: 4,277,070 gallons per year.
- c. Maximum fuel use of all compressor engines is 671.72 MMscf/year

## 2. Operational Requirements

- a. Compressor engines will operate with the catalytic converter in place at all times and will be fueled by natural gas only.
- b. Catalysts installed on all compressor engines will be operated per manufacturer instructions.
- c. Replace reciprocating compressor rod packing within 36 months of last packing/startup or within 26,000 operating hours, whichever comes first.
- d. Microturbines must be fueled by natural gas only.
- e. Operate each Dehy Reboiler at no more than 1.5 MMBtu/hr and fuel only by natural gas or off-gases from the Dehydrator flash tanks.
- f. No fuel-burning unit of any kind will have opacity greater than 10 percent based on a six minute block average observation.
- g. The Dehy Flare capacity will not exceed 4.80 MMBtu/hr, will achieve 98 percent destruction efficiency, will operate at all times that gas is vented to it, will have a flame present at all times, and will have no visible emissions other than for periods not to exceed a total of 5 minutes during any 2 consecutive hours.
- h. The flare will be operated per manufacturer instructions.
- i. Produced water, Condensate, and Settling storage tanks potential emissions shall be routed to the VRU with recovery greater than 98 percent at all times.
- j. Storage tanks must be covered and routed to a closed vent system with no detectable emissions.
- k. Liquid loadout trucks must use the submerged-fill method.
- l. Dehydrator still vents must be controlled by the flare.

## 3. Monitoring

- a. Non-certified engines must be stack tested within 1 year of startup and every 8,760 hours of operation thereafter.
- b. Monitor catalyst inlet temperature.
- c. Monitor compressor run time or track number of months since compressor rod repacking.

- d. Monitor daily, monthly, and rolling 12-month average wet gas throughput for the Dehy.
- e. Conduct an initial Method 22 observation of the Reboiler exhaust and flare for a minimum of 2 hours.
- f. Conduct monthly Method 22 observations of the Reboiler exhaust and flare for a minimum of 10 minutes each.
- g. Conduct monthly olfactory, visual, and auditory inspections of the tanks closed vent and control system (flare) for leaks or defects that could result in emissions. Repair leaks as soon as practicable (no later than 5 days for first attempt).
- h. Continuously monitor presence of flare flame.
- i. Monitor monthly and rolling twelve-month average amount of liquids loaded out.

#### **4. Recordkeeping**

- a. Keep records on-site for a minimum of 2 years, and in company records (on or off-site) for a minimum of 5 years.
- b. Keep records of inspection, observations, preventive maintenance, malfunctions, and shutdowns of all onsite equipment.
- c. Keep records of the date, time, duration of each time that a flame is not present at the flare and startup, shutdown, malfunctions of the flare.
- d. Keep records of engine maintenance and engine run time.
- e. Keep records of catalyst inlet temperature.
- f. Keep records of the actual annual average natural gas throughput in the dehy.

#### **5. Notifications and Reports**

- a. Notify WVDAQ within 30 calendar days of startup.
- b. Upon startup, file a Certificate to Operate (CTO) application and pay fees to WVDAQ for the period from startup to the following June 30 and then annually renew the CTO and pay fees. Maintain CTO on-site.
- c. File an annual report of compliance with 40 CFR 60 Subpart OOOO for the compressors and storage tanks (for settling tank only) within 90 days after one year of operation (i.e., within 90 days after 12 months after initial startup).
- d. For stack testing, file protocol at least 30 days prior to test and notify WVDAQ and EPA of the test at least 15 days prior to test. Report results within 60 days of test.
- e. If operations are suspended for 60 days or more, notify WVDAQ within 2 weeks after the 60<sup>th</sup> day.

**Attachment P.  
Public Notice**

## **AIR QUALITY PERMIT NOTICE**

### **Notice of Application**

Notice is given that Antero Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a modification to the existing 45CSR13 Construction Permit R13-3106 for a Natural Gas Compressor Station located 0.3 miles west of New Milton in Doddridge County, West Virginia. The latitude and longitude coordinates are: 39.2290N, 80.6874W.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: Nitrogen Oxides (NO<sub>x</sub>) – 56.68 tons per year (tpy); Carbon Monoxide (CO) – 61.22 tpy; Volatile Organic Compounds (VOC) – 54.99; Particulate Matter less than 10 µm (PM<sub>10</sub>) – 8.11 tpy; Particulate Matter less than 2.5 µm (PM<sub>2.5</sub>) – 7.48 tpy; Sulfur Dioxide (SO<sub>2</sub>) – 0.29 tpy; Formaldehyde – 1.18 tpy; Benzene – 2.79 tpy; Toluene – 0.24 tpy; Ethylbenzene – 0.14 tpy; Xylenes – 1.56 tpy; and Carbon Dioxide equivalent (CO<sub>2e</sub>) – 61,017 tpy.

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated the 5th day of January 2015.

By: Antero Midstream LLC  
Luz C. Slauter  
Midstream Environmental Manager  
1615 Wynkoop Street  
Denver, CO 80202

**Attachment R.  
Authority/Delegation of Authority**

**Attachment R  
AUTHORITY OF CORPORATION  
OR OTHER BUSINESS ENTITY (DOMESTIC OR FOREIGN)**

TO: The West Virginia Department of Environmental Protection,  
Division of Air Quality

DATE: January 5, 2015

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 46-5517375

The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which is used in the conduct of an incorporated business or other business entity.

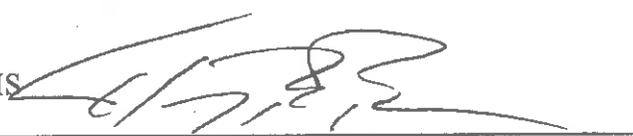
Further, the corporation or the business entity certifies as follows:

(1) Luz Slauter and Lou Ann Lee (is/are) the authorized representative(s) and in that capacity may represent the interest of the corporation or the business entity and may obligate and legally bind the corporation or the business entity.

(2) The corporation or the business entity is authorized to do business in the State of West Virginia.

(3) If the corporation or the business entity changes its authorized representative(s), the corporation or the business entity shall notify the Director of the West Virginia Department of Environmental Protection, Division of Air Quality, immediately upon such change.

Troy Roach, Vice President - EHS



\_\_\_\_\_  
President or Other Authorized Officer  
(Vice President, Secretary, Treasurer or other  
official in charge of a principal business function of  
the corporation or the business entity)

(If not the President, then the corporation or the business entity must submit certified minutes or bylaws stating legal authority of other authorized officer to bind the corporation or the business entity).

\_\_\_\_\_  
Secretary

Antero Midstream LLC  
Name of Corporation or business entity

A copy of the Air Quality Permit Notice for the advertisement is included as Attachment P. As the Notice is being submitted simultaneously with the application, the official affidavit of publication will be submitted to the Division of Air Quality separately once it is completed.

Please call if you have any questions or if I can be of further assistance. I can be reached at (719)632-3593 or by email at [msteyskal@kleinfelder.com](mailto:msteyskal@kleinfelder.com).

Sincerely,  
Kleinfelder



Michele Steyskal  
Air Quality Specialist

Enclosures: New Milton Compressor Station R13-3106 Permit Modification

**Antero Midstream LLC**

**New Milton Compressor Station**



**NSR Permit R13-3106 Modification  
West Virginia Department of Environmental Protection  
Division of Air Quality  
45CSR13**

**Doddridge County, West Virginia**

**January 2015**

**Prepared by:**



**1801 California Street, Suite 1100  
Denver, CO 80202  
(303) 237-6601  
Fax (303) 237-6602  
[www.kleinfelder.com](http://www.kleinfelder.com)**

Copyright 2015 Kleinfelder  
DEN14O09880

## **Table of Contents**

	45CSR13 Application Form
	Discussion of Nearby Facilities
Attachment A.	Business Certificate
Attachment B.	Area Map
Attachment C.	Installation and Startup Schedule
Attachment D.	Regulatory Discussion
Attachment E.	Plot Plan
Attachment F.	Process Flow Diagram
Attachment G.	Process Description
Attachment H.	Material Safety Data Sheets
Attachment I.	Emission Units Table
Attachment J.	Emission Point Data Summary Sheet
Attachment K.	Fugitive Emissions Data Summary Sheet
Attachment L.	Emissions Unit Data Sheets
	a. Compressor Engines
	b. Generator
	c. Catalytic Heater
	d. Dehydrator
	e. Storage Tanks
	f. Bulk Loading and Fugitives
Attachment M.	Air Pollution Control Device Sheets
	a. NSCR Catalysts
	b. Flare
	c. Vapor Recovery Unit
Attachment N.	Supporting Emissions Calculations
	a. Emission Calculations
	b. Tanks 4.0.9d
Attachment O.	Monitoring, Recordkeeping, Reporting, and Testing Plans
Attachment P.	Public Notice
Attachment R.	Authority/Delegation of Authority



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**DIVISION OF AIR QUALITY**  
 601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304  
 (304) 926-0475  
[www.dep.wv.gov/daq](http://www.dep.wv.gov/daq)

**APPLICATION FOR NSR PERMIT  
 AND  
 TITLE V PERMIT REVISION  
 (OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):  
 CONSTRUCTION     MODIFICATION     RELOCATION  
 CLASS I ADMINISTRATIVE UPDATE     TEMPORARY  
 CLASS II ADMINISTRATIVE UPDATE     AFTER-THE-FACT

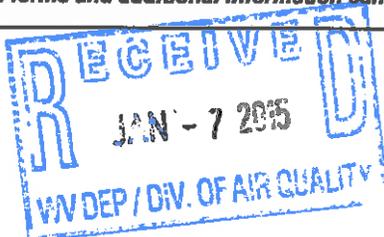
PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):  
 ADMINISTRATIVE AMENDMENT     MINOR MODIFICATION  
 SIGNIFICANT MODIFICATION  
 IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION

**FOR TITLE V FACILITIES ONLY:** Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

**Section I. General**

1. Name of applicant (as registered with the WV Secretary of State's Office): Antero Midstream LLC		2. Federal Employer ID No. (FEIN): 46-5517375	
3. Name of facility (if different from above): New Milton Compressor Station		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: 1615 Wynkoop Street Denver, CO 80202		5B. Facility's present physical address: Meathouse Fork Road New Milton, WV 26411	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO - If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A. - If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A.			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, please explain:    Antero Midstream LLC owns the land for the proposed site - If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Natural Gas Compressor Station		10. North American Industry Classification System (NAICS) code for the facility:  221210	
11A. DAQ Plant ID No. (for existing facilities only): 017-00060		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): R13-3106	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.



12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits**, please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

From Pennsboro, WV, head southeast on Collins Avenue. Turn left onto Main street and then the first right onto Wells Avenue. Make a slight right onto WV-74N and continue for 1.7 miles. Turn left onto facility entrance.

12.B. New site address (if applicable):

Meathouse Fork Road  
New Milton, WV 26411

12C. Nearest city or town:

New Milton

12D. County:

Doddridge

12.E. UTM Northing (KM): 4342.232

12F. UTM Easting (KM): 526.978

12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:

The reduction efficiencies for the engine catalyts have been updated based on actual operating conditions.

14A. Provide the date of anticipated installation or change: Upon Permit Issuance

- If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen:     /     /

14B. Date of anticipated Start-Up

if a permit is granted:

Upon Permit Issuance

14C. Provide a **Schedule** of the planned **Installation of/Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:

Hours Per Day 24     Days Per Week 7     Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved?    YES    NO

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see [www.epa.gov/ceppo](http://www.epa.gov/ceppo)), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (*if known*). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (*if known*). Provide this information as **Attachment D**.

### ***Section II. Additional attachments and supporting documents.***

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to **Plot Plan Guidance**).

- Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F**.

23. Provide a **Process Description** as **Attachment G**.

- Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

**All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.**

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.  
– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I**.

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

<input checked="" type="checkbox"/> Bulk Liquid Transfer Operations	<input checked="" type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input checked="" type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input checked="" type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger	

General Emission Unit, specify: Engines, Dehydrator, Generator, Fuel Gas Pre-Heater

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input checked="" type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System

Other Collectors, specify : Catalysts, VRU

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M**.

30. Provide all **Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.

➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and **Example Legal Advertisement** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

YES     NO

➤ If **YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's **"Precautionary Notice – Claims of Confidentiality"** guidance found in the **General Instructions** as **Attachment Q**.

**Section III. Certification of Information**

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

<input checked="" type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R**.

**All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.**

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

**Certification of Truth, Accuracy, and Completeness**

I, the undersigned  **Responsible Official** /  **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

**Compliance Certification**

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE \_\_\_\_\_

*(Please use blue ink.)*

DATE: \_\_\_\_\_

*(Please use blue ink.)*

35B. Printed name of signee: Luz C. Slauter

35C. Title: Midstream Environmental Supervisor

35D. E-mail: [lslauter@anteroresources.com](mailto:lslauter@anteroresources.com)

36E. Phone: (303) 357-6834

36F. FAX: (303)357-7315

36A. Printed name of contact person (if different from above):

36B. Title:

36C. E-mail:

36D. Phone:

36E. FAX:

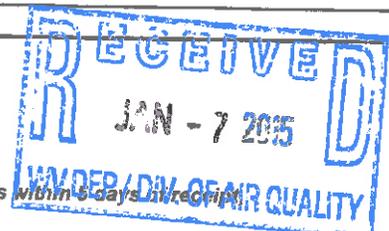
**PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:**

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate               | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet            |
| <input checked="" type="checkbox"/> Attachment B: Map(s)                             | <input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s)                     |
| <input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s)            |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion              | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations                |
| <input checked="" type="checkbox"/> Attachment E: Plot Plan                          | <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s)   | <input checked="" type="checkbox"/> Attachment P: Public Notice                                    |
| <input checked="" type="checkbox"/> Attachment G: Process Description                | <input type="checkbox"/> Attachment Q: Business Confidential Claims                                |
| <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input checked="" type="checkbox"/> Attachment R: Authority Forms                                  |
| <input checked="" type="checkbox"/> Attachment I: Emission Units Table               | <input type="checkbox"/> Attachment S: Title V Permit Revision Information                         |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Application Fee  |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

**FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:**

- Forward 1 copy of the application to the Title V Permitting Group and:
- For Title V Administrative Amendments:
  - NSR permit writer should notify Title V permit writer of draft permit,
- For Title V Minor Modifications:
  - Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt.
  - NSR permit writer should notify Title V permit writer of draft permit.
- For Title V Significant Modifications processed in parallel with NSR Permit revision:
  - NSR permit writer should notify a Title V permit writer of draft permit,
  - Public notice should reference both 45CSR13 and Title V permits,
  - EPA has 45 day review period of a draft permit.



All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

## **Discussion of Nearby Facilities**

## **New Milton Compressor Station – Closest Antero Midstream Facilities**

1. **Common Control:** Only those facilities that are owned and managed by Antero were included in the aggregation discussion. This includes Antero Resources Corporation production facilities in addition to the Antero Midstream LLC midstream facilities.

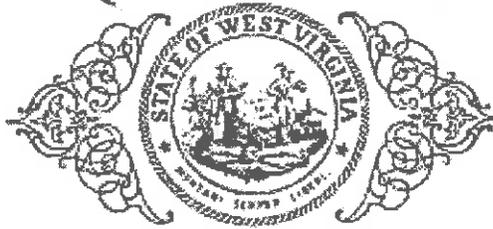
2. **SIC Code:** The New Milton Compressor Station will operate under SIC code 4922 (pipeline transportation of natural gas). The closest facilities owned by Antero Midstream LLC with this SIC code is a compressor station 4.2 miles north of the facility and a compressor station 11 miles southwest of the facility. All Antero Resources Corporation production facilities operate under the SIC code of 1311 (crude petroleum of natural gas).

3. **Continuous or Adjacent:** The land between the New Milton Compressor Station and its nearest facility operating under the same SIC code is not owned or managed by Antero Midstream LLC. Therefore, the facilities are not considered to be adjacent or continuous.

Based on this three-pronged evaluation, there are no other existing facilities that should aggregate emissions with New Milton Compressor Station.

**Attachment A.  
Business Certificate**

# State of West Virginia



## Certificate

UB

*I, Natalie E. Tennant, Secretary of State of the  
State of West Virginia, hereby certify that*

**ANTERO MIDSTREAM LLC**

Control Number: 9A5E1

a limited liability company, organized under the laws of the State of Delaware has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of April 29, 2014, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

### **CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY**

to the limited liability company authorizing it to transact business in West Virginia



*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
April 29, 2014*

*Natalie E. Tennant*

Secretary of State

FILED

APR 29 2014

IN THE OFFICE OF  
WV SECRETARY OF STATE

Submitted by:  
CT Corporation Rep-Terry Stamper  
Terry.Stamper@wolterskluwer.com  
304-776-1162

1152

Natalie E. Tennant  
Secretary of State  
1900 Kanawha Blvd E  
Bldg 1, Suite 157-K  
Charleston, WV 25305



Penney Barker, Manager  
Corporations Division  
Tel: (304)558-8000  
Fax: (304)558-8381  
Website: [www.wvsos.com](http://www.wvsos.com)  
E-mail: [business@wvsos.com](mailto:business@wvsos.com)

WV APPLICATION FOR  
CERTIFICATE OF AUTHORITY OF  
LIMITED LIABILITY COMPANY

FILE ONE ORIGINAL.  
(Two if you want a filed  
stamped copy returned to you)  
FEE: \$150

Office Hours: Monday – Friday  
8:30 a.m. – 5:00 p.m. ET

Control # 1152

1. The name of the company as registered in its home state is: Antero Midstream LLC

and the state or country of organization is: Delaware

**CHECK HERE** to indicate you have obtained and submitted with this application a **CERTIFICATE OF EXISTENCE (GOOD STANDING)**, dated during the current tax year, from your home state of original incorporation as **required** to process your application. The certificate may be obtained by contacting the Secretary of State's Office in the home state of original incorporation.

2. The name to be used in West Virginia will be:  Home State name as listed above, if available in WV (If name is not available, check DBA Name box below and follow special instructions in Section 2. attached.)

