

# INTERNAL PERMITTING DOCUMENT TRACKING MANIFEST

Company Name M3 Appalachia Gathering, LLC

Permitting Action Number R13-3292      Total Days 55      DAQ Days 11

**Permitting Action:**

- |   |   |                                      |
|---|---|--------------------------------------|
| <input type="radio"/> Permit Determination  | <input type="radio"/> Temporary               | <input type="radio"/> Modification   |
| <input type="radio"/> General Permit        | <input type="radio"/> Relocation              | <input type="radio"/> PSD (Rule 14)  |
| <input type="radio"/> Administrative Update | <input checked="" type="radio"/> Construction | <input type="radio"/> NNSR (Rule 19) |

**Documents Attached:**

- |  |  |
|--|--|
| <input checked="" type="radio"/> Engineering Evaluation/Memo   | <input type="radio"/> Completed Database Sheet |
| <input checked="" type="radio"/> Draft Permit                  | <input type="radio"/> Withdrawal               |
| <input type="radio"/> Notice                                   | <input type="radio"/> Letter                   |
| <input type="radio"/> Denial                                   | <input type="radio"/> Other (specify) _____    |
| <input type="radio"/> Final Permit/General Permit Registration | _____  |

Date	From	To	Action Requested
3/7/2016	Jerry	Bev	Please review and approve to go to notice.
3/7	Bev	Jerry	Go to Notice
3/8	Jerry	SANDIE	APPROVED FOR NOTICE <i>Travis JW</i>

NOTE: Retain a copy of this manifest for your records when transmitting your document(s).

Engineer	Jerry Williams, P.E.
Email Address	jerry.williams@wv.gov
Company Name	M3 Appalachia Gathering, LLC
Company ID	061-00206
Facility Name	Hamilton Compressor Station
Permit Number	R13-3292
County	Monongalia
Newspaper	<i>The Dominion Post</i>
Company Email and "Attention To:"	James C. Roberts j.roberts@m3midstream.com
Environmental Contact Email Address	Eric Tennison e.tennison@m3midstream.com
Regional Office (if applicable)	NCRO
New or Modified Source?	new
Construction, Modification, or Relocation?	construction
Type of Facility	natural gas compressor station
"Located" or "To Be Located"?	to be located
Place where I can find electronic versions of your notice, engineering evaluation, and draft permit	Q:\AIR_QUALITY\J_Will\Permit Applications Under Review\R13-3292 Hamilton Compressor Station

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# AIR QUALITY PERMIT NOTICE

## Notice of Intent to Approve

On January 12, 2016, M3 Appalachia Gathering, LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to construct and operate a natural gas compressor facility located on an access road off of WV-218N, near Daybrook, Monongalia County, WV at latitude 39.64194 and longitude -80.205278. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as R13-3292.

The following potential emissions will be authorized by this permit action: Particulate Matter less than 10 microns 0.07 tons per year (TPY); Sulfur Dioxide, 0.10 TPY; Oxides of Nitrogen, 28.41 TPY; Carbon Monoxide, 12.82 TPY; Volatile Organic Compounds, 16.27 TPY; Formaldehyde, 3.56 TPY; Total Hazardous Air Pollutants, 7.42 TPY.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on (Day of Week, Month, Day, Year). A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed construction will meet all state and federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Jerry Williams, P.E.  
WV Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Telephone: 304/926-0499, ext. 1223  
FAX: 304/926-0478

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:

[www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx](http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx)

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**west virginia** department of environmental protection

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

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

**ENGINEERING EVALUATION / FACT SHEET**

BACKGROUND INFORMATION

Application No.: R13-3292  
Plant ID No.: 061-00206  
Applicant: M3 Appalachia Gathering, LLC (M3)  
Facility Name: Hamilton Compressor Station  
Location: Fairview, Monongalia County  
NAICS Code: 211111 (Natural Gas Extraction)  
Application Type: Construction  
Received Date: January 12, 2016  
Engineer Assigned: Jerry Williams, P.E.  
Fee Amount: \$4,500.00  
Date Received: \$3,500 (January 12, 2016), \$1,000 (January 26, 2016)  
Complete Date: February 25, 2016  
Due Date: May 25, 2016  
Applicant Ad Date: January 11, 2016  
Newspaper: *The Dominion Post*  
UTM's: Easting: 568.164 km      Northing: 4,388.042 km      Zone: 17  
Latitude: 39.64194  
Longitude: -80.205278  
Description: Construction and operation of a natural gas compressor station.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-3292:

The Hamilton Compressor Station will compress lean wet natural gas (approximately 95-98% methane) that originates from 3rd party producers and compress the gas to pressures necessary to deliver into M3's Appalachia Gathering System (AGS) 24 inch pipeline. Between 75 million standard cubic feet per day (MMSCFD) and 100 MMSCFD of wet natural gas at approximately 300-450 psig first enters the compressor station via pipeline into a 60 inch

diameter by 10 foot inlet separator. The gas then travels through a suction control valve and into the main suction header which feeds into three (3) natural gas driven CAT G3606 engine/compressor units. The gas is compressed to 900-1125 psig and travels to the existing Hamilton Dehydration Station, for ultimate delivery into the AGS gathering system.

Other major equipment on site will include one (1) 30 barrel waste oil tank, three (3) 500 gallon engine lube oil make-up tanks, three (3) 500 gallon compressor lube oil tanks, two (2) 30 barrel engine coolant tanks, and a 335 gallon methanol storage/containment tank.

Wet compressed gas from the Hamilton compressors will enter the existing Hamilton dehydration equipment. The wet gas is passed through an Exterran 60-inch by 10-foot inlet separator. It is then passed through an Exterran 75 MMSCFD Dehydration Skid (Dehy), followed by an Exterran 60-inch by 10-foot Dehy After Scrubber. Once the gas passes through the Dehy After Scrubber, it proceeds to a 24-inch pipeline at 900 to 1125 psig, at a rate of 50-75 MMSCFD. The dehydrated gas is also used for fuel gas for the Compressor engines. Water rich triethylene glycol (TEG) enters a reboiler rated at 1.5 million British Thermal Units per hour (MMBTU/hr) where water evaporation occurs. After evaporation occurs in the reboiler, water lean TEG re-enters the Dehy with fresh make-up TEG from the glycol storage tank. Water not evaporated in the reboiler is separated from the gas at two different locations, the inlet separator and the Dehy. Wet gas entering the facility passes through the inlet separator and water droplets present in the influent stream separate from the gas. This water is stored in a 12-foot diameter by 20-foot high (400 barrel) API12F Produced Water Tank (PWT). Most water, which is not absorbed by TEG, separates from the product gas in the Dehy and is stored in the PWT. A 500 gallon TEG make up tank is also present. In addition to the Dehy equipment, an 85 HP generator provides power to instrumentation and electrical equipment.

## SITE INSPECTION

A site inspection was conducted on March 1, 2016 by Karl Dettinger of the DAQ Enforcement Section. According to Mr. Dettinger, the site is appropriate for the facility.

Directions as given in the permit application are as follows:

*From Morgantown, WV, drive on US-19 N/WV-7 W/ Monongahela Boulevard. Make a slight right onto US-19 N/ WV-7 W and drive for approximately 1.6 miles. Turn left onto WV-7 W (Mason Dixon Hwy) and drive for approximately 5.2 miles. Turn left onto Pedlar Run Road and drive for approximately 0.6-mile. Turn right onto Co Rd 37/1/Jessel Tennant Hill Road/Henderson Ridge Road and drive for approximately 2.1 miles. Continue onto Long Drain Road for approximately 0.1-mile. Turn left onto Mooresville Road and drive for approximately 0.3-mile. Turn left onto Jakes Run Road and drive for approximately 2.8 miles. Turn right onto Statler Run Road and drive for approximately 3.7 miles. Continue onto WV-218N/Guston Run Road/Daybrook Road and drive for 0.8-mile until arriving to access road at 3030 Daybrook Road.*

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this facility consist of the equipment listed in the following table and fugitive emissions. Fugitive emissions for the facility are based on calculation methodologies presented in EPA Protocol for Equipment Leak Emission Estimates. The following table indicates which methodology was used in the emissions determination:

<b>Emission Unit ID#</b>	<b>Process Equipment</b>	<b>Calculation Methodology</b>
CE-1 CE-2 CE-3	1,775 hp Caterpillar G3616 Reciprocating Internal Combustion Engines (RICE) w/ Oxidation Catalysts (Ox Cat)	Manufacturer's Data, EPA AP-42 Emission Factors
GE-1	126 hp Gillette Natural Gas Generator	Manufacturer's Data, EPA AP-42 Emission Factors
GE-2	85 hp Natural Gas Generator	Manufacturer's Data, EPA AP-42 Emission Factors
T01	30 bbl (1,260 gal) Waste Lube Oil Tank (T-450)	Negligible
T02	335 gal Methanol Tank	Negligible
T03	30 bbl (1,260 gal) Coolant Make Up Tank	Negligible
T04	30 bbl (1,260 gal) Coolant Drain Tank	Negligible
T05	500 gal Engine Lube Oil Tank for CE-1	Negligible
T06	500 gal Compressor Lube Oil for CE-1	Negligible
T07	500 gal Engine Lube Oil Tank for CE-2	Negligible
T08	500 gal Compressor Lube Oil for CE-2	Negligible
T09	500 gal Engine Lube Oil Tank for CE-3	Negligible
T10	500 gal Compressor Lube Oil for CE-3	Negligible
T11	400 bbl (16,800 gal) Produced Water Tank (T-421)	HYSYS
T12	500 gal TEG Storage Tank	Negligible
TEG-1	75 mmscfd TEG Dehydrator Still Vent w/ BTEX Condenser/Burner/Glow Plug	GRI-GlyCalc 4.0
REB-1	1.5 MMBTU/hr Reboiler Unit (TEG-302)	EPA AP-42 Emission Factors
L01	76,143 gal/yr Produced Water Truck Loadout	EPA AP-42 Emission Factors
L02	3,685 gal/yr Methanol Unloading	EPA AP-42 Emission Factors

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

<b>Emission Unit</b>	<b>Pollutant</b>	<b>Control Device</b>	<b>Control Efficiency</b>
1,775 hp Caterpillar G3616 RICE w/ Ox Cat (CE-1, CE-2, CE-3)	Carbon Monoxide	Oxidation Catalyst	94 %
	Volatile Organic Compounds		73 %
	Formaldehyde		77 %
75 mmscfd TEG Dehydrator Still Vent (TEG-1)	Volatile Organic Compounds	BTEX Condenser/ Burner/Glow Plug	98 %
	Hazardous Air Pollutants		98 %

The total facility PTE for the Hamilton Compressor Station is shown in the following table:

<b>Pollutant</b>	<b>R13-3292 PTE (tons/year)</b>
Nitrogen Oxides	28.41
Carbon Monoxide	12.82
Volatile Organic Compounds	16.27
Particulate Matter-10	0.07
Sulfur Dioxide	0.10
Formaldehyde	3.56
Total HAPs	7.42
Carbon Dioxide Equivalent	24,880

Maximum detailed controlled point source emissions were calculated by M3 and checked for accuracy by the writer and are summarized in the table on the next page.

### M3 Appalachia Gathering, LLC – Hamilton Compressor Station (R13-3292)

Emission Point ID#	Source	NO <sub>x</sub>		CO		VOC		PM-10		SO <sub>2</sub>		Formaldehyde		Total HAPs		CO <sub>2e</sub> ton/year
		lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	
CE-1	CAT G3616 Compressor Engine	1.96	8.57	0.63	2.74	1.01	4.43	<0.01	<0.01	0.01	0.04	0.24	1.03	0.49	2.12	7559
CE-2	CAT G3616 Compressor Engine	1.96	8.57	0.63	2.74	1.01	4.43	<0.01	<0.01	0.01	0.04	0.24	1.03	0.49	2.12	7559
CE-3	CAT G3616 Compressor Engine	1.96	8.57	0.63	2.74	1.01	4.43	<0.01	<0.01	0.01	0.04	0.24	1.03	0.49	2.12	7559
GE-1	Natural Gas Generator	0.28	1.22	0.56	2.43	0.27	1.20	<0.01	<0.01	<0.01	<0.01	0.07	0.30	0.09	0.41	537
GE-2	Natural Gas Generator	0.19	0.82	0.37	1.64	0.18	0.77	<0.01	<0.01	<0.01	<0.01	0.04	0.17	0.05	0.23	362
TEG-1	Dehy w BTEX condenser/burner	0.00	0.00	0.00	0.00	0.11	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	135
REB-1	Dehy Reboiler	0.15	0.64	0.12	0.54	0.01	0.04	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	854
L01	Produced Water Loadout	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
L02	Methanol Loadout	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0
T11	Produced Water Storage Tank	0.00	0.00	0.00	0.00	<0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	0.02	<0.01
<b>Total Point Source</b>		<b>6.50</b>	<b>28.41</b>	<b>2.95</b>	<b>12.82</b>	<b>3.63</b>	<b>15.87</b>	<b>0.01</b>	<b>0.07</b>	<b>0.02</b>	<b>0.10</b>	<b>0.83</b>	<b>3.56</b>	<b>1.62</b>	<b>7.11</b>	<b>24565</b>
Fugitive	Component Leaks	0.00	0.00	0.00	0.00	0.09	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.29	233
Fugitive	Pigging	0.00	0.00	0.00	0.00	NA	<0.01	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	<0.01	18
Fugitive	Blowdowns	0.00	0.00	0.00	0.00	NA	0.01	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	<0.01	63
<b>Total Fugitive</b>		<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.09</b>	<b>0.40</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.07</b>	<b>0.31</b>	<b>314</b>
<b>Total Site-wide</b>		<b>6.50</b>	<b>28.41</b>	<b>2.95</b>	<b>12.82</b>	<b>3.72</b>	<b>16.27</b>	<b>0.01</b>	<b>0.07</b>	<b>0.02</b>	<b>0.10</b>	<b>0.83</b>	<b>3.56</b>	<b>1.69</b>	<b>7.42</b>	<b>24880</b>

## REGULATORY APPLICABILITY

The following rules apply to the facility:

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

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

The individual heat input of the reboiler (REB-1) is below 10 MMBTU/hr. Therefore, this unit is exempt from the aforementioned sections of 45CSR2.

M3 would also be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

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

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

The individual heat input of the reboiler (REB-1) is below 10 MMBTU/hr. Therefore, this unit is exempt from the aforementioned sections of 45CSR2.

### **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)**

A 45CSR13 construction permit applies to this source due to the fact that M3 exceeds the regulatory emission threshold for uncontrolled criteria pollutants of 6 lb/hr and 10 ton/year of nitrogen oxides, carbon monoxide, volatile organic compounds and formaldehyde.

M3 paid the appropriate application fee and published the required legal advertisement for a construction permit application.

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

45CSR16 applies to this source by reference of 40CFR60, Subparts JJJJ and OOOO. These requirements are discussed under that rule below.

**45CSR22 (Air Quality Management Fee Program)**

M3 is not subject to 45CSR30. The Hamilton Compressor Station is subject to 40CFR60 Subparts JJJJ and OOOO, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source.

M3 is required to pay the appropriate annual fees and keep their Certificate to Operate current.

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

40CFR60 Subpart JJJJ establishes emission standards for applicable SI ICE.

The 1,775 hp Caterpillar G3616 RICEs (CE-1, CE-2, CE-3) were manufactured after the July 1, 2007 date for engines with a maximum rated power capacity greater than or equal to 500 hp.

The 1,775 hp Caterpillar G3616 RICEs (CE-1, CE-2, CE-3) will be subject to the following emission limits: NO<sub>x</sub> – 1.0 g/hp-hr (3.92 lb/hr); CO – 2.0 g/hp-hr (7.83 lb/hr); and VOC – 0.7 g/hp-hr (2.74 lb/hr). Based on the manufacturer's specifications for these engines, the emission standards will be met.

The 1,775 hp Caterpillar G3616 RICEs (CE-1, CE-2, CE-3) are not certified by the manufacturer to meet the emission standards listed in 40CFR60 Subpart JJJJ. Therefore, M3 will be required to conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or three (3) years, whichever comes first, to demonstrate compliance.

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

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

*There are no gas wells at this facility. Therefore, all requirements regarding gas well affected facilities under 40 CFR 60 Subpart OOOO would not apply.*

- a. Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your centrifugal compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

*There are no centrifugal compressors at the Hamilton Compressor Station. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOO would not apply.*

- b. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

*There are reciprocating internal combustion engines located at the Hamilton Compressor Station that were constructed after August 23, 2011. Therefore, the requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOO will apply. M3 will be required to perform the following:*

- Replace the reciprocating compressor rod packing at least every 26,000 hours of operation or 36 months or installation of a rod packing emissions collection system.
- Demonstrate initial compliance by continuously monitoring the number of hours of operation or track the number of months since the last rod packing replacement.
- Submit the appropriate start up notifications.
- Submit the initial annual report for the reciprocating compressors.
- Maintain records of hours of operation since last rod packing replacement, records of the date and time of each rod packing replacement, and records of deviations in cases where the reciprocating compressor was not operated in compliance.

*There are no sweetening units at the Hamilton Compressor Station. Therefore, all requirements regarding sweetening units under 40 CFR 60 Subpart OOOO would not apply.*

**40CFR63 Subpart HH** (National Emission Standards for Hazardous Air Pollutants for Oil and Natural Gas Production Facilities)

Subpart HH establishes national emission limitations and operating limitations for HAPs emitted from oil and natural gas production facilities located at major and area sources of HAP emissions. The glycol dehydration units at the Hamilton Compressor Station are subject to the area source requirements for glycol dehydration units. However, because the facility is an area source of HAP emissions and the actual average benzene emissions from the glycol dehydration unit is below 0.90 megagram per year (1.0 tons/year) it is exempt from all requirements of Subpart HH except to maintain records of actual average flowrate of natural gas to demonstrate a continuous exemption status.

**40CFR63 Subpart ZZZZ** (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. The engines (CE-1, CE-2, CE-3, GE-1, GE-2) at the Hamilton Compressor Station are subject to the area source requirements for non-emergency spark ignition engines.

The applicability requirements for new stationary RICEs located at an area source of HAPs, is the requirement to meet the standards of 40CFR60 Subpart JJJJ. These requirements were outlined above. The proposed engine meets these standards.

Because these engines are not certified by the manufacturer, M3 will be required to perform an initial performance test within 180 days from startup, and subsequent testing every 8,760 hours or 3 years, whichever comes first.

The following rules do not apply to the facility:

**45CSR14** (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants)

**45CSR19** (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment)

The Hamilton Compressor Station is located in Monongalia County, which is an attainment county for all criteria pollutants, therefore the Hamilton Compressor Station is not applicable to 45CSR19.

As shown in the following table, M3 is not a major source subject to 45CSR14 or 45CSR19 review. According to 45CSR14 Section 2.43.e, fugitive emissions are not

included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, the fugitive emissions are not included in the PTE below.

Pollutant	PSD (45CSR14) Threshold (tpy)	NANSR (45CSR19) Threshold (tpy)	Hamilton PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	12.82	No
Nitrogen Oxides	250	NA	28.41	No
Sulfur Dioxide	250	NA	0.10	No
Particulate Matter 2.5	250	NA	0.07	No
Ozone (VOC)	250	NA	15.87	No

**45CSR30 (Requirements for Operating Permits)**

M3 is not subject to 45CSR30. The Hamilton Compressor Station is subject to 40CFR60 Subparts JJJJ and OOOO, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source.

**40CFR60 Subpart Kb (Standards of Performance for VOC Liquid Storage Vessels)**

40CFR60 Subpart Kb does not apply to storage vessels with a capacity less than 75 cubic meters. The largest tanks that M3 has proposed to install are 63.60 cubic meters each. Therefore, M3 would not be subject to this rule.

**40CFR60 Subpart KKK (Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants)**

40CFR60 Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984, and on or Before August 23, 2011. The Hamilton Compressor Station is not a natural gas processing facility, therefore, M3 is not subject to this rule.

**40CFR60 Subpart KKKK (Standards of Performance for Stationary Combustion Turbines)**

40CFR60 Subpart KKKK does not apply because there are no stationary combustion turbines at the facility with a heat input at peak load equal to or greater than 10 MMBTU/hr, based on the higher heating value of the fuel (§60.4305).

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The following HAPs are common to this industry. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen

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

## AIR QUALITY IMPACT ANALYSIS

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) as seen in the table listed in the Regulatory Discussion Section.

## SOURCE AGGREGATION

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

The Hamilton Compressor Station is located in Monongalia County and will be operated by M3.

1. The Hamilton Compressor Station will operate under SIC code 1311 (Natural Gas Extraction). There are other compressor stations operated by M3 that share the same two-digit major SIC code of 13 for natural gas extraction. Therefore, the Hamilton Compressor Station does share the same SIC code as other M3 compressor stations.

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

The existing Hamilton Dehydration Station is considered to be on contiguous or adjacent property with the Hamilton Compressor Station.

3. Common control. The Hamilton Dehydration Station and Hamilton Compressor Station are under common control.

Because the Hamilton Compressor Station and Hamilton Dehydration Station meet all three (3) prongs in determining a ‘source’, the emissions from the Hamilton Compressor Station and Hamilton Dehydration Station will be aggregated in determining major source or PSD status.

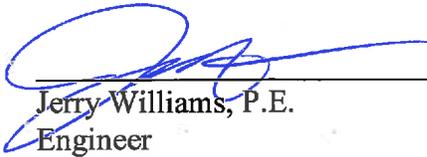
#### MONITORING OF OPERATIONS

M3 will be required to perform the following monitoring:

- Monitor and record quantity of natural gas consumed for all combustion devices.
- Monitor and record quantity of wet gas throughput for the glycol dehydration unit.
- Monitor and record quantity of condensate loaded into storage tanks and loadouts.
- Maintain records of testing conducted in accordance with the permit. Said records shall be maintained on-site or in a readily accessible off-site location
- Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit.
- Maintain records of the visible emission opacity tests conducted per the permit.
- Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engines and ancillary equipment.
- Maintain records of all applicable requirements of 40CFR60 Subparts JJJJ and OOOO and 40CFR63 Subparts HH and ZZZZ.
- Maintain records of the flare design evaluation.
- The records shall be maintained on site or in a readily available off-site location maintained by M3 for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that M3 meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Hamilton Compressor Station should be granted a 45CSR13 construction permit for their facility.

  
\_\_\_\_\_  
Jerry Williams, P.E.  
Engineer

*MAR 07. 2016*  
\_\_\_\_\_  
Date



Facility Location: Fairview, Monongalia County, West Virginia  
Mailing Address: 742 Fairmont Rd. Suite E, Westover, WV 26501  
Facility Description: Natural Gas Compressor Station  
NAICS Codes: 211111  
UTM Coordinates: 568.1639 km Easting • 4388.042 km Northing • Zone 17  
Permit Type: Construction  
Description of Change: Construction and operation of a natural gas compressor station.

*Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §§22-5-14.*

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*The source is not subject to 45CSR30.*

DRAFT

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**1.0. Emission Units**

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
CE-1	CE-1	Caterpillar G3616 Compressor Engine	2016	1,775 hp	Ox Cat (C1)
CE-2	CE-2	Caterpillar G3616 Compressor Engine	2016	1,775 hp	Ox Cat (C2)
CE-3	CE-3	Caterpillar G3616 Compressor Engine	2016	1,775 hp	Ox Cat (C3)
GE-1	GE-1	Gillette Natural Gas Generator	2016	126 hp	None
GE-2	GE-2	Natural Gas Generator	2016	85 hp	None
T01	T01	Waste Lube Oil	2016	1,260 gal	None
T02	T02	Methanol Tank	2016	335 gal	None
T03	T03	Coolant Make Up Tank	2016	1,260 gal	None
T04	T04	Coolant Drain Tank	2016	1,260 gal	None
T05	T05	Engine Lube Oil Tank for CE-1	2016	500 gal	None
T06	T06	Compressor Lube Oil for CE-1	2016	500 gal	None
T07	T07	Engine Lube Oil Tank for CE-2	2016	500 gal	None
T08	T08	Compressor Lube Oil for CE-2	2016	500 gal	None
T09	T09	Engine Lube Oil Tank for CE-3	2016	500 gal	None
T10	T10	Compressor Lube Oil for CE-3	2016	500 gal	None
T11	T11	Produced Water Tank (T-421)	2014	16,800 gal	None
T12	T12	TEG Storage Tank	2014	500 gal	None
TEG-1	TEG-1	TEG Dehydration Unit	2014	75 mmscfd	X-304 (C4)
REB-1	REB-1	TEG Reboiler Unit	2014	1.5 MMBTU/hr	None
L01	L01	Produced Water Truck Loadout	2014	76,143 gal/yr	None
L02	L02	Methanol Unloading	2014	3,685 gal/yr	None

**1.1. Control Devices**

Emission Unit	Pollutant	Control Device	Control Efficiency
1,775 hp Caterpillar G3616 RICE w/ Ox Cat (CE-1, CE-2, CE-3)	Carbon Monoxide	Oxidation Catalyst	94 %
	Volatile Organic Compounds		73 %
	Formaldehyde		77 %
75 mmscfd TEG Dehydrator Still Vent (TEG-1)	Volatile Organic Compounds	BTEX Condenser/ Burner/Glow Plug	98 %
	Hazardous Air Pollutants		98 %

**2.0. General Conditions**

**2.1. Definitions**

- 2.1.1. All references to the “West Virginia Air Pollution Control Act” or the “Air Pollution Control Act” mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.
- 2.1.2. The “Clean Air Act” means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.
- 2.1.3. “Secretary” means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45CSR§30-2.12.). The Director of the Division of Air Quality is the Secretary’s designated representative for the purposes of this permit.

**2.2. Acronyms**

<b>CAAA</b>	Clean Air Act Amendments	<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>CBI</b>	Confidential Business Information	<b>NSPS</b>	New Source Performance Standards
<b>CEM</b>	Continuous Emission Monitor	<b>PM</b>	Particulate Matter
<b>CES</b>	Certified Emission Statement	<b>PM<sub>2.5</sub></b>	Particulate Matter less than 2.5 μm in diameter
<b>C.F.R. or CFR</b>	Code of Federal Regulations	<b>PM<sub>10</sub></b>	Particulate Matter less than 10μm in diameter
<b>CO</b>	Carbon Monoxide	<b>Ppb</b>	Pounds per Batch
<b>C.S.R. or CSR</b>	Codes of State Rules	<b>Pph</b>	Pounds per Hour
<b>DAQ</b>	Division of Air Quality	<b>Ppm</b>	Parts per Million
<b>DEP</b>	Department of Environmental Protection	<b>Ppmv or ppmv</b>	Parts per Million by Volume
<b>dscm</b>	Dry Standard Cubic Meter	<b>PSD</b>	Prevention of Significant Deterioration
<b>FOIA</b>	Freedom of Information Act	<b>Psi</b>	Pounds per Square Inch
<b>HAP</b>	Hazardous Air Pollutant	<b>SIC</b>	Standard Industrial Classification
<b>HON</b>	Hazardous Organic NESHAP	<b>SIP</b>	State Implementation Plan
<b>HP</b>	Horsepower	<b>SO<sub>2</sub></b>	Sulfur Dioxide
<b>lbs/hr</b>	Pounds per Hour	<b>TAP</b>	Toxic Air Pollutant
<b>LDAR</b>	Leak Detection and Repair	<b>TPY</b>	Tons per Year
<b>M</b>	Thousand	<b>TRS</b>	Total Reduced Sulfur
<b>MACT</b>	Maximum Achievable Control Technology	<b>TSP</b>	Total Suspended Particulate
<b>MDHI</b>	Maximum Design Heat Input	<b>USEPA</b>	United States Environmental Protection Agency
<b>MM</b>	Million	<b>UTM</b>	Universal Transverse Mercator
<b>MMBtu/hr or mmbtu/hr</b>	Million British Thermal Units per Hour	<b>VEE</b>	Visual Emissions Evaluation
<b>MMCF/hr or mmcf/hr</b>	Million Cubic Feet per Hour	<b>VOC</b>	Volatile Organic Compounds
<b>NA</b>	Not Applicable	<b>VOL</b>	Volatile Organic Liquids
<b>NAAQS</b>	National Ambient Air Quality Standards		
<b>NESHAPS</b>	National Emissions Standards for Hazardous Air Pollutants		

### **2.3. Authority**

This permit is issued in accordance with West Virginia Air Pollution Control Act W.Va. Code §§ 22-5-1. et seq. and the following Legislative Rules promulgated thereunder:

- 2.3.1. 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation;*

### **2.4. Term and Renewal**

- 2.4.1. Permit shall remain valid, continuous and in effect unless it is revised, suspended, revoked or otherwise changed under an applicable provision of 45CSR13 or any other applicable legislative rule;

### **2.5. Duty to Comply**

- 2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Application R13-3292, and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to;  
[45CSR§§13-5.11 and 10.3.]
- 2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;
- 2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;
- 2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses, and/or approvals from other agencies; i.e., local, state, and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted

### **2.6. Duty to Provide Information**

The permittee shall furnish to the Secretary within a reasonable time any information the Secretary may request in writing to determine whether cause exists for administratively updating, modifying, revoking, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Secretary copies of records to be kept by the permittee. For information claimed to be confidential, the permittee shall furnish such records to the Secretary along with a claim of confidentiality in accordance with 45CSR31. If confidential information is to be sent to USEPA, the permittee shall directly provide such information to USEPA along with a claim of confidentiality in accordance with 40 C.F.R. Part 2.