DBA name \_\_\_\_\_  
(See special instructions in Section 2. Regarding the Letter of Resolution attached to this application.)

3. The company will be a: [See instructions for limitations on professions which may form P.L.L.C. in WV. All members must have WV professional license. In most cases, a Letter of Authorization/Approval from the appropriate State Licensing Board is required to process the application.]

regular L.L.C.  
 Professional L.L.C. for the profession of \_\_\_\_\_

4. The street address of the principal office is: No. & Street: 1625 17th Street, Suite 300  
City/State/Zip: Denver, Colorado 80202  
and the mailing address (if different) is: Street/Box: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_

5. The address of the designated office of the company in WV, if any, will be: No. & Street: 5400 D Big Tyler Road  
City/State/Zip: Charleston, West Virginia 25313

6. Agent of Process: Properly designated person to whom notice of legal process may be sent, if any: Name: C T Corporation System  
Address: 5400 D Big Tyler Road  
City/State/Zip: Charleston, West Virginia 25313

RECEIVED

APR 29 2014

7. E-mail address where business correspondence may be received: jgiannaula@anteroresources.com

8. Website address of the business, if any: N/A

9. The company is:  an at-will company, for an indefinite period  
 a term company, for the term of \_\_\_\_\_ years,  
 which will expire on \_\_\_\_\_

10. The company is:  member-managed. [List the names and addresses of all members.]  
 manager-managed. [List the names and addresses of all managers.]

List the Name(s) and Address(es) of the Member(s)/Manager(s) of the company (attach additional pages if necessary).

<u>Name</u>	<u>Street Address</u>	<u>City, State, Zip</u>
Antero Resources Corporation	1625 17th Street, Suite 300	Denver, Colorado 80202

11. All or specified members of a limited liability company are liable in their capacity as members for all or specified debts, obligations or liabilities of the company.  No--All debts, obligations and liabilities are those of the company.  
 Yes--Those persons who are liable in their capacity as members for all debts, obligations or liability of the company have consented in writing to the adoption of the provision or to be bound by the provision.

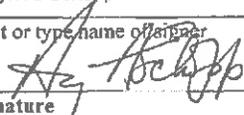
12. The purpose for which this limited liability company is formed are as follows:  
 (Describe the type(s) of business activity which will be conducted, for example, "real estate," "construction of residential and commercial buildings," "commercial printing," "professional practice of architecture.")  
Midstream oil and gas operating company

13. Is the business a Scrap Metal Dealer?  
 Yes [If "Yes," you must complete the Scrap Metal Dealer Registration Form (Form SMD-1) and proceed to question 14.].  
 No [Proceed to question 14.]

14. The number of pages attached and included in this application is: 3

15. The requested effective date is:  the date & time of filing in the Secretary of State's Office  
 [Requested date *may not be earlier than filing nor later than 90 days after filing in our office.*]  
 the following date \_\_\_\_\_ and time \_\_\_\_\_

16. Contact and Signature Information\* (See below Important Legal Notice Regarding Signature):

a.	Alvyn A. Schopp	(313) 357-7310
	Contact Name	Phone Number
b.	Alvyn A. Schopp	Chief Administrative Officer and Regional Vice President
	Print or type name of signer	Title / Capacity of Signer
c.		April 28, 2014
	Signature	Date

**\*Important Legal Notice Regarding Signature:** Per West Virginia Code §31B-2-209, Liability for false statement in filed record. If a record authorized or required to be filed under this chapter contains a false statement, one who suffers loss by reliance on the statement may recover damages for the loss from a person who signed the record or caused another to sign it on the person's behalf and knew the statement to be false at the time the record was signed.

# Delaware

PAGE 1

*The First State*

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "ANTERO MIDSTREAM LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTY-NINTH DAY OF APRIL, A.D. 2014.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE NOT BEEN ASSESSED TO DATE.



5466900 8300

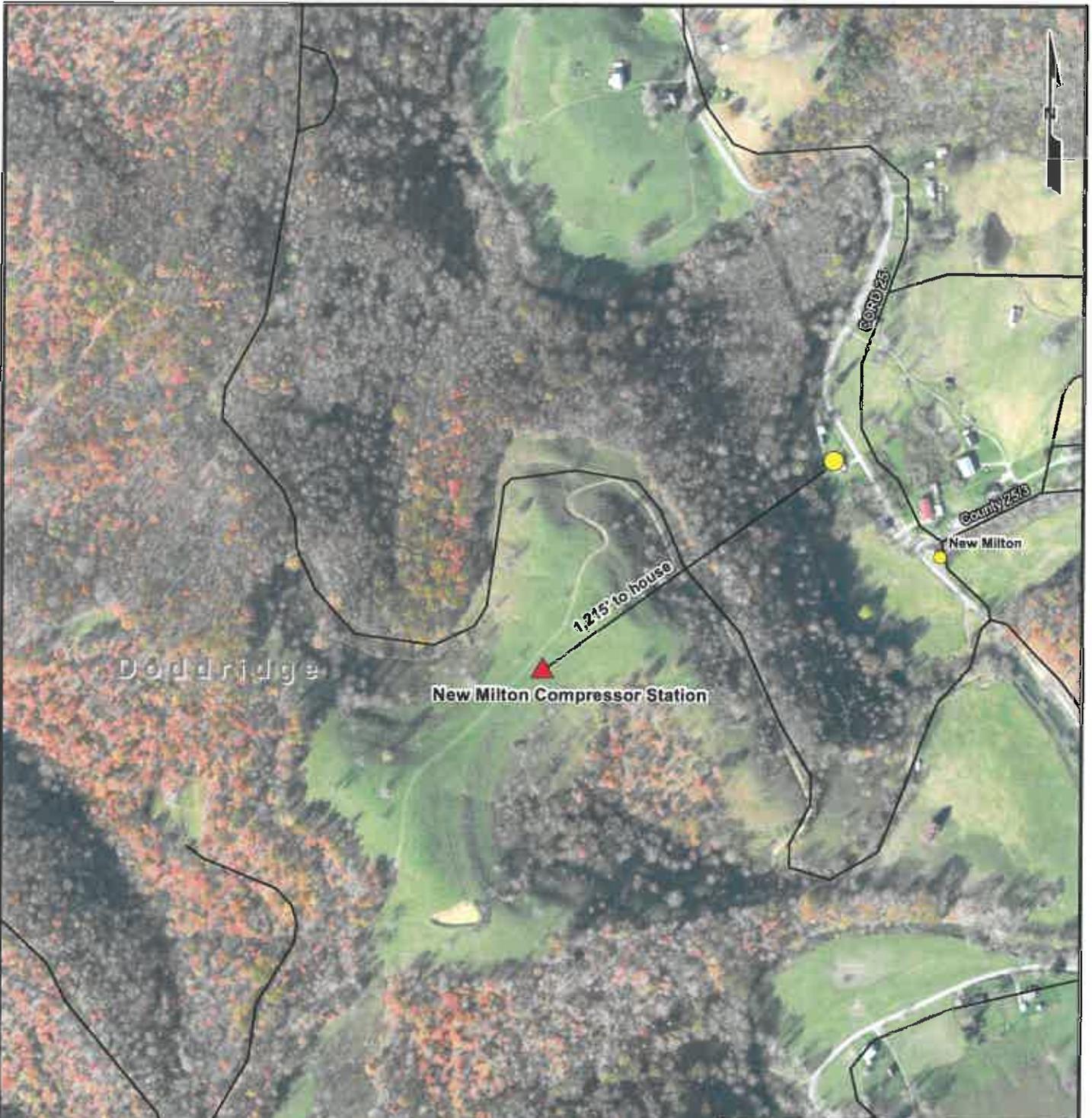
140532521

You may verify this certificate online  
at [corp.delaware.gov/authver.shtml](http://corp.delaware.gov/authver.shtml)

  
Jeffrey W. Bullock, Secretary of State  
AUTHENTICATION: 1328067

DATE: 04-29-14

**Attachment B.  
Area Map**



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. KLEINFELDER makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or other characteristics of such information. This document is not intended for use as a legal survey product nor is it designed or intended as a construction design document. The user or users of the information contained on this graphic representation is at the sole risk of the party relying on such information.



Sources: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, USDA, swisstopo, and the GIS I

**Legend**

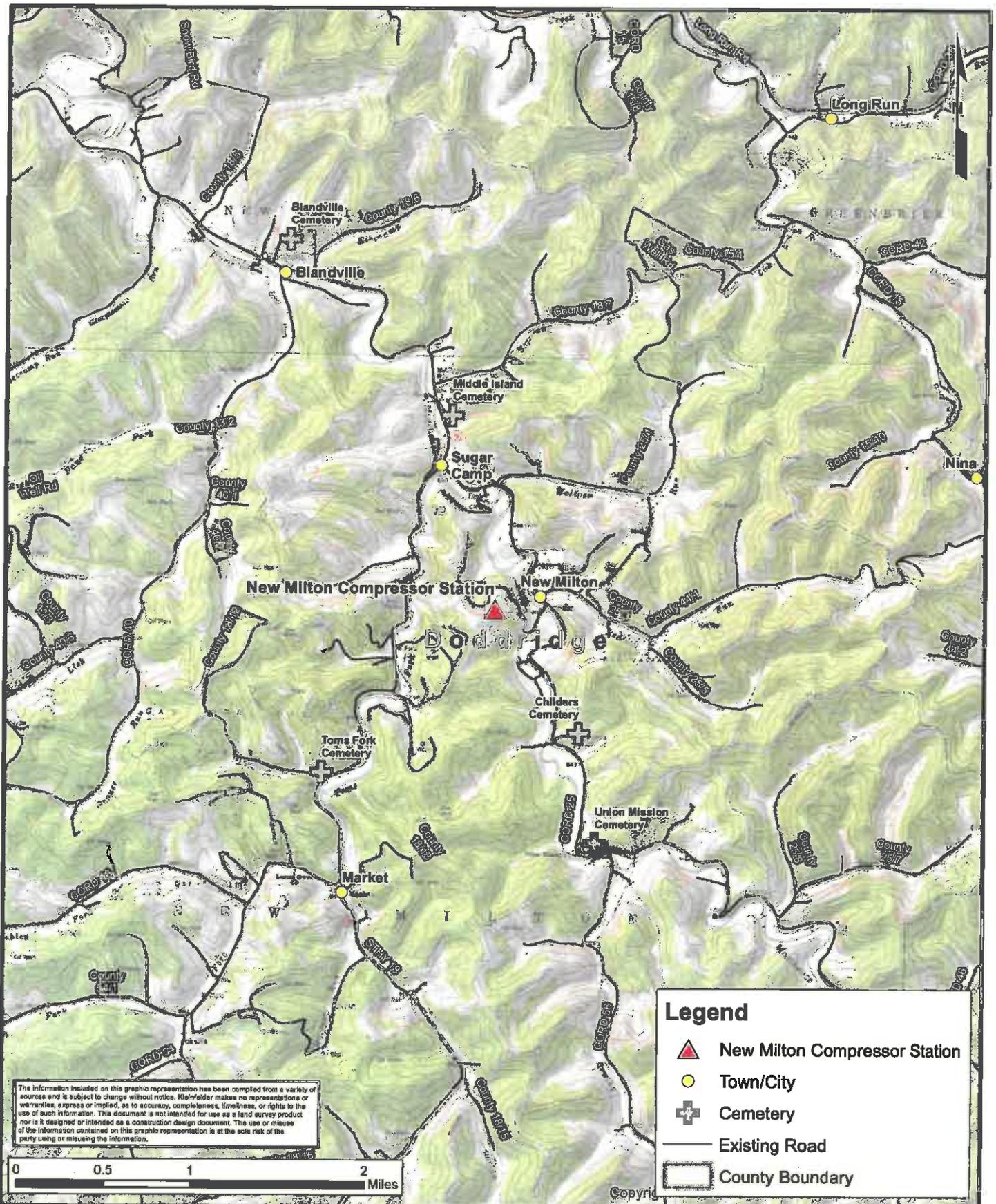
- New Milton Compressor Station
- Receptor
- Existing Road
- County Boundary

PROJECT NO.	20152867
DRAWN:	10/23/2014
DRAWN BY:	J. Weber
CHECKED BY:	K. Meszaros
FILE NAME:	NewMiltonCS_Receptor.mxd

**Antero Midstream LLC**

New Milton Compressor Station  
Doddridge County, West Virginia

FIGURE



**KLEINFELDER**  
Bright People. Right Solutions.  
www.kleinfelder.com

PROJECT NO.	20152867
DRAWN:	10/23/2014
DRAWN BY:	J. Weber
CHECKED BY:	K.Meszáros
FILE NAME:	NewMiltonCS_Topo.mxd

**Antero Midstream LLC**

**New Milton Compressor Station  
Doddridge County, West Virginia**

FIGURE

**Attachment C.  
Installation and Startup Schedule**

## **New Milton Compressor Station – Installation and Startup Schedule**

The New Milton Compressor Station will be a modified facility located in Doddridge County, WV, approximately 0.3 miles west of New Milton, WV. Installation of equipment began in February of 2014. Operations under the original permit conditions commenced on August 5, 2014. There will be no new equipment installed onsite. The modifications are strictly for changing operating conditions.

**Attachment D.  
Regulatory Discussion**

## **New Milton Compressor Station – Regulatory Discussion**

### **Federal Regulations**

#### **40 CFR Part 60 – Standards of Performance for New Stationary Sources**

- I. *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.*

Applicability: Subpart Kb applies to volatile organic liquid storage tanks with a capacity greater than or equal to 75 m<sup>3</sup> (§60.110b(a)). Storage vessels with a design capacity less than 1,589.874 m<sup>3</sup> do not apply to this subpart if they are used store condensate prior to custody transfer. The settling, condensate and produced water storage tanks at the New Milton Compressor Station are 64 m<sup>3</sup>. Therefore, Subpart Kb does not apply to the New Milton Compressor Station.

- II. *Subpart GG - Standards of Performance for Stationary Gas Turbines*

Applicability: Subpart GG applies to all stationary gas turbines with a heat input at peak load equal to or greater than 10 million BTU per hour based on the lower heating value of the fuel (§60.330(a)). Since the microturbine generators at the New Milton Compressor Station have a heat input rating less than 10 million Btu per hour, Subpart GG does not apply.

- III. *Subpart KKK - Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011.*

Applicability: Subpart KKK applies to facilities built or modified before August 23, 2011, so Subpart KKK does not apply as the New Milton Compressor Station was constructed after the applicable date.

- IV. *Subpart LLL - Standards of Performance for SO<sub>2</sub> Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011.*

Applicability: Subpart LLL applies to facilities built or modified before August 23, 2011, so Subpart LLL does not apply as the New Milton Compressor Station was constructed after the applicable date.

- V. *Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

Applicability: Subpart JJJJ applies to rich burn engines that were ordered after June 12, 2006 and manufactured on or after July 1, 2007 for engines with maximum power greater than or equal to 500 hp (§60.4230(a)(4)(i)). Thus, Subpart JJJJ applies to the

New Milton Compressor Station as the compressor engines were installed after June 12, 2006 and manufactured after July 1, 2010.

**VI. *Subpart KKKK - Standards of Performance for Stationary Combustion Turbines***

**Applicability:** Subpart KKKK applies to all stationary combustion turbines with a heat input at peak load equal to or greater than 10 million BTU per hour based on the higher heating value of the fuel (§60.4305(a)). Since the microturbine generators at the New Milton Compressor Station have a heat input rating less than 10 million Btu per hour, Subpart KKKK does not apply.

**VII. *Subpart OOOO - Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution***

**Applicability:** Subpart OOOO applies to reciprocating compressor facilities that were constructed, modified, or reconstructed after August 23, 2011 (§60.5365(c)). Additionally, Subpart OOOO applies to storage vessel affected facilities with individual tank emissions greater than 6 tons per year (§60.5365(e)). Thus, Subpart OOOO applies to the New Milton Compressor Station as it was constructed after August 23, 2011 and has reciprocating compressors and a settler tank that's uncontrolled VOC potential to emit is greater than six (6) tons per year. The pneumatic controllers installed at New Milton Compressor Station are air-actuated and therefore exempt from the requirements of this subpart.

**40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants**

**I. *Subpart V – National Emission Standard for Equipment Leaks (Fugitive Emission Sources)***

**Applicability:** Subpart V applies to components such as compressors, valves, and pumps that are intended to operate in volatile hazardous air pollutant (VHAP) service (§61.240(a)). VHAP service means that a component contains or contacts a fluid that is at least 10 percent by weight a VHAP. Subpart V does not apply to the New Milton Compressor Station because none of the components have fluid (natural gas, water, or condensate) that is over 10 percent by weight of any VHAP.

**40 CFR Part 63 – National Emission Standards for Hazardous Air Pollutants for Source Categories**

**I. *Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities***

**Applicability:** Subpart HH applies to oil and natural gas production facilities that are a major or area source of HAP emissions, and that process, upgrade, or store hydrocarbon liquids or natural gas prior to the transmission and storage source category (§63.760(a)). Subpart HH does apply to the New Milton Compressor Station, and

because it is an area source of HAP emissions, the two (2) TEG dehydrators are applicable sources under Subpart HH (§63.760(b)(2)). However, actual benzene emissions from the dehydrators at the New Milton Compressor Station are less than 1 ton per year, so both dehydrators are exempt from all requirements except recordkeeping (§63.764(e)(1)(ii)).

**II. *Subpart HHH – National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities***

**Applicability:** Subpart HHH applies to natural gas transmission and storage facilities that are a major source of HAP emissions (§63.1270(a)). Subpart HHH does not apply to the New Milton Compressor Station as it is not a major source of HAP emissions. Further, the New Milton Compressor Station is prior to the gas transmission and storage phase.

**III. *Subpart EEEE – National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)***

**Applicability:** Subpart EEEE applies to organic liquids distribution operations that are located at major source of HAP emissions (§63.2334(a)). Subpart EEEE does not apply to the New Milton Compressor Station as it is not a major source of HAP emissions.

**IV. *Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines***

**Applicability:** Subpart YYYY applies to stationary combustion turbines located at major sources of HAP emissions (§63.6085(a)). Since the New Milton Compressor Station is not a major source of HAP emissions, Subpart YYYY does not apply.

**V. *Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines***

**Applicability:** Subpart ZZZZ applies to stationary RICE at a major or area source of HAP emissions (§63.6585). Subpart ZZZZ applies to the New Milton Compressor Station as the compressor engines are new RICE. The engines will meet Subpart ZZZZ by meeting 40 CFR Part 60, Subpart JJJJ as the New Milton Compressor Station is an area source of HAP emissions (§63.6590(c)(1)).

**VI. *Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters***

**Applicability:** Subpart DDDDD applies to process heaters at a major source of HAP emissions (§63.7485). Subpart DDDDD does not apply to the New Milton Compressor Station as it is not a major source of HAP emissions.

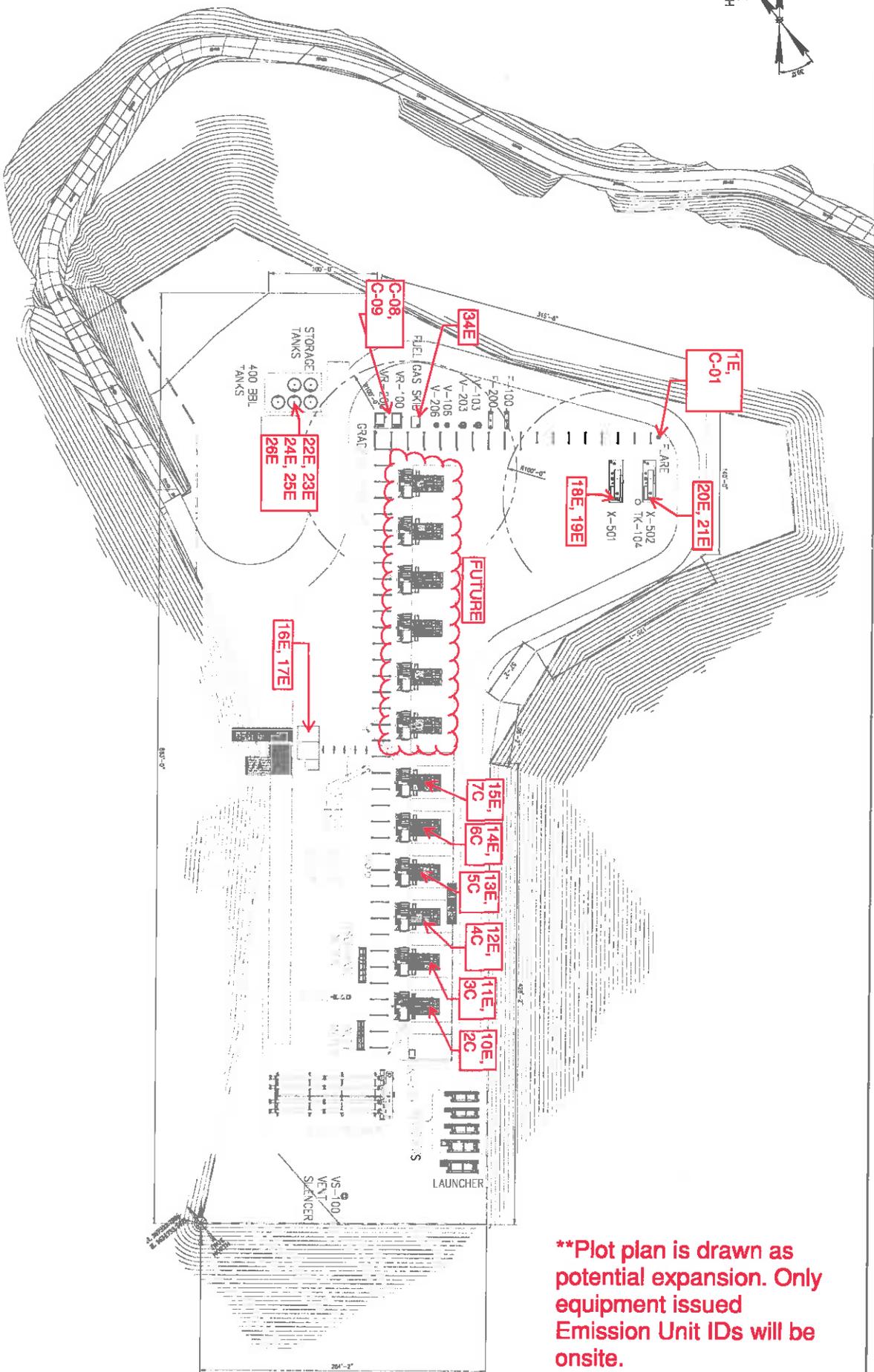
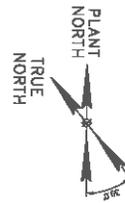
## **West Virginia State Regulations**

### ***Title 45 Legislative Rule – Division of Environmental Protection, Office of Air Quality***

The following Title 45 Legislative Rules will be applicable to the New Milton Compressor Station:

- I. 45CSR2 – To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers*
- II. 45CSR2A – Testing, Monitoring, Recordkeeping and Reporting Requirements Under 45CSR2*
- III. 45CSR4 – To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors*
- IV. 45CSR6 – Control of Air Pollution from Combustion of Refuse*
- V. 45CSR8 – Ambient Air Quality Standards*
- VI. 45CSR11 – Prevention of Air Pollution Emergency Episodes*
- VII. 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*
- VIII. 45CSR16 – Standards of Performance for New Stationary Sources Pursuant to 40 CFR, Part 60*
- IX. 45CSR20 – Good Engineering Practice as Applicable to Stack Heights*
- X. 45CSR22 – Air Quality Management Fee Program*
- XI. 45CSR27 – To Prevent and Control the Emissions of Toxic Air Pollutants*
- XII. 45CSR33 – Acid Rain Provisions and Permits*
- XIII. 45CSR34 – Emission Standards for Hazardous Air Pollutants for Source Categories Pursuant to 40 CFR, Part 63*
- XIV. 45CSR38 – Provisions for Determination of Compliance with Air Quality Management Rules*
- XV. 45CSR42 – Greenhouse Gas Emissions Inventory*

**Attachment E.  
Plot Plan**



**\*\*Plot plan is drawn as potential expansion. Only equipment issued Emission Unit IDs will be onsite.**

REFERENCE DIMENSIONS

REVISIONS

SITE PLAN

NO.	DATE	DESCRIPTION
1	08/25/13	ISSUED FOR PERMIT
2	08/25/13	ISSUED FOR PERMIT
3	08/25/13	ISSUED FOR PERMIT
4	08/25/13	ISSUED FOR PERMIT
5	08/25/13	ISSUED FOR PERMIT
6	08/25/13	ISSUED FOR PERMIT
7	08/25/13	ISSUED FOR PERMIT
8	08/25/13	ISSUED FOR PERMIT
9	08/25/13	ISSUED FOR PERMIT
10	08/25/13	ISSUED FOR PERMIT
11	08/25/13	ISSUED FOR PERMIT
12	08/25/13	ISSUED FOR PERMIT
13	08/25/13	ISSUED FOR PERMIT
14	08/25/13	ISSUED FOR PERMIT
15	08/25/13	ISSUED FOR PERMIT
16	08/25/13	ISSUED FOR PERMIT
17	08/25/13	ISSUED FOR PERMIT
18	08/25/13	ISSUED FOR PERMIT
19	08/25/13	ISSUED FOR PERMIT
20	08/25/13	ISSUED FOR PERMIT
21	08/25/13	ISSUED FOR PERMIT
22	08/25/13	ISSUED FOR PERMIT
23	08/25/13	ISSUED FOR PERMIT
24	08/25/13	ISSUED FOR PERMIT
25	08/25/13	ISSUED FOR PERMIT
26	08/25/13	ISSUED FOR PERMIT
27	08/25/13	ISSUED FOR PERMIT
28	08/25/13	ISSUED FOR PERMIT
29	08/25/13	ISSUED FOR PERMIT
30	08/25/13	ISSUED FOR PERMIT
31	08/25/13	ISSUED FOR PERMIT
32	08/25/13	ISSUED FOR PERMIT
33	08/25/13	ISSUED FOR PERMIT
34	08/25/13	ISSUED FOR PERMIT
35	08/25/13	ISSUED FOR PERMIT
36	08/25/13	ISSUED FOR PERMIT
37	08/25/13	ISSUED FOR PERMIT
38	08/25/13	ISSUED FOR PERMIT
39	08/25/13	ISSUED FOR PERMIT
40	08/25/13	ISSUED FOR PERMIT
41	08/25/13	ISSUED FOR PERMIT
42	08/25/13	ISSUED FOR PERMIT
43	08/25/13	ISSUED FOR PERMIT
44	08/25/13	ISSUED FOR PERMIT
45	08/25/13	ISSUED FOR PERMIT
46	08/25/13	ISSUED FOR PERMIT
47	08/25/13	ISSUED FOR PERMIT
48	08/25/13	ISSUED FOR PERMIT
49	08/25/13	ISSUED FOR PERMIT
50	08/25/13	ISSUED FOR PERMIT

**ALTERED RESOURCES**  
 New Milton Compressor Station  
**KAHUNA VENTURES** LP  
 500-481-7374  
 870 NATIONAL AVENUE, SUITE 100  
 NEW MILTON, CO 80021

DESIGN BY: JUP	CHECKED BY: JUP	DATE: 08/25/13
PROJECT NO: NMCSP-3050	DATE: 08/25/13	SCALE: 1"=40'
ISSUED FOR PERMIT	DATE: 08/25/13	SCALE: 1"=40'

**Attachment F.  
Process Flow Diagram**





**Attachment G.  
Process Description**

## **New Milton Compressor Station - Process Description**

Raw natural gas produced in area wells will enter into the facility and, after passing through a slug catcher to remove condensate and produced water, will be compressed by the engines (CE-01 through CE-06). All of the condensate and produced water that enters the station from pigging or drops out in vessels is routed to a tank battery consisting of one (1) 400-bbl settling tank (T03), two (2) 400-bbl condensate tanks (T04 & T05), and two (2) 400-bbl produced water tanks (T01 & T02). The combined liquids are directed first to a settling tank (T03) for natural separation and then directed to homogenous tanks for storage (T01 and T02 will hold produced water and T04 and T05 will hold condensate). There are four (4) smaller tanks used for bulk storage that are outlined in the table below. Vapors from the settling, condensate, and produced water storage tanks (working, breathing, and flashing emissions) will be captured by one of the two Vapor Recovery Units (VRUs: C08 and C09) and recycled back into facility for further processing. Any emissions from the miscellaneous tanks are, based on the vapor pressures of the materials stored, considered insignificant.

The gas, compressed in the engines (CE-01 through CE-06), is directed to two coalescing filter separators and then allowed to pass through the glycol dehydration units (GDUs) (RBV-1 and RBV-2) where it is dehydrated to the desired level. The compressor engines are each controlled (NO<sub>x</sub>, CO, VOCs, formaldehyde, and methane) by an EMIT Technologies Model ELH-4200T-1616F-65CEE-361 catalytic converter (C-02 through C-07).

Glycol dehydration is a liquid desiccant system used for the removal of water from natural gas. In each GDU, lean, water-free glycol is fed to the top of an absorber (known as a "contactor") where it is contacted with the wet natural gas stream. The glycol removes water from the natural gas by physical absorption and is carried out the bottom of the column. The dry natural gas leaves the top of the absorption column and is fed into a pipeline for transportation. The dehydrator still vent gases are each sent to the flare (C-01) for destruction.

After leaving the absorber, each glycol stream - now referred to as "rich" glycol - is fed to a flash vessel where flashed hydrocarbon vapors are captured by the VRU and recycled back into facility for further processing. Any liquid hydrocarbons removed in the flash tank are sent to the storage tanks. After leaving the flash vessel, the rich glycol is fed to a Glycol Regenerator Column. Each Regenerator Column consists of a column, an overhead condenser, and the reboiler. The glycol is thermally regenerated to remove excess water and regain high purity. The heat for the regeneration is provided by two (2) 1.5 mmBtu/hr natural gas-fired reboilers (RBV-1, RBV-2) which are fueled by gas off of the flash tanks. The hot, lean glycol is cooled by a heat-exchanger and is then fed to a pump where it is sent to the glycol absorber for reuse. Liquids produced in the regeneration process are sent to the appropriate storage tanks.

A portion of the gas is withdrawn after dehydration but before the station outlet metering and sent to the fuel gas system. The fuel gas is directed through a fuel gas scrubber and metering before being directed to the compressor engines and other gas-powered equipment. A 0.5 mmBtu/hr direct-fired gas heater (HTR-1) will be used in the fuel gas system to prevent the formation of hydrates and to minimize condensate dropout from the pressure reduction. Lastly, the process gas is sent through small vertical conditioning scrubbers and final custody transfer metering before leaving the compressor station.

Additionally, the facility will utilize a truck loadout (EPLOR) to remove condensate and produced water from the facility. Emissions from the truck rack will be uncontrolled. Two 200 kWe uncontrolled Microturbines (GEN-1 and GEN-2) will be used to produce primary and backup power, respectively for the facility.

<b>Tank ID</b>	<b>Storage Tank Name</b>	<b>Capacity</b>
T06	Engine Oil StorageTank	2,000 gallons
T07	Compressor Oil Storage Tank	2,000 gallons
T08	TEG Storage Tank	2,000 gallons
T09	Used Oil Storage Tank	1,000 gallons

**Attachment H.**  
**Material Safety Data Sheets**

**Material Safety Data Sheet  
(TRIETHYLENE GLYCOL (TEG))**

<b>JMN Specialties, Inc.</b> 1100 Victory Drive Westwego, LA 70094 (504) 341-3749 ISO 9001 Registered	HMIS HEALTH:.....2 HMIS FLAMMABILITY: .....1 HMIS REACTIVITY:.....0 PERSONAL PROTECTION: .....C  EMERGENCY NUMBER: .....800-255-3924
---	---

**SECTION 1 – IDENTIFICATION OF CHEMICAL PRODUCT**

**PRODUCT NAME:**..... TRIETHYLENE GLYCOL (TEG)  
**EFFECTIVE DATE:**..... October 1, 2007  
**CHEMICAL FAMILY:**..... Glycol  
**FORMULA:**..... C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>  
**CAS NUMBER:**..... 112-27-6

**SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS**

HAZARDOUS INGREDIENT	PERCENT	CAS NUMBER	PEL
TRIETHYLENE GLYCOL	> 99	112-27-6	None Established by ACGIH or OSHA.

The criteria for listing components in the composition section are as follows: Carcinogens are listed when present at 0.1% or greater; components which are otherwise hazardous according to OSHA are listed when present at 1.0% or greater. Non-hazardous components may be listed at 3.0% or greater if not proprietary in nature. This is not intended to be complete compositional disclosure. Refer to section 14 for applicable states right to know and other regulatory information.

**SECTION 3 – HAZARDS IDENTIFICATION**

**EMERGENCY OVERVIEW**

**APPEARANCE / ODOR:** ..... Clear Liquid / Mild Odor  
**SHORT TERM EXPOSURE:**   **Inhalation:** No adverse health effects expected from inhalation.  
  **Ingestion:** No adverse effects expected. **Skin Contact:** Prolonged exposure may cause skin irritation. **Eye Contact:** Splashing in eye causes irritation with transitory disturbances of corneal epithelium. However, these effects diminish and no permanent injury is expected. Vapors are non-irritating. **Chronic Exposure:** Possible skin irritation. **Aggravation of Pre-existing Conditions:** No information found.  
**OSHA REGULATED:** ..... No  
**LISTED CARCINOGEN:** ..... NTP: No   **IARC MONOGRAPHS:** No

**POTENTIAL HEALTH EFFECTS**

**INHALATION:** ..... Unlikely  
**INGESTION:** ..... Irritant  
**SKIN (DERMAL):** ..... Slight Irritant After Prolonged Contact

# Material Safety Data Sheet (TRIETHYLENE GLYCOL (TEG))

**OVER EXPOSURE EFFECTS:** **Inhalation:** No adverse health effects expected from inhalation. **Ingestion:** No adverse effects expected. **Skin Contact:** Prolonged exposure may cause skin irritation. **Eye Contact:** Splashing in eye causes irritation with transitory disturbances of corneal epithelium. However, these effects diminish and no permanent injury is expected. Vapors are non-irritating. **Chronic Exposure:** Possible skin irritation. **Aggravation of Pre-existing Conditions:** No information found.

## SECTION 4 – FIRST AID MEASURES

**FIRST AID:** **SKIN CONTACT:** Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately. **EYE CONTACT:** Flush eyes immediately with large amounts of water or normal saline solution, occasionally lifting upper and lower lids until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately. **INGESTION:** Give large amounts of fresh water or milk immediately. Do not give anything by mouth if person is unconscious or otherwise unable to swallow. If vomiting occurs, keep head below hips to prevent aspiration. Treat symptomatically and supportively. Seek medical attention immediately. **INHALATION:** Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial resuscitation. Keep person warm and at rest. Treat symptomatically and supportively. Seek medical attention immediately. Qualified medical personnel should consider administering oxygen.

**NOTE TO PHYSICIAN:** ..... Ethylene Glycol (EG) and diethylene glycol (DEG) intoxication may initially produce behavioral changes, drowsiness, vomiting, diarrhea, thirst, and convulsions. EG and DEG are nephrotoxic. End stages of poisoning may include renal damage or failure with acidosis. Supportive measures, supplemented with hemodialysis if indicated, may limit the progression and severity of toxic effects. Primary toxic effects of EG when swallowed are kidney damage and metabolic acidosis. This product may contain trace amounts of Ethylene Glycol (EG) or Diethylene Glycol (DEG).