## **2.7. Duty to Supplement and Correct Information**

Upon becoming aware of a failure to submit any relevant facts or a submittal of incorrect information in any permit application, the permittee shall promptly submit to the Secretary such supplemental facts or corrected information.

## **2.8. Administrative Update**

The permittee may request an administrative update to this permit as defined in and according to the procedures specified in 45CSR13.  
[45CSR§13-4.]

## **2.9. Permit Modification**

The permittee may request a minor modification to this permit as defined in and according to the procedures specified in 45CSR13.  
[45CSR§13-5.4.]

## **2.10 Major Permit Modification**

The permittee may request a major modification as defined in and according to the procedures specified in 45CSR14 or 45CSR19, as appropriate.  
[45CSR§13-5.1]

## **2.11. Inspection and Entry**

The permittee shall allow any authorized representative of the Secretary, upon the presentation of credentials and other documents as may be required by law, to perform the following:

- a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
- d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

## **2.12. Emergency**

- 2.12.1. An "emergency" means any situation arising from sudden and reasonable unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by

improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

- 2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.
- 2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:
- a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;
  - b. The permitted facility was at the time being properly operated;
  - c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and
  - d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.
- 2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.
- 2.12.5. The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

### **2.13. Need to Halt or Reduce Activity Not a Defense**

It shall not be a defense for a permittee in an enforcement action that it should have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. However, nothing in this paragraph shall be construed as precluding consideration of a need to halt or reduce activity as a mitigating factor in determining penalties for noncompliance if the health, safety, or environmental impacts of halting or reducing operations would be more serious than the impacts of continued operations.

### **2.14. Suspension of Activities**

In the event the permittee should deem it necessary to suspend, for a period in excess of sixty (60) consecutive calendar days, the operations authorized by this permit, the permittee shall notify the Secretary, in writing, within two (2) calendar weeks of the passing of the sixtieth (60) day of the suspension period.

### **2.15. Property Rights**

This permit does not convey any property rights of any sort or any exclusive privilege.

**2.16. Severability**

The provisions of this permit are severable and should any provision(s) be declared by a court of competent jurisdiction to be invalid or unenforceable, all other provisions shall remain in full force and effect.

**2.17. Transferability**

This permit is transferable in accordance with the requirements outlined in Section 10.1 of 45CSR13. [45CSR§13-10.1.]

**2.18. Notification Requirements**

The permittee shall notify the Secretary, in writing, no later than thirty (30) calendar days after the actual startup of the operations authorized under this permit.

**2.19. Credible Evidence**

Nothing in this permit shall alter or affect the ability of any person to establish compliance with, or a violation of, any applicable requirement through the use of credible evidence to the extent authorized by law. Nothing in this permit shall be construed to waive any defense otherwise available to the permittee including, but not limited to, any challenge to the credible evidence rule in the context of any future proceeding.

### 3.0. Facility-Wide Requirements

#### 3.1. Limitations and Standards

- 3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.  
[45CSR§6-3.1.]
- 3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.  
[45CSR§6-3.2.]
- 3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management, and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.  
[40CFR§61.145(b) and 45CSR§34]
- 3.1.4. **Odor.** No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.  
[45CSR§4-3.1] *[State Enforceable Only]*
- 3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.  
[45CSR§13-10.5.]
- 3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45CSR11.  
[45CSR§11-5.2.]

#### 3.2. Monitoring Requirements *[Reserved]*

#### 3.3. Testing Requirements

- 3.3.1. **Stack testing.** As per provisions set forth in this permit or as otherwise required by the Secretary, in accordance with the West Virginia Code, underlying regulations, permits and orders, the permittee shall conduct test(s) to determine compliance with the emission limitations set forth in this permit and/or established or set forth in underlying documents. The Secretary, or his duly authorized representative, may at his option witness or conduct such test(s). Should the Secretary exercise his option to conduct such test(s), the operator shall provide all necessary sampling

connections and sampling ports to be located in such manner as the Secretary may require, power for test equipment and the required safety equipment, such as scaffolding, railings and ladders, to comply with generally accepted good safety practices. Such tests shall be conducted in accordance with the methods and procedures set forth in this permit or as otherwise approved or specified by the Secretary in accordance with the following:

- a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.
- b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.
- c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.
- d. The permittee shall submit a report of the results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:
  1. The permit or rule evaluated, with the citation number and language;
  2. The result of the test for each permit or rule condition; and,
  3. A statement of compliance or noncompliance with each permit or rule condition.

[WV Code § 22-5-4(a)(14-15) and 45CSR13]

### 3.4. Recordkeeping Requirements

- 3.4.1. **Retention of records.** The permittee shall maintain records of all information (including monitoring data, support information, reports, and notifications) required by this permit recorded in a form suitable and readily available for expeditious inspection and review. Support information

includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation. The files shall be maintained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent two (2) years of data shall be maintained on site. The remaining three (3) years of data may be maintained off site, but must remain accessible within a reasonable time. Where appropriate, the permittee may maintain records electronically (on a computer, on computer floppy disks, CDs, DVDs, or magnetic tape disks), on microfilm, or on microfiche.

- 3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.

[45CSR§4. *State Enforceable Only.*]

### 3.5. Reporting Requirements

- 3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.
- 3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W.Va. Code § 22-5-10 and 45CSR31.
- 3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class with postage prepaid to the address(es) set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

**If to the DAQ:**

Director  
WVDEP  
Division of Air Quality  
601 57<sup>th</sup> Street  
Charleston, WV 25304-2345

**If to the US EPA:**

Associate Director  
Office of Air Enforcement and Compliance Assistance  
(3AP20)  
U.S. Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, PA 19103-2029

#### 3.5.4. Operating Fee

- 3.5.4.1. In accordance with 45CSR22 – Air Quality Management Fee Program, the permittee shall not operate nor cause to operate the permitted facility or other associated facilities on the same or contiguous sites comprising the plant without first obtaining and having in current effect a Certificate to Operate (CTO). Such Certificate to Operate (CTO) shall be renewed annually, shall be maintained on the premises for which the certificate has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.

- 3.5.4.2. In accordance with 45CSR22 – Air Quality Management Fee Program, enclosed with this permit is an Application for a Certificate to Operate (CTO). The CTO will cover the time period beginning with the date of initial startup through the following June 30. Said application and the appropriate fee shall be submitted to this office prior to the date of initial startup. For any startup date other than July 1, the permittee shall pay a fee or prorated fee in accordance with Section 4.5 of 45CSR22. A copy of this schedule may be found on the reverse side of the CTO application.
- 3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

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#### 4.0. Source-Specific Requirements

##### 4.1. Limitations and Standards

4.1.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:

- a. The date, place as defined in this permit, and time of sampling or measurements;
- b. The date(s) analyses were performed;
- c. The company or entity that performed the analyses;
- d. The analytical techniques or methods used;
- e. The results of the analyses; and
- f. The operating conditions existing at the time of sampling or measurement.

4.1.2. **Minor Source of Hazardous Air Pollutants (HAP).** HAP emissions from the facility shall be less than 10 tons/year of any single HAP or 25 tons/year of any combination of HAPs. Compliance with this Section shall ensure that the facility is a minor HAP source.

4.1.3. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate all pollution control equipment listed in Section 1.0 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.  
[45CSR§13-5.11.]

4.1.4. **Record of Malfunctions of Air Pollution Control Equipment.** For all air pollution control equipment listed in Section 1.0, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:

- a. The equipment involved.
- b. Steps taken to minimize emissions during the event.
- c. The duration of the event.
- d. The estimated increase in emissions during the event.

For each such case associated with an equipment malfunction, the additional information shall also be recorded:

- e. The cause of the malfunction.
- f. Steps taken to correct the malfunction.
- g. Any changes or modifications to equipment or procedures that would help prevent future recurrences of the malfunction.

4.1.5. The permittee shall install, maintain, and operate all above-ground piping, valves, pumps, etc. that service lines in the transport of potential sources of regulated air pollutants to minimize any fugitive escape of regulated air pollutants (leak). Any above-ground piping, valves, pumps, etc. that shows signs of excess wear and that have a reasonable potential for fugitive emissions of regulated air pollutants shall be repaired or replaced as needed.

4.1.6. The permittee shall monitor and maintain quarterly records (calendar year) for each facility component that was inspected for fugitive escape of regulated air pollutants. Each component shall operate with no detectable emissions, as determined using audio-visual-olfactory (AVO) inspections, USEPA 40CFR60 Method 21, USEPA alternative work practice to detect leaks from

equipment using optical gas imaging (OGI) camera (ex. FLIR camera), or some combination thereof. AVO inspections shall include, but not limited to, defects as visible cracks, holes, or gaps in piping; loose connections; liquid leaks; or broken or missing caps or other closure devices. If permittee uses USEPA Method 21, then no detectable emissions is defined as less than 500 ppm in accordance with Method 21. If permittee uses an OGI camera, then no detectable emissions is defined as no visible leaks detected in accordance with USEPA alternative OGI work practices.

If any leak is detected, the permittee shall repair the leak as soon as possible. The first attempt at repair must be made within five (5) calendar days of discovering the leak, and the final repair must be made within fifteen (15) calendar days of discovering the leak. The permittee shall record each leak detected and the associated repair. The leak will not be considered repaired until the same monitoring method or a more detailed instrument determines the leak is repaired.

Delay of repair of a closed vent system for which leaks or defects have been detected is allowed if the repair is technically infeasible without a shutdown, or if you determine that emissions resulting from immediate repair would be greater than the fugitive emissions likely to result from delay of repair. You must complete repair of such equipment by the end of the next shutdown.

[45CSR§13-5.11.]

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## 5.0. Source-Specific Requirements [Produced Water Storage Vessel (T11)]

### 5.1. Limitations and Standards

- 5.1.1. *Emission Units.* The maximum design capacity for the produced water tank (T11) shall not exceed 400 bbl (16,800 gallons)
- 5.1.2. *Maximum Storage Vessel Throughput Limitation.* The permittee shall not exceed 76,153 gallons per year throughput without first obtaining a modification or administrative update. Compliance with the annual throughput limitation shall be determined using a twelve (12) month rolling total. A twelve (12) month rolling total shall mean the sum of the storage vessel throughput at any given time during the previous twelve (12) consecutive calendar months.
- 5.1.3. *Emissions determination.* The permittee shall determine the VOC emissions for each storage vessel (as defined in § 60.5430) to determine affected facility status (commenced construction, modification or reconstruction after August 23, 2011) in accordance with the *emissions determination* required in 40CFR60 Subpart OOOO.
- 5.1.4. *Site specific sample.*
1. The permittee shall use a site specific sample to determine potential emissions. The permittee shall comply with the following:
    - i. The site specific sample shall be taken within thirty (30) days of startup.
    - ii. The type and location of the sample shall be appropriate for the calculation methodology or model (e.g. ProMax, E&P Tanks, HYSYS) being used to calculate the emissions. The sample location shall be equipped with appropriate sampling access.
    - iii. If the VOC potential emissions are higher than the emission limits in the registration, DAQ shall be notified in accordance with section 5.4.1.
      - a. The permittee shall re-evaluate the VOC potential emissions based on the site specific sample within 90 days of receiving the analysis of the site specific sample determined per section 5.1.4 of this permit.

### 5.2. Monitoring Requirements

- 5.2.1. The permittee shall monitor and maintain quarterly records of the temperature and pressure upstream of any storage vessel containing produced water (T11) at the appropriate separation unit based on the calculation methodology or model being used by the permittee to calculate their VOC flash emissions. Pressure monitoring shall not be required if the pressure setting is greater than the pressure safety valve for the storage vessel(s).

### 5.3. Recordkeeping Requirements

- 5.3.1. To demonstrate compliance with section 5.1.1 - 5.1.2 of this permit, the permittee shall maintain a record of the aggregate throughput for the produced water storage vessel (T11) that contain on a monthly and rolling twelve (12) month total. Said records shall be maintained in accordance with section 3.5.1 of this permit.
- 5.3.2. To demonstrate compliance with section 5.1.3 of this permit, the permittee shall maintain records of the determination of the VOC emission rate per storage vessel, including identification of the model or calculation methodology used to calculate the VOC emission rate.

- 5.3.3. To demonstrate compliance with section 5.1.4 of this permit, the permittee shall maintain records of the type of sample taken, the location of the sample within the process, the temperature at the location and time where the sample was taken, the pressure at the location and time that the sample was taken, the analysis of the sample, and the resulting emissions calculations using the site specific sample.

**5.4. Notification and Reporting Requirements**

- 5.4.1. The permittee shall notify the Director of the DAQ in writing for any instance when the potential emissions determined with a site specific sample in accordance with section 5.1.4 of this permit were greater than the potential emissions provided in the R13-3292 application. The notification shall include whether or not this change in emissions affects applicability determination to NSPS, Subpart OOOO for any storage vessel. The notification to the Director shall be provided no later than 30 days from the date of discovery of the increased emissions.

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## **6.0. Source-Specific Requirements [TEG Reboiler Unit (REB-1)]**

### **6.1. Limitations and Standards**

- 6.1.1. *Maximum Design Heat Input.* The maximum design heat input for the TEG Reboiler Unit (REB-1) shall be 1.5 MMBTU/hr.
- 6.1.2. No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any fuel burning unit which is greater than ten (10) percent opacity based on a six minute block average. [45CSR§2-3.1.]

### **6.2. Monitoring Requirements**

- 6.2.1. At such reasonable times as the Secretary may designate, the permittee shall conduct Method 9 emission observations for the purpose of demonstrating compliance with section 6.1.2 of this permit. Method 9 shall be conducted in accordance with 40 CFR 60 Appendix A.

### **6.3. Testing Requirements**

- 6.3.1. Upon request by the Secretary, compliance with the visible emission requirements of section 6.1.2 of this permit shall be determined in accordance with 40 CFR Part 60, Appendix A, Method 9 or by using measurements from continuous opacity monitoring systems approved by the Secretary. The Secretary may require the installation, calibration, maintenance and operation of continuous opacity monitoring systems and may establish policies for the evaluation of continuous opacity monitoring results and the determination of compliance with the visible emission requirements of section 6.1.2 of this permit. Continuous opacity monitors shall not be required on fuel burning units which employ wet scrubbing systems for emission control. [45CSR§2-3.2.]

### **6.4. Recordkeeping Requirements**

- 6.4.1. The permittee shall maintain records of all monitoring data required by section 6.2.1 of this permit documenting the date and time of each visible emission check, the emission point or equipment/source identification number, the name or means of identification of the observer, the results of the check(s), whether the visible emissions are normal for the process, and, if applicable, all corrective measures taken or planned. The permittee shall also record the general weather conditions (i.e. sunny, approximately 80°F, 6 - 10 mph NE wind) during the visual emission check(s). Should a visible emission observation be required to be performed per the requirements specified in Method 9, the data records of each observation shall be maintained per the requirements of Method 9.

## **7.0. Source-Specific Requirements [Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)]**

### **7.1. Limitations and Standards**

- 7.1.1. Each pneumatic controller affected facility shall comply with the applicable requirements specified in 40 CFR Part 60, Subpart OOOO.

## **8.0. Source-Specific Requirements [Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO) (CE-1, CE-2, CE-3)]**

### **8.1. Limitations and Standards**

- 8.1.1. You must comply with the standards in paragraphs (a) through (d) of this section for each reciprocating compressor affected facility.
- a. You must replace the reciprocating compressor rod packing according to either paragraph (a)(1) or (2) of this section or you must comply with paragraph (a)(3) of this section.
    1. Before the compressor has operated for 26,000 hours. The number of hours of operation must be continuously monitored beginning upon initial startup of your reciprocating compressor affected facility, or October 15, 2012, or the date of the most recent reciprocating compressor rod packing replacement, whichever is later.
    2. Prior to 36 months from the date of the most recent rod packing replacement, or 36 months from the date of startup for a new reciprocating compressor for which the rod packing has not yet been replaced.
    3. Collect the emissions from the rod packing using a rod packing emissions collection system which operates under negative pressure and route the rod packing emissions to a process through a closed vent system that meets the requirements of §60.5411(a).
  - b. You must demonstrate initial compliance with standards that apply to reciprocating compressor affected facilities as required by § 60.5410.
  - c. You must demonstrate continuous compliance with standards that apply to reciprocating compressor affected facilities as required by § 60.5415.
  - d. You must perform the required notification, recordkeeping, and reporting as required by § 60.5420.

### **[40CFR§60.5385, Reciprocating Compressor Engines]**

### **8.2. Initial Compliance Demonstration**

- 8.2.1. You must determine initial compliance with the standards for each affected facility using the requirements in paragraph (c) of this section. The initial compliance period begins on October 15, 2012 or upon initial startup, whichever is later, and ends no later than one year after the initial startup date for your affected facility or no later than one year after October 15, 2012. The initial compliance period may be less than one full year.
- c. To achieve initial compliance with the standards for each reciprocating compressor affected facility you must comply with paragraphs (c)(1) through (4) of this section.
    1. If complying with §60.5385(a)(1) or (2), during the initial compliance period, you must continuously monitor the number of hours of operation or track the number of months since the last rod packing replacement.
    2. If complying with §60.5385(a)(3), you must operate the rod packing emissions collection system under negative pressure and route emissions to a process through a closed vent system that meets the requirements of §60.5411(a).

3. You must submit the initial annual report for your reciprocating compressor as required in § 60.5420(b).
4. You must maintain the records as specified in § 60.5420(c)(3) for each reciprocating compressor affected facility.

[40CFR§60.5410]

### 8.3. Continuous Compliance Demonstration

- 8.3.1. For each reciprocating compressor affected facility complying with §60.5385(a)(1) or (2), you must demonstrate continuous compliance according to paragraphs (c)(1) through (3) of this section. For each reciprocating compressor affected facility complying with §60.5385(a)(3), you must demonstrate continuous compliance according to paragraph (c)(4) of this section.
  1. You must continuously monitor the number of hours of operation for each reciprocating compressor affected facility or track the number of months since initial startup, or October 15, 2012, or the date of the most recent reciprocating compressor rod packing replacement, whichever is later.
  2. You must submit the annual report as required in § 60.5420(b) and maintain records as required in § 60.5420(c)(3).
  3. You must replace the reciprocating compressor rod packing before the total number of hours of operation reaches 26,000 hours or the number of months since the most recent rod packing replacement reaches 36 months.
  4. You must operate the rod packing emissions collection system under negative pressure and continuously comply with the closed vent requirements in §60.5411(a).

[40CFR§60.5415]

### 8.4. Notification, Recordkeeping and Reporting Requirements

- 8.4.1. You must submit the notifications according to paragraphs (a)(1) and (2) of this section if you own or operate one or more of the affected facilities specified in § 60.5365 that was constructed, modified, or reconstructed during the reporting period.

[40CFR§60.5420(a)]

- 8.4.2. Reporting requirements. You must submit annual reports containing the information specified in paragraphs (b)(1) and (4) of this section to the Administrator and performance test reports as specified in paragraph (b)(7) of this section. The initial annual report is due no later than 90 days after the end of the initial compliance period as determined according to § 60.5410. Subsequent annual reports are due no later than same date each year as the initial annual report. If you own or operate more than one affected facility, you may submit one report for multiple affected facilities provided the report contains all of the information required as specified in paragraphs (b)(1) and (4) of this section. Annual reports may coincide with title V reports as long as all the required elements of the annual report are included. You may arrange with the Administrator a common schedule on which reports required by this part may be submitted as long as the schedule does not extend the reporting period.

(1) The general information specified in paragraphs (b)(1)(i) through (iv) of this section.

(i) The company name and address of the affected facility.

(ii) An identification of each affected facility being included in the annual report.

(iii) Beginning and ending dates of the reporting period.

(iv) A certification by a responsible official of truth, accuracy, and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

(4) For each reciprocating compressor affected facility, the information specified in paragraphs (b)(4)(i) through (ii) of this section.

(i) The cumulative number of hours of operation or the number of months since initial startup, since October 15, 2012, or since the previous reciprocating compressor rod packing replacement, whichever is later.

(ii) Records of deviations specified in paragraph (c)(3)(iii) of this section that occurred during the reporting period.

(7)(i) Within 60 days after the date of completing each performance test (see § 60.8 of this part) as required by this subpart you must submit the results of the performance tests required by this subpart to EPA's WebFIRE database by using the Compliance and Emissions Data Reporting Interface (CEDRI) that is accessed through EPA's Central Data Exchange (CDX) ( [www.epa.gov/cdx](http://www.epa.gov/cdx) ). Performance test data must be submitted in the file format generated through use of EPA's Electronic Reporting Tool (ERT) (see <http://www.epa.gov/ttn/chief/ert/index.html> ). Only data collected using test methods on the ERT Web site are subject to this requirement for submitting reports electronically to WebFIRE. Owners or operators who claim that some of the information being submitted for performance tests is confidential business information (CBI) must submit a complete ERT file including information claimed to be CBI on a compact disk or other commonly used electronic storage media (including, but not limited to, flash drives) to EPA. The electronic media must be clearly marked as CBI and mailed to U.S. EPA/OAPQS/CORE CBI Office, Attention: WebFIRE Administrator, MD C404-02, 4930 Old Page Rd., Durham, NC 27703. The same ERT file with the CBI omitted must be submitted to EPA via CDX as described earlier in this paragraph. At the discretion of the delegated authority, you must also submit these reports, including the confidential business information, to the delegated authority in the format specified by the delegated authority.

(ii) All reports required by this subpart not subject to the requirements in paragraph (a)(2)(i) of this section must be sent to the Administrator at the appropriate address listed in § 63.13 of this part. The Administrator or the delegated authority may request a report in any form suitable for the specific case (e.g., by commonly used electronic media such as Excel spreadsheet, on CD or hard copy). The Administrator retains the right to require submittal of reports subject to paragraph (a)(2)(i) and (ii) of this section in paper format.

[40CFR§60.5420]

8.4.3. Recordkeeping requirements. You must maintain the records identified as specified in § 60.7(f) and in paragraph (c)(1) of this section. All records must be maintained for at least 5 years.

(3) For each reciprocating compressors affected facility, you must maintain the records in paragraphs (c)(3)(i) through (iii) of this section.

(i) Records of the cumulative number of hours of operation or number of months since initial startup or October 15, 2012, or the previous replacement of the reciprocating compressor rod packing, whichever is later.

(ii) Records of the date and time of each reciprocating compressor rod packing replacement, or date of installation of a rod packing emissions collection system and closed vent system as specified in §60.5385(a)(3).

(iii) Records of deviations in cases where the reciprocating compressor was not operated in compliance with the requirements specified in § 60.5385.  
[40CFR§60.5420]

**9.0. Source-Specific Requirements [Reciprocating Internal Combustion Engines (RICE) (CE-1, CE-2, CE-3), Generators (GE-1, GE-2)]**

**9.1. Limitations and Standards**

9.1.1. Maximum emissions from each of the 1,775 hp natural gas fired reciprocating engines, Caterpillar G3616 (CE-1, CE-2, CE-3) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	1.96	8.57
Carbon Monoxide	0.63	2.74
Volatile Organic Compounds	1.01	4.43
Formaldehyde	0.24	1.03

9.1.2. Maximum emissions from the 126 hp natural gas fired generator (GE-1) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	0.28	1.22
Carbon Monoxide	0.56	2.43
Volatile Organic Compounds	0.19	0.85
Formaldehyde	0.09	0.41

9.1.3. Maximum emissions from the 85 hp natural gas fired generator (GE-2) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	0.19	0.82
Carbon Monoxide	0.37	1.64
Volatile Organic Compounds	0.13	0.57
Formaldehyde	0.05	0.23

9.1.4. The applicable RICEs (CE-1, CE-2, CE-3) and generators (GE-1, GE-2) shall be operated and maintained as follows:

- a. In accordance with the manufacturer’s recommendations and specifications or in accordance with a site specific maintenance plan; and,
- b. In a manner consistent with good operating practices.

9.1.5. Requirements for Use of Catalytic Reduction Devices

- a. Lean-burn natural gas compressor engines (CE-1, CE-2, CE-3) equipped with oxidation catalyst air pollution control devices shall be fitted with a closed-loop automatic air/fuel ratio feedback controller to ensure emissions of regulated pollutants do not exceed the emission limit listed in permit condition 9.1.1 for any engine/oxidation catalyst combination under

varying load. The closed-loop, automatic air/fuel ratio controller shall control a fuel metering valve to ensure a lean-rich mixture.

- b. For natural gas compressor engines (CE-1, CE-2, CE-3), the permittee shall monitor the temperature to the inlet of the catalyst and in accordance with manufacturer's specifications; a high temperature alarm shall shut off the engine before thermal deactivation of the catalyst occurs. If the engine shuts off due to high temperature, the permittee shall also check for thermal deactivation of the catalyst before normal operations are resumed.
  - c. The permittee shall follow a written operation and maintenance plan that provides the periodic and annual maintenance requirements.
- 9.1.6. The permittee shall comply with all applicable NSPS for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 60, Subpart JJJJ, and/or the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 63, Subpart ZZZZ.
- 9.1.7. The emission limitations specified in permit conditions 9.1.1 – 9.1.3 shall apply at all times except during periods of start-up and shut-down provided that the duration of these periods does not exceed 30 minutes per occurrence. The permittee shall operate the engine in a manner consistent with good air pollution control practices for minimizing emissions at all times, including periods of start-up and shut-down. The emissions from start-up and shut-down shall be included in the twelve (12) month rolling total of emissions. The permittee shall comply with all applicable start-up and shut-down requirements in accordance with 40 CFR Part 60, Subpart JJJJ and 40 CFR Part 63, Subpart ZZZZ.

## 9.2. Monitoring Requirements

### 9.2.1. Catalytic Reduction Devices

- a. The permittee shall regularly inspect, properly maintain and/or replace catalytic reduction devices and auxiliary air pollution control devices to ensure functional and effective operation of the engine's physical and operational design. The permittee shall ensure proper operation, maintenance and performance of catalytic reduction devices and auxiliary air pollution control devices by:
  - 1. Maintaining proper operation of the automatic air/fuel ratio controller or automatic feedback controller.
  - 2. Following the catalyst manufacturer emissions related operating and maintenance recommendations, or develop, implement, or follow a site-specific maintenance plan.

## 9.3. Recordkeeping Requirements

- 9.3.1. To demonstrate compliance with permit condition 9.1.5, the permittee shall maintain records of the maintenance performed on each RICE (CE-1, CE-2, CE-3)
- 9.3.2. To demonstrate compliance with permit conditions 9.1.4 and 9.2.1, the permittee shall maintain a copy of the site specific maintenance plan or manufacturer maintenance plan.
- 9.3.3. The permittee shall comply with all applicable recordkeeping requirements under NSPS for Stationary Compression Ignition Internal Combustion Engines specified in 40 CFR Part 60, Subpart JJJJ, and/or the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 63, Subpart ZZZZ.

9.3.4. All records required by this section shall be maintained in accordance with permit condition.

#### 9.4. Testing Requirements

- 9.4.1. The permittee shall comply with all applicable testing requirements under NSPS for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 60, Subpart JJJJ, and/or the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 63, Subpart ZZZZ.
- 9.4.2. To demonstrate compliance with permit condition 9.1.5(a), the permittee shall verify that the closed-loop, automatic air/fuel ratio controller shall control a fuel metering valve to ensure a fuel-rich mixture and a resultant exhaust oxygen content of less than or equal to 2% during any performance testing.

#### 9.5. Reporting Requirements

- 9.5.1. The permittee shall comply with all applicable notification requirements under NSPS for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 60, Subpart JJJJ, and/or the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Spark Ignition Internal Combustion Engines specified in 40 CFR Part 63, Subpart ZZZZ.

### 10.0. Source-Specific Requirements [Truck Loading (L01, L02)]

#### 10.1. Limitations and Standards

- 10.1.1. *Maximum Truck Loading Throughput Limitation.* The permittee shall not exceed the following maximum throughput limits without obtaining a modification or administrative update. Compliance with the Maximum Annual Throughput Limitation shall be determined using a twelve (12) month rolling total. A twelve (12) month rolling total shall mean the sum of the tanker truck product throughput at any given time during the previous twelve (12) consecutive calendar months.

Emission Point ID#	Material Loaded	Maximum Annual Throughput (gal/yr)
L01	Produced Water	76,143
L02	Methanol	3,685

#### 10.2. Recordkeeping Requirements

- 10.2.1. To demonstrate compliance with the throughput limitation in permit condition 10.1.1, the permittee shall maintain monthly and annual records that include the total quantity of material loaded into tanker trucks. The annual records shall be calculated on a twelve (12) month rolling total.