## SECTION 5 - FIRE FIGHTING MEASURES

**FLASHPOINT:**..... 350°F  
**EXTINGUISHING MEDIA:** Water fog or spray, Foam, Dry Powder, Carbon Dioxide (CO<sub>2</sub>).  
**DECOMPOSITION**  
**PRODUCTS:**..... From fire; Smoke, Carbon dioxide, & Carbon Monoxide  
**LOWER FLAME LIMIT:**..... < 0.9  
**HIGHER FLAME LIMIT:**..... > 9  
**UNUSUAL FIRE AND**  
**EXPLOSION HAZARDS:**..... Toxic levels of carbon monoxide, carbon dioxide, irritation aldehydes and ketones may be formed on burning. Heating in air may produce irritating aldehydes, acids, and ketones.

### FIRE FIGHTING

# Material Safety Data Sheet (TRIETHYLENE GLYCOL (TEG))

**EQUIPMENT:** ..... Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

## SECTION 6 – ACCIDENTAL RELEASE MEASURES

### CHEMTEL EMERGENCY

**NUMBER (24 Hour):** ..... 1-800-255-3924

**SPILL:** ..... Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

**RCRA STATUS:** ..... None

## SECTION 7 – HANDLING AND STORAGE

**HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND PROMPT REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.**

**HANDLING AND STORAGE:** .. No special storage requirements. Do not store above 120°F.

### PRECAUTIONARY

**MEASURES:** ..... Provide fresh air ventilation during and after application. Close container after each use. Avoid prolonged or repeated contact with skin. Avoid contact with skin, eyes, and clothing. After handling this product, wash hands before eating, drinking, or smoking. If needed, take first aid action shown in Section 4.

## SECTION 8 – EXPOSURE CONTROL / PERSONAL PROTECTION

### GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment.

**EYE PROTECTION:**..... Chemical safety goggles meeting the specifications of OSHA 29CFR 1910.133 / ANSI Standard Z87.1 should be worn whenever there is the possibility of splashing or other contact with the eyes. Wear safety glasses meeting the specifications of OSHA 29CFR 1910.133 / ANSI Standard Z87.1 where no contact with the eye is anticipated.

### RESPIRATORY

**PROTECTION:**..... Not normally needed. Use NIOSH approved vapor respirator if exposure is unknown or exceeds permissible limits. A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use.

**Use NIOSH / MSHA approved respiratory protection equipment when airborne exposure limits are exceeded (see below). Consult the respirator manufacturer to determine appropriate type of**

## Material Safety Data Sheet (TRIETHYLENE GLYCOL (TEG))

equipment for a given application. Observe respirator use limitations specified by NIOSH / MSHA or the manufacturer. Respiratory protection programs must comply with 29 CFR 1910.134.

**WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

**PROTECTIVE GLOVES:**..... Wear impervious gloves

**VENTILATION:** A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**MECHANICAL EXHAUST:** ..... Desired in closed places

**LOCAL EXHAUST:** ..... Recommended

**VENTILATION NOTES:** Provide natural or mechanical ventilation to control exposure levels below Airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment. Consult NFPA Standard 91 for design of exhaust systems.

**THRESHOLD LIMIT VALUE:** . None Established

**PROTECTIVE EQUIPMENT:**... HMIS PERSONAL PROTECTION: C: Safety Glasses, Gloves, Apron  
The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

### SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE / ODOR:** ..... Clear Liquid / Mild Odor

**BOILING POINT:** ..... > 500°F

**FREEZING POINT:** ..... < 32°F

**VAPOR PRESSURE:**..... > 1

**VAPOR DENSITY (AIR=1):** ..... 5.1

**SPECIFIC GRAVITY:** ..... 1.1

**pH:** ..... 8.2

**SOLUBILITY IN WATER:** ..... Complete

### SECTION 10 – STABILITY AND REACTIVITY

**STABILITY:**..... Stable

**HAZARDOUS**

**POLYMERIZATION:** ..... Will Not Occur

**POLYMERIZATION AVOID:**... None

**INCOMPATIBILITY:** ..... Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures. Therefore, avoid strong acids and strong bases at elevated temperatures. Avoid contamination with strong oxidizing agents and materials reactive with hydroxyl compounds. Avoid burning or heating in air. This may produce irritating aldehydes, acids, and ketones.

**CONDITIONS TO AVOID:**..... Excessive heat. Will ignite in air at 700°F

# Material Safety Data Sheet (TRIETHYLENE GLYCOL (TEG))

## SECTION 11 – TOXICOLOGICAL INFORMATION

### EYE EFFECTS:

The eye irritation hazard is based on data from information supplied by raw material(s) supplier(s).

### SKIN EFFECTS:

The skin irritation hazard is based on data from information supplied by raw material(s) supplier(s).

### ACUTE ORAL EFFECTS:

The acute oral toxicity is based on data from information supplied by raw material(s) supplier(s).

### ACUTE INHALATION EFFECTS:

The acute respiratory toxicity is based on data from information supplied by raw material(s) supplier(s).

## SECTION 12 – ECOLOGICAL INFORMATION

Data from laboratory studies and from scientific literature is noted below if available.

## SECTION 13 DISPOSAL CONSIDERATIONS

**WASTE DISPOSAL:** ..... Treatment, storage, transportation and disposal must be in accordance with Federal, State/Provincial and Local Regulations. Regulations may vary in different locations. Characterization and compliance with applicable laws are the responsibility solely of the generator. Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## SECTION 14- TRANSPORTATION INFORMATION

The data provided in this section is for information only. The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate regulations to properly classify your shipment for transportation.

**PROPER SHIPPING NAME:** ..... DOT NON-REGULATED - TRIETHYLENE GLYCOL (TEG)

**REPORTABLE QUANTITY:** ..... None

**HAZARD CLASS AND LABEL:** NON-REGULATED

**UN NUMBER:** ..... None

**NA NUMBER:** ..... None

**PACKAGING SIZE:** ..... Pail, Drum & Bulk

## SECTION 15 - REGULATORY INFORMATION

### SARA 311 CATEGORIES:

**EPA ACUTE:** ..... Yes (Eyes)

**Material Safety Data Sheet  
(TRIETHYLENE GLYCOL (TEG))**

EPA CHRONIC: ..... No  
EPA IGNITABILITY: ..... No  
EPA REACTIVITY: ..... No  
EPA SUDDEN RELEASE  
OF PRESSURE: ..... No

CERCLA RQ VALUE: ..... None  
SARA TPQ: ..... None  
SARA RQ: ..... None  
EPA HAZARD WASTE #: ..... None  
CLEAN AIR: ..... NA  
CLEAN WATER: ..... NA  
SARA SECTION 313: ..... No  
NFPA HEALTH: ..... 2  
NFPA FLAMMABILITY: ..... 1  
NFPA REACTIVITY: ..... 0  
DEA Chemical Trafficking Act:.. No  
TSCA STATUS: ..... All ingredients in this product are on the TSCA Inventory List.

**SECTION 16 - ADDITIONAL INFORMATION**

**FOOT NOTES:** NA - NOT APPLICABLE ND - NO DATA AVAILABLE > = GREATER THAN < = LESS THAN

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Company Health and Risk Assessment Unit, PO Box 1519, Gretna, LA 70054-1519.

**REVISION STATEMENT:** Changes have been made throughout this Material Safety Data Sheet. Please read the entire document.

**DISCLAIMER:**

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, the Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving this MSDS will make their own determination as to its suitability for their intended purposes prior to use. Since the product is within the exclusive control of the user, it is the user's obligation to determine the conditions of safe use of this product. Such conditions should comply with all Federal Regulations concerning the Product. It must be recognized that the physical and chemical properties of any product may not be fully understood and that new, possibly hazardous products may arise from reactions between chemicals. The information given in this data sheet is based on our present knowledge and shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship. **NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.**

\*\*\*\*\*  
THIS IS THE LAST PAGE OF THIS MSDS  
\*\*\*\*\*



# SAFETY DATA SHEET

**Material Name:** Produced Water

**US GHS**

**SYNONYMS:** Produced Brine Water, Brine, Brine Water, Formation Water

## \*\*\* Section 1 – PRODUCT AND COMPANY IDENTIFICATION \*\*\*

**PRODUCT NAME:** Produced Water

**EMERGENCY PHONE:** (800) 878-1373

**PRODUCT CODES:** Mixture

**AFTER HOURS:** (800) 878-1373

**PRODUCER:** Antero Resources

**ADDRESS:** 1615 Wynkoop Street  
Denver, Colorado 80202

**CHEMTREC PHONE:** (800) 424-9300

## \*\*\* Section 2 – HAZARDS IDENTIFICATION \*\*\*

### GHS Classification:

Eye Irritant – Category 2A.

### GHS LABEL ELEMENTS

#### Symbol(s)



#### Signal Word

Warning

#### Hazard Statements

Causes serious eye irritation

#### Precautionary Statements

##### Prevention

Wear protective gloves/protective clothing/eye protection/face protection.

##### Response

If on SKIN (or hair): Rinse skin with water / shower. Remove / Take off all contaminated clothing immediately.

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

If in EYES: Rinse cautiously with water for at least fifteen (15) minutes. Remove Contact Lenses, if present and easy to do. Continue rinsing.

If EYE irritation persists, get medical advice / attention.

## Storage

Store in a secure area.

## Disposal

Dispose of contents/containers in accordance with regulations.

### \*\*\* Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS \*\*\*

CAS #	Component	Percent
7732-18-5	Water	80
7647-14-5	Sodium Chloride	20

Because brine water is a natural product, composition can vary greatly.

### \*\*\* Section 4 – FIRST AID MEASURES \*\*\*

#### First Aid: Eyes

Flush eyes with clean running water for at least fifteen (15) minutes. If irritation or redness develops from exposure, following flushing, seek medical attention.

#### First Aid: Skin

First aid is not required, normally. However, it is a good practice to wash any chemical from the skin.

#### First Aid: Ingestion (Swallowing)

First aid is not required, normally. If spontaneous vomiting occurs, lean the victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. If symptoms develop, seek medical attention.

#### First Aid: Inhalation (Breathing)

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

# SAFETY DATA SHEET

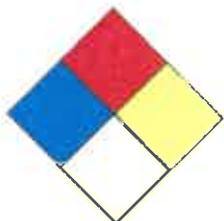
Material Name: Produced Water

US GHS

## Most important symptoms and effects

None known or anticipated.

### \*\*\* Section 5 – FIRE FIGHTING MEASURES \*\*\*



## NFPA 704 Hazard Class

Health: 1 Flammability: 0 Instability: 0 (0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe)

## General Fire Hazards

No fire hazards are expected.

## General Fire Hazards

No unusual fire or explosion hazards are expected. If container is not properly cooled, it can rupture in the heat of a fire.

## Extinguishing Media

The material is non-flammable. Use extinguishing agent suitable for the type of surrounding fire.

## Unsuitable Extinguishing Media

None

## Fire Fighting Equipment / Instructions

Small fires in the beginning stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Isolate area around container involved in fire and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from the immediate hazard area if it can be done safely. Cool equipment exposed to fire with water, if it can be done safely.

## Hazardous Combustion Products

None Anticipated. See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

## \*\*\* Section 6 – ACCIDENTAL RELEASE MEASURES \*\*\*

### Recovery and Neutralization

Contain and stop the source of the spill, if safe to do so.

### Materials and Methods for Clean-Up

Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios of this material. However, local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

### Emergency Measures

The material is not considered hazardous. Nevertheless, evacuate nonessential personnel and secure the area. Stay upwind and uphill, if possible.

### Personal Precautions and Protective Equipment

Stay upwind and away from the spill/release. Avoid direct contact with the material. For large spillages, notify persons downstream of the spill/release. Isolate the immediate hazard area and keep unauthorized personnel out. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

### Environmental Precautions

Protect bodies of water by diking or absorbents, if possible. Do not flush down sewer or drainage systems. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If a spill occurs on water, notify appropriate authorities and advise shipping of any hazard.

### Prevention of Secondary Hazards

None

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

## \*\*\* Section 7 – HANDLING AND STORAGE \*\*\*

### Handling Procedures

Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29 CFR 1910.146. Do not wear contaminated clothing or shoes.

### Storage Procedures

Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well ventilated areas. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

### Incompatibilities

Keep away from excessive heat to prevent rupture of container.

## \*\*\* Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION \*\*\*

### Component Exposure Limits

#### Water (7732-18-5)

ACGIH: Not listed

#### Sodium Chloride (7647-14-5)

ACGIH: Not listed

### Engineering Measures

If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

### Personal Protective Equipment: Respiratory

Emergencies or conditions that could result in significant airborne exposures may require the use of NIOSH approved respiratory protection. An industrial hygienist or other appropriate health and safety professional should be consulted for specific guidance under these situations.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use.

## Personal Protective Equipment: Skin and Hands

The use of skin protection is not normally required; however, good industrial hygiene practice suggests the use of gloves or other appropriate skin protection whenever working with chemicals.

## Personal Protective Equipment: Eyes

Safety glasses or goggles that meet or exceed ANSI Z-87.1 are recommended where there is a possibility of splashing or spraying.

## Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove contaminated clothing and launder before reuse.

### \*\*\* Section 9 – PHYSICAL AND CHEMICAL PROPERTIES \*\*\*

<b>Appearance:</b>	Clear to Brown	<b>Odor:</b>	Salty
<b>Physical State:</b>	Liquid	<b>pH:</b>	ND
<b>Vapor Pressure:</b>	< 0.36 psia @ 70°F / 21.1°C	<b>Vapor Density:</b>	> 1
<b>Boiling Point:</b>	212°F / 100°C	<b>Melting Point:</b>	2.4°F / -16.5°C
<b>Solubility (H2O):</b>	Complete	<b>Specific Gravity:</b>	1.1 @ 68°F / 20°C
<b>Evaporation Rate:</b>	Variable	<b>VOC:</b>	ND
<b>Octanol / H2O Coeff.:</b>	ND	<b>Flash Point:</b>	ND
<b>Flash Point Method:</b>	ND		
<b>Lower Flammability Limit:</b>	ND	<b>Upper Flammability Limit:</b>	ND
<b>(LFL):</b>		<b>(UFL):</b>	
<b>Auto Ignition:</b>	ND	<b>Burning Rate:</b>	ND

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

## \*\*\* Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION \*\*\*

### Chemical Stability

This is a stable material.

### Hazardous Reaction Potential

Will react with alkali and alkaline metals to form flammable hydrogen gas.

### Conditions to Avoid

Avoid contact with alkali metals (lithium, sodium, potassium), alkaline metals (beryllium, magnesium, calcium, strontium, and barium), and metallic hydrides like lithium aluminum hydride.

### Hazardous Decomposition Products

Not anticipated under normal conditions of use.

### Hazardous Polymerization

Not known to occur.

## \*\*\* Section 11 – TOXICOLOGICAL INFORMATION \*\*\*

### Acute Toxicity

#### A: General Product Information

Unlikely to be harmful.

#### B. Component Analysis – D50/LC50

##### Water (7732-18-5)

Oral LD50 Rat 90 g/kg

##### Sodium Chloride (7647-14-5)

Oral LD50 Rat 3 g/kg

### Potential Health Effects: Skin Corrosion Property / Stimulativeness

May cause skin irritation with prolonged or repeated contact. Not expected to be a skin sensitizer.

### Potential Health Effects: Eye Critical Damage / Stimulativeness

Contact with eyes may cause moderate irritation.

# SAFETY DATA SHEET

**Material Name:** Produced Water

**US GHS**

**Potential Health Effects: Ingestion**

Ingestion may result in nausea, vomiting, diarrhea, abdominal cramps, and dehydration (thirst).

**Potential Health Effects: Inhalation**

No information available on the mixture. However, none of the components have been classified for respiratory sensitization (or are below the concentration threshold for classification).

**Generative Cell Mutagenicity**

Not expected to cause genetic effects.

**Carcinogenicity**

**General Product Information**

Not expected to cause cancer. This substance is not listed as a carcinogen by IARC, NTP or OSHA.

**Reproductive Toxicity**

This product is not reported to have any reproductive toxicity effects.

**Specified Target Organ General Toxicity: Single Exposure**

This product is not reported to have any specific target organ general toxicity single exposure effects.

**Specified Target Organ General Toxicity: Repeated Exposure**

This product is not reported to have any specific target organ general toxicity multiple exposure effects.

**Aspiration Respiratory Organs Hazard**

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

<b>*** Section 12 – ECOLOGICAL INFORMATION ***</b>
--

**Ecotoxicity**

**A: General Product Information**

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

## Persistence / Degradability

No information available

## Bioaccumulation

No information available

## Mobility in Soil

No information available

### \*\*\* Section 13 – DISPOSAL CONSIDERATIONS \*\*\*

#### Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

#### Disposal of Contaminated Containers or Packaging

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.

This material, if discarded as produced, is not a RCRA "listed" hazardous waste, and is not believed to exhibit characteristics of hazardous waste. Consult state and local regulations regarding the proper disposal of this material. Do not dispose of brine water by draining onto the ground. This will result in soil and groundwater contamination. Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate should not be considered a RCRA hazardous waste but must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

### \*\*\* Section 14 – TRANSPORTATION INFORMATION \*\*\*

#### DOT Information

Shipping Description: Not Regulated

UN #: Not Regulated

# SAFETY DATA SHEET

Material Name: Produced Water

US GHS

## \*\*\* Section 15 – REGULATORY INFORMATION \*\*\*

### **CERCLA/SARA – Section 302 Extremely Hazardous Substances and TPQs (in pounds):**

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372,

### **CERCLA/SARA – Section 313 and 40 CFR 372):**

This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

### **EPA (CERCLA) Reportable Quantity (in pounds):**

This material does not contain any chemicals with CERCLA Reportable Quantities.

### **State Regulations**

#### **Component Analysis**

The following components appear on one or more of the following state hazardous substances list.

### **California Proposition 65:**

This material does not contain any chemicals that are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

### **National Chemical Inventories:**

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.

**U.S. Export control classification Number:** EAR99.

## \*\*\* Section 16 – OTHER INFORMATION \*\*\*

### **NFPA® Hazard Rating**

Health	1
Fire	0
Reactivity	0

### **HMIS® Hazard Rating**

Health	1	Slight
Fire	0	Minimal
Physical	0	Minimal

# **SAFETY DATA SHEET**

**Material Name: Produced Water**

**US GHS**

## **Key/Legend**

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

## **Literature References**

None

## **Other Information**

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

**Date of Preparation: January 28, 2014**

**Date of Last Revision: March 4, 2014**

End of Sheet

Material Name: Natural Gas Condensate

US GHS

SYNONYMS: Drips; Condensate; Field Condensate; Gas Well Condensate; High Pressure Inlet Liquids; Lease Condensate; Natural Gas Liquids; Pipeline Liquids

**\*\*\* Section 1 – PRODUCT AND COMPANY IDENTIFICATION \*\*\***

PRODUCT NAME: Natural Gas Condensate

EMERGENCY PHONE: (800) 878-1373

PRODUCT CODES: 64741-47-5

AFTER HOURS: (800) 878-1373

PRODUCER: Antero Resources

ADDRESS: 1615 Wynkoop Street  
Denver, Colorado 80202

CHEMTREC PHONE: (800) 424-9300

**\*\*\* Section 2 – HAZARDS IDENTIFICATION \*\*\***

**GHS Classification:**

Flammable Liquids – Category 2.

Acute Toxicity Inhalation – Category 3

Germ Cell Mutagenicity – Category 1B

Carcinogenicity – Category 1A

Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 3

Specific Target Organ Systemic Toxicity (STOT) – Repeat Exposure Category 1

Aspiration Toxicity – Category 1

Toxic to the Aquatic Environment Acute – Category 3

**GHS LABEL ELEMENTS**

**Symbol(s)**



**Signal Word**

Danger

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## Hazard Statements

Highly flammable liquid and vapor.

Toxic if inhaled.

May cause genetic defects.

May cause cancer.

May cause respiratory irritation.

May cause drowsiness or dizziness.

May cause damage to organs (liver, kidneys, blood, nervous system, and skin) through prolonged or repeated exposure.

May be fatal if swallowed and enters airways.

Harmful to aquatic life.

## Precautionary Statements

### Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Keep container tightly closed.

Ground/bond container and receiving equipment.

Use explosion-proof electrical/ventilating/lighting equipment.

Use only non-sparking tools.

Take precautionary measures against static discharge.

Wear protective gloves/protective clothing/eye protection/face protection.

Do not breathe gas/mist/vapors/spray.

Do not handle until all safety precautions have been read and understood.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

Use only outdoors or in a well-ventilated area.

Avoid release to the environment.

### Response

If on SKIN (or hair): Wash with plenty of soap and water. Remove / Take off all contaminated clothing immediately. Rinse skin with water/shower.

If INHALED: Remove victim to fresh air and keep comfortable for breathing. Call a poison center/doctor if the victim feels unwell.

If SWALLOWED: Immediately call a poison center or doctor / physician. Do not induce vomiting.

If exposed or concerned: Get medical advice/attention.

In case of fire: Use water spray, fog or fire-fighting foam.

### Storage

Store in a well-ventilated place. Keep cool.

Store in a secure area.

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

### \*\*\* Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS \*\*\*

CAS #	Component	Percent
111-65-9	Octanes	25 - 95
142-82-5	Heptanes	25 - 95
110-54-3	Hexanes as n-Hexane	25 - 95
109-66-0	Pentanes as n-Pentane	5 - 70
106-97-8	N-butane	0 - 45
74-98-6	Propane	0 - 15
78-84-0	Ethane	0 - 5
71-43-2	Benzene	< 1
108-88-3	Toluene	< 1
1330-20-7	m-,o-,p-Xylene	< 1

Because natural gas condensate is a natural product, composition can vary greatly.

### \*\*\* Section 4 – FIRST AID MEASURES \*\*\*

#### First Aid: Eyes

Flush eyes with clean running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

#### First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Wash contaminated clothing before reuse.

#### First Aid: Ingestion (swallowing)

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean the victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

# SAFETY DATA SHEET

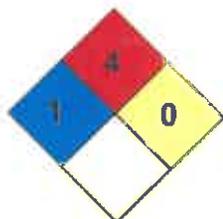
Material Name: Natural Gas Condensate

US GHS

## First Aid: Inhalation (breathing)

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

### \*\*\* Section 5 – FIRE FIGHTING MEASURES \*\*\*



## NFPA 704 Hazard Class

Health: 1 Flammability: 4 Instability: 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

## General Fire Hazards

See Section 9 for Flammability Properties.

Extremely flammable. Vapors may be ignited rapidly when exposed to heat, spark, open flame, or other source of ignition (e.g., static electricity, pilot lights, mechanical / electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Flammable vapors can burn in the open or explode in confined spaces. Vapors are heavier than air, and may travel distances to an ignition source and flash back. Runoff to sewer systems may cause fire or explosion.

## Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## Extinguishing Media

**SMALL FIRES:** Any extinguisher suitable for Class B fires, dry chemical, firefighting foam, water spray, carbon dioxide (CO<sub>2</sub>), or other gaseous extinguishing agents. Use caution when applying CO<sub>2</sub> in confined spaces.

**LARGE FIRES:** Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

## Unsuitable Extinguishing Media

None

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## Fire Fighting Equipment / Instructions

Small fires in the beginning stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full face piece and full protective clothing.

## \*\*\* Section 6 – ACCIDENTAL RELEASE MEASURES \*\*\*

### Recovery and Neutralization

Contain and stop the source of the spill, if safe to do so.

### Materials and Methods for Clean-Up

Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

### Emergency Measures

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

### Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8). Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of

# SAFETY DATA SHEET

**Material Name: Natural Gas Condensate**

**US GHS**

ignition and hot metal surfaces away from spill/release if safe to do so.

The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons downwind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

## **Environmental Precautions**

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of firefighting foam may be useful in certain situations to reduce vapors. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

## **Prevention of Secondary Hazards**

None

## **\*\*\* Section 7 – HANDLING AND STORAGE \*\*\***

### **Handling Procedures**

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use non-sparking tools. Use only outdoors or in well ventilated areas. Wear protective gloves / clothing and eye / face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

### **Storage Procedures**

Store only in approved containers. Bond and ground containers. Keep away from flame, sparks, excessive temperatures and open flames. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

## \*\*\* Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION \*\*\*

### Component Exposure Limits

#### Octanes (111-65-9)

ACGIH: 300 ppm TWA (listed under Octane, all isomers)

#### Heptanes (142-82-5)

ACGIH: 400 ppm TWA (listed under n-Heptane)

#### n-Hexane (110-54-3)

ACGIH: 20 ppm TWA (listed under n-Hexane)

#### n-Pentane (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

#### n-Butane (106-97-8)

ACGIH: 600 ppm TWA (listed under n-Butane)

#### Propane (74-98-6)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases C1-C4)

#### Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases C1-C4)

#### Benzene (71-43-2)

ACGIH: 0.5 ppm (TWA); NIOSH: 0.1 ppm (TWA); OSHA 1 ppm (TWA)

#### Toluene (108-88-3)

ACGIH: 20 ppm TWA (listed under Toluene)

#### m-, o-, p-Xylene (1330-20-7)

ACGIH: 100 ppm TWA (listed under Xylene o, m & p isomers)

# SAFETY DATA SHEET

**Material Name:** Natural Gas Condensate

US GHS

## **Engineering Measures**

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

## **Personal Protective Equipment: Respiratory**

Use a NIOSH-approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere (oxygen content less than 19.5 percent). A respiratory program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant the use of a respirator.

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29 CFR 1910.1028 – Benzene).

**CAUTION:** Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

## **Personal Protective Equipment: Hands**

Gloves constructed of nitrile or neoprene are recommended.

## **Personal Protective Equipment: Eyes**

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Eye protection that meets or exceeds ANSI Z.87.1 is recommended. Depending on conditions of use, a face shield may be necessary.

## **Personal Protective Equipment: Skin and Body**

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

## **Hygiene Measures**

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use gasoline or solvents (naphtha, kerosene, etc.) for washing this product from

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

## \*\*\* Section 9 – PHYSICAL AND CHEMICAL PROPERTIES \*\*\*

<b>Appearance:</b>	Colorless to straw yellow	<b>Odor:</b>	Aromatic, Gasoline;
<b>Physical State:</b>	Liquid	<b>pH:</b>	ND
<b>Vapor Pressure:</b>	110 – 200 psia (Reid VP) @ 100°F/37.8°C	<b>Vapor Density (air = 1):</b>	> 1
<b>Boiling Point:</b>	Approx. 85 - 437°F (39 – 200°C)	<b>Melting Point:</b>	ND
<b>Solubility (H2O):</b>	Insoluble to slightly soluble	<b>Specific Gravity:</b>	AP 0.62-0.76 (varies)
<b>Evaporation Rate:</b>	High	<b>VOC:</b>	ND
<b>Octanol / H2O Coeff.:</b>	ND	<b>Flash Point:</b>	-40°F -40°C
<b>Flash Point Method:</b>	Tag Closed Cup (TCC)		
<b>Lower Flammability Limit: (LFL):</b>	ND (NFPA Gasoline 1.4)	<b>Upper Flammability Limit: (UFL):</b>	ND (NFPA Gasoline 7.6)
<b>Auto Ignition:</b>	AP 480°F (250°C)	<b>Burning Rate:</b>	ND

## \*\*\* Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION \*\*\*

### Chemical Stability

This is a stable material.

### Hazardous Reaction Potential

Will not occur.

### Conditions to Avoid

Keep away from ignition sources and high temperatures.

### Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

*** Section 11 – TOXICOLOGICAL INFORMATION ***
--

## Acute Toxicity

### A: General Product Information

Harmful if swallowed.

### B. Component Analysis – LD50/LC50

#### Octanes (111-65-9)

Inhalation LC50 rat = 118,000 mg/m<sup>3</sup> / 4H

#### Heptanes (142-82-5)

Inhalation LC50 rat = 103,000 mg/m<sup>3</sup> / 4H

#### Hexanes as n-Hexane (110-53-3)

Inhalation LC50 rat = 48,000 ppm / 4H

#### Pentanes as n-Pentane (109-66-0)

Inhalation LC50 rat = 364,000 mg/m<sup>3</sup> / 4H

#### Butanes as n-Butane (106-97-8)

Inhalation LC50 rat 658,000 mg/l / 4H

#### Propane (74-98-6)

Inhalation LC50 Rat > 800,000 ppm / 0.25H

#### Ethane (74-84-0)

Inhalation LC50 Rat 658,000 mg/l / 4H

#### Benzene (71-43-2)

Inhalation LC50 Rat 44,700 mg/m<sup>3</sup> /

#### Toluene (108-88-3)

Inhalation LD50 Rat 12/5 mg/l / 4H

#### m-, o-, p-Xylene (1330-20-7)

Inhalation LC50 Rat 5000 ppm / 4H

### Potential Health Effects: Skin Corrosion Property / Stimulativeness

May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## Potential Health Effects: Eye Critical Damage / Stimulativeness

Contact with eyes may cause moderate irritation.

## Potential Health Effects: Ingestion (swallowing)

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

## Potential Health Effects: Inhalation (breathing)

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

## Respiratory Organs Sensitization / Skin Sensitization

This product is not reported to have any skin sensitization effects.

## Generative Cell Mutagenicity

May cause genetic defects. Some crude oils and crude oil fractions have been positive in mutagenicity studies.

## Carcinogenicity

### A: General Product Information

May cause cancer.

This product contains benzene, although at very low concentrations. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Exposure to light hydrocarbons in the same boiling range as this product have been associated in animal studies with effects to the central nervous system, peripheral nervous system, liver, and kidneys. The significance of these animal models to predict similar human response is uncertain. Observing good work practices and personal hygiene procedures (Sections 7 and 8) can minimize potential risks to humans.

### B: Component Carcinogenicity

#### Benzene (71-43-2)

ACGIH:	A1 - Confirmed Human Carcinogen
OSHA:	5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH:	potential occupational carcinogen
NTP:	Known Human Carcinogen (Select Carcinogen)

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

IARC: Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

## Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

## Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

## Specified Target Organ General Toxicity: Repeated Exposure

May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure.

## Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

### \*\*\* Section 12 – ECOLOGICAL INFORMATION \*\*\*

## Ecotoxicity

### A: General Product Information

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

### B: Component Analysis – Ecotoxicity – Aquatic Toxicity

#### Benzene (71-43-2)

Test and Species	Conditions
96 Hr LC50 <i>Pimephales promelas</i>	10.7-14.7 mg/L [flow-through]
96 Hr LC50 <i>Oncorhynchus mykiss</i>	5.3 mg/L [flow-through]
96 Hr LC50 <i>Lepomis macrochirus</i>	22.49 mg/L [static]
96 Hr LC50 <i>Poecilia reticulata</i>	28.6 mg/L [static]
96 Hr LC50 <i>Pimephales promelas</i>	22330-41160 µg/L [static]
96 Hr LC50 <i>Lepomis macrochirus</i>	70000-142000 µg/L [static]
72 Hr EC50 <i>Pseudokirchneriella subcapitata</i>	29 mg/L
48 Hr EC50 <i>Daphnia magna</i>	8.76 - 15.6 mg/L [static]
48 Hr EC50 <i>Daphnia magna</i>	10 mg/L

# SAFETY DATA SHEET

**Material Name: Natural Gas Condensate**

**US GHS**

## **Natural Gas condensates (68919-39-1)**

<b>Test and Species</b>	<b>Conditions</b>
96 Hr LC50 <i>Alburnus alburnus</i>	119 mg/L [static]
96 Hr LC50 <i>Cyprinodon variegatus</i>	82 mg/L [static]
72 Hr EC50 <i>Pseudokirchneriella subcapitata</i>	56 mg/L
24 Hr EC50 <i>Daphnia magna</i>	170 mg/L

### **Persistence / Degradability**

No information available

### **Bioaccumulation**

No information available

### **Mobility in Soil**

No information available

## **\*\*\* Section 13 – DISPOSAL CONSIDERATIONS \*\*\***

### **Waste Disposal Instructions**

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

### **Disposal of Contaminated Containers or Packaging**

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.

This material, if discarded should be fully characterized for ignitability (D001), reactivity (D003) and benzene (D018) prior to disposal (40 CFR261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material. Do not dispose of by draining onto the ground. This will result in soil and groundwater contamination.

Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

## \*\*\* Section 14 – TRANSPORTATION INFORMATION \*\*\*

### DOT Information

**Shipping Name:** Petroleum Products, n.o.s. (condensate)

**UN #: 1268 Hazard Class: 3**

**Additional Info.:** Dependent on the product's properties, the shipper may also elect to classify as Gasoline UN1203 or Petroleum Crude Oil UN1267 - reference 49 CFR 172.101 for further description (e.g., packing group determination).

Placard:



## \*\*\* Section 15 – REGULATORY INFORMATION \*\*\*

### Regulatory Information

#### Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

#### **Benzene (71-43-2)**

SARA 313: 0.1% de minimis concentration

CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

#### **SARA Section 311/312 – Hazard Classes**

<u>Acute Health</u>	<u>Chronic Health</u>	<u>Fire</u>	<u>Sudden Release of Pressure</u>	<u>Reactive</u>
X	X	X	--	--

#### **SARA SECTION 313 – SUPPLIER NOTIFICATION**

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

# SAFETY DATA SHEET

Material Name: Natural Gas Condensate

US GHS

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION PERCENT BY WEIGHT
Benzene (71-43-2)	<0.1 to 2

## Canadian Regulatory Information

<b>DSL/NDSL Inventory</b>	This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.
<b>Workplace Hazardous Materials Information System</b>	B2 - Flammable Liquid D1A – Material Causing Immediate and Serious Toxic Effects - Very Toxic Material D2A: Material Causing Other Toxic Effects Very Toxic D2B - Material Causing Other Toxic Effects - Toxic Material

## European Union Regulatory Information

<b>Labeling</b>	Product is dangerous as defined by the European Union Dangerous Substances / Preparations Directives. Contains: Low Boiling Point Naphtha
<b>Symbol</b>	F+ Extremely Flammable T Toxic N Dangerous for the Environment
<b>Risk Phrases</b>	R12-45-38-65-67-51/53 Extremely flammable. May cause cancer. Irritating to skin. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>Safety Phrases</b>	S16-53-45-2-23-24-29-43-62 Keep away from sources of ignition – No smoking. Avoid exposure – obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/dry powder/CO2. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

# SAFETY DATA SHEET

**Material Name: Natural Gas Condensate**

**US GHS**

**State Regulations**

**Component Analysis – State**

The following components appear on one or more of the following state hazardous substances lists

Component	CAS	CA	MA	MN	NJ	PA	RI
Octanes	111-65-9	Yes	No	Yes	Yes	Yes	Yes
Heptanes	142-82-5	Yes	No	Yes	Yes	Yes	Yes
n-Hexane	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
n-Pentane	109-66-0	Yes	No	Yes	Yes	Yes	Yes
n-Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	Yes
m-, o-, p-Xylene	1330-20-7	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

WARNING! This product contains a chemical known to the state of California to cause Reproductive / developmental effects.

**Component Analysis – WHMIS IDL**

The following components are identified under the Canadian Hazardous Products Act

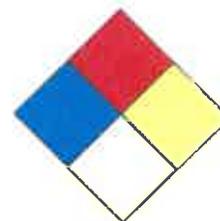
Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Benzene	71-43-2	0.1%

**\*\*\* Section 16 – OTHER INFORMATION \*\*\***

**NFPA® Hazard Rating**

Health 1  
Fire 4  
Reactivity 0



**HMIS® Hazard Rating**

Health 1 Slight  
Fire 4 Severe  
Physical 0 Minimal  
\* Chronic

# **SAFETY DATA SHEET**

**Material Name: Natural Gas Condensate**

**US GHS**

## **Key/Legend**

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

## **Literature References**

None

## **Other Information**

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

**Date of Preparation: January 29, 2014**

**Date of Last Revision: March 4, 2014**

End of Sheet

Material Name: Wet Field Natural Gas

SYNONYMS: CNG, Natural Gas, Methane.