## 11.0 Source-Specific Requirements [Glycol Dehydration Unit (TEG-1)]

### 11.1. Limitations and Standards

- 11.1.1. The permittee shall comply with the applicable requirements specified in 40 CFR Part 63, Subpart HH.
- 11.1.2. *Maximum Throughput Limitation.* The maximum wet natural gas throughput to the glycol dehydration unit/ still column (TEG-1) shall not exceed 75 million standard cubic feet per day (mmscfd). Compliance with the Maximum Throughput Limitation shall be determined using a twelve (12) month rolling total. A twelve (12) month rolling total shall mean the sum of the quarterly throughput at any given time during the previous twelve (12) consecutive calendar months.
- 11.1.3. Maximum emissions from the 75 mmscfd TEG dehydration unit/still column (TEG-1) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Volatile Organic Compounds	0.11	0.46

- 11.1.4. *Emission Calculations.*
- For purposes of determining potential HAP emissions, the methods specified in 40 CFR 63, Subpart HH shall be used.
  - Any source that has actual emissions of 5 tons per year or more of a single HAP, or 12.5 tons per year or more of a combination of HAP (i.e., 50 percent of the major source thresholds), shall update its major source determination within 1 year of the prior determination or October 15, 2012, whichever is later, and each year thereafter, using gas composition data measured during the preceding 12 months. [40CFR§63.760(c)]
  - For the purposes of determining actual annual average natural gas throughput or actual average benzene emissions, the methods specified in § 63.772(b) of 40 CFR 63, Subpart HH shall be used if the permittee is exempt from § 63.764(d).
- 11.1.5. *Condenser/BTEX Eliminator/Glow Plug.* The permittee shall comply with the requirements below for the condenser/BTEX Eliminator/Glow Plug:
- Vapors that are being controlled by the condenser/BTEX Eliminator/Glow Plug shall be routed through a closed vent system to the condenser/BTEX Eliminator/Glow Plug at all times when there is a potential that vapors (emissions) can be generated from the glycol dehydration still column.
  - The condenser/BTEX Eliminator/Glow Plug shall be designed, operated, and maintained according to good engineering practices and manufacturer's specifications so as to achieve, at a minimum, a capture and control efficiency of 98%.

**11.2. Monitoring Requirements**

- 11.2.1. To demonstrate compliance with permit condition 11.1.2, the permittee shall monitor the throughput of wet natural gas from the dehydration system on a quarterly basis.
- 11.2.2. Representative gas sample collection and analysis frequency for dehydration units shall be determined as set forth in the schedule provided in Table 11.2.2 of this section.

**Table 11.2.2**

<b>Wet Gas Sampling and Analysis Frequency for Dehydration Units Based on Potential HAP Emission Rates</b>	
Each dehydration unit exempt from § 63.764(d) requirements and with federally enforceable controls	Upon request by the Secretary.
Each dehydration unit exempt from § 63.764(d) requirements and without federally enforceable controls	An initial compliance evaluation within 180 days of registration issuance or within 180 days of start-up of the dehydration unit, whichever is later.

- 11.2.3. To demonstrate compliance with area source status and the benzene exemption in permit condition 11.1.4.c, the following parameters shall be measured at a minimum frequency of once per quarter, with the exception of natural gas flowrate annual daily average, natural gas flowrate maximum design capacity and wet gas composition. In order to define annual average values or, if monitoring is not practical, some parameters may be assigned default values as listed below.
  - a. Natural Gas Flowrate
    - i. Operating hours per quarter
    - ii. Quarterly throughput (MMscf/quarter)
    - iii. Annual daily average (MMscf/day), and
    - iv. Maximum design capacity (MMscf/day)
  - b. Absorber temperature and pressure
  - c. Lean glycol circulation rate
  - d. Glycol pump type and maximum design capacity (gpm)
  - e. Flash tank temperature and pressure, if applicable
  - f. Stripping Gas flow rate, if applicable
  - g. Wet gas composition (upstream of the absorber – dehydration column) sampled in accordance with GPA method 2166 and analyzed consistent with GPA extended method 2286 as well as the procedures presented in the GRI-GLYCalc™ Technical Reference User Manual and Handbook V4
  - h. Wet gas water content (lbs H<sub>2</sub>O/MMscf)
  - i. Dry gas water content (lbs H<sub>2</sub>O/MMscf) at a point directly after exiting the dehydration column and before any additional separation points

The following operating parameter(s) may be assigned default values when using GRI-GLYCalc:

- a. Dry gas water content can be assumed to be equivalent to pipeline quality at 7 lb H<sub>2</sub>O / MMscf
- b. Wet gas water content can be assumed to be saturated
- c. Lean glycol water content if not directly measured may use the default value of 1.5 % water as established by GRI
- d. Lean glycol circulation rate may be estimated using the TEG recirculation ratio of 3 gal TEG / lb H<sub>2</sub>O removed.

Note: If you are measuring and using actual wet or dry gas water content, then you should also measure the glycol circulation rate rather than using the default TEG recirculation ratio.

[45CSR§13-5.11, §63.772(b)(2)(i)]

### **11.3. Testing Requirements**

- 11.3.1. The permittee shall sample wet natural gas in accordance with the Gas Processor Association (GPA) Method 2166 and analyze the samples in accordance with GPA Method 2286. The permittee may utilize other equivalent methods provided they are approved in advance by DAQ as part of a testing protocol. If alternative methods are proposed, a test protocol shall be submitted for approval no later than 60 days before the scheduled test date.

*Note:* The DAQ defines a representative wet gas sample to be one that is characteristic of the average gas composition dehydrated throughout a calendar year. If an isolated sample is not indicative of the annual average composition, then a company may opt to produce a weighted average based on throughput between multiple sampling events, which can be used to define a more representative average annual gas composition profile.

### **11.4. Recordkeeping Requirements**

- 11.4.1. The permittee shall maintain records of the quarterly wet natural gas throughput through the glycol dehydration unit, all monitoring data, wet gas sampling, and GRI-GLYCalc™ emission estimates. Said records shall be maintained in accordance with permit condition 3.5.1.

### **11.5. Reporting Requirements**

- 11.5.1. The permittee shall submit the wet gas analysis report required by section 11.2 within 60 days of conducting the sampling of the wet gas stream as required. This report shall include a potential to emit (PTE) estimate using GRI-GlyCalc Version 3.0 or higher, incorporating the specific parameters measured, as well as a copy of the laboratory analysis.
- 11.5.2. If the results of the compliance determination conducted as required in Section 11.2 predict the emissions to be at or above 95% of HAPs major source levels or 0.95 tons per year of benzene, the permittee shall submit such determination and all supporting documentation to the Secretary within 15 days after making such determination.

## 12.0. Source-Specific Requirements (40CFR60 Subpart JJJJ Requirements, CE-1, CE-2, CE-3, GE-1, GE-2)

### 12.1. Limitations and Standards

- 12.1.1. The provisions of this subpart are applicable to owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified below. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.
- a. Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:
    1. On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);
    2. *Reserved*;
    3. on or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or
    4. *Reserved*.
  - b. Owners and operators of stationary SI ICE that commence modification or reconstruction after June 12, 2006.  
[40CFR§60.4230(a)]
- 12.1.2. The provisions of this subpart are not applicable to stationary SI ICE being tested at an engine test cell/stand. [40CFR§60.4230(b)]
- 12.1.3. If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable. [40CFR§60.4230(c)]
- 12.1.4. Stationary SI ICE may be eligible for exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C (or the exemptions described in 40 CFR parts 90 and 1048, for engines that would need to be certified to standards in those parts), except that owners and operators, as well as manufacturers, may be eligible to request an exemption for national security. [40CFR§60.4230(e)]
- 12.1.5. Owners and operators of facilities with internal combustion engines that are acting as temporary replacement units and that are located at a stationary source for less than 1 year and that have been properly certified as meeting the standards that would be applicable to such engine under the appropriate nonroad engine provisions, are not required to meet any other provisions under this subpart with regard to such engines. [40CFR§60.4230(f)]

### 12.2. Emission Standards for Owners and Operators

- 12.2.1. Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP (except

gasoline and rich burn engines that use LPG) manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified.

[40CFR§60.4233(e)]

12.2.2. Owners and operators of stationary SI ICE that are required to meet standards that reference 40 CFR 1048.101 must, if testing their engines in use, meet the standards in that section applicable to field testing, except as indicated in paragraph (e) of this section. [40CFR§60.4233(h)]

12.2.3. Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in §60.4233 over the entire life of the engine.

[40CFR§60.4234]

### 12.3. Other Requirements for Owners and Operators

12.3.1. After July 1, 2010, owners and operators may not install stationary SI ICE with a maximum engine power of less than 500 HP that do not meet the applicable requirements in §60.4233.

[40CFR§60.4236(a)]

12.3.2. After July 1, 2009, owners and operators may not install stationary SI ICE with a maximum engine power of greater than or equal to 500 HP that do not meet the applicable requirements in §60.4233, except that lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP that do not meet the applicable requirements in §60.4233 may not be installed after January 1, 2010. [40CFR§60.4236(b)]

12.3.3. The requirements of this section do not apply to owners and operators of stationary SI ICE that have been modified or reconstructed, and they do not apply to engines that were removed from one existing location and reinstalled at a new location. [40CFR§60.4236(e)]

### 12.4. Compliance Requirements for Owners and Operators

12.4.1. If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in §60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section.

a. Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of this section.

b. Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233(d) or (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

1. If you are an owner or operator of a stationary SI internal combustion engine greater than 25 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance.

2. If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with

good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

**[40CFR§60.4243(b)]**

- 12.4.2. If you are an owner or operator of a stationary SI internal combustion engine that must comply with the emission standards specified in §60.4233(f), you must demonstrate compliance according paragraph (b)(2)(i) or (ii) of this section, except that if you comply according to paragraph (b)(2)(i) of this section, you demonstrate that your non-certified engine complies with the emission standards specified in §60.4233(f). **[40CFR§60.4243(c)]**
- 12.4.3. If you are an owner or operator of a stationary SI internal combustion engine that is less than or equal to 500 HP and you purchase a non-certified engine or you do not operate and maintain your certified stationary SI internal combustion engine and control device according to the manufacturer's written emission-related instructions, you are required to perform initial performance testing as indicated in this section, but you are not required to conduct subsequent performance testing unless the stationary engine is rebuilt or undergoes major repair or maintenance. A rebuilt stationary SI ICE means an engine that has been rebuilt as that term is defined in 40 CFR 94.11(a). **[40CFR§60.4243(f)]**
- 12.4.4. It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times. **[40CFR§60.4243(g)]**
- 12.4.5. If you are an owner/operator of an stationary SI internal combustion engine with maximum engine power greater than or equal to 500 HP that is manufactured after July 1, 2007 and before July 1, 2008, and must comply with the emission standards specified in sections 60.4233(b) or (c), you must comply by one of the methods specified in paragraphs (h)(1) through (h)(4) of this section.
- a. Purchasing an engine certified according to 40 CFR part 1048. The engine must be installed and configured according to the manufacturer's specifications.
  - b. Keeping records of performance test results for each pollutant for a test conducted on a similar engine. The test must have been conducted using the same methods specified in this subpart and these methods must have been followed correctly.
  - c. Keeping records of engine manufacturer data indicating compliance with the standards.
  - d. Keeping records of control device vendor data indicating compliance with the standards.

**[40CFR§60.4243(h)]**

## **12.5. Testing Requirements for Owners and Operators**

- 12.5.1. Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.
- a. Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to this subpart. **[40CFR§60.4244(a)]**
  - b. You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §60.8(c). If your stationary SI internal combustion engine is non-operational,

you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine. [40CFR§60.4244(b)]

- c. You must conduct three separate test runs for each performance test required in this section, as specified in §60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour. [40CFR§60.4244(c)]
- d. To determine compliance with the NO<sub>x</sub> mass per unit output emission limitation, convert the concentration of NO<sub>x</sub> in the engine exhaust using Equation 1 of this section:

$$ER = \frac{C_d \times 1.912 \times 10^{-3} \times Q \times T}{HP - hr} \quad (\text{Eq. 1})$$

Where:

ER = Emission rate of NO<sub>x</sub> in g/HP-hr.

C<sub>d</sub> = Measured NO<sub>x</sub> concentration in parts per million by volume (ppmv).

1.912×10<sup>-3</sup> = Conversion constant for ppm NO<sub>x</sub> to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

[40CFR§60.4244(d)]

- e. To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = \frac{C_d \times 1.164 \times 10^{-3} \times Q \times T}{HP - hr} \quad (\text{Eq. 2})$$

Where:

ER = Emission rate of CO in g/HP-hr.

C<sub>d</sub> = Measured CO concentration in ppmv.

1.164×10<sup>-3</sup> = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

[40CFR§60.4244(e)]

- f. For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = \frac{C_d \times 1.833 \times 10^{-3} \times Q \times T}{HP - hr} \quad (\text{Eq. 3})$$

Where:

ER = Emission rate of VOC in g/HP-hr.

$C_d$  = VOC concentration measured as propane in ppmv.

$1.833 \times 10^{-3}$  = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

**[40CFR§60.4244(f)]**

- g. If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = \frac{C_{Mi}}{C_{Ai}} \quad (\text{Eq. 4})$$

Where:

$RF_i$  = Response factor of compound i when measured with EPA Method 25A.

$C_{Mi}$  = Measured concentration of compound i in ppmv as carbon.

$C_{Ai}$  = True concentration of compound i in ppmv as carbon.

$$C_{i,cor} = RF_i \times C_{i,meas} \quad (\text{Eq. 5})$$

Where:

$C_{i,cor}$  = Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

$C_{i,meas}$  = Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6093 \times C_{i,cor} \quad (\text{Eq. 6})$$

Where:

$C_{Peq}$  = Concentration of compound i in mg of propane equivalent per DSCM.

**[40CFR§60.4244(g)]**

## 12.6. Notification, Reports, and Records for Owners and Operators

12.6.1. Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

a. Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

1. All notifications submitted to comply with this subpart and all documentation supporting any notification.
2. Maintenance conducted on the engine.
3. If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90 and 1048.
4. If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

**[40CFR§60.4245(a)]**

b. For all stationary SI emergency ICE greater than or equal to 500 HP manufactured on or after July 1, 2010, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than or equal to 130 HP and less than 500 HP manufactured on or after July 1, 2011 that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than 25 HP and less than 130 HP manufactured on or after July 1, 2008, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. **[40CFR§60.4245(b)]**

c. Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in §60.4231 must submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section.

1. Name and address of the owner or operator;
2. The address of the affected source;
3. Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
4. Emission control equipment; and
5. Fuel used.

**[40CFR§60.4245(c)]**

d. Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in §60.4244 within 60 days after the test has been completed. **[40CFR§60.4245(d)]**

**13.0. Source-Specific Requirements (40CFR63 Subpart ZZZZ Requirements, CE-1, CE-2, CE-3)**

**13.1. Limitations and Standards**

13.1.1. The permittee must comply with the applicable operating limitations in this section no later than October 19, 2013.

**[40 C.F.R. § 63.6595(a)]**

13.1.2. *Stationary RICE subject to Regulation under 40 CFR Part 60.* An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

The permittee meets the criteria of paragraph (c)(1), which is for a new or reconstructed stationary RICE located at an area source. The permittee must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart JJJJ.

**[40 C.F.R. § 63.6590(c)]**

DRAFT

### CERTIFICATION OF DATA ACCURACY

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached \_\_\_\_\_, representing the period beginning \_\_\_\_\_ and ending \_\_\_\_\_, and any supporting documents appended hereto, is true, accurate, and complete.

Signature<sup>1</sup> \_\_\_\_\_  
(please use blue ink) Responsible Official or Authorized Representative Date

Name & Title \_\_\_\_\_  
(please print or type) Name Title

Telephone No. \_\_\_\_\_ Fax No. \_\_\_\_\_

<sup>1</sup> This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:

- a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
  - (i) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), or
  - (ii) the delegation of authority to such representative is approved in advance by the Director;
- b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
- c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of U.S. EPA); or
- d. The designated representative delegated with such authority and approved in advance by the Director.

## Williams, Jerry

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**From:** Williams, Jerry  
**Sent:** Monday, February 29, 2016 2:14 PM  
**To:** 'Jim Roberts'; Eric Tennison  
**Cc:** McKeone, Beverly D  
**Subject:** WV DAQ NSR Permit Application Complete for M3 Appalachia Gathering - Hamilton Station

**RE: Application Status: Complete  
M3 Appalachia Gathering - Hamilton Station  
Permit Application R13-3292  
Plant ID No. 061-00206**

Mr. Roberts,

Your application for a construction permit for a natural gas compressor station was received by this Division on January 12, 2016 and assigned to the writer for review. Upon review of said application, it was determined that the application was incomplete and additional information was requested. The requested information has been received, therefore, the statutory review period commenced on February 25, 2016.

**In the case of this application, the agency believes it will take approximately 90 days to make a final permit determination.**

This determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit determination.

Should you have any questions, please contact Jerry Williams at (304) 926-0499 ext. 1223 or reply to this email.

Jerry Williams, P.E.  
Engineer  
WVDEP – Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0499 ext. 1223  
[jerry.williams@wv.gov](mailto:jerry.williams@wv.gov)



Please consider the environment before printing this email.

**Williams, Jerry**

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**From:** Jim Roberts <j.roberts@m3midstream.com>  
**Sent:** Thursday, February 25, 2016 12:30 PM  
**To:** Williams, Jerry  
**Cc:** Eric Tennison  
**Subject:** RE: Response to Comments - Hamilton Compressor Station  
**Attachments:** Hammilton\_TankVent\_and\_Produced\_Water.pdf; HYSYS-Print2 (3).pdf; Table N-11 HYSYS Summary Hamilton-T11.pdf; Attachment N - Emissions Summary Hamilton-rev3.pdf

Hello Jerry:

Please see attached HYSYS Model output and process flow for to estimate flash emissions from the 400 bbl Produced Water Tank (T11) at Hamilton. The HYSYS PFD has been formatted to 11x17 to make it legible but is best viewed on a monitor. We utilized the same throughput, gas analysis and produced water analyses as before but obviously the model provides more realistic numbers than the conservative estimates previously provided. From the model we recalculated the expected flash emissions based on the vapor phase expected in the tank and have attached an additional calculation sheet to provide lb/hr and tpy of various components including VOC and CO2(eq). Also attached is a revised emission summary sheet that includes the revised flash emissions with the overall Produced Water Tank (T11) emissions.

We were curious about whether the permit approval could be delayed given that we are over the 30 day completeness period. We are hoping to start installation of permanent structures and equipment in late April/early May and wondered whether the 90 day clock starts now.

Once again we appreciate your patience and hope that you now have all the information you need to complete your review.

Thanks

**Jim Roberts**  
VP Environmental, Health, and Safety  
C: 970-769-1955  
[j.roberts@m3midstream.com](mailto:j.roberts@m3midstream.com)



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**From:** Jim Roberts  
**Sent:** Thursday, February 18, 2016 1:45 PM  
**To:** 'Williams, Jerry'  
**Subject:** RE: Response to Comments - Hamilton Compressor Station

Jerry:

Just confirmed that our engineering group has HYSYS and will get to work on this soon.

Thanks

**Jim Roberts**  
VP Environmental, Health, and Safety  
C: 970-769-1955  
[j.roberts@m3midstream.com](mailto:j.roberts@m3midstream.com)

**NON-CONFIDENTIAL**

ID # 061-00206  
Reg R13-3292  
Company M3 Appalachia Culture  
Facility Hamilton Initials JR



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**From:** Williams, Jerry [<mailto:Jerry.Williams@wv.gov>]  
**Sent:** Thursday, February 18, 2016 1:20 PM  
**To:** Jim Roberts  
**Subject:** RE: Response to Comments - Hamilton Compressor Station

Jim,

Thanks for the quick response. E&P Tanks would be your least expensive option or you could contact a consultant who could do it. The review will not be slowed because of this. I can just use placeholder language until it is resolved.

I do not need anything further on the engine emissions.

Thanks,  
Jerry

---

**From:** Jim Roberts [<mailto:j.roberts@m3midstream.com>]  
**Sent:** Thursday, February 18, 2016 12:55 PM  
**To:** Williams, Jerry <[Jerry.Williams@wv.gov](mailto:Jerry.Williams@wv.gov)>  
**Cc:** Eric Tennison <[E.Tennison@m3midstream.com](mailto:E.Tennison@m3midstream.com)>  
**Subject:** RE: Response to Comments - Hamilton Compressor Station

Hello Jerry:

I'm surprised that VBE is not acceptable (understand the TCEQ concern) but we will provide you estimates utilizing one of the programs that the WVDEP accepts. Unfortunately we will have to either purchase the program or ask for further assistance so it could be early next week before we can provide.

Also per your comment below on VOCs we are definitely open to including a VOC limit on the engines that includes the aldehydes. Please let us know if there is any additional data that you need for this.

Thanks

**Jim Roberts**  
VP Environmental, Health, and Safety  
C: 970-769-1955  
[j.roberts@m3midstream.com](mailto:j.roberts@m3midstream.com)



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**From:** Williams, Jerry [<mailto:Jerry.Williams@wv.gov>]  
**Sent:** Thursday, February 18, 2016 12:18 PM  
**To:** Jim Roberts  
**Subject:** RE: Response to Comments - Hamilton Compressor Station

Jim,

Thanks for responding to the additional information request. When I spoke to Eric about the flashing emission calculations, I recommended him using E&P Tanks, ProMax, HYSYS, etc. The WVDEP DAQ does not accept TCEQ data or VBE as a means of calculating flashing emissions.

Additionally, I have a lot of experience in permitting Caterpillar engines and the VOC emissions on the spec sheets do not account for formaldehyde emissions. I was passing this along to M3 as a courtesy so that the engine would not be permitted at a value that would cause compliance issues.

Thanks,  
Jerry

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**From:** Jim Roberts [<mailto:j.roberts@m3midstream.com>]  
**Sent:** Wednesday, February 17, 2016 5:50 PM  
**To:** Williams, Jerry <[Jerry.Williams@wv.gov](mailto:Jerry.Williams@wv.gov)>  
**Cc:** Eric Tennison <[E.Tennison@m3midstream.com](mailto:E.Tennison@m3midstream.com)>  
**Subject:** FW: Response to Comments - Hamilton Compressor Station

Jerry:

Per the comments you recently provided Eric Tennison regarding the Hamilton Compressor Station Rule 13 Application, please see responses in red below and the corresponding attachments. Hopefully this satisfies your remaining concerns. You can call me directly any time at the cell # listed below for further clarification.

Thanks

**Jim Roberts**  
VP Environmental, Health, and Safety  
C: 970-769-1955  
[j.roberts@m3midstream.com](mailto:j.roberts@m3midstream.com)



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**From:** Eric Tennison  
**Sent:** Friday, February 12, 2016 9:45 AM  
**To:** Jim Roberts  
**Subject:** Jerry Williams Comments

Jim,

Below are the comments received from Jerry Williams.

- 1) Need to provide more detailed information from glycalc showing input information. See attached input from Glycalc model. Note that a higher VOC content was utilized than expected from a representative gas stream and can therefore be considered a conservative case.
- 2) EPA conformity for generator information, which sheets are for which generators. We may need to perform emission testing if we can't provide the data for each generator. This was provided in previous submittal in Attachment L and was included with each Generator's/Engine data with model numbers included on each sheet. For clarification, have attached separate files that include the EPA Emission Cert along with the corresponding Genset/Engine spec. The Engine Family for the 126 HP Genset is an 8.8 L NG engine and the one for the 85 HP Genset is an 5.7 L NG Engine. Hopefully this addresses the concern.
- 3) Btex efficiency, generally WV only expects 50% efficiency yet we show 95% in the application. We need to provide data that supports the 95% efficiency. Please see attached study from Jatco on the BTEX and VOC removal efficiency which achieved an efficiency of 99.6%. We have actually used 98% in past applications but are being conservative at 95% with the equipment available. I would again like to point out that we expect less than 1% by weight of VOC in the gas stream per analytical information.
- 4) WVDEP doesn't accept numbers provided by the state of Texas on tank emissions and etc. We need to use programs accepted by WVDEP to demonstrate tank emissions such as E&P tanks or Promax. Please see attached spreadsheet calculation that utilizes the Vasquez-Beggs equation. This equation is used in the GRI-HAP

Calc program and is mentioned as an acceptable means of estimating VOC flashing emissions from various state air quality agencies and the EPA. Again I'd like to point out that we expect minimal VOCs but have again been conservative in our estimates as illustrated in the attached sheet. We have left in the Excel Format in case you want to review the cells with the formulas. Have included additional GHG calculations as well. Also attached is an updated Emission Summary Sheet that includes the additional flash emissions included with T11.

- 5) Concern that we underestimated our VOC calculations. Page 1 of 4 voc and CH<sub>2</sub>O values are included yet the cat spec sheet, footnote #9 indicates that CH<sub>2</sub>O is excluded. May just need to clarify but Jerry believes the values reflect an underestimation. This should be essentially covered given that there are already separate emissions/limits for both Formaldehyde and NMNEHC VOC. We are not underestimating anything although in the essence of time I have attached a revised engine calculation sheet that includes a VOC number that combines both the VOC and the aldehydes including Formaldehyde and Acetaldehyde for all engines. Also included is a revised Emission Summary (previously mentioned) that includes the additions. Both of the aldehyde compounds are also already included in the HAPs as well. I do plan to check with both the Engine Manufacturer and Catalyst Manufacturer to see if they can provide some further guidance on your aldehyde question but we are willing to accept the higher VOC #s in our permit regardless. It appears that both the Engine and the corresponding Pollution Control Sheets do not need to be edited as both the engine and catalyst specs and emission factors are clearly stated and we are using the NMNE VOC emission factor along with the CH<sub>2</sub>O emission factor provided.

Thanks Again,  
Eric Tennison  
Environmental Health & Safety Manager  
742 Fairmont Rd, Suite E  
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1	 M3 MIDSTREAM LLC Bedford, MA USA		Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc		
2			Unit Set:	Field		
3			Date/Time:	Tue Feb 23 12:54:07 2016		
4						
5						
6	<b>Material Stream: TANK VENT</b>			Fluid Package:	Basis-1	
7				Property Package:	Pang-Robinson	
8						
9	<b>CONDITIONS</b>					
10						
11		Overall	Vapour Phase	Aqueous Phase	Liquid Phase	
12	Vapour / Phase Fraction	1.0000	1.0000	0.0000	0.0000	
13	Temperature: (F)	100.0 *	100.0	100.0	100.0	
14	Pressure: (psia)	14.70	14.70	14.70	14.70	
15	Molar Flow (lbmole/hr)	8.385e-005	8.385e-005	0.0000	0.0000	
16	Mass Flow (lb/hr)	2.666e-003	2.666e-003	0.0000	0.0000	
17	Std Ideal Liq Vol Flow (barrel/day)	3.395e-004	3.395e-004	0.0000	0.0000	
18	Molar Enthalpy (Btu/lbmole)	-6.681e+004	-6.681e+004	-1.226e+005	5541	
19	Molar Entropy (Btu/lbmole-F)	42.21	42.21	13.61	-21.07	
20	Heat Flow (Btu/hr)	-5.602	-5.602	0.0000	0.0000	
21	Liq Vol Flow @Std Cond (barrel/day)	0.1226 *	0.1226	0.0000	0.0000	
22						
23	<b>PROPERTIES</b>					
24		Overall	Vapour Phase	Aqueous Phase	Liquid Phase	
25	Molecular Weight	31.79	31.79	18.02	91.30	
26	Molar Density (lbmole/ft3)	2.461e-003	2.461e-003	3.457	0.5820	
27	Mass Density (lb/ft3)	7.824e-002	7.824e-002	62.28	53.14	
28	Act. Volume Flow (barrel/day)	0.1457	0.1457	0.0000	0.0000	
29	Mass Enthalpy (Btu/lb)	-2101	-2101	-6806	60.70	
30	Mass Entropy (Btu/lb-F)	1.328	1.328	0.7553	-0.2308	
31	Heat Capacity (Btu/lbmole-F)	11.05	11.05	18.57	35.38	
32	Mass Heat Capacity (Btu/lb-F)	0.3477	0.3477	1.030	0.3875	
33	LHV Molar Basis (Std) (Btu/lbmole)	3.885e+005	3.885e+005	1.989e-003	1.606e+006	
34	HHV Molar Basis (Std) (Btu/lbmole)	4.197e+005	4.197e+005	1.763e+004	1.676e+006	
35	HHV Mass Basis (Std) (Btu/lb)	1.320e+004	1.320e+004	978.5	1.836e+004	
36	CO2 Loading	---	---	---	---	
37	CO2 App ML Con (lbmole/ft3)	---	---	---	---	
38	CO2 App WT Con (lbmol/lb)	---	---	---	---	
39	LHV Mass Basis (Std) (Btu/lb)	1.222e+004	1.222e+004	1.104e-004	1.759e+004	
40	Phase Fraction [Vol. Basis]	1.000	1.000	---	---	
41	Phase Fraction [Mass Basis]	1.000	1.000	0.0000	0.0000	
42	Phase Fraction [Act. Vol. Basis]	1.000	1.000	0.0000	0.0000	
43	Mass Exergy (Btu/lb)	1.096	---	---	---	
44	Partial Pressure of CO2 (psia)	3.641	---	---	---	
45	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000	
46	Act. Gas Flow (ACFM)	5.679e-004	5.679e-004	---	---	
47	Avg. Liq. Density (lbmole/ft3)	1.056	1.056	3.458	0.5932	
48	Specific Heat (Btu/lbmole-F)	11.05	11.05	18.57	35.38	
49	Std. Gas Flow (MMSCFD)	7.622e-007	7.622e-007	0.0000	0.0000	
50	Std. Ideal Liq. Mass Density (lb/ft3)	33.56	33.56	62.30	54.16	
51	Act. Liq. Flow (USGPS)	0.0000	---	0.0000	---	
52	Z Factor	---	0.9946	7.080e-004	4.205e-003	
53	Watson K	12.78	12.78	8.524	10.15	
54	User Property	---	---	---	---	
55	Partial Pressure of H2S (psia)	0.0000	---	---	---	
56	Cp/(Cp - R)	1.219	1.219	1.120	1.059	
57	Cp/Cv	1.225	1.225	1.155	1.390	
58	Heat of Vap. (Btu/lbmole)	1.126e+004	---	---	---	
59	Kinematic Viscosity (cSt)	9.424	9.424	0.6815	0.5566	
60	Liq. Mass Density (Std. Cond) (lb/ft3)	9.292e-002	9.292e-002	63.35	54.46	
61	Liq. Vol. Flow (Std. Cond) (barrel/day)	0.1226	0.1226	0.0000	0.0000	
62	Liquid Fraction	0.0000	0.0000	1.000	1.000	
63	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)		Page 1 of 10	

1	 M3 MIDSTREAM LLC Bedford, MA USA	Case Name: CompDehy_Hamilton_TEG_PackageForDehy.hsc
2		Unit Set: Field
3		Date/Time: Tue Feb 23 12:54:07 2016
4		
5		

**Material Stream: TANK VENT (continued)**

Fluid Package: Basis-1  
Property Package: Peng-Robinson

**PROPERTIES**

		Overall	Vapour Phase	Aqueous Phase	Liquid Phase
12	Molar Volume (ft3/lbmole)	406.4	406.4	0.2893	1.718
13	Mass Heat of Vap. (Btu/lb)	354.3	---	---	---
14	Phase Fraction [Molar Basis]	1.0000	1.0000	0.0000	0.0000
15	Surface Tension (dyne/cm)	---	---	69.87	26.19
16	Thermal Conductivity (Btu/hr-ft-F)	1.427e-002	1.427e-002	0.3633	7.627e-002
17	Viscosity (cP)	1.181e-002	1.181e-002	0.6799	0.4738
18	Cv (Semi-Ideal) (Btu/lbmole-F)	9.068	9.068	16.58	33.39
19	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.2852	0.2852	0.9203	0.3657
20	Cv (Btu/lbmole-F)	9.025	9.025	16.08	25.45
21	Mass Cv (Btu/lb-F)	0.2839	0.2839	0.8926	0.2787
22	Cv (Ent. Method) (Btu/lbmole-F)	---	---	15.67	27.17
23	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	0.8695	0.2976
24	Cp/Cv (Ent. Method)	---	---	1.185	1.302
25	Reid VP at 37.8 C (psia)	3375	3375	---	4.638
26	True VP at 37.8 C (psia)	3362	3362	4.564	14.70
27	Liq. Vol. Flow - Sum(Std. Cond.) (barrel/day)	0.1226	0.1226	0.0000	0.0000
28	Viscosity Index	-5.693	---	---	---

**COMPOSITION**

**Overall Phase**

Vapour Fraction 1.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION	
35	Methane	0.0000	0.4963	0.0007	0.2504	0.0002	0.4497
36	Ethane	0.0000	0.0607	0.0002	0.0574	0.0000	0.0867
37	Propane	0.0000	0.0290	0.0001	0.0402	0.0000	0.0427
38	i-Butane	0.0000	0.0070	0.0000	0.0128	0.0000	0.0123
39	n-Butane	0.0000	0.0031	0.0000	0.0056	0.0000	0.0052
40	i-Pentane	0.0000	0.0062	0.0000	0.0140	0.0000	0.0120
41	n-Pentane	0.0000	0.0007	0.0000	0.0016	0.0000	0.0013
42	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	Nitrogen	0.0000	0.0002	0.0000	0.0002	0.0000	0.0001
53	H2O	0.0000	0.0642	0.0001	0.0364	0.0000	0.0196
54	CO2	0.0000	0.2477	0.0009	0.3429	0.0001	0.2233
55	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	Benzene	0.0000	0.0190	0.0001	0.0467	0.0000	0.0284
57	p-Xylene	0.0000	0.0015	0.0000	0.0049	0.0000	0.0031
58	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	Toluene	0.0000	0.0645	0.0005	0.1870	0.0000	0.1155
61	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Total	0.0001	1.0000	0.0027	1.0000	0.0003	1.0000

1	 M3 MIDSTREAM LLC Bedford, MA USA	Case Name:	CompDshy_Hamilton_TEG_PackageForDehy.hsc
2		Unit Set:	Field
3		Date/Time:	Tue Feb 23 12:54:07 2016
4			
5			

**Material Stream: TANK VENT (continued)**

Fluid Package: Basis-1  
Property Package: Peng-Robinson

**COMPOSITION**

**Vapour Phase**

Phase Fraction 1.000

13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
15	Methane	0.0000	0.4963	0.0007	0.2504	0.0002	0.4497
16	Ethane	0.0000	0.0607	0.0002	0.0574	0.0000	0.0867
17	Propane	0.0000	0.0290	0.0001	0.0402	0.0000	0.0427
18	i-Butane	0.0000	0.0070	0.0000	0.0128	0.0000	0.0123
19	n-Butane	0.0000	0.0031	0.0000	0.0056	0.0000	0.0052
20	i-Pentane	0.0000	0.0062	0.0000	0.0140	0.0000	0.0120
21	n-Pentane	0.0000	0.0007	0.0000	0.0016	0.0000	0.0013
22	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	Nitrogen	0.0000	0.0002	0.0000	0.0002	0.0000	0.0001
33	H2O	0.0000	0.0642	0.0001	0.0364	0.0000	0.0196
34	CO2	0.0000	0.2477	0.0009	0.3429	0.0001	0.2233
35	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	Benzene	0.0000	0.0190	0.0001	0.0467	0.0000	0.0284
37	p-Xylene	0.0000	0.0015	0.0000	0.0049	0.0000	0.0031
38	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	Toluene	0.0000	0.0645	0.0005	0.1870	0.0000	0.1155
41	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	Total	0.0001	1.0000	0.0027	1.0000	0.0003	1.0000

**Aqueous Phase**

Phase Fraction 0.0000

45	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
47	Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1			Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc				
2		M3 MIDSTREAM LLC	Unit Set:	Field				
3		Bedford, MA	Date/Time:	Tue Feb 23 12:54:07 2016				
4		USA						
5								
6	<b>Material Stream: TANK VENT (continued)</b>						Fluid Package:	Basis-1
7							Property Package:	Peng-Robinson
8								
9	<b>COMPOSITION</b>							
10								
11	<b>Aqueous Phase (continued)</b>						Phase Fraction	0.0000
12								
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION	
14								
15	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
16	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	H2O	0.0000	0.9999	0.0000	0.9998	0.0000	0.9997	
18	CO2	0.0000	0.0001	0.0000	0.0002	0.0000	0.0003	
19	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
20	Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
21	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
22	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
23	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
24	Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
25	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
26	Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	
27	<b>Liquid Phase</b>							
28							Phase Fraction	0.0000
29	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION	
30								
31	Methane	0.0000	0.0013	0.0000	0.0002	0.0000	0.0007	
32	Ethane	0.0000	0.0010	0.0000	0.0003	0.0000	0.0008	
33	Propane	0.0000	0.0016	0.0000	0.0008	0.0000	0.0013	
34	i-Butane	0.0000	0.0011	0.0000	0.0007	0.0000	0.0011	
35	n-Butane	0.0000	0.0007	0.0000	0.0005	0.0000	0.0007	
36	i-Pentane	0.0000	0.0033	0.0000	0.0026	0.0000	0.0037	
37	n-Pentane	0.0000	0.0005	0.0000	0.0004	0.0000	0.0005	
38	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
39	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
40	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
41	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
42	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
43	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
44	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
45	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
46	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
47	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
48	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
49	H2O	0.0000	0.0008	0.0000	0.0002	0.0000	0.0001	
50	CO2	0.0000	0.0026	0.0000	0.0013	0.0000	0.0013	
51	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
52	Benzene	0.0000	0.0808	0.0000	0.0692	0.0000	0.0680	
53	p-Xylene	0.0000	0.0608	0.0000	0.0707	0.0000	0.0710	
54	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
55	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
56	Toluene	0.0000	0.8454	0.0000	0.8532	0.0000	0.8508	
57	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
58	Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	
59	<b>K VALUE</b>							
60								
61	COMPONENTS	MIXED		LIGHT		HEAVY		
62	Methane	8.664e+007		370.4		8.664e+007		
63	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)				Page 4 of 10	

1	 M3 MIDSTREAM LLC Bedford, MA USA	Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc
2		Unit Set:	Field
3		Date/Time:	Tue Feb 23 12:54:07 2016
4			
5			

**Material Stream: TANK VENT (continued)**

Fluid Package: Basis-1  
 Property Package: Peng-Robinson

**K VALUE**

11	COMPONENTS	MIXED	LIGHT	HEAVY
12	Ethane	3.215e+009	60.38	3.215e+009
13	Propane	3.307e+011	18.60	3.307e+011
14	i-Butane	9.868e+013	6.258	9.868e+013
15	n-Butane	5.993e+013	4.164	5.993e+013
16	i-Pentane	2.430e+016	1.844	2.430e+016
17	n-Pentane	2.111e+016	1.355	2.111e+016
18	n-Hexane	---	---	---
19	n-Heptane	---	---	---
20	n-Octane	---	---	---
21	n-Nonane	---	---	---
22	n-Decane	---	---	---
23	n-C11	---	---	---
24	n-C12	---	---	---
25	n-C13	---	---	---
26	n-C14	---	---	---
27	n-C15	---	---	---
28	Nitrogen	9.367e+004	1552	9.367e+004
29	H2O	6.423e-002	84.04	6.423e-002
30	CO2	2712	95.49	2712
31	TEGlycol	2.079	3.951e-003	2.079
32	Benzene	2.608e+012	0.2350	2.608e+012
33	p-Xylene	2.175e+018	2.431e-002	2.175e+018
34	m-Xylene	---	---	---
35	o-Xylene	---	---	---
36	Toluene	2.131e+015	7.632e-002	2.131e+015
37	E-Benzene	---	---	---

**UNIT OPERATIONS**

40	FEED TO	PRODUCT FROM	LOGICAL CONNECTION
41		Separator:	TANK

**UTILITIES**

( No utilities reference this stream )

**PROCESS UTILITY**

**DYNAMICS**

50	Pressure Specification	(Inactive)	14.70 psia		
51	Flow Specification	(Inactive)	Molar: 3.385e-005 lbmole/hr	Mass: 2.666e-003 lb/hr	Std Ideal Liq Volume: 3.5e-004 barrel/day

**User Variables**

**NOTES**

**Description**

1			Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc				
2	 M3 MIDSTREAM LLC Bedford, MA USA	Unit Set:		Field				
3		Date/Time:		Tue Feb 23 12:54:07 2015				
4		<b>Material Stream: Produced Water</b>					Fluid Package:	Basis-1
5							Property Package:	Peng-Robinson
6	<b>CONDITIONS</b>							
7		Overall	Vapour Phase	Aqueous Phase	Liquid Phase			
8	Vapour / Phase Fraction	0.0000	0.0000	1.0000	0.0000			
9	Temperature: (F)	100.0	100.0	100.0	100.0			
10	Pressure: (psia)	14.70	14.70	14.70	14.70			
11	Molar Flow (lbmole/hr)	4.055	0.0000	4.055	4.084e-006			
12	Mass Flow (lb/hr)	73.05	0.0000	73.05	3.729e-004			
13	Std Ideal Liq Vol Flow (barrel/day)	5.012	0.0000	5.012	2.943e-005			
14	Molar Enthalpy (Btu/lbmole)	-1.226e+005	-6.681e+004	-1.226e+005	5541			
15	Molar Entropy (Btu/lbmole-F)	13.61	42.21	13.61	-21.07			
16	Heat Flow (Btu/hr)	-4.972e+005	0.0000	-4.972e+005	2.263e-002			
17	Liq Vol Flow @Std Cond (barrel/day)	4.929	0.0000	4.929	2.927e-005			
18	<b>PROPERTIES</b>							
19		Overall	Vapour Phase	Aqueous Phase	Liquid Phase			
20	Molecular Weight	18.02	31.79	18.02	91.30			
21	Molar Density (lbmole/ft3)	3.457	2.461e-003	3.457	0.5820			
22	Mass Density (lb/ft3)	62.28	7.824e-002	62.28	53.14			
23	Act. Volume Flow (barrel/day)	5.014	0.0000	5.014	3.000e-005			
24	Mass Enthalpy (Btu/lb)	-6806	-2101	-6806	60.70			
25	Mass Entropy (Btu/lb-F)	0.7553	1.328	0.7553	-0.2308			
26	Heat Capacity (Btu/lbmole-F)	18.57	11.05	18.57	35.38			
27	Mass Heat Capacity (Btu/lb-F)	1.030	0.3477	1.030	0.3875			
28	LHV Molar Basis (Std) (Btu/lbmole)	1.620	3.885e+005	1.989e-003	1.606e+006			
29	HHV Molar Basis (Std) (Btu/lbmole)	1.763e+004	4.197e+005	1.763e+004	1.676e+006			
30	HHV Mass Basis (Std) (Btu/lb)	978.6	1.320e+004	978.5	1.836e+004			
31	CO2 Loading	---	---	---	---			
32	CO2 App ML Con (lbmole/ft3)	3.157e-004	---	3.157e-004	1.510e-003			
33	CO2 App WT Con (lbmol/lb)	5.069e-006	---	5.068e-006	2.841e-005			
34	LHV Mass Basis (Std) (Btu/lb)	8.991e-002	1.222e+004	1.104e-004	1.759e-004			
35	Phase Fraction [Vol. Basis]	---	---	1.000	5.872e-006			
36	Phase Fraction [Mass Basis]	0.0000	0.0000	1.000	5.105e-006			
37	Phase Fraction [Act. Vol. Basis]	0.0000	0.0000	1.000	5.984e-006			
38	Mass Exergy (Btu/lb)	0.4949	---	---	---			
39	Partial Pressure of CO2 (psia)	0.0000	---	---	---			
40	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000			
41	Act. Gas Flow (ACFM)	---	---	---	---			
42	Avg. Liq. Density (lbmole/ft3)	3.458	1.056	3.458	0.5932			
43	Specific Heat (Btu/lbmole-F)	18.57	11.05	18.57	35.38			
44	Std. Gas Flow (MMSCFD)	3.686e-002	0.0000	3.686e-002	3.713e-008			
45	Std. Ideal Liq. Mass Density (lb/ft3)	62.30	33.56	62.30	54.16			
46	Act. Liq. Flow (USGPS)	2.437e-003	---	2.437e-003	1.458e-008			
47	Z Factor	---	0.9946	7.080e-004	4.205e-003			
48	Watson K	8.552	12.78	8.524	10.15			
49	User Property	---	---	---	---			
50	Partial Pressure of H2S (psia)	0.0000	---	---	---			
51	Cp/(Cp - R)	1.120	1.219	1.120	1.059			
52	Cp/Cv	1.155	1.225	1.155	1.390			
53	Heat of Vap. (Btu/lbmole)	1.866e+004	---	---	---			
54	Kinematic Viscosity (cSt)	0.6815	9.424	0.6815	0.5566			
55	Liq. Mass Density (Std. Cond) (lb/ft3)	63.36	9.292e-002	63.35	54.46			
56	Liq. Vel. Flow (Std. Cond) (barrel/day)	4.929	0.0000	4.929	2.927e-005			
57	Liquid Fraction	1.000	0.0000	1.000	1.000			

1	 <b>M3 MIDSTREAM LLC</b> Bedford, MA USA		Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc							
2			Unit Set:	Field							
3			Date/Time:	Tue Feb 23 12:54:07 2016							
4			<b>Material Stream: Produced Water (continued)</b>								
5	Fluid Package:	Basis-1									
6	Property Package:	Peng-Robinson									
7	<b>PROPERTIES</b>										
8			Overall	Vapour Phase	Aqueous Phase	Liquid Phase					
9	Molar Volume (ft <sup>3</sup> /lbmole)		0.2893	406.4	0.2893	1.718					
10	Mass Heat of Vap. (Btu/lb)		1036	---	---	---					
11	Phase Fraction [Molar Basis]		0.0000	0.0000	1.0000	0.0000					
12	Surface Tension (dyne/cm)		69.87	---	69.87	26.19					
13	Thermal Conductivity (Btu/hr-ft-F)		0.3633	1.427e-002	0.3633	7.627e-002					
14	Viscosity (cP)		0.6799	1.181e-002	0.6799	0.4738					
15	Cv (Semi-Ideal) (Btu/lbmole-F)		16.58	9.068	16.58	33.39					
16	Mass Cv (Semi-Ideal) (Btu/lb-F)		0.9203	0.2852	0.9203	0.3657					
17	Cv (Btu/lbmole-F)		16.08	9.025	16.08	25.45					
18	Mass Cv (Btu/lb-F)		0.8926	0.2839	0.8926	0.2787					
19	Cv (Ent. Method) (Btu/lbmole-F)		15.67	---	15.67	27.17					
20	Mass Cv (Ent. Method) (Btu/lb-F)		0.8695	---	0.8695	0.2976					
21	Cp/Cv (Ent. Method)		1.185	---	1.185	1.302					
22	Reid VP at 37.8 C (psia)		1155	3375	---	4.638					
23	True VP at 37.8 C (psia)		7.187	3362	4.564	14.70					
24	Liq. Vol. Flow - Sum(Std. Cond) (barrel/day)		4.929	0.0000	4.929	2.927e-005					
25	Viscosity Index		-2.598	---	---	---					
26	<b>COMPOSITION</b>										
27	<b>Overall Phase</b>						Vapour Fraction	0.0000			
28	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION				
29	Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
30	Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
31	Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
32	i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
33	n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
34	i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
35	n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
36	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
37	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
38	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
39	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
40	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
42	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
43	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
44	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
45	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
46	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
47	H2O	4.0542	0.9999	73.0365	0.9998	5.0111	0.9997				
48	CO2	0.0004	0.0001	0.0163	0.0002	0.0014	0.0003				
49	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
50	Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
51	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
52	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
53	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
54	Toluene	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000				
55	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
56	Total	4.0546	1.0000	73.0532	1.0000	5.0125	1.0000				
57	Aspen Technology Inc.		Aspen HYSYS Version 8.8 (34.0.0.8909)			Page 7 of 10					

1				Case Name: CompDehy_Hamilton_TEG_PackageForDehy.hsc			
2	 M3 MIDSTREAM LLC Bedford, MA USA	Unit Set: Field					
3		Date/Time: Tus Feb 23 12:54:07 2016					
4		Fluid Package: Basis-1					
5		Property Package: Peng-Robinson					
6	<b>Material Stream: Produced Water (continued)</b>						
7	<b>COMPOSITION</b>						
8	<b>Vapour Phase</b> <span style="float: right;">Phase Fraction 0.0000</span>						
9	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
10	15 Methane	0.0000	0.4963	0.0000	0.2504	0.0000	0.4497
11	16 Ethane	0.0000	0.0607	0.0000	0.0574	0.0000	0.0867
12	17 Propane	0.0000	0.0290	0.0000	0.0402	0.0000	0.0427
13	18 i-Butane	0.0000	0.0070	0.0000	0.0128	0.0000	0.0123
14	19 n-Butane	0.0000	0.0031	0.0000	0.0056	0.0000	0.0052
15	20 i-Pentane	0.0000	0.0062	0.0000	0.0140	0.0000	0.0120
16	21 n-Pentane	0.0000	0.0007	0.0000	0.0016	0.0000	0.0013
17	22 n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	23 n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	24 n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	25 n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	26 n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22	27 n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	28 n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	29 n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	30 n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	31 n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	32 Nitrogen	0.0000	0.0002	0.0000	0.0002	0.0000	0.0001
28	33 H2O	0.0000	0.0642	0.0000	0.0364	0.0000	0.0196
29	34 CO2	0.0000	0.2477	0.0000	0.3429	0.0000	0.2233
30	35 TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	36 Benzene	0.0000	0.0190	0.0000	0.0467	0.0000	0.0284
32	37 p-Xylene	0.0000	0.0015	0.0000	0.0049	0.0000	0.0031
33	38 m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	39 o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	40 Toluene	0.0000	0.0645	0.0000	0.1870	0.0000	0.1155
36	41 E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	42 Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
38	<b>Aqueous Phase</b> <span style="float: right;">Phase Fraction 1.000</span>						
39	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
40	47 Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	48 Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	49 Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	50 i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	51 n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	52 i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	53 n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	54 n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	55 n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	56 n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	57 n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	58 n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	59 n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	60 n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	61 n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	62 n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1				Case Name:	CompDehy_Hamilton_TEG_PackageForDehy hsc			
2	 M3 MIDSTREAM LLC Bedford, MA USA				Unit Set:	Field		
3					Date/Time:	Tue Feb 23 12:54:07 2016		
4								
5								
6	<b>Material Stream: Produced Water (continued)</b>				Fluid Package:	Basis-1		
7					Property Package:	Peng-Robinson		
8								
9	<b>COMPOSITION</b>							
10								
11	<b>Aqueous Phase (continued)</b>				Phase Fraction		1.000	
12								
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION	
14								
15	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
16	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	H2O	4.0542	0.9999	73.0365	0.9998	5.0111	0.9997	
18	CO2	0.0004	0.0001	0.0163	0.0002	0.0014	0.0003	
19	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
20	Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
21	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
22	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
23	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
24	Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
25	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
26	Total	4.0546	1.0000	73.0528	1.0000	5.0125	1.0000	
27								
28	<b>Liquid Phase</b>				Phase Fraction		1.007e-006	
29	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION	
30								
31	Methane	0.0000	0.0013	0.0000	0.0002	0.0000	0.0007	
32	Ethane	0.0000	0.0010	0.0000	0.0003	0.0000	0.0008	
33	Propane	0.0000	0.0016	0.0000	0.0008	0.0000	0.0013	
34	i-Butane	0.0000	0.0011	0.0000	0.0007	0.0000	0.0011	
35	n-Butane	0.0000	0.0007	0.0000	0.0005	0.0000	0.0007	
36	i-Pentane	0.0000	0.0033	0.0000	0.0026	0.0000	0.0037	
37	n-Pentane	0.0000	0.0005	0.0000	0.0004	0.0000	0.0005	
38	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
39	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
40	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
41	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
42	n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
43	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
44	n-C12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
45	n-C13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
46	n-C14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
47	n-C15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
48	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
49	H2O	0.0000	0.0008	0.0000	0.0002	0.0000	0.0001	
50	CO2	0.0000	0.0026	0.0000	0.0013	0.0000	0.0013	
51	TEGlycol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
52	Benzene	0.0000	0.0808	0.0000	0.0692	0.0000	0.0680	
53	p-Xylene	0.0000	0.0608	0.0000	0.0707	0.0000	0.0710	
54	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
55	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
56	Toluene	0.0000	0.8454	0.0003	0.8532	0.0000	0.8508	
57	E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
58	Total	0.0000	1.0000	0.0004	1.0000	0.0000	1.0000	
59								
60	<b>K VALUE</b>							
61	COMPONENTS	MIXED		LIGHT		HEAVY		
62	Methane	7.012e+007		370.4		8.664e+007		
63	Aspen Technology Inc.			Aspen HYSYS Version 8.8 (34.0.0.8909)			Page 9 of 10	

1	 M3 MIDSTREAM LLC Bedford, MA USA		Case Name:	CompDehy_Hamilton_TEG_PackageForDehy.hsc		
2			Unit Set:	Field		
3			Date/Time:	Tue Feb 23 12:54:07 2016		
4						
5	<b>Material Stream: Produced Water (continued)</b>					
6				Fluid Package:	Basis-1	
7				Property Package:	Peng-Robinson	
8	<b>K VALUE</b>					
9	<b>COMPONENTS</b>					
10		<b>MIXED</b>	<b>LIGHT</b>	<b>HEAVY</b>		
11	Ethane	5.884e+007	60.38	3.215e+009		
12	Propane	1.847e+007	18.60	3.307e+011		
13	i-Butane	6.212e+006	6.258	9.868e+013		
14	n-Butane	4.133e+006	4.164	5.993e+013		
15	i-Pentane	1.830e+006	1.844	2.430e+016		
16	n-Pentane	1.345e+006	1.355	2.111e+016		
17	n-Hexane	---	---	---		
18	n-Heptane	---	---	---		
19	n-Octane	---	---	---		
20	n-Nonane	---	---	---		
21	n-Decane	---	---	---		
22	n-C11	---	---	---		
23	n-C12	---	---	---		
24	n-C13	---	---	---		
25	n-C14	---	---	---		
26	n-C15	---	---	---		
27	Nitrogen	9.367e+004	1552	9.367e+004		
28	H2O	6.423e-002	84.04	6.423e-002		
29	CO2	2712	95.49	2712		
30	TEGlycol	2.078	3.951e-003	2.079		
31	Benzene	2.333e+005	0.2350	2.608e+012		
32	p-Xylene	2.413e+004	2.431e-002	2.175e+018		
33	m-Xylene	---	---	---		
34	o-Xylene	---	---	---		
35	Toluene	7.576e+004	7.632e-002	2.131e+015		
36	E-Benzene	---	---	---		
37						
38	<b>UNIT OPERATIONS</b>					
39						
40	<b>FEED TO</b>	<b>PRODUCT FROM</b>		<b>LOGICAL CONNECTION</b>		
41		Separator:	TANK			
42	<b>UTILITIES</b>					
43						
44	( No utilities reference this stream )					
45	<b>PROCESS UTILITY</b>					
46						
47	<b>DYNAMICS</b>					
48						
49	Pressure Specification	(Inactive)	14.70 psia			
50	Flow Specification	(Inactive)	Molar: 4.055 lbmole/hr	Mass: 73.05 lb/hr	Std Ideal Liq Volume 5.012 barrel/day	
51	<b>User Variables</b>					
52						
53	<b>NOTES</b>					
54						
55	<b>Description</b>					
56						
57						
58						
59						
60						
61						
62						
63	Aspen Technology Inc.	Aspen HYSYS Version 8.8 (34.0.0.8909)			Page 10 of 10	



**Attachment N - Table 11 - Flash Emissions - Emission Unit T11  
Hamilton Compressor Station 400 BBL Produced Water Storage Tank (P&ID Equip No T-421)**

**Emission Calculations for Flashing using HYSYS**

From Model - Case Name CompDehy\_Hamilton... dated 2/23/16

Vapor Phase - Showing components present from HYSYS

Component	Mass Flow (lb/hr)	Mass Frac	tons/year
Methane	0.0007	0.2504	0.0032
Ethane	0.0002	0.0574	0.0010
Propane	0.0001	0.0402	0.0004
i-Butane	0.0000	0.0128	0.0000
n-Butane	0.0000	0.0056	0.0000
i-Pentane	0.0000	0.014	0.0000
n-Pentane	0.0000	0.0016	0.0000
Nitrogen	0.0000	0.0002	0.0000
H2O	0.0001	0.0364	0.0004
CO2	0.0009	0.3429	0.0039
Benzene	0.0001	0.0467	0.0004
Xylenes	0.0000	0.0049	0.0000
Toluene	0.0005	0.187	0.0022
<b>Totals</b>	0.0027	1.0001	0.0117
<b>Total VOCs</b>	0.0007	0.3128	0.0031
<b>Total HAPs</b>	0.0006	0.2386	0.0026
<b>Total CO2(eq)</b>	0.0194	0.5933	0.0850

**Document Notes:**

Also note that Tanks 4.0.9 Input (Att N) used for liquid volumes. Total throughput = 76143 gal./year = 209 gal./day = 5 bbl./day total. Composition of produced water is average of analyticals for Daybrook Compressor station and Wetzel Dehy.

For CO2(eq) used GHG factor of 25 for CH4. HAPs include BTEX.