**\*\*\* Section 1 – PRODUCT AND COMPANY IDENTIFICATION \*\*\***

PRODUCT NAME:	Wet Field Natural Gas	EMERGENCY PHONE:	(800) 878-1373
PRODUCT CODES:	CAS Reg. No. 68410-63-9	AFTER HOURS:	(800) 878-1373
PRODUCER:	Antero Resources		
ADDRESS:	1615 Wynkoop Street Denver, Colorado 80202	CHEMTREC PHONE:	(800) 424-9300

**\*\*\* Section 2 – HAZARDS IDENTIFICATION \*\*\***

**GHS Classification:**

Flammable Gas – Category 1.

Gases Under Pressure – Gas.

Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 2.

**GHS LABEL ELEMENTS**

Symbol(s)



Signal Word

Danger

**Hazard Statements**

Extremely flammable gas.

Contains gas under pressure, may explode if heated.

May cause damage to central nervous and respiratory systems.

**Precautionary Statements**

**Prevention**

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Do not breathe fume/gas/mist/vapors/spray.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

## Response

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

If exposed to gas, or concerned about possible exposure: Call a POISON CENTER or doctor/physician.

## Storage

Protect from sunlight. Store in a well-ventilated place.

Store in a secure area.

## Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

### \*\*\* Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS \*\*\*

CAS #	Component	Percent
74-82-8	Methane	72 - 97
78-84-0	Ethane	2.2 - 14
74-98-6	Propane	0.0 – 8.0
106-97-8	Butanes	0.0 – 3.5
109-66-0	Pentanes	0.0 – 1.4
110-54-3	Hexanes	0.0 – 0.5
7727-37-9	Nitrogen	< 0.4
124-38-9	Carbon Dioxide	< 0.2
7782-44-7	Oxygen	< 0.04

Because natural gas is a natural product, composition can vary greatly.

### \*\*\* Section 4 – FIRST AID MEASURES \*\*\*

#### First Aid: Eyes

In case of freeze burn, cover eyes to protect from light. Flush eyes with running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

#### First Aid: Skin

Remove contaminated clothing. In case of blistering, frostbite or freeze burns, seek immediate medical attention.

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

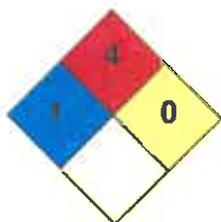
## **First Aid: Ingestion**

Risk of ingestion is extremely low. However, if oral exposure occurs, seek immediate medical assistance.

## **First Aid: Inhalation**

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

### \*\*\* Section 5 – FIRE FIGHTING MEASURES \*\*\*



## **NFPA 704 Hazard Class**

Health: 1 Flammability: 4 Instability: 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

## **General Fire Hazards**

See Section 9 for Flammability Properties.

Forms a flammable mixture with air. If released, the resulting vapors will disperse with the prevailing wind. If a source of ignition is present where the vapor exists at a 5 – 15% concentration in air, the vapor will burn along the flame front toward the source of the fuel.

## **Hazardous Combustion Products**

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## **Extinguishing Media**

Any extinguisher suitable for Class B fires, dry chemical, firefighting foam, CO<sub>2</sub>, and other gaseous agents. However, fire should not be extinguished unless flow of gas can be immediately stopped.

## **Unsuitable Extinguishing Media**

None.

## **Fire Fighting Equipment / Instructions**

Gas fires should not be extinguished unless flow of gas can be immediately stopped. Shut off gas source and allow gas to burn out. If spill or leak has not ignited, determine

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and piping exposed to fire and excessive heat. For large fire, the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around piping. Let the fire burn unless leak can be stopped. Concentrate fire-fighting efforts on objects / materials ignited by the initial fire. Withdraw immediately in the event of a rising sound from a venting safety device.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH-approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

## \*\*\* Section 6 – ACCIDENTAL RELEASE MEASURES \*\*\*

### **Recovery and Neutralization**

Stop the source of the release, if safe to do so.

### **Materials and Methods for Clean-Up**

Consider the use of water spray to disperse gas vapors. Do not use water spray to direct gas vapors toward sewer or drainage systems. Isolate the area until gas has dispersed. Ventilate and gas test area before entering.

### **Emergency Measures**

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

### **Personal Precautions and Protective Equipment**

Cooling effect of expanding gas from leak may present frostbite / freeze burn hazard. Wear flame retardant (FR) clothing around un-ignited leak. Wear fire protective clothing around an active fire.

### **Environmental Precautions**

Do not flush gas vapors toward sewer or drainage systems.

### **Prevention of Secondary Hazards**

None.

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

## \*\*\* Section 7 – HANDLING AND STORAGE \*\*\*

### Handling Procedures

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use only in well ventilated areas.

### Storage Procedures

Natural gas will be contained in the pipeline. Keep away from flame, sparks, excessive temperatures and open flames. Empty pipeline segments may contain explosive residues from natural gas liquids. Do not cut, heat, weld or expose containers to sources of ignition sections of pipeline unless the sections have been purged of natural gas residues.

### Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

## \*\*\* Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION \*\*\*

### Component Exposure Limits

#### Methane (74-82-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Propane (74-98-6)

ACGIH: 2500 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Butane (106-97-8)

ACGIH: 800 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Pentanes (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

#### Hexanes (110-54-3)

ACGIH: 50 ppm TWA (listed under n-Hexane)

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

**Nitrogen (7727-37-9)**

Simple Asphyxiant

**Carbon Dioxide (124-38-9)**

ACGIH: 5000 ppm TWA (listed under Carbon Dioxide)

**Oxygen (7782-44-7)**

N/A – Necessary for life

## Engineering Measures

Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

## Personal Protective Equipment: Respiratory

Use a NIOSH approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere. CAUTION: Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

## Personal Protective Equipment: Hands

Use cold-impervious, insulating flame-retardant (FR) gloves where contact with pressurized gas may occur.

## Personal Protective Equipment: Eyes

Where there is a possibility of pressurized gas contact, wear splash-proof safety goggles and faceshield.

## Personal Protective Equipment: Skin and Body

Where contact with pressurized gas may occur, wear flame-retardant (FR) and a faceshield.

## \*\*\* Section 9 – PHYSICAL AND CHEMICAL PROPERTIES \*\*\*

<b>Appearance:</b> Colorless	<b>Odor:</b> Odorless to slight petroleum odor
<b>Physical State:</b> Gas	<b>pH:</b> ND
<b>Vapor Pressure:</b> 40 atm @ -187°F (-86°C)	<b>Vapor Density:</b> 0.6
<b>Boiling Point:</b> -259°F (-162°C)	<b>Melting Point:</b> ND
<b>Solubility (H2O):</b> 3.5%	<b>Specific Gravity:</b> 0.4 @ -263°F (-164°C)

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

<b>Evaporation Rate:</b>	ND	<b>VOC:</b>	ND
<b>Octanol / H2O Coeff.:</b>	ND	<b>Flash Point:</b>	Flammable Gas
<b>Flash Point Method:</b>	N/A		
<b>Lower Flammability Limit:</b>	3.8 – 6.5	<b>Upper Flammability Limit:</b>	13-17
<b>(LFL):</b>		<b>(UFL):</b>	
<b>Auto Ignition:</b>	900-1170°F (482-632°C)	<b>Burning Rate:</b>	ND

## \*\*\* Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION \*\*\*

### Chemical Stability

This is a stable material.

### Hazardous Reaction Potential

Will not occur.

### Conditions to Avoid

Keep away from strong oxidizers, ignition sources and heat.

### Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## \*\*\* Section 11 – TOXICOLOGICAL INFORMATION \*\*\*

### Acute Toxicity

#### A: General Product Information

Methane and ethane, the main components of natural gas, are considered practically inert in terms of physiological effects. At high concentrations these materials act as simple asphyxiants and may cause death due to lack of oxygen.

#### B. Component Analysis – LD50/LC50

##### Methane (74-82-8)

Inhalation LC50 Mouse 326 g/m<sup>3</sup> 2h

##### Ethane (74-84-0)

Inhalation LC50 Rat 658 mg/l 4h

##### Propane (74-98-6)

Inhalation LC50 Rat 658 mg/l 4h

# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

**Butanes (106-97-8)**

Inhalation LC50 Rat 658 g/m<sup>3</sup> 4h

**Pentanes (109-66-0)**

Inhalation LD50 Rat 364 g/m<sup>3</sup> 4h

**Hexanes (110-54-3)**

Inhalation LC50 Rat > 20 mg/l 4h

**Nitrogen (7727-37-9)**

Simple Asphyxiant

**Carbon Dioxide (124-38-9)**

Inhalation LC50 Human 100,000 ppm 1minute

**Oxygen (7782-44-7)**

N/A – Necessary for life

**Potential Health Effects: Skin Corrosion Property / Stimulativeness**

This product is not reported to have any skin sensitization effects.

**Generative Cell Mutagenicity**

This product is not reported to have any mutagenic effects.

**Carcinogenicity**

**A: General Product Information**

This product is not reported to have any carcinogenic effects.

**B: Component Carcinogenicity**

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

**Reproductive Toxicity**

This product is not reported to have any reproductive toxicity effects.

**Specified Target Organ General Toxicity: Single Exposure**

This product may cause damage to the heart.

**Specified Target Organ General Toxicity: Repeated Exposure**

This product is not reported to have any specific target organ repeat effects.

**Aspiration Respiratory Organs Hazard**

This product is not reported to have any aspiration hazard effects.

# SAFETY DATA SHEET

Material Name: Wet Field Natural Gas

## \*\*\* Section 12 – ECOLOGICAL INFORMATION \*\*\*

### Ecotoxicity

#### A: General Product Information

Keep gas and vapors out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

#### B: Component Analysis – Ecotoxicity – Aquatic Toxicity

No ecotoxicity data are available for this product's components.

### Persistence / Degradability

No information available.

### Bioaccumulation

No information available.

### Mobility in Soil

No information available.

## \*\*\* Section 13 – DISPOSAL CONSIDERATIONS \*\*\*

### Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

### Disposal of Contaminated Containers or Packaging

Dispose of contents / container in accordance with local / regional / national / international regulations.

## \*\*\* Section 14 – TRANSPORTATION INFORMATION \*\*\*

### DOT Information

Shipping Name: Natural Gas, Compressed

UN #: 1971 Hazard Class: 2.1

Placard:



# SAFETY DATA SHEET

**Material Name: Wet Field Natural Gas**

**\*\*\* Section 15 – REGULATORY INFORMATION \*\*\***

**Regulatory Information**

**Component Analysis**

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A).

n-hexane is listed under SARA Section 313 (40 CFR 372.65). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

n-hexane is listed under CERCLA (40 CFR 302.4). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

**SARA Section 311/312 – Hazard Classes**

<u>Acute Health</u>	<u>Chronic Health</u>	<u>Fire</u>	<u>Sudden Release of Pressure</u>	<u>Reactive</u>
---	---	X	X	---

**SARA Section 313 – Supplier Notification**

This product contains one chemical (n-Hexane) that is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-know act (EPCRA) of 1986 and of 40 CFR 372. However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

**State Regulations**

**Component Analysis – State**

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Methane	74-82-8	No	No	Yes	Yes	Yes	No
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Pentanes	109-66-0	Yes	No	Yes	Yes	Yes	Yes
Hexanes	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
Nitrogen	7727-37-9	No	No	No	No	No	No
Carbon Dioxide	124-38-9	Yes	No	Yes	Yes	Yes	Yes
Oxygen	7782-44-7	No	No	No	No	No	No

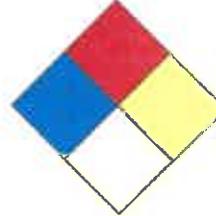
# SAFETY DATA SHEET

Material Name: Wet Field Natural Gas

## \*\*\* Section 16 – OTHER INFORMATION \*\*\*

**NFPA® Hazard Rating**

Health	1
Fire	4
Reactivity	0



**HMIS® Hazard Rating**

Health	1	Moderate
Fire	4	Severe
Physical	0	Minimal

\* Chronic

### Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

### Literature References

None

### Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

**Date of Preparation:** February 7, 2014

**Date of Last Revision:** March 4,, 2014

End of Sheet

Material Name: Dry Field Natural Gas

US GHS

SYNONYMS: CNG, Natural Gas, Methane.

**\*\*\* Section 1 – PRODUCT AND COMPANY IDENTIFICATION \*\*\***

PRODUCT NAME:	Dry Field Natural Gas	EMERGENCY PHONE:	(800) 878-1373
PRODUCT CODES:	CAS Reg. No. 68410-63-9	AFTER HOURS:	(800) 878-1373
PRODUCER:	Antero Resources		
ADDRESS:	1615 Wynkoop Street Denver, Colorado 80202	CHEMTREC PHONE:	(800) 424-9300

**\*\*\* Section 2 – HAZARDS IDENTIFICATION \*\*\***

**GHS Classification:**

Flammable Gas – Category 1.

Gases Under Pressure – Gas.

Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 2.

**GHS LABEL ELEMENTS**

Symbol(s)



Signal Word

Danger

Hazard Statements

Extremely flammable gas.

Contains gas under pressure, may explode if heated.

May cause damage to central nervous and respiratory systems.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Do not breathe fume/gas/mist/vapors/spray.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

## Response

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

If exposed to gas, or concerned about possible exposure: Call a POISON CENTER or doctor/physician.

## Storage

Protect from sunlight. Store in a well-ventilated place.

Store in a secure area.

## Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

### \*\*\* Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS \*\*\*

CAS #	Component	Percent
74-82-8	Methane	95.01
78-84-0	Ethane	3.99
74-98-6	Propane	0.32
106-97-8	Butanes	0.07
109-66-0	Pentanes	0.02
110-54-3	Hexanes	0.01
7727-37-9	Nitrogen	0.35
124-38-9	Carbon Dioxide	0.19
7782-44-7	Oxygen	0.03

Because natural gas is a natural product, composition can vary greatly.

### \*\*\* Section 4 – FIRST AID MEASURES \*\*\*

#### First Aid: Eyes

In case of freeze burn, cover eyes to protect from light. Flush eyes with running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

#### First Aid: Skin

Remove contaminated clothing. In case of blistering, frostbite or freeze burns, seek immediate medical attention.

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

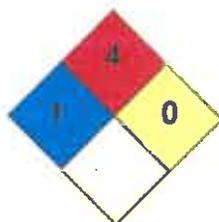
## First Aid: Ingestion

Risk of ingestion is extremely low. However, if oral exposure occurs, seek immediate medical assistance.

## First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

### \*\*\* Section 5 – FIRE FIGHTING MEASURES \*\*\*



## NFPA 704 Hazard Class

Health: 1 Flammability: 4 Instability: 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

## General Fire Hazards

See Section 9 for Flammability Properties.

Forms a flammable mixture with air. If released, the resulting vapors will disperse with the prevailing wind. If a source of ignition is present where the vapor exists at a 5 – 15% concentration in air, the vapor will burn along the flame front toward the source of the fuel.

## Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## Extinguishing Media

Any extinguisher suitable for Class B fires, dry chemical, fire fighting foam, CO<sub>2</sub>, and other gaseous agents. However, fire should not be extinguished unless flow of gas can be immediately stopped.

## Unsuitable Extinguishing Media

None.

## Fire Fighting Equipment / Instructions

Gas fires should not be extinguished unless flow of gas can be immediately stopped. Shut off gas source and allow gas to burn out. If spill or leak has not ignited, determine

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and piping exposed to fire and excessive heat. For large fire, the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around piping. Let the fire burn unless leak can be stopped. Concentrate fire-fighting efforts on objects / materials ignited by the initial fire. Withdraw immediately in the event of a rising sound from a venting safety device.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH-approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

## \*\*\* Section 6 – ACCIDENTAL RELEASE MEASURES \*\*\*

### Recovery and Neutralization

Stop the source of the release, if safe to do so.

### Materials and Methods for Clean-Up

Consider the use of water spray to disperse gas vapors. Do not use water spray to direct gas vapors toward sewer or drainage systems. Isolate the area until gas has dispersed. Ventilate and gas test area before entering.

### Emergency Measures

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

### Personal Precautions and Protective Equipment

Cooling effect of expanding gas from leak may present frostbite / freeze burn hazard. Wear flame retardant (FR) clothing around un-ignited leak. Wear fire protective clothing around an active fire.

### Environmental Precautions

Do not flush gas vapors toward sewer or drainage systems.

### Prevention of Secondary Hazards

None.

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

## \*\*\* Section 7 – HANDLING AND STORAGE \*\*\*

### Handling Procedures

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use only in well ventilated areas.

### Storage Procedures

Natural gas will be contained in the pipeline. Keep away from flame, sparks, excessive temperatures and open flames. Empty pipeline segments may contain explosive residues from natural gas liquids. Do not cut, heat, weld or expose containers to sources of ignition sections of pipeline unless the sections have been purged of natural gas residues.

### Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

## \*\*\* Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION \*\*\*

### Component Exposure Limits

#### Methane (74-82-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Propane (74-98-6)

ACGIH: 2500 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Butane (106-97-8)

ACGIH: 800 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

#### Pentanes (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

#### Hexanes (110-54-3)

ACGIH: 50 ppm TWA (listed under n-Hexane)

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

**Nitrogen (7727-37-9)**

Simple Asphyxiant

**Carbon Dioxide (124-38-9)**

ACGIH: 5000 ppm TWA (listed under Carbon Dioxide)

**Oxygen (7782-44-7)**

N/A – Necessary for life

**Engineering Measures**

Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

**Personal Protective Equipment: Respiratory**

Use a NIOSH approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere. CAUTION: Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

**Personal Protective Equipment: Hands**

Use cold-impervious, insulating flame-retardant (FR) gloves where contact with pressurized gas may occur.

**Personal Protective Equipment: Eyes**

Where there is a possibility of pressurized gas contact, wear splash-proof safety goggles and faceshield.

**Personal Protective Equipment: Skin and Body**

Where contact with pressurized gas may occur, wear flame-retardant (FR) and a faceshield.