**Hamilton Compressor Station**  
**Overall Emission Summary - Rev 3 - 2/25/16**

Notes - recent changes indicated in yellow

Unit ID	Description	Control	Criteria Pollutants						GHGs			HAPs		Highest HAP						
			NOx lb/hr	NOx ton/yr	CO lb/hr	CO ton/yr	VOC lb/hr	VOC ton/yr	PM <sub>10</sub> lb/hr	PM <sub>10</sub> ton/yr	PM <sub>2.5</sub> lb/hr	PM <sub>2.5</sub> ton/yr	SO <sub>2</sub> lb/hr	SO <sub>2</sub> ton/yr	CO <sub>2</sub> e lb/hr	CO <sub>2</sub> e ton/yr	Total HAPs lb/yr	Total HAPs ton/yr	Formaldehyde lb/yr	Formaldehyde ton/yr
CE-1	CAT G3616 Comp Engine (C-101) - See Table N-1	O <sub>3</sub> Cat (C1)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
CE-2	CAT G3616 Comp Engine (C-102) - See Table N-1	O <sub>3</sub> Cat (C2)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
CE-3	CAT G3616 Comp Engine (C-103) - See Table N-1	O <sub>3</sub> Cat (C3)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
GE-1	Giulietti Natural Gas Generator - See Table N-1	N/A	0.28	1.22	0.56	2.43	0.27	1.20	0.00	0.00	0.00	0.00	0.001	0.003	123	537	0.09	0.41	0.07	0.3
T01	Waste Lube Oil (T-450)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T02	Methanol	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
T03	Coolant Make Up Tank	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T04	Coolant Drain Tank	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T05	Engine Lube Oil for CE-1	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T06	Compressor Lube Oil for CE-1	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T07	Engine Lube Oil for CE-2	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T08	Compressor Lube Oil for CE-2	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T09	Engine Lube Oil for CE-3	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T10	Compressor Lube Oil for CE-3	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unit ID	Description	Control	Criteria Pollutants										GHGs		HAPs		Highest HAP						
			NOx		CO		VOC		PM <sub>10</sub>		PM <sub>2.5</sub>		SO <sub>2</sub>		CO <sub>2e</sub>		Total HAPs		Formaldehyde				
			lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr			
T11	Produced Water Tank (1-421) Flushing and Breathing Working Losses	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
T12	TEG Storage Tank (T-301)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
TEG-1	TEG Deth Unit (TEG-302)	X-304 (C4)	0.00	0.00	0.00	0.00	0.11	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
REB-1	TEG Reboiler Unit (TEG-302)	N/A	0.15	0.66	0.12	0.53	0.01	0.05	0.01	0.05	0.01	0.05	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00			
GE-2	85 HP Generator (G-102) - See Table N-1	N/A	0.19	0.82	0.38	1.64	0.18	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17			
L01	Produced Water Truck Loadout	N/A	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
L02	Methanol Unloading	N/A	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
F01	Fugitives	N/A	0.00	0.00	0.00	0.00	0.09	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
P01	Pigging Blowdowns (not continuous - lb/hr avg for year)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
B01	Compressor Maintenance Blowdowns (not continuous - lb/hr avg for year)	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
<b>Totals</b>			<b>6.50</b>	<b>28.41</b>	<b>2.95</b>	<b>12.82</b>	<b>3.72</b>	<b>16.27</b>	<b>0.01</b>	<b>0.07</b>	<b>0.01</b>	<b>0.07</b>	<b>0.01</b>	<b>0.07</b>	<b>0.00</b>	<b>0.02</b>	<b>0.10</b>	<b>5.682</b>	<b>24.880</b>	<b>1.69</b>	<b>7.42</b>	<b>0.83</b>	<b>3.56</b>

## Williams, Jerry

---

**From:** Jim Roberts <j.roberts@m3midstream.com>  
**Sent:** Wednesday, February 17, 2016 5:50 PM  
**To:** Williams, Jerry  
**Cc:** Eric Tennison  
**Subject:** FW: Response to Comments - Hamilton Compressor Station  
**Attachments:** Hamilton Dehy Glycalc file INPUTS.PDF; Genset Engine GE-1 126 HP.pdf; Genset Engine GE-2 85 HP.pdf; Summary of Results- Air Cooled.pdf; VBE\_Hamilton-Prod H2O Tank.xls; Attachment N - Emissions Summary Hamilton-rev2.pdf; Att N - Table 1 Hamilton Engine Emissions-rev2.pdf

Jerry:

Per the comments you recently provided Eric Tennison regarding the Hamilton Compressor Station Rule 13 Application, please see responses in **red** below and the corresponding attachments. Hopefully this satisfies your remaining concerns. You can call me directly any time at the cell # listed below for further clarification.

Thanks

**Jim Roberts**  
VP Environmental, Health, and Safety  
C: 970-769-1955  
j.roberts@m3midstream.com



ID # 061-00206  
Reg R13-3292  
Company M3 ANIMALCHIA CATERING  
Facility HAMILTON Initials JW

---

**From:** Eric Tennison  
**Sent:** Friday, February 12, 2016 9:45 AM  
**To:** Jim Roberts  
**Subject:** Jerry Williams Comments

Jim,

Below are the comments received from Jerry Williams.

- 1) Need to provide more detailed information from glycalc showing input information. **See attached input from Glycalc model. Note that a higher VOC content was utilized than expected from a representative gas stream and can therefore be considered a conservative case.**
- 2) EPA conformity for generator information, which sheets are for which generators. We may need to perform emission testing if we can't provide the data for each generator. **This was provided in previous submittal in Attachment L and was included with each Generator's/Engine data with model numbers included on each sheet. For clarification, have attached separate files that include the EPA Emission Cert along with the corresponding Genset/Engine spec. The Engine Family for the 126 HP Genset is an 8.8 L NG engine and the one for the 85 HP Genset is an 5.7 L NG Engine. Hopefully this addresses the concern.**
- 3) Btex efficiency, generally WV only expects 50% efficiency yet we show 95% in the application. We need to provide data that supports the 95% efficiency. **Please see attached study from Jatco on the BTEX and VOC removal efficiency which achieved an efficiency of 99.6%. We have actually used 98% in past applications but are being conservative at 95% with the equipment available. I would again like to point out that we expect less than 1% by weight of VOC in the gas stream per analytical information.**
- 4) WVDEP doesn't accept numbers provided by the state of Texas on tank emissions and etc. We need to use programs accepted by WVDEP to demonstrate tank emissions such as E&P tanks or Promax. **Please see**

attached spreadsheet calculation that utilizes the Vasquez-Beggs equation. This equation is used in the GRI-HAP Calc program and is mentioned as an acceptable means of estimating VOC flashing emissions from various state air quality agencies and the EPA. Again I'd like to point out that we expect minimal VOCs but have again been conservative in our estimates as illustrated in the attached sheet. We have left in the Excel Format in case you want to review the cells with the formulas. Have included additional GHG calculations as well. Also attached is an updated Emission Summary Sheet that includes the additional flash emissions included with T11.

- 5) Concern that we underestimated our VOC calculations. Page 1 of 4 voc and CH2O values are included yet the cat spec sheet, footnote #9 indicates that CH2O is excluded. May just need to clarify but Jerry believes the values reflect an underestimation. This should be essentially covered given that there are already separate emissions/limits for both Formaldehyde and NMNEHC VOC. We are not underestimating anything although in the essence of time I have attached a revised engine calculation sheet that includes a VOC number that combines both the VOC and the aldehydes including Formaldehyde and Acetaldehyde for all engines. Also included is a revised Emission Summary (previously mentioned) that includes the additions. Both of the aldehyde compounds are also already included in the HAPs as well. I do plan to check with both the Engine Manufacturer and Catalyst Manufacturer to see if they can provide some further guidance on your aldehyde question but we are willing to accept the higher VOC #s in our permit regardless. It appears that both the Engine and the corresponding Pollution Control Sheets do not need to be edited as both the engine and catalyst specs and emission factors are clearly stated and we are using the NMNE VOC emission factor along with the CH2O emission factor provided.

Thanks Again,  
Eric Tennison  
Environmental Health & Safety Manager  
742 Fairmont Rd, Suite E  
Westover, WV 26501  
O [304-212-4403](tel:304-212-4403) ext 5006  
C [724-705-3816](tel:724-705-3816)  
F [304-212-4366](tel:304-212-4366)  
[e.tennison@m3midstream.com](mailto:e.tennison@m3midstream.com)



## GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Hamilton Dehy  
 File Name: Z:\Energy\2014\C141137.00 - M3 - Hamilton Pipeline Pr\Working  
 Docs\Dehydration\Hamilton Dehy Glycalc file.ddf  
 Date: February 17, 2016

## DESCRIPTION:

-----  
 Description: 75 MMSCFD

Annual Hours of Operation: 8760.0 hours/yr

## WET GAS:

-----  
 Temperature: 120.00 deg. F  
 Pressure: 915.00 psig  
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1480
Nitrogen	0.2750
Methane	93.9900
Ethane	5.0540
Propane	0.4510
Isobutane	0.0320
n-Butane	0.0400
Isopentane	0.0040
n-Pentane	0.0030

## DRY GAS:

-----  
 Flow Rate: 75.0 MMSCF/day  
 Water Content: 7.0 lbs. H2O/MMSCF

## LEAN GLYCOL:

-----  
 Glycol Type: TEG  
 Water Content: 1.5 wt% H2O  
 Recirculation Ratio: 3.0 gal/lb H2O

## PUMP:

-----  
 Glycol Pump Type: Electric/Pneumatic

## REGENERATOR OVERHEADS CONTROL DEVICE:

-----  
 Control Device: Combustion Device  
 Destruction Efficiency: 95.0 %  
 Excess Oxygen: 0.0 %  
 Ambient Air Temperature: 60.0 deg. F



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
2015 MODEL YEAR  
CERTIFICATE OF CONFORMITY  
WITH THE CLEAN AIR ACT**

**OFFICE OF TRANSPORTATION  
AND AIR QUALITY  
ANN ARBOR, MICHIGAN 48105**

**Certificate Issued To: Power Solutions International, Inc.**  
(U.S. Manufacturer or Importer)

**Certificate Number: FPSIB8.80NGP-020**

**Effective Date:**  
12/09/2014

**Expiration Date:**  
12/31/2015

  
Byron J. Bunker, Division Director  
Compliance Division

**Issue Date:**  
12/09/2014

**Revision Date:**  
N/A

**Manufacturer:** Power Solutions International, Inc.

**Engine Family:** FPSIB8.80NGP

**Certification Type:** Mobile and Stationary

**Fuel :** Natural Gas (CNG/LNG)  
LPG/Propane

**Emission Standards :** NOx ( g/Hp-hr ) : 1

CO ( g/Hp-hr ) : 2

VOC ( g/Hp-hr ) : 0.7NMHC + NOx ( g/kW-hr ) : 2.7

CO ( g/kW-hr ) : 4.4

HC + NOx ( g/kW-hr ) : 2.7

**Emergency Use Only :** N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 40 CFR Part 60, 1065, 1066, and 60 ( stationary only and combined stationary and mobile ) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 1048, 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 1048, 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

# APPLICATION AND ENGINEERING DATA FOR MODEL PR-800-60 HZ

## GENERATOR SPECIFICATIONS

Manufacturer..... Marathon Electric Generators  
 Model & Type..... 363CSL1617, 4 Pole, 4 Lead, Single Phase  
 ..... 362CSL1606, 4 Pole, 12 Lead, re-connectable, Three Phase  
 ..... 362PSL1635, 4 Pole, 4 Lead, Three Phase  
 Exciter..... Brushless, shunt excited  
 Voltage Regulator..... Solid State, HZ/Volts  
 Voltage Regulation..... ½%, No load to full load  
 Frequency..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability..... 100% of prime amps  
 Total Stator and Load Insulation..... Class H, 180°C  
 Temperature Rise..... 105°C R/R, prime rating @ 40°C amb.  
 1 Ø Motor Starting @ 30% Voltage Dip (240V)..... 210 kVA  
 3 Ø Motor Starting @ 30% Voltage Dip (208-240V)..... 260 kVA  
 3 Ø Motor Starting @ 30% Voltage Dip (480V)..... 340 kVA  
 Bearing..... 1, Pre-lubed and sealed  
 Coupling..... Direct flexible disc  
 Total Harmonic Distortion..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor..... Max 50 (NEMA MG1-22)  
 Deviation Factor..... Max 5% (MIL-STD 405B)  
 Ltd. Warranty Period..... 24 Months from date of start-up or  
 ..... 1000 hours use, first to occur.

## GENERATOR FEATURES

- World Renown Marathon Electric Generator having UL-1446 certification.
- Full generator protection with SENTINEL "ULTIMATE" controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Generator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 certification.
- Complete engine-generator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-generator sets, before shipping.
- Self ventilating and drip-proof & revolving field design

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer..... Power Solutions Inc. (PSI)  
 Model and Type..... Ind, Power Train, Vortec, 8.8L, 4 cycle  
 Aspiration..... Naturally  
 Cylinder Arrangement..... 8 Cylinders, V-8  
 Displacement Cu. In. (Liters)..... 537 (8.8)  
 Bore & Stroke In. (Cm.)..... 4.35 x 4.50 (11.5 x 11.4)  
 Compression Ratio  
 ..... 10.1:1  
 Main Bearings & Style..... 5, Bi-Metal Steel and Aluminum  
 Cylinder Head..... Cast Iron  
 Pistons..... Cast Aluminum  
 Crankshaft..... Nodular Iron  
 Exhaust Valve..... Inconel, A193  
 Governor..... Electronic  
 Frequency Reg. (no load-full load)..... Isochronous  
 Frequency Reg. (steady state)..... ± 1/4%  
 Air Cleaner..... Dry, Replaceable Cartridge  
 Engine Speed..... 1800  
 Piston Speed, ft/min (m./min)..... 1311 (399)  
 Max Power, bhp (kwm) Prime/NG..... 126 (94)  
 Ltd. Warranty Period..... 12 Months or 2000 hrs., first to occur

### FUEL SYSTEM

Type..... NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O..... (1.74), 7"  
 Secondary Fuel Regulator..... NG or LPG Vapor System  
 Auto Fuel Lock-Off Solenoid..... Standard on all sets  
 Fuel Supply Inlet Line..... 1¼" NPTF

### FUEL CONSUMPTION

NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR)	PRIME
100% LOAD	1330 (37.6)
75% LOAD	1030 (29.1)
50% LOAD	730 (20.6)
NG = 1000 BTU X FT <sup>3</sup> /HR = Total BTU/HR	

### OIL SYSTEM

Type..... Full Pressure  
 Oil Pan Capacity qt. (L)..... 8.5 (8.0)  
 Oil Pan Cap. W/ filter qt. (L)..... 9.0 (8.5)  
 Oil Filter..... 1, Replaceable Spin-On

### ELECTRICAL SYSTEM

Ignition System..... Electronic  
 Eng. Alternator and Starter:  
     Ground..... Negative  
     Volts, DC..... 12  
 Recommended Battery to -18°C (0°F): ... 12 VDC, Size BCI# 27,  
 Max Dimensions: ..... 12" lg X 6 3/4" wi X 9" hi, with standard  
 round posts. Min output at 700 CCA. Battery tray (max. dim. at  
 12"lg x 7"wi), hold down straps, battery cables, and battery  
 charger, is furnished. Installation of (1) starting battery is  
 required, with possible higher AMP/HR rating, as described  
 above, if normal environment averages -13°F (-25°C) or cooler.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
2015 MODEL YEAR  
CERTIFICATE OF CONFORMITY  
WITH THE CLEAN AIR ACT**

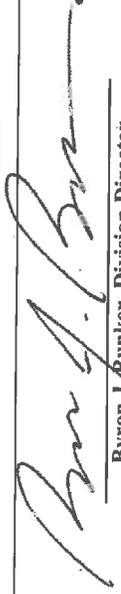
**OFFICE OF TRANSPORTATION  
AND AIR QUALITY  
ANN ARBOR, MICHIGAN 48105**

**Certificate Issued To: Power Solutions International, Inc.**  
(U.S. Manufacturer or Importer)

**Certificate Number: FPSIB5.70NGP-006**

**Effective Date:**  
10/20/2014

**Expiration Date:**  
12/31/2015



Byron J. Bunker, Division Director  
Compliance Division

**Issue Date:**  
10/20/2014

**Revision Date:**  
N/A

**Manufacturer:** Power Solutions International, Inc.

**Engine Family:** FPSIB5.70NGP

**Certification Type:** Mobile and Stationary

**Fuel:** Natural Gas (CNG/LNG)  
LPG/Propane

**Emission Standards:** VOC (g/HP-hr) : 0.7

CO (g/HP-hr) : 2

NOx (g/HP-hr) : 1HC + NOx (g/kW-hr) : 2.7

CO (g/kW-hr) : 4.4

NMHC + NOx (g/kW-hr) : 2.7

**Emergency Use Only:** N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1066, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.



## Summary of Results

Aquila Gas Pipeline Company owns and operates the Schultz Compressor Station located near Giddings, Texas. Within the Schultz Compressor Station is one glycol reboiler equipped with a Jatco BTEX Eliminator. The unit was tested to determine the pattern and quantity of emissions released into the atmosphere. The tests were conducted on May 24, 1996 by Cubix Corporation of Austin, Texas.

Three one-hour test runs were performed on the glycol reboiler while the unit was operating at normal conditions in which the burner cycled on and off. Table 2 represents the summary of results for the tests performed on the glycol reboiler. The summary table contains three different emission rates for each test run:

1. While the burner was firing (on).
2. While the burner was not firing (off).
3. A one hour average that included both burner on and off conditions.

Maximum emission rates based on the highest concentrations and flow rates encountered during the tests are also presented in Table 2.

It should be noted that total hydrocarbons (THC) were measured continuously via Method 25a and by GC sample injections using Method 18. The continuous measurement tends to average the concentrations while the GC sample injections indicate the instantaneous concentrations at the specific moment in time. Spikes that may occur over very small time periods will be included in the average hydrocarbon concentrations by the continuous THC analyzer but may be picked up by the GC if the spike occurs during an injection period. This may explain the discrepancies between the low THC (and total VOC) concentrations listed in the table. VOC concentrations were determined by only taking the non-methane/nonethane fraction of the sample into account.

Measured concentrations and exhaust volumetric flow rates were used to calculate mass emission rates. Examples of the calculations for determination of emission rates can be found in Appendix B. All field data sheets used in accumulation of data can be found in Appendix A. Appendix A also contains a table which summarizes the stack gas flow rates, moisture contents, and molecular weights.

**Table 2**  
**Summary of Results: Test Runs 1 and 2**

Aquila Gas Pipeline  
Schultz Compressor Stations near Giddings, TX  
Technicians: SLB, JRW  
Sources: Glycol Reboiler Unit

Test Run Number-Burner Status	1-OFF	1-ON	Overall Average 1-BOTH	2-OFF	2-ON	Overall Average 2-BOTH
Date	5-24-96	5-24-96	5-24-96	5-24-96	5-24-96	5-24-96
Start Time (24 hr)	9:23	9:23	9:23	10:53	10:53	10:53
Stop Time (24 hr)	10:23	10:23	10:23	11:53	11:53	11:53
<b>Ambient Conditions</b>						
Atmospheric Pressure (in. Hg)	29.50	29.50	29.50	29.50	29.50	29.50
Temperature (°F wet)	74	74	74	74	74	74
Temperature (°F dry)	80	80	80	87	87	87
Humidity (lb/lb of air)	0.017	0.017	0.017	0.015	0.015	0.015
<b>Flow Rate Data</b>						
Exhaust Flow (DSCFH)	2953	4873	3747	3366	622	4701
<b>Measured Stack Concentrations</b>						
Methane (ppmv)	14.0	9.5	12.1	23.0	176.0	110.1
Ethane (ppmv)	4.5	<0.5	<2.8	<0.5	96.0	<54.6
Propane (ppmv)	4.6	<0.5	<2.9	<0.5	1.6	<1.2
Butane (ppmv)	3.3	<0.5	<2.1	<0.5	<0.5	<0.5
Pentane (ppmv)	9.6	3.2	3.2	<0.5	<0.5	<0.5
Hexane (ppmv)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene (ppmv)	<0.5	<0.5	<0.5	<0.5	3.4	<2.2
Toluene (ppmv)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (ppmv)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
O-xylene (ppmv)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P-xylene (ppmv)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total VOC By GC/FID (ppmv as propane)	23.5	5.0	15.8	33.0	38.5	36.7
Total Hydrocarbons by GC/FID (ppmv as propane)	31.0	8.4	21.7	41.0	169.5	114.5
Total VOC By Continuous FID (ppmv as propane)*	7.0	6.8	7.0	7.8	3.0	5.2
Total Hydrocarbons by Cont. FID (ppmv as propane)	9.2	11.6	10.2	9.7	13.3	11.7
OC (%)	18.10	5.40	12.84	19.05	6.37	12.08
CO2 (%)	1.80	10.40	5.35	1.45	9.72	6.00
<b>Emission Rates (GC/FID)</b>						
Methane (lb/hr)	0.0017	0.0019	0.0019	0.0032	0.0411	0.0215
Ethane (lb/hr)	0.0010	<0.0002	<0.0008	<0.0001	0.0420	<0.0200
Propane (lb/hr)	0.0016	<0.0003	<0.0012	<0.0002	0.0011	<0.0006
Butane (lb/hr)	0.0014	<0.0004	<0.0012	<0.0002	<0.0004	<0.0003
Pentane (lb/hr)	0.0053	0.0029	0.0049	<0.0003	<0.0005	<0.0004
Hexane (lb/hr)	<0.003	<0.0005	<0.0004	<0.0004	<0.0006	<0.0005
Benzene (lb/hr)	<0.003	<0.0005	<0.0004	<0.0003	0.039	<0.0021
Toluene (lb/hr)	<0.004	<0.0006	<0.0004	<0.0004	<0.0007	<0.0006
Ethylbenzene (lb/hr)	<0.004	<0.0007	<0.0005	<0.0005	<0.0008	<0.0007
O-xylene (lb/hr)	<0.004	<0.0007	<0.0005	<0.0005	<0.0008	<0.0007
p-xylene (lb/hr)	<0.004	<0.0007	<0.0005	<0.0005	<0.0008	<0.0007
Total VOC (lb/hr) by Continuous FID	0.0024	0.038	0.0030	0.0030	0.0019	0.0028
Total THC (lb/hr) by Continuous FID	0.0031	0.0065	0.0044	0.0037	0.0086	0.0063

\*Total Hydrocarbons by Continuous FID determined by  
subtracting non-VOC (Methane + Ethane) fraction measured  
by GC/FID

Tested by Cubix Corporation, Austin, Texas

**Table 2**  
**Summary of Results: Test Runs 3**

Aquila Gas Pipeline  
Schultz Compressor Stations near Giddings, TX  
Technicians: SLB, JRW  
Sources: Glycol Reboiler Unit

Test Run Number-Burner Status	3-OFF	3-ON	Overall Average 3-BOTH	Overall Emissions 1 thru 3
Date	5-24-96	5-24-96	5-24-96	5-24-96
Start Time (24 hr)	12:18	12:18	12:18	9:23
Stop Time (24 hr)	13:18	13:18	13:18	13:18
<b>Ambient Conditions</b>				
Atmospheric Pressure (in. Hg)	29.50	29.50	29.50	
Temperature (°F wet)	77	77	77	
Temperature (°F dry)	90	90	90	
Humidity (lb/lb of air)	0.017	0.017	0.017	
<b>Flow Rate Data</b>				
Exhaust Flow (DSCFH)	3439	5449	4524	5622
<b>Measured stack Concentrations</b>				
Methane (ppmv)	13.0	48.5	32.2	324.4
Ethane (ppmv)	<0.5	30.5	<16.7	191.9
Propane (ppmv)	3.8	35.6	21.0	64.2
Butane (ppmv)	3.1	41.2	23.7	73.4
Pentane (ppmv)	4.0	27.4	16.6	44.9
Hexane (ppmv)	<0.5	12.3	<6.9	17.8
Benzene (ppmv)	3.0	43.9	25.1	60.5
Toluene (ppmv)	<0.5	15.8	<8.8	17.2
Ethylbenzene (ppmv)	<0.5	<0.5	<0.5	<0.5
O-xylene (ppmv)	<0.5	<0.5	<0.5	<0.5
P-xylene (ppmv)	<0.5	<0.5	<0.5	<0.5
Total VOC By GC/FID (ppmv as propane)	18.1	419	234.6	654.8
Total Hydrocarbons by GC/FID (ppmv as propane)	22.9	458	257.9	723.0
Total VOC By Continuous FID (ppmv as propane)*	53.9	25.9	38.8	481.9
Total Hydrocarbons by Cont. FID (ppmv as propane)	68.1	28.3	46.1	532.0
OC (%)	19.72	5.78	12.33	20.37
CO2 (%)	1.11	10.16	5.91	13.66
<b>Emission Rates (GC/FID)</b>				
Methane (lb/hr)	0.0019	0.0110	0.0060	0.0758
Ethane (lb/hr)	<0.0001	0.0129	<0.0059	0.0840
Propane (lb/hr)	0.0015	0.0222	0.0108	0.0412
Butane (lb/hr)	0.0015	0.0326	0.0156	0.0600
Pentane (lb/hr)	0.0025	0.0279	0.0141	0.0472
Hexane (lb/hr)	<0.0004	0.0146	<0.0068	0.0218
Benzene (lb/hr)	0.0021	0.0485	0.0230	0.0690
Toluene (lb/hr)	<0.0004	0.0206	<0.0095	0.0231
Ethylbenzene (lb/hr)	<0.0005	<0.0008	<0.0006	<0.0008
O-xylene (lb/hr)	<0.0005	<0.0008	<0.0006	<0.0008
p-xylene (lb/hr)	<0.0005	<0.0008	<0.0006	<0.0008
Total VOC (lb/hr) by Continuous FID	0.0212	0.0161	0.0200	0.3095
Total THC (lb/hr) by Continuous FID	0.0267	0.0176	0.0238	0.3417

\*Total Hydrocarbons by Continuous FID determined by  
Subtracting non-VOC (Methane + Ethane) fraction measured  
by GC/FID

Tested by Cubix Corporation, Austin, Texas

## Velocity, Molecular Weight, Moisture Content, Flow Rate

Aquila Gas Pipeline Co.  
 Near Giddings, TX  
 Technicians: SLB, JRW  
 Sources: Glycol Reboiler Unit  
 BURNER STATUS  
 TEST RUN NUMBER

	OFF 1	ON 1	ON 2	OFF 2	OFF 3	ON 3
Date	5-24-96	5-24-96	5-24-96	5-24-96	5-24-96	5-24-96
Start Time (24 hrs)	09:25	09:33	11:08	11:33	12:39	13:15
Stop Time (24 hrs)	09:25	09:33	11:08	11:33	12:39	13:15
<b>Stack Moisture &amp; Molecular Wt.</b>						
CO2 (%)	1.8	10.4	9.72	1.45	1.11	10.16
O2 (%)	18.10	5.40	6.37	19.06	19.72	5.78
Beginning Meter Reading (ft3)	194.33	194.33	194.33	194.33	216.75	216.75
Ending Meter Reading (ft3)	216.65	216.65	216.65	216.65	243.66	243.66
Beginning Impinger Wt (g)	2505.9	2505.9	2505.9	2505.9	2527.4	2527.4
Ending Impinger Wt. (g)	2527.4	2527.4	2527.4	2527.4	2562.0	2562.0
Dry Gas Meter Factor (Kd)	1.0094	1.0094	1.0094	1.0094	1.0094	1.0094
Dry Gas Meter Temperature (oF begin)	93	93	93	93	106	106
Dry Gas Meter Temperature (oF end)	106	106	106	106	106	106
Atmospheric Pressure (in Hg, abs.)	29.50	29.50	29.50	29.50	29.48	29.48
Stack gas Moisture (% volume)	4.61	4.61	4.61	4.61	6.14	6.14
Dry Gas Fraction	0.954	0.954	0.954	0.954	1.939	0.939
Stack Gas Molecular Wt. (lbs/lb-mole)	28.50	29.33	29.27	28.49	28.29	29.13
<b>Velocity Pitot Tube Data</b>						
VP #1	0.0020	0.0044	0.0060	0.0020	0.0021	0.0080
VP #2	0.0015	0.0066	0.0120	0.0016	0.0032	0.0114
VP #3	0.0017	0.0081	0.0100	0.0035	0.0028	0.0124
VP #4	0.0022	0.0120	0.0080	0.0028	0.0023	0.0074
Pitot Tube Factor	0.99	0.99	0.99	0.99	0.99	0.99
Sum of Square Root of Vertical Component	0.1715864	0.3471174	0.3764469	0.19679718	0.20326764	0.39359204
Number of traverse Points	4	4	4	4	4	4
Average Square Root of VP's	0.0428966	0.0867793	0.0941117	0.0491993	0.05081691	0.09839801
Average Temperature (°F)	240	562	445	249	246	564
Static Pressure (in. H2O)	0.01	-0.005	0.01	-0.003	-0.015	-0.015
Stack Diameter (in.)	8	8	8	8	8	8
Stack Area (ft2)	0.3490667	0.3490667	0.3490667	0.34906667	0.34906667	0.34906667
Stack Velocity (ft/min)	199	479	489	229	237	546
Stack Flow, wet (ACFM)	69	167	171	80	83	190
Stack Flow, dry (SCFH)	2953	4873	5622	3366	3439	5449

Testing by Cubix Corporation, Austin, Texas



**JATCO, INC.**  
ENVIRONMENTAL  
PROTECTION  
EQUIPMENT

June 7, 1996

**HOW EFFICIENT IS THE JATCO BTEX ELIMINATOR SYSTEM?**

The question of efficiency has been raised by a number of our customers in recent months. Since the sale of the first JATCO system in May of 1995, we have been approved by several states agencies for meeting their requirements of removal of hazardous VOC's and BTEX.

Texas gives our customers 98% reduction credit without requiring any testing.

Louisiana has approved our systems for use on state leases, and offshore in state waters.

Oklahoma approves the use of our systems without reservation.

Frankly, we were curious. How efficient is the JATCO BTEX ELIMINATOR system?

On May 24, 1996, the Cubix Corporation of Austin Texas tested a Dehydrator with one of our systems installed.

Extended gas analysis was done and GRI-GLYCalc VERSION 3.0 was used to establish emission rates from the regenerator overheads stream.

The total VOC emissions from the regenerator was 3.05281b/hr.

The total VOC emission from the exhaust stack was.00861b/hr.

This computes to 99.6% removal efficiency. WOW!!!

Todd Wiggins  
Jatco, Inc.

**Attachment N - Table 11 - Flash Emissions - Emission Unit T11  
Hamilton Compressor Station 400 BBL Produced Water Storage Tank (P&ID Equip No T-421)**

**Volatile Organic Compound Emission Calculation for Flashing**

**Vasquez - Beggs Solution Gas/Oil Ratio Correlation Method**

(For Estimating VOC Flashing Emissions, Using Stock Tank Gas-Oil Ratios)

**INPUTS:**

Stock Tank API Gravity	78	API
Separator Pressure (psig)	400	P
Separator Temperature (°F)	70	Ti
Separator Gas Gravity at Initial Condition	0.9	SGi
Stock Tank Barrels of Oil per day (BOPD)	1	Q
Stock Tank Gas Molecular Weight	49	MW
Fraction VOC (C3+) of Stock Tank Gas	0.05	VOC
Atmospheric Pressure (psia)	14.7	Patm

**DEFAULTS**

78
N/A
60
0.90
N/A
49
0.8
14.7

$SG_x = \text{Dissolved gas gravity at 100 psig} = SG_i [1.0 + 0.00005912 * API * T_i * \log(P_i/114.7)]$

SG <sub>x</sub> =	1.06
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$R_s = (C_1 * SG_x * P_i^{C_2}) \exp((C_3 * API) / (T_i + 460))$

Where:

Rs	Gas/Oil Ratio of liquid at pressure of interest
SG <sub>x</sub>	Dissolved gas gravity at 100 psig
P <sub>i</sub>	Pressure of initial condition (psia)
API	API Gravity of liquid hydrocarbon at final condition
T <sub>i</sub>	Temperature of initial condition (F)

**Constants**

°API <sub>Ti</sub> →	°API Gravity		
	< 30	>= 30	Given °API
C1	0.0362	0.0178	0.0178
C2	1.0937	1.187	1.187
C3	25.724	23.931	23.931

Rs =	819.24 scf/bbl	for P + Patm =	414.7
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**Document Notes:**

Using conservative estimate for VOC weight fraction in vapor space of 400 bbl tank - Neel analysis is 0.31 % by weight VOC, Glycol input used = 1.45% by weight. V-B Input uses Weight Fraction of 0.05 or 5% by weight VOC.

Also note that Tanks 4.0.9 Input (Att N) used for liquid volumes and throughput with 5% of throughput assumed to be light crude oil. Total throughput = 76143 gal./year = 209 gal./day = 5 bbl/day total; 5% of volume = 0.25 bbl/day --> use 1 bbl/day.

Separator pressure used is from inlet separator upstream of compression and is conservative - also see Att N - Table 9. Jatco liquid is collected at ATM pressures prior to transfer.

$THC = R_s * Q * MW * 1/385 \text{ scf/lb-mole} * 365 \text{ D/Yr} * 1 \text{ ton}/2000 \text{ lb.s}$

THC	Total Hydrocarbon (tons/year)
Rs	Solution Gas/Oil Ratio (scf/STB)
Q	Oil Production Rate (bbl/day)
MW	Molecular Weight of Stock Tank Gas (lb/lb-mole)
385	Volume of 1 lb-mole of gas at 14.7 psia and 68 F (WAQS&R Std Cond)

THC =	19.0 TPY	=	4.344 LB/HR
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$VOC = THC * \text{Frac. of C3+ in the Tank Vapor (0.05 used - see note above)}$

VOC =	0.95 TPY	=	0.217 LB/HR	from "FLASHING" of oil from separator to tank press
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$HAP = VOC * \text{Frac. of HAP in Tank Vapor (From Tank 4.09d output HAP = CH3OH + BTX Vapor Mass Frac = 0.065, use 0.10)}$

HAP =	0.005 TPY	=	0.001 LB/HR	from "FLASHING" of oil from separator to tank press
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$CO_2 \text{ (eq)} = THC * \text{Frac. of CH}_4 \text{ in the Tank Vapor (0.95 - conservative case - Neel Well)} * GHG \text{ CH}_4 \text{ Factor (25)}$

CO <sub>2</sub> (eq)	451.93 TPY	=	103.180 LB/HR	from "FLASHING" of oil from separator to tank press
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**Hamilton Compressor Station**  
**Overall Emission Summary - Rev 2 - 2/17/16**

Note - recent changes indicated in yellow

Unit ID	Description	Control	Criteria Pollutants										GHGs			HAPs		Highest HAP				
			NO <sub>x</sub>		CO		VOC		PM <sub>10</sub>		PM <sub>2.5</sub>		SO <sub>2</sub>	CO <sub>2e</sub>	CO <sub>2e</sub>	Total HAPs	Total HAPs	Formaldehyde	ton/yr			
			lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
CE-1	CAT G3616 Comp Engine (C-101) - See Table N-1	Ox Cat (C1)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	0.01	0.007	1726	7559	0.485	2.124	0.24	1.03
CE-2	CAT G3616 Comp Engine (C-102) - See Table N-1	Ox Cat (C2)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	0.01	0.007	1726	7559	0.485	2.124	0.24	1.03
CE-3	CAT G3616 Comp Engine (C-103) - See Table N-1	Ox Cat (C3)	1.96	8.57	0.63	2.74	1.01	4.43	0.00	0.01	0.00	0.01	0.007	0.03	0.01	0.007	1726	7559	0.485	2.124	0.24	1.03
GE-1	Gillette Natural Gas Compressor - See Table N-1	N A	0.28	1.22	0.56	2.43	0.27	1.20	0.00	0.00	0.00	0.00	0.001	0.003	0.00	0.001	123	537	0.09	0.41	0.07	0.3
T01	Waste Lube Oil (T-150)	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T02	Methanol	N A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
T03	Coolant Make Up Tank	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T04	Coolant Drain Tank	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T05	Engine Lube Oil for CE-1	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T06	Compressor Lube Oil for CE-1	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T07	Engine Lube Oil for CE-2	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T08	Compressor Lube Oil for CE-2	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T09	Engine Lube Oil for CE-3	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T10	Compressor Lube Oil for CE-3	N A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unit ID	Description	Control	Criteria Pollutants										GHGs		HAPs		Highest HAP				
			NO <sub>x</sub>		CO		VOC		PM <sub>10</sub>		PM <sub>2.5</sub>		SO <sub>2</sub>		CO <sub>2e</sub>		Total HAPs		Formaldehyde		
			lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
T11	Produced Water Tank (I-421) Flushing and Breathing Working Losses	N/A	0.00	0.00	0.00	0.00	0.22	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.15	452.00	0.01	0.03	0.00	0.00
T12	TEG Storage Tank (T-301)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TEG-1	TEG Dehy Unit (TEG-302)	X-304 (C-1)	0.00	0.00	0.00	0.00	0.11	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31	135	0.01	0.05	0.00	0.00
REB-1	TEG Reboiler Unit (TEG-302)	N/A	0.15	0.66	0.12	0.53	0.01	0.05	0.01	0.05	0.01	0.05	0.01	0.05	0.00	195	854	0.00	0.00	0.00	0.00
GE-2	85 HP Generator (G-102) - See Table N-1	N/A	0.19	0.82	0.38	1.64	0.18	0.77	0.00	0.00	0.00	0.00	0.00	0.00	83	362	0.05	0.23	0.04	0.17	
L01	Produced Water Truck Loadout	N/A	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L02	Methanol Unloading	N/A	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00
F01	Fugitives	N/A	0.00	0.00	0.00	0.00	0.09	0.39	0.00	0.00	0.00	0.00	0.00	0.00	53	233	0.07	0.29	0.00	0.00	
P01	Pigging Blowdowns (not continuous - lb/hr avg for year)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	18	0.00	0.00	0.00	0.00	
B01	Compressor Maintenance Blowdowns (not continuous - lb/hr avg for year)	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	14.38	63	0.00	0.00	0.00	0.00	
<b>Totals</b>			<b>6.50</b>	<b>28.41</b>	<b>2.95</b>	<b>12.82</b>	<b>3.93</b>	<b>17.22</b>	<b>0.01</b>	<b>0.07</b>	<b>0.01</b>	<b>0.07</b>	<b>0.01</b>	<b>0.07</b>	<b>0.00</b>	<b>5785</b>	<b>25332</b>	<b>1.69</b>	<b>7.42</b>	<b>0.83</b>	<b>3.56</b>

**Attachment N - Table 1  
Engine Calculations - Updated 2/17/16 with VOC combined (NMNEHC + Aldehydes)**

Pollutant	Emission Factor, Other (Emission Factor, AP-42 (All engines) control)	Emissions		Emissions		Emissions		Emission Factor, Other (Both Generators)	Emissions		Emissions	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy		lb/hr	tpy	lb/hr	tpy
units	(lb/MWhr)	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	(g/bhp-hr)	lb/hr	tpy	lb/hr	tpy
PM	9.99E-03	0.135	0.591	0.135	0.591	0.135	0.591		1.30E-02	0.0569	7.19E-03	0.0315
PM-10	7.71E-05	0.001	0.005	0.001	0.005	0.001	0.005		1.00E-04	0.0004	5.55E-05	0.0002
PM-2.5	7.71E-05	0.001	0.005	0.001	0.005	0.001	0.005		1.00E-04	0.0004	5.55E-05	0.0002
NOx	1.95	1.955	8.562	1.955	8.562	1.955	8.562		0.278	1.2156	0.187	0.8200
SO <sub>2</sub>	5.88E-04	0.008	0.035	0.008	0.035	0.008	0.035		7.64E-04	0.0033	4.23E-04	0.0019
CO	0.10	0.626	2.740	0.626	2.740	0.626	2.740		0.555	2.4312	0.374	1.6401
VOC (NMNEHC)	0.17	0.665	2.911	0.665	2.911	0.665	2.911		0.274	1.190	0.131	0.5740
VOC (including aldehydes)	0.17	1.012	4.433	1.012	4.433	1.012	4.433		0.093	0.406	0.051	0.225
Total HAP		0.485	2.124	0.485	2.124	0.485	2.124		0.093	0.406	0.051	0.225
Benzene	4.40E-04	0.006	0.026	0.006	0.026	0.006	0.026		5.72E-04	0.0025	3.17E-04	0.0014
Naphthalene	7.44E-05	0.001	0.004	0.001	0.004	0.001	0.004		9.67E-05	0.0004	5.36E-05	0.0002
Toluene	4.08E-04	0.006	0.024	0.006	0.024	0.006	0.024		5.30E-04	0.0023	2.94E-04	0.0013
Formaldehyde, HCHO	5.28E-02	0.235	1.027	0.235	1.027	0.235	1.027		6.86E-02	0.3006	3.80E-02	0.1665
1,1,2,2-Tetrachloroethane	4.00E-05	0.001	0.002	0.001	0.002	0.001	0.002		5.20E-05	0.0002	2.88E-05	0.0001
1,1,2-Trichloroethane	3.18E-05	0.000	0.000	0.000	0.000	0.000	0.000		4.13E-05	0.0002	2.29E-05	0.0001
1,3-Butadiene	2.36E-05	0.000	0.001	0.000	0.001	0.000	0.001		3.07E-05	0.0001	1.70E-05	0.0001
1,3-Dichloropropene	2.67E-04	0.004	0.016	0.004	0.016	0.004	0.016		3.47E-04	0.0015	1.92E-04	0.0008
2,2,4-Trimethylpentane	2.64E-05	0.000	0.002	0.000	0.002	0.000	0.002		3.43E-05	0.0002	1.90E-05	0.0001
Acetaldehyde	2.50E-05	0.000	0.001	0.000	0.001	0.000	0.001		3.25E-05	0.0001	1.80E-05	0.0001
Biphenyl	8.36E-03	0.113	0.494	0.113	0.494	0.113	0.494		1.09E-02	0.0476	6.02E-03	0.0264
Acrolein	2.42E-04	0.003	0.013	0.003	0.013	0.003	0.013		2.76E-04	0.0012	1.53E-04	0.0007
Carbon Tetrachloride	5.14E-03	0.069	0.304	0.069	0.304	0.069	0.304		6.68E-03	0.0293	3.70E-03	0.0162
Chlorobenzene	3.97E-05	0.000	0.002	0.000	0.002	0.000	0.002		4.77E-05	0.0002	2.64E-05	0.0001
Chloroform	3.04E-05	0.000	0.000	0.000	0.000	0.000	0.000		3.95E-05	0.0002	2.19E-05	0.0001
Ethylbenzene	2.85E-05	0.000	0.002	0.000	0.002	0.000	0.002		3.71E-05	0.0002	2.05E-05	0.0001
Ethylene Dibromide	3.97E-05	0.001	0.002	0.001	0.002	0.001	0.002		5.16E-05	0.0002	2.86E-05	0.0001
Methanol	4.43E-05	0.001	0.003	0.001	0.003	0.001	0.003		5.76E-05	0.0003	3.19E-05	0.0001
Methylene Chloride	2.50E-03	0.034	0.148	0.034	0.148	0.034	0.148		3.25E-03	0.0142	1.80E-03	0.0079
Naphthalene	2.00E-05	0.001	0.004	0.001	0.004	0.001	0.004		2.60E-05	0.0001	1.44E-05	0.0001
PAH	2.69E-05	0.000	0.002	0.000	0.002	0.000	0.002		9.67E-05	0.0004	5.36E-05	0.0002
Phenol	2.40E-05	0.000	0.001	0.000	0.001	0.000	0.001		3.50E-05	0.0002	1.94E-05	0.0001
Styrene	2.36E-05	0.000	0.001	0.000	0.001	0.000	0.001		3.12E-05	0.0001	1.73E-05	0.0001
Vinyl Chloride	1.49E-05	0.000	0.001	0.000	0.001	0.000	0.001		3.07E-05	0.0001	1.70E-05	0.0001
Xylene	1.84E-04	0.002	0.011	0.002	0.011	0.002	0.011		1.94E-05	0.0001	1.07E-05	0.0000
n-hexane	4.45E-04	0.006	0.026	0.006	0.026	0.006	0.026		2.39E-04	0.0010	1.32E-04	0.0006
Generator Eng #1												
Generator Eng #2 - Delhy												
Generator Eng #1												
Generator Eng #2 - Delhy												



Cc: Eric Tennison <[E.Tennison@m3midstream.com](mailto:E.Tennison@m3midstream.com)>

Subject: RE: Hamilton Compressor Station

Hello Jerry:

We are working on your comments and hope to have a response to you by early/mid next week. I believe Eric was working on the check and the Affidavit for the Class 1 legal advertisement.

Thanks

**Jim Roberts**

VP Environmental, Health, and Safety

C: 970-769-1955

[j.roberts@m3midstream.com](mailto:j.roberts@m3midstream.com)



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**From:** Eric Tennison

**Sent:** Friday, January 15, 2016 3:34 PM

**To:** Jim Roberts

**Subject:** Fwd: Hamilton Compressor Station

Hamilton comments....

Thanks again,

Eric Tennison

Begin forwarded message:

**From:** "Williams, Jerry" <[Jerry.Williams@wv.gov](mailto:Jerry.Williams@wv.gov)>

**Date:** January 15, 2016 at 1:41:25 PM EST

**To:** Eric Tennison <[e.tennison@m3midstream.com](mailto:e.tennison@m3midstream.com)>

**Subject:** Hamilton Compressor Station

**RE: M3 Appalachia Gathering, LLC – Hamilton Compressor Station  
Permit Application No. R13-3292  
Plant ID No. 061-00206**

Eric,

To follow up our telephone conversation yesterday, I had a chance to look through the application. The following items are needed in order for the review to continue:

1. Please submit the \$1,000 fee for NSPS (40CFR60 Subpart OOOO). **Eric Tennison confirmed that the check was mailed 1/26/16.**
2. The application indicates there are product loadouts (methanol and produced water). However, these are not listed on the Emission Units Table (Attachment D). Additionally, Attachment L (Emission Unit Data Sheet) for these loadouts utilize Emission Unit ID#s that are the same as emission units listed in the Emission Units Table for other emission units. **Corrections made and provided in the attached revisions to Attachment I and the specified Attachment L table. The Produced Water Loadout is designated as L01 and the Methanol Loadout is designated as L02.**

3. Does the BTEX condenser also contain a BTEX burner that is operated at all times? Yes, see manufacturer's specifications for Jatco BTEX eliminator system provided in Attachment L previously (Item #3 Exterran Dehy quote - note that along with the Reboiler Burner, an Injector Burner Set is also provided – ability to burn vapors continuously). Also refer to Attachment M provided previously – Jatco details and drawings – and note that along with the back-up burner on the Reboiler there is a glow plug in the stack.
4. There are no emission calculations (Attachment N) provided for CE-3. This was an oversight as the plans have changed for the compressor station several times – 1 vs 2 vs 3 compressors. However, CE-3 has identical emissions to CE-1 and CE-2. Hopefully the attached revised Table 1 from Att N which includes the CE-3 emissions suffices. Also see responses below regarding additional corrections made to this table.
5. Attachment L (Emission Unit Data Sheet) for CE-1 – CE-3 indicates that the fuel usage is 13,080 scfh and 114.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 11,500 scf and 101.1 MMscf/yr. Please address the discrepancy. The fuel usage in Attachment L is the correct one to use based on the gas analysis provided in Attachment N. However we recalculated and came up with slightly higher values = 13,114 scfh and 114.9 MMscf/yr. These numbers utilized the approximate average Btu of the gas analysis (1030 Btu/scf, note - HHV from engine sheet = 1031) and the Fuel Consumption Value for HHV at 7610 Btu/BHP-Hr from the engine sheet. This was done to be conservative and be in line with the GHG calculations. If a calculation is done based strictly on the engine sheet with the LHV Fuel value = 929 Btu/scf and the LHV Fuel consumption value = 6860 Btu/BHP-Hr, the numbers are very close at 13,107 scfh and 114.8 MMscf/yr. The original Attachment N fuel usage calculations had been provided by a consultant and is close to the value obtained when using the LHV fuel consumption value and the “average” Fuel value of the gas analysis or the HHV fuel gas in the engine sheet. However, this could not be precisely replicated and we decided to go with the more conservative values which are based on known factors. Corrections have been made to the appropriate Attachment L and N documents and are attached. Due to the updated fuel usage numbers, engine emissions increased slightly for Total HAPs (approx. 0.4 tpy) and are included in the Emission Summary Tables in Attachment J and N.
6. Attachment L (Emission Unit Data Sheet) for GE-1 indicates that the fuel usage is 1,330 scfh and 11.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 1,300 scf and 11.13 MMscf/yr. Please address the discrepancy. The 1330 scfh figure comes directly off the Genset engine sheet. The discrepancy was likely caused by utilizing a higher fuel Btu value in Att N rather than the default one provided in the engine sheet of 1000 Btu/scf. Regardless the more conservative value and the one from the manufacturer/vendor will be used. Attachment N Table 1 has been corrected with the values from Attachment L and is attached. In addition there was a mistake on GE-2 in Table 1 – previous version had a potential fuel usage of 600 scfh although the manufacturer indicates 720 scfh at full load. In addition an erroneous emission factor of 2 g/bhp-hr was used for NOx. Per spec sheet in Attachment N this should be 1 g/bhp-hr. This correction has been made in the overall emission summary and Table 1 in Attachment N as well as in Attachment J with the newly revised versions of each of these included in the attachment. This change did not make a significant impact to the overall emissions - NOx decreased 0.8 tpy and Total HAP increase of 0.4 tpy.
7. Please provide an applicability determination for the generator engines (GE-1, GE-2) in regards to 40CFR60 Subpart JJJJ in Attachment D. Provided in a revised version of Attachment D which is attached. Additions highlighted in yellow.

8. Please provide an applicability determination for the produced water tank (T-11) in regards to 40CFR60 Subpart OOOO in Attachment D. **Provided in a revised version of Attachment D which is attached. Additions highlighted in yellow.**
9. Attachment I (Emission Units Table) indicates that the reboiler is 1.5 mmscf. Is this supposed to be 1.5 MMBTU/hr? **Yes, the Reboiler is a 1.5 MMBtu/hr unit. This has been corrected in the attached revision of Attachment I.**
10. Please provide the GLYCalc input and aggregate report for the glycol dehydration unit (TEG-1). **Attached to this email. This was supposed to be included after the calculation sheets in Appendix N in the original submittal.**
11. Please provide the emission factors used for the reboiler in Table 2 of Attachment N. **See attached revised and updated Table 2 that includes the AP-42 Emission factors.**
12. Please provide the source of calculations used for the fugitive emission calculations in Table 3 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations. **Component counts were based on the detailed Process Flow Diagrams provided previously in Attachment F. In general the counts were overestimated. Calculations are based on Emission factors are from Table 2-4 of the USEPA guidance EPA-453/R-95-017 dated November 1995 and 40 CFR 60 Subpart OOOO. This was in the footnotes previously so not sure what else is needed.**
13. Please list the component for each line in Table 5 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations. **Unclear on what you are looking for as all combustion sources including designations were included. Also the footnotes were included in the previous submittal.**
14. Please list the source for each line in Table 6 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations. **Have included the emission unit designations (L01 and L02) in the revised and attached table. The source of the emission calculations were provided in the previously submitted sheet with item c) which is now in bold. If this does not fully address the concerns let us know.**
15. Please list the emission estimation methodology used for flashing emissions in Table 8 of Attachment N. **The document utilized was supposed to be included in the original application in Appendix N but apparently did not get included. Table 8 of Attachment N did include a reference to the Texas Commission on Environmental Quality (TCEQ) document that the estimates was taken from and therefore is not being changed. However, incorporated by reference and attached are the relevant pages from the TCEQ document.**
16. Please provide a spreadsheet representing the overall facility emissions (lb/hr and tpy). **Attached and referenced above.**
17. Are there are pigging or blowdown emissions associated with this facility? **Yes. Please see attached Tables 9 and 10. Pigging events will be once per week at the 12" Receiver at the Station Inlet. Maintenance blowdowns will be required on each compressor every 1000 hours. Due to the gas being extremely lean, the VOC emissions are minimal. GHG emissions in CO<sub>2</sub> (eq) are included in these sheets and are included in the overall Emission Summary Sheet. Given the minor amount of additional emissions except for CO<sub>2</sub> eq we have not included these emissions as separate emission units but have included in the overall emissions for permitting.**
18. Please provide the affidavit of publication for the Class I legal advertisement. **Eric Tennison confirmed that the affidavit was mailed 1/26/16. Note that the revisions to the application have not changed overall emissions significantly from the estimates provided in the current Public Notice – NO<sub>x</sub> has decreased from 29.2 tpy to 28.4 tpy, Total HAPs have increased from 7.0 to 7.4, and CO<sub>2</sub> eq from 24,400 tpy to 24,800 tpy. All other pollutants have**

remained essentially the same. We are not planning on re-publishing another notice but can if requested.

Please address each item and resubmit all affected forms.

Should you have any questions, please contact me at (304) 926-0499 ext. 1223 or reply to this email.

Thanks,  
Jerry

Jerry Williams, P.E.  
Engineer  
WVDEP – Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0499 ext. 1223  
[jerry.williams@wv.gov](mailto:jerry.williams@wv.gov)

 Please consider the environment before printing this email.

**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> ):				
1. Loading Area Name: Methanol Loading L02				
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	1			
Number of liquids loaded	1			
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1			
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:				
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	24	24	24	24
days/week	7	7	7	7



TM = Test Measurement based upon test data submittal  
 O = other (describe)

**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.

<p><b>MONITORING</b></p> <p>None</p>	<p><b>RECORDKEEPING</b></p> <p>Throughput of liquid loaded at site (gal/yr)</p>
<p><b>REPORTING</b></p> <p>None</p>	<p><b>TESTING</b></p> <p>None</p>

**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**

**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> ):				
1. Loading Area Name: Produced Water Loading L01				
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	1			
Number of liquids loaded	1			
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1			
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:				
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	24	24	24	24
days/week	7	7	7	7

weeks/quarter	13	13	13	13
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<b>8. Bulk Liquid Data (add pages as necessary):</b>						
Pump ID No.	NA					
Liquid Name	Produced Water					
Max. daily throughput (1000 gal/day)	3.4 (estimated for loading one 80 bbl truck)					
Max. annual throughput (1000 gal/yr)	76.1					
Loading Method <sup>1</sup>	SUB = Submerged Fill					
Max. Fill Rate (gal/min)	60					
Average Fill Time (min/loading)	60					
Max. Bulk Liquid Temperature (°F)	~70					
True Vapor Pressure <sup>2</sup>	0.30 psia					
Cargo Vessel Condition <sup>3</sup>	Unknown					
Control Equipment or Method <sup>4</sup>	NA					
Minimum control efficiency (%)	0					
Maximum Emission Rate	Loading (lb/hr)	~0.01 lb/hr VOC				
	Annual (lb/yr)	~60 lb/yr VOC				
Estimation Method <sup>5</sup>	AP-42					
<sup>1</sup> BF = Bottom Fill    SP = Splash Fill    SUB = Submerged Fill						
<sup>2</sup> At maximum bulk liquid temperature						
<sup>3</sup> B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)						
<sup>4</sup> List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets</i> ): CA = Carbon Adsorption    LOA = Lean Oil Adsorption CO = Condensation    SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption    TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation    VB = Dedicated Vapor Balance (closed system) O = other (describe)						
<sup>5</sup> EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance						

TM = Test Measurement based upon test data submittal  
 O = other (describe)

**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.

<p><b>MONITORING</b></p> <p>None</p>	<p><b>RECORDKEEPING</b></p> <p>Throughput of liquid loaded at site (gal/yr)</p>
<p><b>REPORTING</b></p> <p>None</p>	<p><b>TESTING</b></p> <p>None</p>

**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

## 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>
CE-1	CE-1	CAT G3616 Comp Engine (C-101)	2016	1775 HP	New	Ox Cat (C1)
CE-2	CE-2	CAT G3616 Comp Engine (C-102)	2016	1775 HP	New	Ox Cat (C2)
CE-3	CE-3	CAT G3616 Comp Engine (C-103)	2016	1775 HP	New	Ox Cat (C3)
GE-1	GE-1	Gillette Natural Gas Generator	2016	126 HP	New	N/A
T01	T01	Waste Lube Oil (T-450)	2016	30 BBL	New	N/A
T02	T02	Methanol	2016	335 Gal	New	N/A
T03	T03	Coolant Make Up Tank	2016	30 BBL	New	N/A
T04	T04	Coolant Drain Tank	2016	30 BBL	New	N/A
T05	T05	Engine Lube Oil for CE-1	2016	500 Gal	New	N/A
T06	T06	Compressor Lube Oil for CE-1	2016	500 Gal	New	N/A
T07	T07	Engine Lube Oil for CE-2	2016	500 Gal	New	N/A
T08	T08	Compressor Lube Oil for CE-2	2016	500 Gal	New	N/A
T09	T09	Engine Lube Oil for CE-3	2016	500 Gal	New	N/A
T10	T10	Compressor Lube Oil for CE-3	2016	500 Gal	New	N/A
T11	T11	Produced Water Tank (T-421)	2014	400 BBL	Mod/Exist	N/A
T12	T12	TEG Storage Tank (T-301)	2014	500 Gal	Mod/Exist	N/A
TEG-1	TEG-1	TEG Dehy Unit (TEG-302)	2014	75 MMSCF	Mod/Exist	X-304 (C4)
REB-1	REB-1	TEG Reboiler Unit (TEG-302)	2014	1.5 MMBtu/hr	Mod/Exist	N/A
GE-2	GE-2	85 HP Generator (G-102)	2014	85 HP	Mod/Exist	N/A
L01	L01	Produced Water Truck Loadout	2014	76143 gal/yr	Mod/Exist	N/A
L02	L02	Methanol Unloading	2016	3685 gal/yr	New	N/A

<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 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*): CE-1 through CE-3

<p>1. Name or type and model of proposed affected source:</p> <p>Compressor Engine #1 – #3: Three (3) Caterpillar 3606 natural gas fired compressor engines equipped with oxidation catalyst. Unless otherwise noted, emission numbers and ratings are for each engine.</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>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Does not produce any materials. Compresses natural gas to maintain pipeline pressure.</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Internal combustion of natural gas.</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 – 13,114 scf/hr (each engine), 114.9 MMscf/yr (each engine)			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
Natural gas with negligible H2S and ash content.			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
22.6	@	60	°F and 14.7 psia.
(d) Percent excess air: Unknown			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
13.51 MMBtu/hr spark ignition reciprocating internal combustion engine.			
(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:			
N/A			
(g) Proposed maximum design heat input: 13.51 × 10 <sup>6</sup> BTU/hr.			
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@	847	°F and	14.7 psia
a. NO <sub>x</sub>	1.96	lb/hr	grains/ACF
b. SO <sub>2</sub>	0.007	lb/hr	grains/ACF
c. CO	10.72	lb/hr	grains/ACF
d. PM <sub>10</sub>	0.001	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	2.47	lb/hr	grains/ACF
g. Pb	N/A	lb/hr	grains/ACF
h. Specify other(s)			
Formaldehyde	1.02	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**

Replace the reciprocating compressor rod packing before  
26,000 hours or 36 months from the date of the most recent rod packing element  
Monitor the number of hours of operation for each reciprocating compressor

**RECORDKEEPING**

Maintain records of maintenance conducted on the engine  
Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e)  
Maintain records of all notification submitted  
Maintain records of the date and time of each reciprocating compressor rod packing element  
Maintain records of the deviations in cases where the compressor was not operated in compliance with 60.5383

**REPORTING**

Submission of an initial notification as required in 40 CFR 60.7(a)(1)  
Submit a copy of each performance test  
Submit an annual NSPS OOOO report one year from the initial annual report

**TESTING**

Initial performance test and subsequent performance testing every 8760 hours or every three years, whichever comes first.