**\*\*\* Section 9 – PHYSICAL AND CHEMICAL PROPERTIES \*\*\***

<b>Appearance:</b> Colorless	<b>Odor:</b> Odorless to slight petroleum odor
<b>Physical State:</b> Gas	<b>pH:</b> ND
<b>Vapor Pressure:</b> 40 atm @ -187°F (-86°C)	<b>Vapor Density:</b> 0.6
<b>Boiling Point:</b> -259°F (-162°C)	<b>Melting Point:</b> ND
<b>Solubility (H2O):</b> 3.5%	<b>Specific Gravity:</b> 0.4 @ -263°F (-164°C)

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

Evaporation Rate:	ND	VOC:	ND
Octanol / H <sub>2</sub> O Coeff.:	ND	Flash Point:	Flammable Gas
Flash Point Method:	N/A		
Lower Flammability Limit:	3.8 – 6.5	Upper Flammability Limit:	13-17
(LFL):		(UFL):	
Auto Ignition:	900-1170°F (482-632°C)	Burning Rate:	ND

## \*\*\* Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION \*\*\*

### Chemical Stability

This is a stable material.

### Hazardous Reaction Potential

Will not occur.

### Conditions to Avoid

Keep away from strong oxidizers, ignition sources and heat.

### Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## \*\*\* Section 11 – TOXICOLOGICAL INFORMATION \*\*\*

### Acute Toxicity

#### A: General Product Information

Methane and ethane, the main components of natural gas, are considered practically inert in terms of physiological effects. At high concentrations these materials act as simple asphyxiants and may cause death due to lack of oxygen.

#### B. Component Analysis – LD50/LC50

##### Methane (74-82-8)

Inhalation LC50 Mouse 326 g/m<sup>3</sup> 2h

##### Ethane (74-84-0)

Inhalation LC50 Rat 658 mg/l 4h

##### Propane (74-98-6)

Inhalation LC50 Rat 658 mg/l 4h

# SAFETY DATA SHEET

**Material Name: Dry Field Natural Gas**

**US GHS**

**Butanes (106-97-8)**

Inhalation LC50 Rat 658 g/m<sup>3</sup> 4h

**Pentanes (109-66-0)**

Inhalation LD50 Rat 364 g/m<sup>3</sup> 4h

**Hexanes (110-54-3)**

Inhalation LC50 Rat > 20 mg/l 4h

**Nitrogen (7727-37-9)**

Simple Asphyxiant

**Carbon Dioxide (124-38-9)**

Inhalation LC50 Human 100,000 ppm 1minute

**Oxygen (7782-44-7)**

N/A – Necessary for life

**Potential Health Effects: Skin Corrosion Property / Stimulativeness**

This product is not reported to have any skin sensitization effects.

**Generative Cell Mutagenicity**

This product is not reported to have any mutagenic effects.

**Carcinogenicity**

**A: General Product Information**

This product is not reported to have any carcinogenic effects.

**B: Component Carcinogenicity**

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

**Reproductive Toxicity**

This product is not reported to have any reproductive toxicity effects.

**Specified Target Organ General Toxicity: Single Exposure**

This product may cause damage to the heart.

**Specified Target Organ General Toxicity: Repeated Exposure**

This product is not reported to have any specific target organ repeat effects.

**Aspiration Respiratory Organs Hazard**

This product is not reported to have any aspiration hazard effects.

# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

## \*\*\* Section 12 – ECOLOGICAL INFORMATION \*\*\*

### Ecotoxicity

#### A: General Product Information

Keep gas and vapors out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

#### B: Component Analysis – Ecotoxicity – Aquatic Toxicity

No ecotoxicity data are available for this product's components.

### Persistence / Degradability

No information available.

### Bioaccumulation

No information available.

### Mobility in Soil

No information available.

## \*\*\* Section 13 – DISPOSAL CONSIDERATIONS \*\*\*

### Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

### Disposal of Contaminated Containers or Packaging

Dispose of contents / container in accordance with local / regional / national / international regulations.

## \*\*\* Section 14 – TRANSPORTATION INFORMATION \*\*\*

### DOT Information

**Shipping Name:** Natural Gas, Compressed

**UN #:** 1971 **Hazard Class:** 2.1

Placard:



# SAFETY DATA SHEET

Material Name: Dry Field Natural Gas

US GHS

## \*\*\* Section 15 – REGULATORY INFORMATION \*\*\*

### Regulatory Information

#### Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A).

n-hexane is listed under SARA Section 313 (40 CFR 372.65). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

n-hexane is listed under CERCLA (40 CFR 302.4). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

#### SARA Section 311/312 – Hazard Classes

<u>Acute Health</u>	<u>Chronic Health</u>	<u>Fire</u>	<u>Sudden Release of Pressure</u>	<u>Reactive</u>
---	---	X	X	---

#### SARA Section 313 – Supplier Notification

This product contains one chemical (n-Hexane) that is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-know act (EPCRA) of 1986 and of 40 CFR 372. However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

### State Regulations

#### Component Analysis – State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Methane	74-82-8	No	No	Yes	Yes	Yes	No
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Pentanes	109-66-0	Yes	No	Yes	Yes	Yes	Yes
Hexanes	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
Nitrogen	7727-37-9	No	No	No	No	No	No
Carbon Dioxide	124-38-9	Yes	No	Yes	Yes	Yes	Yes
Oxygen	7782-44-7	No	No	No	No	No	No

# SAFETY DATA SHEET

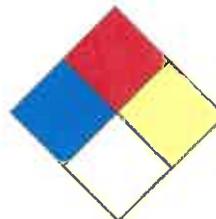
Material Name: Dry Field Natural Gas

US GHS

## \*\*\* Section 16 – OTHER INFORMATION \*\*\*

### NFPA® Hazard Rating

Health 1  
Fire 4  
Reactivity 0



### HMIS® Hazard Rating

Health 1 Moderate  
Fire 4 Severe  
Physical 0 Minimal  
\* Chronic

### Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

### Literature References

None

### Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Date of Preparation: January 30, 2014

Date of Last Revision: March 4, 2014

End of Sheet

**Attachment I.  
Emission Units Table**

## Attachment I

### Emission Units Table

(Includes all emission units and air pollution control devices  
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID <sup>1</sup>	Emission Point ID <sup>2</sup>	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type <sup>3</sup> and Date of Change	Control Device <sup>4</sup>
C-01	1E	Flare Control Device	2014	4.8 MMBtu/hr	NA	None
CE-01	10E	Compression Unit #1	2014	1,680 bhp	Modification	NSCR Catalyst (C-02)
CE-02	11E	Compression Unit #2	2014	1,680 bhp	Modification	NSCR Catalyst (C-03)
CE-03	12E	Compression Unit #3	2014	1,680 bhp	Modification	NSCR Catalyst (C-04)
CE-04	13E	Compression Unit #4	2014	1,680 bhp	Modification	NSCR Catalyst (C-05)
CE-05	14E	Compression Unit #5	2014	1,680 bhp	Modification	NSCR Catalyst (C-06)
CE-06	15E	Compression Unit #6	2014	1,680 bhp	Modification	NSCR Catalyst (C-07)
GEN-1	16E	Microturbine #1	2014	200 kW	NA	None
GEN-2	17E	Microturbine #2	2014	200 kW	NA	None
RBV-1	18E	#1 Dehy Regenerator Flame Exhaust	2014	1.5 MMBtu/hr	NA	None
RSV-1	19E	#1 Dehy Gaseous Still Vent	2014	60 MMSCFD	NA	Flare (C-01)
RBV-2	20E	#2 Dehy Regenerator Flame Exhaust	2014	1.5 MMBtu/hr	NA	None
RSV-2	21E	#2 Dehy Gaseous Still Vent	2014	60 MMSCFD	NA	Flare (C-01)
T01	22E	Produced Water Tank Gaseous Vent	2014	400 BBL	Modification	VRUs (C-08, C-09)
T02	23E	Produced Water Tank Gaseous Vent	2014	400 BBL	Modification	VRUs (C-08, C-09)
T03	24E	Settling Tank Gaseous Vent	2014	400 BBL	Modification	VRUs (C-08, C-09)
T04	25E	Condensate Tank Gaseous Vent	2014	400 BBL	Modification	VRUs (C-08, C-09)
T05	26E	Condensate Tank Gaseous Vent	2014	400 BBL	Modification	VRUs (C-08, C-09)
HTR-1	34E	Fuel Gas Pre-heater	2014	0.5 MMBTU/hr	NA	None
----	----	NSCR Catalyst for Compression Unit #1	2014	----	Modification	C-02

----	----	NSCR Catalyst for Compression Unit #2	2014	----	Modification	C-03
----	----	NSCR Catalyst for Compression Unit #3	2014	----	Modification	C-04
----	----	NSCR Catalyst for Compression Unit #4	2014	----	Modification	C-05
----	----	NSCR Catalyst for Compression Unit #5	2014	----	Modification	C-06
----	----	NSCR Catalyst for Compression Unit #6	2014	----	Modification	C-07
----	----	Vapor Recovery Unit 1	2014	65 MSCFD	Modification	C-08
----	----	Vapor Recovery Unit 2	2014	65 MSCFD	Modification	C-09

<sup>1</sup> For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

<sup>2</sup> For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

<sup>3</sup> New, modification, removal

<sup>4</sup> For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

**Attachment J.  
Emission Point Data Summary Sheet**

**Attachment J  
EMISSION POINTS DATA SUMMARY SHEET**

Table 1: Emissions Data															
Emission Point ID No. <i>(Must match Emission Units Table &amp; Plot Plan)</i>	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point <i>(Must match Emission Units Table &amp; Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table &amp; Plot Plan)</i>		Vent Time for Emission Unit <i>(chemical processes only)</i>		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> <i>(Speciate VOCs &amp; HAPS)</i>	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase  <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used <sup>6</sup>	Emission Concentration <sup>7</sup> <i>(ppmv or mg/m<sup>3</sup>)</i>
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1E	Vertical Stack	C-01	Flare Exhaust	---	---	C	8760	NOx CO VOC PM10 Total HAPs CO2e	--- --- --- --- --- ---	--- --- --- --- --- ---	0.33 1.78 0.0001 0.0001 3E-5 563	1.44 7.79 0.0004 0.0006 0.0001 2465	Gas/ Vapor	EE	
10E	Upward Vertical Stack	CE-01	Compress or Engine 1	C-02	NSCR catalyst	C	8760	NOx CO VOC SO2 PM10 Total HAPs Formaldehyde CO2e	50.00 47.41 1.22 0.008 0.27 0.35 0.19 2090	219.42 208.04 5.36 0.04 1.19 1.54 0.81 9171	2.00 1.90 0.61 0.008 0.27 0.21 0.04 1989	8.78 8.32 2.68 0.04 1.19 0.93 0.20 8727	Gas/ Vapor	EE	
11E	Upward Vertical Stack	CE-02	Compress or Engine 2	C-03	NSCR catalyst	C	8760	NOx CO VOC SO2 PM10 Total HAPs Formaldehyde CO2e	50.00 47.41 1.22 0.008 0.27 0.35 0.19 2090	219.42 208.04 5.36 0.04 1.19 1.54 0.81 9171	2.00 1.90 0.61 0.008 0.27 0.21 0.04 1989	8.78 8.32 2.68 0.04 1.19 0.93 0.20 8727	Gas/ Vapor	EE	

12E	Upward Vertical Stack	CE-03	Compress or Engine 3	C-04	NSCR catalyst	C	8760	NOx	50.00	219.42	2.00	8.78	Gas/ Vapor	EE				
								CO	47.41	208.04	1.90	8.32						
								VOC	1.22	5.36	0.61	2.68						
								SO2	0.008	0.04	0.008	0.04						
								PM10	0.27	1.19	0.27	1.19						
								Total HAPs	0.35	1.54	0.21	0.93						
								Formaldehyde	0.19	0.81	0.04	0.20						
								CO2e	2090	9171	1989	8727						
13E	Upward Vertical Stack	CE-04	Compress or Engine 4	C-05	NSCR catalyst	C	8760	NOx	50.00	219.42	2.00	8.78	Gas/ Vapor	EE				
								CO	47.41	208.04	1.90	8.32						
								VOC	1.22	5.36	0.61	2.68						
								SO2	0.008	0.04	0.008	0.04						
								PM10	0.27	1.19	0.27	1.19						
								Total HAPs	0.35	1.54	0.21	0.93						
								Formaldehyde	0.19	0.81	0.04	0.20						
								CO2e	2090	9171	1989	8727						
14E	Upward Vertical Stack	CE-05	Compress or Engine 5	C-06	NSCR catalyst	C	8760	NOx	50.00	219.42	2.00	8.78	Gas/ Vapor	EE				
								CO	47.41	208.04	1.90	8.32						
								VOC	1.22	5.36	0.61	2.68						
								SO2	0.008	0.04	0.008	0.04						
								PM10	0.27	1.19	0.27	1.19						
								Total HAPs	0.35	1.54	0.21	0.93						
								Formaldehyde	0.19	0.81	0.04	0.20						
								CO2e	2090	9171	1989	8727						
15E	Upward Vertical Stack	CE-06	Compress or Engine 6	C-07	NSCR catalyst	C	8760	NOx	50.00	219.42	2.00	8.78	Gas/ Vapor	EE				
								CO	47.41	208.04	1.90	8.32						
								VOC	1.22	5.36	0.61	2.68						
								SO2	0.008	0.04	0.008	0.04						
								PM10	0.27	1.19	0.27	1.19						
								Total HAPs	0.35	1.54	0.21	0.93						
								Formaldehyde	0.19	0.81	0.04	0.20						
								CO2e	2090	9171	1989	8727						

16E	Upward Vertical Stack	GEN-1	Micro-Turbine Generator 1	---	---	C	8760	NOx	0.08	0.35	0.08	0.35	Gas/ Vapor	EE
								CO	0.22	0.96	0.22	0.96		
								VOC	0.02	0.09	0.02	0.09		
								SO2	0.01	0.03	0.01	0.03		
								PM10	0.01	0.06	0.01	0.06		
								Total HAPs	0.002	0.01	0.002	0.01		
								Formaldehyde	0.001	0.006	0.001	0.006		
								CO2e	266	1166	266	1166		
17E	Upward Vertical Stack	GEN-2	Micro-Turbine Generator 2	---	---	C	8760	NOx	0.08	0.35	0.08	0.35	Gas/ Vapor	EE
								CO	0.22	0.96	0.22	0.96		
								VOC	0.02	0.09	0.02	0.09		
								SO2	0.01	0.03	0.01	0.03		
								PM10	0.01	0.06	0.01	0.06		
								Total HAPs	0.002	0.01	0.002	0.01		
								Formaldehyde	0.001	0.006	0.001	0.006		
								CO2e	266	1166	266	1166		
18E	Upward Vertical Stack	RBV-1,	Dehy Reboiler 1	---	---	C	8760	NOx	0.18	0.81	0.18	0.81	Gas/ Vapor	EE
								CO	0.15	0.68	0.15	0.68		
								VOC	0.01	0.04	0.01	0.04		
								SO2	0.001	0.005	0.001	0.005		
								PM10	0.01	0.06	0.01	0.06		
								Total HAPs	0.003	0.02	0.003	0.02		
								Formaldehyde	0.0001	0.0006	0.0001	0.0006		
								CO2e	176	771	176	771		
20E	Upward Vertical Stack	RBV-2,	Dehy Reboiler 2	---	---	C	8760	NOx	0.18	0.81	0.18	0.81	Gas/ Vapor	EE
								CO	0.15	0.68	0.15	0.68		
								VOC	0.01	0.04	0.01	0.04		
								SO2	0.001	0.005	0.001	0.005		
								PM10	0.01	0.06	0.01	0.06		
								Total HAPs	0.003	0.02	0.003	0.02		
								Formaldehyde	0.0001	0.0006	0.0001	0.0006		
								CO2e	176	771	176	771		

19E	Upward Vertical Stack	RSV-1	Dehy Still Vent 1	C-01	Flare 98% control	C	8760	VOC	55.14	241.50	1.10	4.83	Gas/ Vapor	EE	
								Total HAPs	17.71	77.57	0.36	1.56			
								Benzene	1.12	4.91	0.02	0.10			
								Toluene	5.85	25.63	0.12	0.52			
								Ethylbenzene	0.76	3.33	0.01	0.07			
								Xylenes	8.27	36.22	0.17	0.73			
								n-Hexane	1.71	7.48	0.03	0.15			
								CO2e	2046	8963	92.23	404			
21E	Upward Vertical Stack	RSV-2	Dehy Still Vent 2	C-01	Flare 98% control	C	8760	VOC	55.14	241.50	1.10	4.83	Gas/ Vapor	EE	
								Total HAPs	17.71	77.57	0.36	1.56			
								Benzene	1.12	4.91	0.02	0.10			
								Toluene	5.85	25.63	0.12	0.52			
								Ethylbenzene	0.76	3.33	0.01	0.07			
								Xylenes	8.27	36.22	0.17	0.73			
								n-Hexane	1.71	7.48	0.03	0.15			
								CO2e	2046	8963	92.23	404			
22E	Upward Vertical Stack	T01	Produced Water Tank 1	C-08, C-09	VRU - closed loop system	C	8760	VOC	0.08	0.34	0.002	0.007	Gas/ Vapor	EE	
								Total HAPs	0.001	0.005	0.00002	0.0001			
								CO2e	0.55	2.41	0.01	0.05			
23E	Upward Vertical Stack	T02	Produced Water Tank 2	C-08, C-09	VRU - closed loop system	C	8760	VOC	0.08	0.34	0.002	0.007	Gas/ Vapor	EE	
								Total HAPs	0.001	0.005	0.00002	0.0001			
								CO2e	0.55	2.41	0.01	0.05			
24E	Upward Vertical Stack	T03	Settler Tank	C-08, C-09	VRU - closed loop system	C	8760	VOC	75.00	328.48	1.50	6.57	Gas/ Vapor	EE	
								Total HAPs	1.07	4.69	0.02	0.09			
								CO2e	536	2346	10.73	47			
25E	Upward Vertical Stack	T04	Condensate Tank 1	C-08, C-09	VRU - closed loop system	C	8760	VOC	0.99	4.33	0.02	0.09	Gas/ Vapor	EE	
								Total HAPs	0.01	0.06	0.0003	0.001			
								CO2e	7.06	30.94	0.14	0.62			

26E	Upward Vertical Stack	T05	Condensate Tank 2	C-08, C-09	VRU – closed loop system	C	8760	VOC	0.99	4.33	0.02	0.09	Gas/ Vapor	EE	
								Total HAPs	0.01	0.06	0.0003	0.001			
								CO2e	7.06	30.94	0.14	0.62			
34E	Upward Vertical Stack	HTR-1	Fuel Gas Pre-heater exhaust	---	---	C	8760	NOx	0.06	0.27	0.06	0.27	Gas/Vapor	EE	
								CO	0.05	0.23	0.05	0.23			
								VOC	0.003	0.015	0.003	0.015			
								SO2	0.0004	0.002	0.0004	0.002			
								PM10	0.005	0.02	0.005	0.02			
								Total HAPs	0.001	0.005	0.001	0.005			
								Formaldehyde	4.6E-5	0.0002	4.6E-5	0.0002			
								CO2e	58.69	257	58.69	257			

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

- <sup>1</sup> Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- <sup>2</sup> Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- <sup>3</sup> List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. DO NOT LIST H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.
- <sup>4</sup> Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- <sup>5</sup> Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- <sup>6</sup> Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- <sup>7</sup> Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m<sup>3</sup>) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO<sub>2</sub>, use units of ppmv (See 45CSR10).