**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

See attached manufacturer specification sheet

**Attachment N - Table 6 - Truck Loading Associated with Methanol (T02) and Prod Water (T11)**

Emission Point	Loading Properties			Throughput <sup>(a)</sup> Annual (1,000 gal/yr)		
	Loading Temperature (F)	Loading Temperature (R)	Vapor Pressure (psi)			
L02 - Methanol Product Loading	62	521.67	1.6	3.69		
L01 - Produced Water Unloading	62	521.67	0.3	76.00		
Emission Point	Saturation Factor <sup>(b)</sup>	Loading Loss <sup>(c)</sup> (lb/10 <sup>3</sup> gal)	Uncontrolled VOC Emissions <sup>(d)</sup>		Uncontrolled HAP Emissions <sup>(e)</sup>	
			Annual (ton/yr)	Hourly (lb/hr)	Annual (ton/yr)	Hourly (lb/hr)
L02 - Methanol Product Loading	1.45	18.165	0.033	0.008	0.033	0.008
L01 - Produced Water Loading	0.6	7.486	0.028	0.006	0.001	0.000
<b>Totals</b>			<b>0.062</b>	<b>0.014</b>	<b>0.035</b>	<b>0.008</b>

Notes:

(a) Maximum annual throughput methanol: 3,685 gal/yr  
 Maximum annual throughput Produced Water: 76,143 gal/yr

(b) Saturation factor for loading, dedicated loading taken from Table 5.2-1 (dedicated normal service) of Section 5.2 of AP-42, Fifth Edition, Volume 1.

(c) Loading loss calculated according to the methodology in Section 5.2 of AP-42, Fifth Edition, Volume 1.

Sample Calculation, average loading loss for methanol:

$$L_v (\text{lb}/10^3 \text{ gal}) = 12.46 \text{ SMP} / T ; S = \text{Saturation Factor } (-)$$

$$M = \text{Vapor Molecular Weight (lb/lb-mol)}$$

$$P = \text{Vapor Pressure (psi)}$$

$$T = \text{Loading Temperature (R)}$$

$$L_v = \frac{(12.46)(1.5)(32 \text{ lb/lb-mol})(1.600 \text{ psi})}{521.67 \text{ R}} = 18.165 \text{ lb} / 10^3 \text{ gal}$$

(d) Emissions estimated by applying the loading loss to the applicable loading throughput.

sample calculation for methanol, annual emissions:

$$\frac{18.165 \text{ lb}}{1,000 \text{ gal}} \times \frac{4 \times 1,000 \text{ gal}}{\text{yr}} \times \frac{\text{ton}}{2,000 \text{ lb}} = 0.033 \frac{\text{VOC ton}}{\text{yr}}$$

(e) Total HAP emissions estimated from vapor compositions:

Methanol	=	100.00%	Methanol
Produced Water	=	5.00%	Produced Water
Control efficiency	=	0%	

# Determining Emissions from Produced Water Storage Tanks

## Disclaimer

*Guidance presented within this document is ONLY applicable to the Barnett Shale, Phase Two Special Inventory and is not intended for permitting, demonstrating compliance, or other agency purposes, including annual point source emissions inventory reporting.*

The following guidance was developed specifically for the Barnett Shale Phase Two Special Inventory to determine emissions from produced water tanks specific to the Barnett Shale formation(s).

## Definition

For the purposes of this inventory, produced water storage tanks are defined as tanks that do not report a liquid hydrocarbon product volume to the Texas Railroad Commission. Note produced water is also commonly referred to as saltwater. There are alternate calculation methods that may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions and data. For additional guidance regarding the acceptability of a given emissions determination method for the purposes of the Barnett Shale Phase Two Special Inventory, contact Julia Knezek at (512) 239-1424, Miles Whitten at (512) 239-5749, or the Emissions Inventory Help Line at (512) 239-1773.

## Produced Water Operations

Site operations determine emissions from produced water tanks. Working, breathing, and flash losses are all considerations. Atmospheric storage tanks located at oil and gas exploration and production activities that receive liquids from a separator are a common type of produced water tank. Atmospheric storage tanks located at saltwater disposal sites that store produced water in preparation for disposal are another type. The emissions determination methodologies for each of the operation types will be addressed in this document. Skim oil/condensate tanks are also addressed but are considered condensate tanks for Barnett Shale special inventory purposes.

## ***Produced Water Tanks at Oil and Gas Production Sites***

In a typical tank battery, the well stream is passed through a separator or a heater treater where liquid hydrocarbons (i.e., oil or condensate), gas, and water are separated. The reduction in pressure in the separator relative to the inlet gas pressure releases gases dissolved in the liquids. Gases are collected and routed for further processing. Separated liquids – oil, condensate, and/or produced water – are stored in a tank battery. If hydrocarbons are present in the produced water, these compounds could flash when placed into the atmospheric pressure storage tanks. If the hydrocarbons remain in liquid form, these compounds contribute to increased vapor phase concentrations in the tank headspace and thus increased working and breathing losses.



## Emission factor method

When direct measurement or pressurized samples of produced water are not available or a feasible option, the TCEQ has developed the following factors in Table 1 to determine produced water flash emissions for Barnett Shale Special Inventory Phase Two purposes only. These produced water flash emissions factors are categorized into two subsets based on the type of product the site produces. The "Gas Production Only Sites" factors are for produced water tanks located at sites where only gas was produced and reported to the Texas Railroad Commission. The "Liquid Hydrocarbon and Gas Production Sites" factors are for produced water tanks located at sites where gas and a liquid hydrocarbon product, such as condensate, is produced and reported to the Texas Railroad Commission.

### Examples

1. If a tank battery consists of two condensate tanks and one produced water tank, the "Liquid Hydrocarbon and Gas Production Sites" factor should be used to determine flash emissions from the one produced water tank since the site produces hydrocarbon liquids as well as water.
  - Working and breathing losses from the one produced water tank can be determined using TANKS 4.09D as outlined in the "Determining Working and Breathing Losses" section below.
  - Flash, breathing, and working losses from the two condensate tanks can be determined as detailed in the "Skim Oil/Condensate Tanks" section below.
2. However, if a tank battery consists of only two produced water tanks, then "Gas Production Only Sites" factor would be used to determine flash emissions from the two produced water tanks. Working and breathing losses from the two produced water tanks can be determined using TANKS 4.09D as outlined below.

NOTE: If any of the tanks store a liquid hydrocarbon product, then these factors do not apply. See the skim oil/condensate tanks section below for how to determine emissions for these types of tanks.

**Table 1. Produced Water Storage Tank Flash Loss Emissions Factors for Barnett Shale Special Inventory Purposes ONLY**

Pollutant	Average Produced Water Emission Factor (lb/bbl)	
	Gas Production Only Sites	Liquid Hydrocarbon and Gas Production Sites
VOC	0.01	0.0402
Benzene	0.0001	0.000054
Toluene	0.0003	0.000130
Ethylbenzene	0.000006	0.000003
Xylene(s)	0.00006	0.000049
n-Hexane	NA	0.000987

## GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Hamilton Dehy  
 File Name: Z:\Energy\2014\C141137.00 - M3 - Hamilton Pipeline Pr\Working  
 Docs\Dehydration\Hamilton Dehy Glycalc file.ddf  
 Date: August 08, 2014

## DESCRIPTION:

Description: 75 MMSCFD  
 Annual Hours of Operation: 8760.0 hours/yr

## EMISSIONS REPORTS:

## CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.2334	29.601	5.4021
Ethane	0.3725	8.939	1.6314
Propane	0.0771	1.850	0.3377
Isobutane	0.0095	0.228	0.0416
n-Butane	0.0152	0.365	0.0667
Isopentane	0.0018	0.044	0.0080
n-Pentane	0.0017	0.042	0.0076
Total Emissions	1.7112	41.068	7.4950
Total Hydrocarbon Emissions	1.7112	41.068	7.4950
Total VOC Emissions	0.1054	2.529	0.4615

## UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	24.6671	592.011	108.0420
Ethane	7.4492	178.780	32.6273
Propane	1.5419	37.005	6.7535
Isobutane	0.1901	4.561	0.8324
n-Butane	0.3045	7.307	1.3335
Isopentane	0.0364	0.873	0.1594
n-Pentane	0.0346	0.830	0.1515
Total Emissions	34.2236	821.367	149.8996
Total Hydrocarbon Emissions	34.2236	821.367	149.8996
Total VOC Emissions	2.1074	50.577	9.2303

## EQUIPMENT REPORTS:

## COMBUSTION DEVICE

Ambient Temperature: 60.00 deg. F  
 Excess Oxygen: 0.00 %

Combustion Efficiency: 95.00 %  
 Supplemental Fuel Requirement: 2.70e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	5.00%	95.00%
Isobutane	5.00%	95.00%
n-Butane	5.00%	95.00%
Isopentane	5.00%	95.00%
n-Pentane	5.00%	95.00%

ABSORBER

Calculated Absorber Stages: 1.38  
 Specified Dry Gas Dew Point: 7.00 lbs. H2O/MMSCF  
 Temperature: 120.0 deg. F  
 Pressure: 915.0 psig  
 Dry Gas Flow Rate: 75.0000 MMSCF/day  
 Glycol Losses with Dry Gas: 1.9811 lb/hr  
 Wet Gas Water Content: Saturated  
 Calculated Wet Gas Water Content: 107.77 lbs. H2O/MMSCF  
 Specified Lean Glycol Recirc. Ratio: 3.00 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	6.48%	93.52%
Carbon Dioxide	99.76%	0.24%
Nitrogen	99.98%	0.02%
Methane	99.98%	0.02%
Ethane	99.94%	0.06%
Propane	99.91%	0.09%
Isobutane	99.88%	0.12%
n-Butane	99.84%	0.16%
Isopentane	99.85%	0.15%
n-Pentane	99.81%	0.19%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	29.64%	70.36%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.50%	99.50%
n-Pentane	0.50%	99.50%

STREAM REPORTS:

## WET GAS STREAM

-----  
 Temperature: 120.00 deg. F  
 Pressure: 929.70 psia  
 Flow Rate: 3.13e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.27e-001	3.38e+002
Carbon Dioxide	1.48e-001	5.37e+002
Nitrogen	2.74e-001	6.35e+002
Methane	9.38e+001	1.24e+005
Ethane	5.04e+000	1.25e+004
Propane	4.50e-001	1.64e+003
Isobutane	3.19e-002	1.53e+002
n-Butane	3.99e-002	1.92e+002
Isopentane	3.99e-003	2.38e+001
n-Pentane	2.99e-003	1.78e+001
Total Components	100.00	1.40e+005

## DRY GAS STREAM

-----  
 Temperature: 120.00 deg. F  
 Pressure: 929.70 psia  
 Flow Rate: 3.13e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	2.19e+001
Carbon Dioxide	1.48e-001	5.35e+002
Nitrogen	2.75e-001	6.34e+002
Methane	9.40e+001	1.24e+005
Ethane	5.05e+000	1.25e+004
Propane	4.51e-001	1.64e+003
Isobutane	3.20e-002	1.53e+002
n-Butane	3.99e-002	1.91e+002
Isopentane	3.99e-003	2.37e+001
n-Pentane	2.99e-003	1.78e+001
Total Components	100.00	1.40e+005

## LEAN GLYCOL STREAM

-----  
 Temperature: 120.00 deg. F  
 Flow Rate: 1.57e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.73e+003
Water	1.50e+000	1.33e+002
Carbon Dioxide	1.43e-012	1.27e-010
Nitrogen	1.56e-013	1.38e-011
Methane	9.35e-018	8.29e-016
Ethane	3.96e-008	3.52e-006
Propane	7.08e-010	6.28e-008
Isobutane	6.43e-011	5.70e-009
n-Butane	8.52e-011	7.55e-009

Isopentane 2.06e-006 1.83e-004

n-Pentane 1.96e-006 1.74e-004

-----  
Total Components 100.00 8.87e+003

RICH GLYCOL STREAM

-----  
Temperature: 120.00 deg. F  
Pressure: 929.70 psia  
Flow Rate: 1.64e+001 gpm  
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.47e+001	8.73e+003
Water	4.87e+000	4.49e+002
Carbon Dioxide	1.38e-002	1.27e+000
Nitrogen	1.50e-003	1.38e-001
Methane	2.68e-001	2.47e+001
Ethane	8.09e-002	7.45e+000
Propane	1.67e-002	1.54e+000
Isobutane	2.06e-003	1.90e-001
n-Butane	3.31e-003	3.04e-001
Isopentane	3.97e-004	3.66e-002
n-Pentane	3.77e-004	3.48e-002
-----	-----	-----
Total Components	100.00	9.21e+003

REGENERATOR OVERHEADS STREAM

-----  
Temperature: 212.00 deg. F  
Pressure: 14.70 psia  
Flow Rate: 7.36e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.04e+001	3.16e+002
Carbon Dioxide	1.48e-001	1.27e+000
Nitrogen	2.54e-002	1.38e-001
Methane	7.93e+000	2.47e+001
Ethane	1.28e+000	7.45e+000
Propane	1.80e-001	1.54e+000
Isobutane	1.69e-002	1.90e-001
n-Butane	2.70e-002	3.04e-001
Isopentane	2.60e-003	3.64e-002
n-Pentane	2.47e-003	3.46e-002
-----	-----	-----
Total Components	100.00	3.51e+002

COMBUSTION DEVICE OFF GAS STREAM

-----  
Temperature: 1000.00 deg. F  
Pressure: 14.70 psia  
Flow Rate: 3.47e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	8.40e+001	1.23e+000

Ethane	1.35e+001	3.72e-001
Propane	1.91e+000	7.71e-002
Isobutane	1.79e-001	9.50e-003
n-Butane	2.86e-001	1.52e-002
Isopentane	2.76e-002	1.82e-003
n-Pentane	2.62e-002	1.73e-003
-----	-----	-----
Total Components	100.00	1.71e+000

Attachment N - Table 1  
Engine Calculations

Source	CAT	G3606	CAT	G3606	CAT	G3606	CAT	G3606
Rated Capacity (HP)	1775	1775	1775	1775	1775	1775	1775	1775
Rated Capacity (MMBtu/hr)	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50
Potential Fuel Usage (scf/hr)	13114	13114	13114	13114	13114	13114	13114	13114
Potential Fuel Usage (MMscf/hr)	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Potential Fuel Usage (MMscf/yr)	114.9	114.9	114.9	114.9	114.9	114.9	114.9	114.9
Potential Operating Hours	8760	8760	8760	8760	8760	8760	8760	8760

Generator Eng #1	Gillette	Gillette
126	126	85
1.30	1.30	0.72
1330	1330	720
0.0013	0.0013	0.0007
11.60	11.60	6.31
8760	8760	8760

Pollutant	Emission Factor, Other (3 CAT Engines - factors include control)	Emission Factor, AP-42 (All engines)	Emissions			Emissions			Emissions			Emissions		
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
units	(g/bhp-hr)	(lb/MMBtu)	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591
PM		9.99E-03	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591	0.135	0.591
PM-10		7.71E-05	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005
PM-2.5		7.71E-05	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005	0.001	0.005
NOx	0.5		1.955	8.562	1.955	8.562	1.955	8.562	1.955	8.562	1.955	8.562	1.955	8.562
SO <sub>2</sub>		5.88E-04	0.008	0.035	0.008	0.035	0.008	0.035	0.008	0.035	0.008	0.035	0.008	0.035
CO	0.16		0.626	2.740	0.626	2.740	0.626	2.740	0.626	2.740	0.626	2.740	0.626	2.740
VOC	0.12		0.665	2.911	0.665	2.911	0.665	2.911	0.665	2.911	0.665	2.911	0.665	2.911
Total HAP		4.40E-04	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026
Naphthalene		7.44E-05	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004
Toluene		4.08E-04	0.006	0.024	0.006	0.024	0.006	0.024	0.006	0.024	0.006	0.024	0.006	0.024
Formaldehyde, HCHO	0.00		5.28E-02	1.027	5.28E-02	1.027	5.28E-02	1.027	5.28E-02	1.027	5.28E-02	1.027	5.28E-02	1.027
1,1,2,2 - tetrachloroethane		4.00E-05	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002
1,1,2-Trichloroethane		3.18E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
1,1-Dichloroethane		2.36E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
1,3 - Butadiene		2.67E-04	0.004	0.016	0.004	0.016	0.004	0.016	0.004	0.016	0.004	0.016	0.004	0.016
1,3 - Dichloropropene		2.64E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
2,2,4-Trimethylpentane		2.50E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Acetaldehyde		8.36E-03	0.113	0.494	0.113	0.494	0.113	0.494	0.113	0.494	0.113	0.494	0.113	0.494
Biphenyl		2.12E-04	0.003	0.013	0.003	0.013	0.003	0.013	0.003	0.013	0.003	0.013	0.003	0.013
Acrolein		5.14E-03	0.069	0.304	0.069	0.304	0.069	0.304	0.069	0.304	0.069	0.304	0.069	0.304
Carbon Tetrachloride		3.67E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
Chlorobenzene		3.04E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
Chloroform		2.85E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
Ethylbenzene		3.97E-05	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.002
Ethylene Dibromide		4.43E-05	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003
Methanol		2.50E-03	0.034	0.148	0.034	0.148	0.034	0.148	0.034	0.148	0.034	0.148	0.034	0.148
Methylene Chloride		2.00E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Naphthalene		7.44E-05	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004	0.001	0.004
PAH		2.69E-05	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
Phenol		2.40E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Styrene		2.36E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Vinyl Chloride		1.49E-05	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Xylene		1.84E-04	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.011	0.002	0.011
n-hexane		4.45E-04	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026	0.006	0.026

Worksheet: Values

**Attachment J  
EMISSION POINTS DATA SUMMARY SHEET**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOCs & HAPs)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used <sup>6</sup>	Emission Concentration <sup>7</sup> (ppmv or mg/m <sup>3</sup> )
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
CE-1	Upward vertical stack	CE-1	Compress -or engine	C-1	Oxidation catalyst	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	1.96 10.72 2.47 0.007 0.001 1.02 1.28 1726	8.57 46.96 10.80 0.03 0.004 4.46 5.43 7559	1.96 0.63 0.67 0.007 0.001 0.24 0.48 1726	8.57 2.74 2.91 0.03 0.004 1.03 2.12 7559	Gas/Vapor	EE O - Vendor data (see Att. L and N)	
CE-2	Upward vertical stack	CE-2	Compress -or engine	C-2	Oxidation catalyst	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	1.96 10.72 2.47 0.007 0.001 1.02 1.28 1726	8.57 46.96 10.80 0.03 0.004 4.46 5.43 7559	1.96 0.63 0.67 0.007 0.001 0.24 0.48 1726	8.57 2.74 2.91 0.03 0.004 1.03 2.12 7559	Gas/Vapor	EE O - Vendor data (see Att. L and N)	
CE-3	Upward vertical stack	CE-3	Compress -or engine	C-3	Oxidation catalyst	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	1.96 10.72 2.47 0.007 0.001 1.02 1.28 1726	8.57 46.96 10.80 0.03 0.004 4.46 5.43 7559	1.96 0.63 0.67 0.007 0.001 0.24 0.48 1726	8.57 2.74 2.91 0.03 0.004 1.03 2.12 7559	Gas/Vapor	EE O - Vendor data (see Att. L and N)	
GE-1	Upward vertical stack	GE-1	Generator Engine - 126 HP	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.28 0.56 0.19 0.001 0.013 0.07 0.09 123	1.22 2.43 0.85 0.003 0.06 0.30 0.41 537	0.28 0.56 0.19 0.001 0.013 0.07 0.09 123	1.22 2.43 0.85 0.003 0.06 0.30 0.41 537	Gas/Vapor	EE O - Vendor data (see Att. L and N)	

T-01	Relief Vent	T-01	Waste Lube Oil Tank	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Gas/Vapor	EE (see Att. H and N - Tanks 4.09 - min VOC)	
T-02	Relief Vent	T-02	Methanol Tank	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.002 0.00 0.00 0.00 0.002 0.00	0.00 0.00 0.009 0.00 0.00 0.00 0.009 0.00	0.00 0.00 0.002 0.00 0.00 0.00 0.002 0.00	0.00 0.00 0.009 0.00 0.00 0.00 0.009 0.00	Gas/Vapor	EE (see Att. H, L and N)	
T-03 and T-04	Relief Vent	T-03 and T-04	Coolant Make up and Drain Tanks	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Gas/Vapor	EE (see Att. H-SDS)	
T-05 through T-10	Relief Vent	T-05 and T-10	Engine and Compressor Lube Oil Tanks	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Gas/Vapor	EE (see Att. H and N - Tanks 4.09 for Waste Lube Oil)	
T-11	Relief Vent	T-11 (T-421)	Produced Water Tank	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.004 0.00 0.00 0.00 0.004 0.00	0.00 0.00 0.02 0.00 0.00 0.00 0.02 0.00	0.00 0.00 0.004 0.00 0.00 0.00 0.004 0.00	0.00 0.00 0.02 0.00 0.00 0.00 0.02 0.00	Gas/Vapor	EE (see Att. H, L and N)	
T-12	Relief Vent	T-12 (T-301)	TEG Storage Tank	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Gas/Vapor	EE (see Att. H, L and N)	

TEG-1	Upward Vertical Stack	TEG-1	TEG Dehy Unit	C-4 (X-304)	Cond-ensor	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.00 0.00 2.11 0.00 0.00 0.00 0.21 618	0.00 0.00 9.23 0.00 0.00 0.00 0.92 2700	0.00 0.00 0.11 0.00 0.00 0.00 0.01 31	0.00 0.00 0.46 0.00 0.00 0.00 0.05 135	Gas/Vapor	EE O - Vendor data (see Att. L, M and N) - Assume 10% of VOC is HAP	
REB-1	Upward Vertical Stack	REB-1	TEG Dehy Reboiler	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.15 0.12 0.01 0.001 0.01 0.00 0.00 195.0	0.66 0.53 0.05 0.004 0.05 0.00 0.00 854.0	0.15 0.12 0.01 0.001 0.01 0.00 0.00 195.0	0.66 0.53 0.05 0.004 0.05 0.00 0.00 854.0	Gas/Vapor	EE O - Vendor data (see Att. L and N)	
GE-2	Upward Vertical Stack	GE-2	Generator Engine - 85 HP (existing Dehy)	N/A	N/A	N/A	N/A	N/A	N/A	NOx CO VOC SO2 PM/PM10 Formaldehyde Total HAP CO2(eq)	0.19 0.375 0.131 0.0003 0.0001 0.04 0.05 83	0.82 1.64 0.57 0.002 0.0002 0.17 0.23 362	0.19 0.375 0.131 0.0003 0.0001 0.04 0.05 83	0.82 1.64 0.57 0.002 0.0002 0.17 0.23 362	Gas/Vapor	EE O - Vendor data (see Att. L and N)	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (e.g., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- 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 D: Regulatory Discussion**

This section documents the applicability determinations made for Federal and State air quality regulations. The monitoring, recordkeeping, reporting, and testing plan are presented in Attachment O. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- Prevention of Significant Deterioration (PSD) permitting;
- Title V of the 1990 Clean Air Act Amendments;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and > West Virginia State Implementation Plan (SIP) regulations.

This review is presented to supplement and/or add clarification to the information provided in the WVDEP Rule 13 permit application forms. In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the Hamilton Compressor Station. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the Hamilton Compressor Station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

### **Title V Operating Permit Program**

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of all other regulated pollutants. The combined emissions for all sources at the Hamilton Compressor Station are well below any of the major source thresholds. Therefore, the Hamilton Compressor Station is not a major source with respect to the Title V permit program and as such is not required to submit a Title V operating permit application.

### **New Source Performance Standards**

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The

following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the Hamilton Compressor Station.

### **NSPS Subparts K, Ka, and Kb**

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m<sup>3</sup> (~19,813 gallons). All of the proposed storage tanks at the Hamilton Compressor Station have a capacity of 1260 gallons or less and the existing Produced Water Storage Tank storage capacity is 16,800 gallons. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the Hamilton Compressor Station.

### **NSPS Subparts IIII – Stationary Compression Ignition Internal Combustion Engines**

This subpart applies to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines. The Hamilton Compressor Station will not have any compression ignition internal combustion engine, and therefore the requirements of this subpart do not apply.

### **NSPS Subparts JJJJ – Stationary Spark Ignition Internal Combustion Engines**

NSPS Subpart JJJJ affects owners and operators of stationary spark ignition internal combustion engines (SI ICE) that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the manufacture date for new engines. The applicability dates for new engines range from July 1, 2007 to January 1, 2009, depending upon the engine horsepower (hp) and application.

40 CFR §60.4230(a)(4) states:

Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

- (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500-hp (except lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp);
- (ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp;
- (iii) On or after July 1, 2008, for engines with a maximum engine power less than 500-hp; or
- (iv) On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 kW (25-hp).

The compressor engines proposed for installation at the Hamilton Compressor Station are four stroke lean burn engines (each rated at 1775 HP) that were manufactured after July 1, 2007, and therefore NSPS JJJJ is applicable. Based on the engine manufacturer's specifications and the specifications for the associated catalyst, the engine complies with the emissions standards contain in 40 CFR §60.4233(e). M3 AGS will operate the engine according to the manufacturer's recommended practices and demonstrate compliance with the requirements specified in 40 CFR §60.4244 (testing methods) and 40 CFR §60.4243(b)(2) (maintenance plan/records and performance testing frequency) for non-certified affected SI ICE at the facility. Initial notification of construction commencement will be submitted as required in 40 CFR §60.7(a)(1) and §60.4245(c), and performance testing results will be reported as required in 40 CFR § 60.4245(d).

In addition 2 natural gas driven generator engines are included in the application, one 85 HP generator (GE-2) was previously installed under a permit determination and the other a proposed generator engine (GE-1) rated at 126 HP. Both engines meet the NSPS JJJJ emission standard criteria for CO, NO<sub>x</sub>, and VOC for engines rated less than 500 HP. GE-2 must comply with 60.4243 (2)(i) in which the owner/operator must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. Due to GE-2 being less than 100 HP, no performance testing is required.

GE-2 being greater than 100 HP and less than 500 HP, must comply with 60.4243 (2)(ii) which requires an owner/operator to keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, the operator must conduct an initial performance test within 1 year of engine startup to demonstrate compliance.

#### **NSPS Subpart OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution**

Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. This NSPS was published in the Federal Register on August 16, 2012, with an effective date of October 15, 2012. The list of potentially affected facilities includes:

- Gas wells
- Centrifugal compressors
- Reciprocating compressors
- Pneumatic controllers
- Storage vessels
- Equipment (as defined in §60.5430) located at onshore natural gas processing plants

- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

The Hamilton Compressor Station does not include gas wells or centrifugal compressors; therefore, the only potentially applicable requirements are those for reciprocating compressors, storage vessels, and pneumatic controllers. Rule applicability for each of these affected categories is discussed below.

Reciprocating Compressors- 40 CFR 60.5385 requires owners and operators of affected reciprocating compressors to change the rod packing prior to operating 26,000 hours or prior to 36 months since start up or the last packing replacement. M3 AGS will comply with this requirement for the proposed compressors.

Storage Vessels – Per previous WVDEP Permit Determination for the existing Hamilton Dehydration Station, one (1) 400 bbl Produced Water Tank (T11) was installed. Per emission calculations including flashing losses and breathing/working losses from T-11, the potential VOC emissions are less than 6 tpy and therefore will not be a storage vessel affected facility per 60.5365 (e). M3 AGS will be installing one (1) 335 gallon methanol tank T02 that has potential for VOC emissions. Potential VOC emissions from the 335 gallon methanol tank are less than 6 tpy. As such, the tank will not be a storage vessel affected facilities under this rule.

Pneumatic Controllers – The pneumatic controllers that will be installed will be potentially subject to NSPS OOOO. Per 60.5365(d)(2), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOO.

### **Non-Applicability of All Other NSPS**

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas operations (Subpart OOOO), internal combustion engines (Subparts IIII and JJJJ), and associated equipment (Subparts D-Dc, KKKK, and K-Kb), the applicability of a particular NSPS to the Hamilton Compressor Station can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to natural gas compressor stations.

### **National Emission Standards for Hazardous Air Pollutants (NESHAP)**

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The Hamilton Compressor Station will be an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type:

- 40 CFR Part 63 Subpart HH – Oil and Natural Gas Production Facilities
- 40 CFR Part 63 HHH – Natural Gas Transmission and Storage Facilities
- 40 CFR Part 63 YYYYY – Stationary Combustion Turbines
- 40 CFR Part 63 Subpart ZZZZ- Stationary Reciprocating Internal Combustion Engines (RICE) > 40 CFR Part 63
- Subpart JJJJJ – Industrial, Commercial, and Institutional Boilers

The applicability of these NESHAP Subparts is discussed in the following sections.

#### **40 CFR 63 Subpart HH – Oil and Natural Gas Production Facilities**

This subpart applies to affected emission points that are located at facilities that are major and area sources of HAP and either process, upgrade, or store hydrocarbon liquids prior to custody transfer or that process, upgrade, or store natural gas prior to entering the natural gas transmission and storage source category. For purposes of this subpart, natural gas enters the natural gas transmission and storage source category after the natural gas processing plant, if present.

The station will process natural gas in its glycol dehydrator prior to the point of custody transfer; therefore, the provisions of NESHAP Subpart HH could apply to the Hamilton Compressor Station although the natural gas is very lean with no detectable benzene noted. The benzene emissions from the glycol dehydrator vents are less than 0.90 mega grams per year (1 tpy), therefore, the Hamilton Compressor Station is exempt from the requirements of NESHAP Subpart HH pursuant to 40 CFR §63.764(e)(1)(ii), except for the requirement to keep records of the actual average natural gas flow rate or actual average benzene emissions from the dehydrator, per 40 CFR §63.774(d)(1).