**Attachment J  
EMISSION POINTS DATA SUMMARY SHEET**

**Table 2: Release Parameter Data**

Emission Point ID No. <i>(Must match Emission Units Table)</i>	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow <sup>1</sup> (acfm) <i>at operating conditions</i>	Velocity (fps)	Ground Level <i>(Height above mean sea level)</i>	Stack Height <sup>2</sup> <i>(Release height of emissions above ground level)</i>	Northing	Easting
1E	5	1200	73.0	1.0	1126	25	526978	4342232
10E-15E	1.1	1226	8,924	121	1126	25	526978	4342232
16E, 17E	NA	535	2.9 lbm/s	NA	1126	10	526978	4342232
18E, 20E	1.5	>1000	19	0.2	1126	10	526978	4342232
19E, 21E	Emissions are controlled by the flare (1E) – 98% efficiency				1126	NA	526978	4342232
22E-26E	Emissions are captured by a VRU (closed-loop system) – claiming 98%				1126	NA	526978	4342232
34E	TBD	120	TBD	TBD	1126	TBD	526978	4342232

<sup>1</sup> Give at operating conditions. Include inerts.

<sup>2</sup> Release height of emissions above ground level.

**Attachment K.**  
**Fugitive Emissions Data Summary Sheet**

## Attachment K

### FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS <sup>1</sup>	Maximum Potential Uncontrolled Emissions <sup>2</sup>		Maximum Potential Controlled Emissions <sup>3</sup>		Est. Method Used <sup>4</sup>
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads	PM-10 PM-2.5	0.16 0.02	0.70 0.07	0.16 0.02	0.70 0.07	EE
Storage Pile Emissions						
Loading/Unloading Operations	VOC HAPs CO2e	59.31 0.85 423.61	8.21 0.12 58.64	59.31 0.85 423.61	8.21 0.12 58.64	EE
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	VOC HAPs CO2e	1.23 0.007 23.63	5.39 0.03 103.49	1.23 0.007 23.63	5.39 0.03 103.49	EE
General Clean-up VOC Emissions						
Other – Fugitive Venting Episodes	VOC HAPs CO2e	Does not apply	8.61 0.05 1,039	Does not apply	8.61 0.05 1,039	EE

<sup>1</sup> List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. DO NOT LIST H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.

<sup>2</sup> Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

<sup>3</sup> Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

<sup>4</sup> Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

**Attachment L.  
Emission Unit Data Sheets**

## **Compressor Engines**

## NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number <sup>1</sup>		10E		11E		12E	
Engine Manufacturer and Model		Waukesha, 7044 GSI		Waukesha, 7044 GSI		Waukesha, 7044 GSI	
Manufacturer's Rated bhp/rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm	
Source Status <sup>2</sup>		MS		MS		MS	
Date Installed/Modified/Removed <sup>3</sup>		February 2014		February 2014		February 2014	
Engine Manufactured/Reconstruction Date <sup>4</sup>		2013		2013		2013	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) <sup>5</sup>		No		No		No	
Engine, Fuel and Combustion Data	Engine Type <sup>6</sup>	RB4S		RB4S		RB4S	
	APCD Type <sup>7</sup>	NSCR		NSCR		NSCR	
	Fuel Type <sup>8</sup>	PQ		PQ		PQ	
	H <sub>2</sub> S (gr/100 scf)	0		0		0	
	Operating bhp/rpm	1680 bhp/1200 rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm	
	BSFC (Btu/bhp-hr)	8,324		8,324		8,324	
	Fuel throughput (ft <sup>3</sup> /hr)	12,780		12,780		12,780	
	Fuel throughput (MMft <sup>3</sup> /yr)	111.95		111.95		111.95	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference <sup>9</sup>	Potential Emissions <sup>10</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO <sub>x</sub>	2.00	8.78	2.00	8.78	2.00	8.78
MD	CO	1.90	8.32	1.90	8.32	1.90	8.32
MD	VOC	0.61	2.68	0.61	2.68	0.61	2.68
AP	SO <sub>2</sub>	0.008	0.04	0.008	0.04	0.008	0.04
AP	PM <sub>10</sub>	0.27	1.19	0.27	1.19	0.27	1.19
MD	Formaldehyde	0.04	0.20	0.04	0.20	0.04	0.20

Source Identification Number <sup>1</sup>		13E		14E		15E	
Engine Manufacturer and Model		Waukesha, 7044 GSI		Waukesha, 7044 GSI		Waukesha, 7044 GSI	
Manufacturer's Rated bhp/rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm	
Source Status <sup>2</sup>		MS		MS		MS	
Date Installed/Modified/Removed <sup>3</sup>		February 2014		February 2014		February 2014	
Engine Manufactured/Reconstruction Date <sup>4</sup>		2013		2013		2013	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) <sup>5</sup>		No		No		No	
Engine, Fuel and Combustion Data	Engine Type <sup>6</sup>	RB4S		RB4S		RB4S	
	APCD Type <sup>7</sup>	NSCR		NSCR		NSCR	
	Fuel Type <sup>8</sup>	PQ		PQ		PQ	
	H <sub>2</sub> S (gr/100 scf)	0		0		0	
	Operating bhp/rpm	1680 bhp/1200 rpm		1680 bhp/1200 rpm		1680 bhp/1200 rpm	
	BSFC (Btu/bhp-hr)	8,324		8,324		8,324	
	Fuel throughput (ft <sup>3</sup> /hr)	12,780		12,780		12,780	
	Fuel throughput (MMft <sup>3</sup> /yr)	111.95		111.95		111.95	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference <sup>9</sup>	Potential Emissions <sup>10</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO <sub>x</sub>	2.00	8.78	2.00	8.78	2.00	8.78
MD	CO	1.90	8.32	1.90	8.32	1.90	8.32
MD	VOC	0.61	2.68	0.61	2.68	0.61	2.68
AP	SO <sub>2</sub>	0.008	0.04	0.008	0.04	0.008	0.04
AP	PM <sub>10</sub>	0.27	1.19	0.27	1.19	0.27	1.19
MD	Formaldehyde	0.04	0.20	0.04	0.20	0.04	0.20

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

3. Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.

4. Enter the date that the engine was manufactured, modified or reconstructed.
5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

**Provide a manufacturer's data sheet for all engines being registered.**

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas
----	------------------------------	----	-----------------

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other _____	(please list)

10. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.



**New Milton Compressor Station - Doddridge County, West Virginia**

**VHP - L7044GSI**

Gas Compression - Continuous

ENGINE SPEED (rpm):	1200	COOLING SYSTEM:	JW, IC + OC
DISPLACEMENT (in3):	7040	INTERCOOLER WATER INLET (°F):	130
COMPRESSION RATIO:	8:1	JACKET WATER OUTLET (°F):	180
IGNITION SYSTEM:	ESM	JACKET WATER CAPACITY (gal):	100
EXHAUST MANIFOLD:	Water Cooled	AUXILIARY WATER CAPACITY (gal):	11
COMBUSTION:	Rich Burn, Turbocharged	LUBE OIL CAPACITY (gal):	190
ENGINE DRY WEIGHT (lbs):	21000	MAX. EXHAUST BACKPRESSURE (in. H2O):	18
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. AIR INLET RESTRICTION (in. H2O):	15
ENGINE SOUND LEVEL (dBA)	104	EXHAUST SOUND LEVEL (dBA)	111

**SITE CONDITIONS:**

FUEL:		ALTITUDE (ft):	1100
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	100
FUEL HHV (BTU/ft3):	1,212.7	FUEL WKI:	66.1
FUEL LHV (BTU/ft3):	1,096.3		

**SITE SPECIFIC TECHNICAL DATA**

POWER RATING	UNITS	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 100 °F		
			100%	75%	50%
CONTINUOUS ENGINE POWER	BHP	1680	1680	1260	843
OVERLOAD	% 2/24 hr	10	10	-	-
MECHANICAL EFFICIENCY (LHV)	%	30.6	30.6	29.8	28.5
CONTINUOUS POWER AT FLYWHEEL	BHP	1680	1680	1260	843

*based on no auxiliary engine driven equipment*

**FUEL CONSUMPTION**

		8324	8324	8543	8941
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	8324	8324	8543	8941
FUEL CONSUMPTION (HHV)	BTU/BHP-hr	9208	9208	9450	9891
FUEL FLOW	SCFM	213	213	164	115

*based on fuel analysis LHV*

**HEAT REJECTION**

		4194	4194	3365	2549
JACKET WATER (JW)	BTU/hr x 1000	4194	4194	3365	2549
LUBE OIL (OC)	BTU/hr x 1000	573	573	518	442
INTERCOOLER (IC)	BTU/hr x 1000	273	273	183	93
EXHAUST	BTU/hr x 1000	4232	4232	3063	1919
RADIATION	BTU/hr x 1000	708	708	638	533

**EMISSIONS**

		13.5	13.5	14.7	16.6
NOx (NO + NO2)	g/bhp-hr	13.5	13.5	14.7	16.6
CO	g/bhp-hr	12.8	12.8	12.4	11.5
THC	g/bhp-hr	2.4	2.4	2.2	1.8
NMHC	g/bhp-hr	0.79	0.79	0.73	0.61
NM, NEHC	g/bhp-hr	0.33	0.33	0.31	0.26
CH4	g/bhp-hr	1.56	1.56	1.43	1.20
CO2	g/bhp-hr	525	525	539	564
CO2e	g/bhp-hr	558	558	569	589
CH2O	g/bhp-hr	0.05	0.05	0.05	0.05

**AIR INTAKE / EXHAUST GAS**

		2561	2561	1971	1380
INDUCTION AIR FLOW	SCFM	2561	2561	1971	1380
EXHAUST GAS MASS FLOW	lb/hr	11909	11909	9167	6416
EXHAUST GAS FLOW	ACFM	8924	8924	6625	4351
EXHAUST TEMPERATURE	°F	1226	1226	1166	1066

*at exhaust temp, 14.5 psia*

**HEAT EXCHANGER SIZING**

		4756
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	4756
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	959

**COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS**

		450
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	450
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	18
AUX WATER PUMP MIN. DESIGN FLOW	GPM	79
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	44



**New Milton Compressor Station - Doddridge County, West Virginia**

**VHP - L7044GSI**  
Gas Compression - Continuous

**FUEL COMPOSITION**

**HYDROCARBONS:**

		<u>Mole or Volume %</u>
Methane	CH4	81.496
Ethane	C2H6	12.745
Propane	C3H8	3.21
Iso-Butane	I-C4H10	0.412
Normal Butane	N-C4H10	0.686
Iso-Pentane	I-C5H12	0.183
Normal Pentane	N-C5H12	0.154
Hexane	C6H14	0.187
Heptane	C7H16	0.338
Ethene	C2H4	0
Propene	C3H6	0

SUM HYDROCARBONS 99.411

**NON-HYDROCARBONS:**

Nitrogen	N2	0.409
Oxygen	O2	0
Helium	He	0
Carbon Dioxide	CO2	0.18
Carbon Monoxide	CO	0
Hydrogen	H2	0
Water Vapor	H2O	0
<b>TOTAL FUEL</b>		<b>100</b>

**FUEL:**

FUEL PRESSURE RANGE (psig):	30 - 60
FUEL WKI:	66.1
FUEL SLHV (BTU/ft3):	1077.18
FUEL SLHV (MJ/Nm3):	42.36
FUEL LHV (BTU/ft3):	1096.25
FUEL LHV (MJ/Nm3):	43.11
FUEL HHV (BTU/ft3):	1212.67
FUEL HHV (MJ/Nm3):	47.69
FUEL DENSITY (SG):	0.89

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1998-02-01[25, V(0;101.325)].

Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. No liquid hydrocarbons are allowed in the fuel. The fuel must not contain any liquid water.

Waukesha recommends both of the following:

1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.

2) A fuel filter separator to be used on all fuels except commercial quality natural gas.

Refer to the 'Fuel and Lubrication' section of 'Technical Data' or contact the Waukesha Application Engineering Department for additional information on fuels, or LHV and WKI\* calculations.

\* Trademark of General Electric Company

**FUEL CONTAMINANTS**

Total Sulfur Compounds	0 % volume
Total Halogen as Chloride	0 % volume
Total Ammonia	0 % volume

Siloxanes

Tetramethyl silane	0 % volume
Trimethyl silanol	0 % volume
Hexamethyldisiloxane (L2)	0 % volume
Hexamethylcyclotrisiloxane (D3)	0 % volume
Octamethyltrisiloxane (L3)	0 % volume
Octamethylcyclotetrasiloxane (D4)	0 % volume
Decamethyltetrasiloxane (L4)	0 % volume
Decamethylcyclopentasiloxane (D5)	0 % volume
Dodecamethylpentasiloxane (L5)	0 % volume
Dodecamethylcyclohexasiloxane (D6)	0 % volume
Others	0 % volume

Total Sulfur Compounds	0 µg/BTU
Total Halogen as Chloride	0 µg/BTU
Total Ammonia	0 µg/BTU
Total Siloxanes (as Si)	0 µg/BTU

*Calculated fuel contaminant analysis will depend on the entered fuel composition and selected engine model.*

No water or hydrocarbon condensates are allowed in the engine. Requires liquids removal.



## NOTES

1. All data is based on engines with standard configurations unless noted otherwise.
2. Power rating is adjusted for fuel, site altitude, and site air inlet temperature, in accordance with ISO 3046/1 with tolerance of  $\pm 3\%$ .
3. Fuel consumption is presented in accordance with ISO 3046/1 with a tolerance of  $-0 / +5\%$  at maximum rating. Fuel flow calculation based on fuel LHV and fuel consumption with a tolerance of  $-0/+5\%$ . For sizing piping and fuel equipment, it is recommended to include the 5% tolerance.
4. Heat rejection tolerances are  $\pm 30\%$  for radiation, and  $\pm 8\%$  for jacket water, lube oil, intercooler, and exhaust energy.
5. Emission levels are given at engine exhaust outlet flange prior to any after treatment. Values are based on a new engine operating at indicated site conditions, and adjusted to the specified timing and air/fuel ratio at rated load. Emissions are at an absolute humidity of 75 grains H<sub>2</sub>O/lb (10.71 g H<sub>2</sub>O/kg) of dry air. Emission levels may vary subject to instrumentation, measurement, ambient conditions, fuel quality, and engine variation. Engine may require adjustment on-site to meet emission values, which may affect engine performance and heat output. NO<sub>x</sub>, CO, THC, and NMHC emission levels are listed as a not to exceed limit, all other emission levels are estimated. CO<sub>2</sub> emissions based on EPA Federal Register/Vol. 74, No. 209/Friday, October 30, 2009 Rules and Regulations 56398, 56399 (3) Tier 3 Calculation Methodology, Equation C-5.
6. Air flow is based on undried air with a tolerance of  $\pm 7\%$ .
7. Exhaust temperature given at engine exhaust outlet flange with a tolerance of  $\pm 75^{\circ}\text{F}$  ( $42^{\circ}\text{C}$ ).
8. Exhaust gas mass flow value is based on a "wet basis" with a tolerance of  $\pm 7\%$ .
9. Inlet air restrictions based on full rated engine load. Exhaust backpressure based on 158 PSI BMEP and 1200 RPM. Refer to the engine specification section of Waukesha's standard technical data for more information.
10. Cooling circuit capacity, lube oil capacity, and engine dry weight values are typical.
11. Fuel must conform to Waukesha's "Gaseous Fuel Specification" S7884-7 or most current version. Fuel may require treatment to meet current fuel specification.
12. Heat exchanger sizing values given as the maximum heat rejection of the circuit, with applied tolerances and an additional 5% reserve factor.
13. Fuel volume flow calculation in english units is based on 100% relative humidity of the fuel gas at standard conditions of 60°F and 14.696 psia (29.92 inches of mercury; 101.325 kPa).
14. Fuel volume flow calculation in metric units is based on 100% relative humidity of the fuel gas at a combustion temperature of 25°C and metering conditions of 0°C and 101.325 kPa (14.696 psia; 29.92 inches of mercury). This is expressed as [25, V(0;101.325)].
15. Engine sound data taken with the microphone at 1 m (3.3 ft) from the side of the engine at the approximate front-to-back centerline. Microphone height was at intake manifold level. Engine sound pressure data may be different at front, back and opposite side locations. Exhaust sound data taken with microphone 1 meter (3.3 ft) away and 1 meter (3.3 ft) to the side of the exhaust outlet.
16. Due to variation between test conditions and final site conditions, such as exhaust configuration and background sound level, sound pressure levels under site conditions may be different than those tabulated above.
17. Cooling system design flow is based on minimum allowable cooling system flow. Cooling system maximum external restriction is defined as the allowable restriction at the minimum cooling system flow. Refer to technical data sheets S-5136-34 and S-6543-36 (or latest version) for more information.
18. Continuous Power Rating: The highest load and speed that can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance at indicated ambient reference conditions and fuel. It is permissible to operate the engine at the indicated overload power, for two hours in every 24 hour period.

## REQUIRED OPTION CODES