#### **40 CFR 63 Subpart HHH – Natural Gas Transmission and Storage Facilities**

This standard applies to such units at natural gas transmission and storage facilities that are major sources of HAP emissions located downstream of the point of custody transfer (after processing and/or treatment in the production sector), but upstream of the distribution sector. The Hamilton Compressor Station is not a transmission facility; therefore, the provisions of NESHAP Subpart HHH do not apply to the Hamilton Compressor Station.

#### **40 CFR 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines**

40 CFR §63.6590(c) states that a new or reconstructed stationary RICE located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under NESHAP Subpart ZZZZ.

#### **40 CFR 63 Subpart JJJJJ – Industrial, Commercial, and Institutional Boilers (Area Source Boiler MACT)**

This MACT standard applies to industrial, commercial, and institutional boilers of various sizes and fuel types. The existing reboiler at the Hamilton Compressor Station is natural gas-fired and is specifically exempt from this subpart. Therefore, the requirements of this subpart will not apply.

### **West Virginia SIP Regulations**

The Hamilton Compressor Station is potentially subject to regulations contained in the West Virginia Code of State Regulations, Chapter 45 (Code of State Regulations). The Code of State Regulations fall under two main categories, those regulations that are generally applicable (e.g., permitting requirements), and those that have specific applicability (e.g., PM standards for manufacturing equipment).

#### **45 CSR 2: Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers**

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel “for the primary purpose of producing heat or power by indirect heat transfer”. The TEG Reboiler is a fuel burning unit and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from this unit shall not exceed 10 percent based on a six minute block average. Per 45 CSR 2-11, units less than 10 MMBtu/hr are exempt from the PM emission requirements in this rule. The TEG Reboiler is 1.5 MMBtu/hr and therefore the PM emission requirements do not apply.

#### **45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor**

According to 45 CSR 4-3:

No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

The Hamilton Compressor Station is generally subject to this requirement. However, due to the nature of the process at the station, production of objectionable odor from the compressor station during normal operation is unlikely.

#### **45 CSR 6: Control of Air Pollution from the Combustion of Refuse**

45 CSR 6 applies to activities involving incineration of refuse, defined as “the destruction of combustible refuse by burning in a furnace designed for that purpose. For the purposes of this rule, the destruction of any combustible liquid or gaseous material by burning in a flare or flare stack, thermal oxidizer or thermal catalytic oxidizer stack shall be considered incineration.” The Hamilton Compressor Station will not have any processes meeting this definition and therefore this regulation will not apply.

#### **45 CSR 16: Standards of Performance for New Stationary Sources**

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 CFR Part 60 by reference. As such, by complying with all

applicable requirements of 40 CFR Part 60 at the Hamilton Compressor Station (discussed earlier in this attachment), M3 AGS will be complying with 45 CSR 16.

**45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter**

According to 45 CSR 17-3.1:

No person shall cause, suffer, allow or permit fugitive particulate matter to be discharged beyond the boundary lines of the property lines of the property on which the discharge originates or at any public or residential location, which causes or contributes to statutory air pollution.

Due to the nature of the activities at the Hamilton Station it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, M3 AGS will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

**45 CSR 21-28: Petroleum Liquid Storage in Fixed Roof Tanks**

45 CSR 21-28 applies to any fixed roof petroleum liquid storage tank with a capacity greater than 40,000 gallons. The capacity of each storage tank proposed for the Hamilton Compressor Station is less than 1260 gallons and the existing Produced Water Storage Tank has a maximum capacity of 16,800 gallons. Also none of the tanks will contain petroleum liquids; therefore, 45 CSR 21-28 will not apply.



**Attachment N - Table 2 - TEG Dehy Unit Emissions**

(Note - GHG Emissions in CO2 (eq) provided in Attachment N - Table 5)

	<b>Source:</b>	<b>TEG Reboiler</b>					
	Rated Capacity (MMBtu/hr)	1,500					
	Heating Value (BTU/scf)	1,020					
	Capacity (10 <sup>6</sup> scf/hr)	0.001471					
	Potential Operating Hours	8760					
	Number of TEG Reboilers	1					
		<b>REBOILER EMISSIONS</b>		<b>TEG DEHYDRATOR**</b>		<b>TOTAL EMISSIONS</b>	
<b>Pollutant</b>	<b>Emission</b>	<b>Emissions</b>		<b>Emissions</b>			
<b>units</b>	(lb/10 <sup>6</sup> scf)	<b>lb/hr</b>	<b>tpy</b>	<b>lb/hr</b>	<b>tpy</b>	<b>lb/hr</b>	<b>tpy</b>
PM Total*	7.6	0.011	0.049			0.011	0.049
NOx	100	0.147	0.644			0.147	0.644
SO2	0.6	0.001	0.004			0.001	0.004
CO	84	0.124	0.541			0.124	0.541
VOC	5.5	0.008	0.035	0.110	0.460	0.118	0.495
TOC	11	0.016	0.071			0.016	0.071

**Based on Existing Gas Analysis**

\*Assume PM Total = PM2.5 = PM10

\*\* Insert from GLYCal Output (2014)

AP-42 Source for Emission Factors: Chapter 1.4 Natural Gas Combustion, July 1998.

HAMILTON TEG Reboiler - Dehy St

1 of 1

Edited by: Roberts

Jan-16

**Attachment N - Table 6 - Truck Loading Associated with Methanol (T02) and Prod Water (T11)**

Emission Point	Loading Properties			Throughput <sup>(a)</sup> Annual (1,000 gal/yr)
	Loading Temperature (F)	Loading Temperature (R)	Vapor Pressure (psi)	
L02 - Methanol Product Loading	62	521.67	1.6	3.69
L01 - Produced Water Unloading	62	521.67	0.3	76.00

Emission Point	Saturation Factor <sup>(b)</sup>	Loading Loss <sup>(c)</sup> (lb/10 <sup>3</sup> gal)	Uncontrolled VOC Emissions <sup>(d)</sup>		Uncontrolled HAP Emissions <sup>(e)</sup>	
			Annual (ton/yr)	Hourly (lb/hr)	Annual (ton/yr)	Hourly (lb/hr)
L02 - Methanol Product Loading	1.45	18.165	0.033	0.008	0.033	0.008
L01 - Produced Water Loading	0.6	7.486	0.028	0.006	0.001	0.000
Totals		0.062		0.014	0.035	0.008

Notes:

(a) Maximum annual throughput methanol: 3,685 gal/yr  
 Maximum annual throughput Produced Water: 76,143 gal/yr

(b) Saturation factor for loading, dedicated loading taken from Table 5.2-1 (dedicated normal service) of Section 5.2 of AP-42, Fifth Edition, Volume 1.

(c) Loading loss calculated according to the methodology in Section 5.2 of AP-42, Fifth Edition, Volume 1.

Sample Calculation, average loading loss for methanol:

$$L_L \text{ (lb/10}^3 \text{ gal)} = 12.46 \text{ SMP} / T ; S = \text{Saturation Factor (-)}$$

$$M = \text{Vapor Molecular Weight (lb/lb-mol)}$$

$$P = \text{Vapor Pressure (psi)}$$

$$T = \text{Loading Temperature (R)}$$

$$L_L = (12.46) (1.5) (32 \text{ lb/lb-mol}) (1.600 \text{ psi}) = 18.165 \text{ lb} / 10^3 \text{ gal}$$

$$521.67 \text{ R}$$

(d) Emissions estimated by applying the loading loss to the applicable loading throughput.

sample calculation for methanol, annual emissions:

$$\frac{18.165 \text{ lb}}{1,000 \text{ gal}} \times \frac{4 \times 1,000 \text{ gal}}{\text{yr}} \times \frac{\text{ton}}{2,000 \text{ lb}} = 0.033 \frac{\text{VOC ton}}{\text{yr}}$$

(e) Total HAP emissions estimated from vapor compositions:

$$\frac{\text{Methanol}}{100.00\%} = \frac{\text{Methanol}}{5.00\%} \times \frac{\text{Produced Water}}{0\%}$$

(f) Control efficiency

$$= 0\%$$

**Hamilton Compressor Station  
Overall Emission Summary**

Unit ID	Description	Control	Criteria Pollutants										GHGs		HAPs		Highest HAP Formaldehyde lb/hr			
			NO <sub>x</sub> lb/hr	NO <sub>x</sub> ton/yr	CO lb/hr	CO ton/yr	VOC lb/hr	VOC ton/yr	PM <sub>10</sub> lb/hr	PM <sub>10</sub> ton/yr	PM <sub>2.5</sub> lb/hr	PM <sub>2.5</sub> ton/yr	SO <sub>2</sub> lb/hr	SO <sub>2</sub> ton/yr	CO <sub>2e</sub> lb/hr	CO <sub>2e</sub> ton/yr		Total HAPs lb/hr	Total HAPs ton/yr	
CE-1	CAT G3616 Comp Engine (C-101) - See Table N-1	Ox Cat (C1)	1.96	8.57	0.63	2.74	0.67	2.91	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
CE-2	CAT G3616 Comp Engine (C-102) - See Table N-1	Ox Cat (C2)	1.96	8.57	0.63	2.74	0.67	2.91	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
CE-3	CAT G3616 Comp Engine (C-103) - See Table N-1	Ox Cat (C3)	1.96	8.57	0.63	2.74	0.67	2.91	0.00	0.01	0.00	0.01	0.007	0.03	1726	7559	0.485	2.124	0.24	1.03
GE-1	Gillette Natural Gas Generator - See Table N-1	N/A	0.28	1.22	0.56	2.43	0.19	0.85	0.00	0.00	0.00	0.00	0.001	0.003	123	537	0.09	0.41	0.07	0.3
T01	Waste Lube Oil (T-450)	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T02	Methanol	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
T03	Coolant Make Up Tank	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T04	Coolant Drain Tank	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T05	Engine Lube Oil for CE-1	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T06	Compressor Lube Oil for CE-1	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T07	Engine Lube Oil for CE-2	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T08	Compressor Lube Oil for CE-2	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T09	Engine Lube Oil for CE-3	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T10	Compressor Lube Oil for CE-3	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



## Attachment N - Table 9 - Pigging Emissions

The following calculations indicate the emissions due to pigging operations. The pig receiver dimensions are estimated.

### Inlet 12" Pig Receiver Hamilton

Pigging operations at the Inlet Receiver will occur 1 time per week, with the barrel blown down and opened up on same frequency. Barrel will be vented to the atmosphere.

The pig receiver is 16" diameter, and the length is 9'.

In addition there is 10' of 12" pipe upstream of the receiver and 24' of 6" pipe that requires blowdown.

	<b>Pig Barrel</b>	<b>Receiver pipe</b>	<b>Kicker Line</b>
Diameter	16 in	12 in	6 in
Length	9 ft	10 ft	24 ft
Pressure	400 psia	Operating Pressure (highest compressor run - conservative case)	
Temperature	60 °F	Operating Temperature	

Calculations:

Volume:	12.6	ft3	Pig Receiver barrel volume
	7.9	ft3	Pig Receiver pipe volume
	4.7	ft3	Kicker line
	25.1	ft3	Total Volume

$$\text{Standard Volume} = (P1*V1*T2)/(T1*P2) = V2$$

Where:	P1, V1, T1	P, V, T at actual conditions
	P2, V2, T2	P, V, T at standard conditions

P1 =	400	psia	P2 =	14.7	psia
V1 =	25.1	ft3			
T1 =	520	°R	T2 =	520	°R

V2 =	683.9	ft3
------	-------	-----

Volume:	683.9	SCF	Standard volume of retained gas
---------	-------	-----	---------------------------------

Gas MW:	16.50	lb/lbmol
Moles/Vent:	1.80	lbmol

**Released Gas:** 29.7 lbs/vent Total Gas Released to atmosphere.

Number of events 52

Total for Year 1546.17 lbs

0.77 tpy

Total VOC emissions (Wt% = 0.05)

0.002 tpy (No HAP)

0.0005 lb/hr

Total CH4 emissions (Wt% = 94.6)

0.73 tpy

0.17 lb/hr

Total CO2 (eq) (GHG Factor = 25)

18.28 tpy

4.17 lb/hr

## Attachment N - Table 10 Blowdown Emissions Hamilton Compressor Station

The calculations provide the emissions from normal compressor maintenance operations

### Depressure (Blow Down)

Information from Exterran Bid Package 7/29/15

	Diameter	Length (S-S)	Volume
	in	in	ft <sup>3</sup>
<b>Compressor Stage 1</b>			
Suction Dampner	18	74	13.3
Discharge Dampner	18	74	13.3
Scrubber	24	84	27.2
Vessel Total			53.7
Overage for piping (% of vessels)			0.2
Total to piping			10.7
Total Volume for 1st stage			<b>64.5</b>

	Diameter	Length (S-S)	Volume
	in	in	ft <sup>3</sup>
<b>Compressor Stage 2</b>			
Suction Dampner	12.75	76	6.5
Discharge Dampner	12.75	76	6.5
Scrubber	24	84	27.2
Vessel Total			40.3
Overage for piping (% of vessels)			0.2
Total to piping			8.1
Total Volume for 2nd stage			<b>48.4</b>

### Compressor Blowdown Volumes

1st Stage		2nd Stage	
Volume	64.5 ft <sup>3</sup>	Volume	48.4 ft <sup>3</sup>
Density, Inlet	1.04 lb/ft <sup>3</sup>	Density, Inlet	1.898 lb/ft <sup>3</sup>
Density, Outlet	1.652 lb/ft <sup>3</sup>	Density, Outlet	2.618 lb/ft <sup>3</sup>
Average Density	1.346 lb/ft <sup>3</sup>	Average Density	2.258 lb/ft <sup>3</sup>
lbs/blowdown	86.8 lbs	lbs/blowdown	109.2 lbs

<b>TOTAL Blowdown</b>	<b>196.0 lbs</b>	Per Compressor	
# of Compressors	3		
# of Maintenance Events	9	(Maintenance performed every 1000 hours)	

### Emission Summary - Based on Neal Well Analysis

Component	Weight Frac	1 Compressor		3 Compressors/All Events	
		lbs per blowdown	lbs/yr	lbs/yr	TPY
Nitrogen	0.006	1.18	31.75	31.75	0.02
Methane	0.946	185.42	5006.29	5006.29	2.50
Carbon Dioxide	0.006	1.18	31.75	31.75	0.02
Ethane	0.039	7.64	206.39	206.39	0.10
Propane	0.003	0.59	15.88	15.88	0.01
I-Butane	0.0001	0.02	0.53	0.53	0.00
n-Butane	0.0003	0.06	1.59	1.59	0.00
I-Pentane	0.00002	0.00	0.11	0.11	0.00
n-Pentane	0.00003	0.01	0.16	0.16	0.00
<b>Total VOCs</b>		<b>0.68</b>	<b>18.26</b>	<b>18.26</b>	<b>0.01</b>
<b>CO2 (eq) (CH4 = 25x)</b>		<b>4637</b>	<b>125189</b>	<b>125189</b>	<b>63</b>

## Williams, Jerry

---

**From:** Williams, Jerry  
**Sent:** Friday, February 05, 2016 3:01 PM  
**To:** 'Jim Roberts'; Eric Tennison  
**Cc:** McKeone, Beverly D  
**Subject:** WV DAQ Permit Application Incomplete for M3 Appalachia Gathering, LLC – Hamilton Compressor Station

**RE: Application Status: Incomplete  
M3 Appalachia Gathering, LLC – Hamilton Compressor Station  
Permit Application No. R13-3292  
Plant ID No. 061-00206**

Dear Mr. Roberts

Your application for a construction permit for a natural gas compressor station was received by this Division on January 12, 2016 and assigned to the writer for review. Upon initial review of said application, it was determined that the application as submitted was incomplete and additional information was requested on January 15, 2016. The application is still incomplete based on the following items:

1. The application indicates there are product loadouts (methanol and produced water). However, these are not listed on the Emission Units Table (Attachment I). Additionally, Attachment L (Emission Unit Data Sheet) for these loadouts utilize Emission Unit ID#s that are the same as emission units listed in the Emission Units Table for other emission units.
2. Does the BTEX condenser also contain a BTEX burner that is operated at all times?
3. There are no emission calculations (Attachment N) provided for CE-3.
4. Attachment L (Emission Unit Data Sheet) for CE-1 – CE-3 indicates that the fuel usage is 13,080 scfh and 114.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 11,500 scf and 101.1 MMscf/yr. Please address the discrepancy.
5. Attachment L (Emission Unit Data Sheet) for GE-1 indicates that the fuel usage is 1,330 scfh and 11.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 1,300 scf and 11.13 MMscf/yr. Please address the discrepancy.
6. Please provide an applicability determination for the generator engines (GE-1, GE-2) in regards to 40CFR60 Subpart JJJJ in Attachment D.
7. Please provide an applicability determination for the produced water tank (T-11) in regards to 40CFR60 Subpart OOOO in Attachment D.
8. Attachment I (Emission Units Table) indicates that the reboiler is 1.5 mmscf. Is this supposed to be 1.5 MMBTU/hr?
9. Please provide the GLYCalc input and aggregate report for the glycol dehydration unit (TEG-1).
10. Please provide the emission factors used for the reboiler in Table 2 of Attachment N.
11. Please provide the source of calculations used for the fugitive emission calculations in Table 3 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.
12. Please list the component for each line in Table 5 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.
13. Please list the source for each line in Table 6 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.

14. Please list the emission estimation methodology used for flashing emissions in Table 8 of Attachment N.
15. Please provide a spreadsheet representing the overall facility emissions (lb/hr and tpy).
16. Are there are pigging or blowdown emissions associated with this facility?

Please address each item and resubmit all affected forms.

Should you have any questions, please contact me at (304) 926-0499 ext. 1223 or reply to this email.

Thanks,  
Jerry

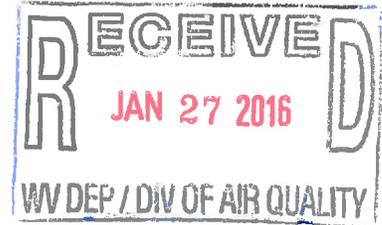
Jerry Williams, P.E.  
Engineer  
WVDEP – Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0499 ext. 1223  
[jerry.williams@wv.gov](mailto:jerry.williams@wv.gov)



 Please consider the environment before printing this email.

January 26th, 2015

West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Attn: Sandra Adkins



Re: Hamilton Compressor Station- Rule 13 Permit Application ID No. 061-00206.

Please accept the attached legal notice for the Hamilton Compressor Station. Please contact me with any questions at the information listed below. Thank you and enjoy your day.

Sincerely,

A handwritten signature in blue ink, appearing to read "Eric Tennison". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Eric Tennison  
Environmental Health & Safety Manager  
M3 Appalachia Gathering, LLC  
742 Fairmont Road, Suite E  
Westover, WV 26501  
e.tennison@m3midstream.com  
304-212-4403 ext. 5006 (office)  
724-705-3816 (cell)

# PUBLISHER'S CERTIFICATE

vs.

010081679

January 11, 12, 13, 14, 15, 16, 18, 19

## AIR QUALITY PERMIT NOTICE

### Notice of Application

Notice is given that M3 Appalachia Gathering, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit Registration per the requirements of 45CSR13 (New Source Review - Minor Air Emissions Source) for a Natural Gas Compressor Station located on an Access Road off of WV-218N, near Daybrook, in Monongalia County, West Virginia. The latitude and longitude coordinates are: (Latitude: 39.64194 N; Longitude: 80.205278 W.)

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Nitrogen Oxides (NOx) = 29.2 tons per year (tpy); Carbon Monoxide (CO) = 12.8 tpy; Volatile Organic Compounds (VOC) = 11.1 tpy; Sulfur Dioxide (SO<sub>2</sub>) = 0.1 tpy; Particulate Matter (PM<sub>10</sub>) = 0.12 tpy; Formaldehyde = 3.52 tpy; Hazardous Air Pollutants (HAPs) = 7.0 tpy; Carbon Dioxide Equivalents (CO<sub>2</sub>(eq)) = 24,800 tpy.

Startup of operation is planned to begin on or about the first day of **July 1, 2016**. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th 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 1250, during normal business hours.

Dated this the **7th** day of **January**, 2015.

By: **M3 Appalachia Gathering, LLC**  
**James C. Roberts V.P. Environmental, Health, and Safety**  
**742 Fairmont Road, Suite E**  
**Westover, WV 26501**

STATE OF WEST VIRGINIA  
COUNTY OF MONONGALIA

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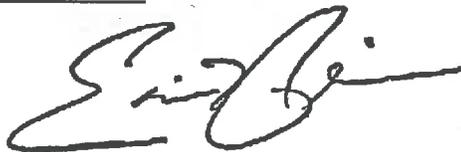
11th day of Jan., 2016 and ending on the

19th day of Jan., 2016

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January, 2016

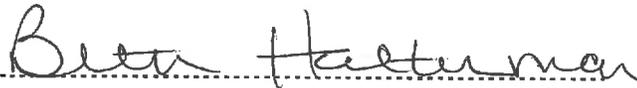


(SEAL)

Advertising Director of THE DOMINION POST

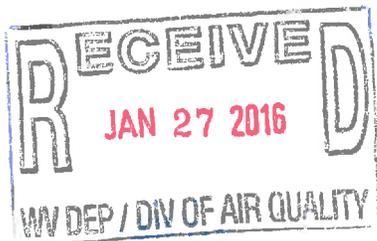
Subscribed and sworn to before me this 19th

day of January, 2016



Notary Public of Monongalia County, W. Va.

My commission expires on the 6 day of July  
2020



**Williams, Jerry**

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**From:** Ward, Beth A  
**Sent:** Wednesday, January 27, 2016 12:47 PM  
**To:** Williams, Jerry  
**Subject:** M3 Appalachia Gathering LLC Permit Application Fee

This is the receipt for payment received from:

M3 Appalachia Gathering LLC, Hamilton Station, CHECK NUMBER 27444, CHECK DATE 01/15/2016, \$1,000.00  
R13-3292 ID# 061-00206

OASIS Deposit CR 1600080612

Thank You!

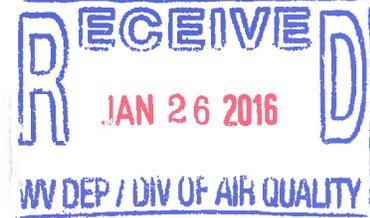
*Beth Ward*

**WV DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BTO FISCAL  
601 57<sup>TH</sup> STREET SE  
CHARLESTON, WV 25304  
(304) 926-0499 EXT 1846  
[beth.a.ward@wv.gov](mailto:beth.a.ward@wv.gov)**

**NON-CONFIDENTIAL**

January 25th, 2015

West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Attn: Sandra Adkins



Re: Hamilton Compressor Station- Rule 13 Permit Application ID No. 061-00206.

Please accept the additional check in the amount of \$1000 for the Hamilton Compressor Station - Rule 13 permit application. Please contact me with any questions at the information listed below. Thank you and enjoy your day.

Sincerely,



Eric Tennison  
Environmental Health & Safety Manager  
M3 Appalachia Gathering, LLC  
742 Fairmont Road, Suite E  
Westover, WV 26501  
e.tennison@m3midstream.com  
304-212-4403 ext. 5006 (office)  
724-705-3816 (cell)

ID # 061-00206  
Reg RP-3292  
Company M3 Appalachia  
Facility HAMILTON initials ET

**NON-CONFIDENTIAL**

## Williams, Jerry

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**From:** Williams, Jerry  
**Sent:** Friday, January 15, 2016 1:41 PM  
**To:** Eric Tennison  
**Subject:** Hamilton Compressor Station

**RE: M3 Appalachia Gathering, LLC – Hamilton Compressor Station  
Permit Application No. R13-3292  
Plant ID No. 061-00206**

Eric,

To follow up our telephone conversation yesterday, I had a chance to look through the application. The following items are needed in order for the review to continue:

1. Please submit the \$1,000 fee for NSPS (40CFR60 Subpart OOOO).
2. The application indicates there are product loadouts (methanol and produced water). However, these are not listed on the Emission Units Table (Attachment I). Additionally, Attachment L (Emission Unit Data Sheet) for these loadouts utilize Emission Unit ID#s that are the same as emission units listed in the Emission Units Table for other emission units.
3. Does the BTEX condenser also contain a BTEX burner that is operated at all times?
4. There are no emission calculations (Attachment N) provided for CE-3.
5. Attachment L (Emission Unit Data Sheet) for CE-1 – CE-3 indicates that the fuel usage is 13,080 scfh and 114.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 11,500 scf and 101.1 MMscf/yr. Please address the discrepancy.
6. Attachment L (Emission Unit Data Sheet) for GE-1 indicates that the fuel usage is 1,330 scfh and 11.6 MMscf/yr. However, the emission calculations (Attachment N) indicate the fuel usage is 1,300 scf and 11.13 MMscf/yr. Please address the discrepancy.
7. Please provide an applicability determination for the generator engines (GE-1, GE-2) in regards to 40CFR60 Subpart JJJJ in Attachment D.
8. Please provide an applicability determination for the produced water tank (T-11) in regards to 40CFR60 Subpart OOOO in Attachment D.
9. Attachment I (Emission Units Table) indicates that the reboiler is 1.5 mmscf. Is this supposed to be 1.5 MMBTU/hr?
10. Please provide the GLYCalc input and aggregate report for the glycol dehydration unit (TEG-1).
11. Please provide the emission factors used for the reboiler in Table 2 of Attachment N.
12. Please provide the source of calculations used for the fugitive emission calculations in Table 3 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.
13. Please list the component for each line in Table 5 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.
14. Please list the source for each line in Table 6 of Attachment N. Additionally, there are no footnotes provided to show the source of the emission calculations.
15. Please list the emission estimation methodology used for flashing emissions in Table 8 of Attachment N.
16. Please provide a spreadsheet representing the overall facility emissions (lb/hr and tpy).
17. Are there are pigging or blowdown emissions associated with this facility?
18. Please provide the affidavit of publication for the Class I legal advertisement.

Please address each item and resubmit all affected forms.

Should you have any questions, please contact me at (304) 926-0499 ext. 1223 or reply to this email.

Thanks,  
Jerry

Jerry Williams, P.E.  
Engineer  
WVDEP – Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0499 ext. 1223  
[jerry.williams@wv.gov](mailto:jerry.williams@wv.gov)



 Please consider the environment before printing this email.

**Williams, Jerry**

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**From:** Ward, Beth A  
**Sent:** Thursday, January 14, 2016 4:59 PM  
**To:** Williams, Jerry  
**Subject:** M3 Appalachia Gathering LLC Permit Application Fee

This is the receipt for payment received from:

M3 Appalachia Gathering LLC, Hamilton Station, CHECK NUMBER 27355, CHECK DATE 12/28/2015, \$3500.00  
R13-3292 ID# 061-00206

OASIS Deposit CR 1600076577

Thank You!

*Beth Ward*

**WV DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BTO FISCAL  
601 57<sup>TH</sup> STREET SE  
CHARLESTON, WV 25304  
(304) 926-0499 EXT 1846  
[beth.a.ward@wv.gov](mailto:beth.a.ward@wv.gov)**

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## Eric Tennison

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**From:** Adkins, Sandra K <Sandra.K.Adkins@wv.gov>  
**Sent:** Thursday, January 14, 2016 1:12 PM  
**To:** Jim Roberts; Eric Tennison  
**Cc:** McKeone, Beverly D; Williams, Jerry  
**Subject:** WV DAQ Permit Application Status for M3 Appalachia Gathering, LLC; Hamilton Station

**RE: Application Status  
M3 Appalachia Gathering, LLC  
Hamilton Station  
Plant ID No. 061-00206  
Application No. R13-3292**

Mr. Roberts,

Your application for a construction permit for the Hamilton Compressor Station was received by this Division on January 12, 2016, and was assigned to Jerry Williams. The following items were not included in the initial application submittal:

**Original affidavit for Class I legal advertisement not submitted.**

**Application fee AND/OR additional application fees:**

\*\$1,000 Construction, Modification, Relocation or Temporary Permit

\*\$1,000 NSPS

\*\$2,500 NESHAP

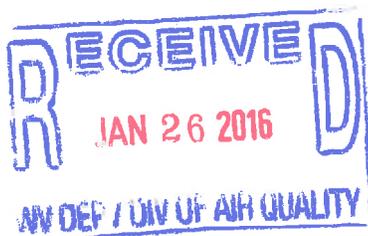
(\$4,500 total; received \$3,500; need an additional \$1,000)

*These items are necessary for the assigned permit writer to continue the 30-day completeness review.*

Within 30 days, you should receive a letter from Jerry stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Jerry Williams, at 304-926-0499, extension 1223.



**From:**  
**Sent:**  
**To:**  
**Cc:**  
**Subject:**

I was able to get it at a better price for you than what we discussed. This legal is set to start running on Monday.

Thank You!

Nikki



**Classified Advertising Payment Receipt**

Date Generated: 1/8/2016

**No:** 1051056  
M3 APPALACHIA GATHERING  
LLC

**Account**

**Email:**  
WESTOVER, WV 26501  
212-4403

**Phone:** 304-

**Sales Associate:** Nikki Moon | **Phone:** 304-291-9420 | **Email:** classads@dominionpost.com

Order		PO
<b>Urn:</b> 010081679	<b>Number:</b>	
<b>PAYMENT INFORMATION</b>		
<b>Total Order Price:</b> \$446.00	<b>Amount:</b> \$0	<b>Payment</b>
	<b>Payment</b>	
<b>Type:</b> Invoice		

ID # 061-00206  
Reg R13-3292  
Company M3 APPALACHIA GATHERING  
Facility HAMILTON Initials dw

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**TITLES:**

Title: Dominion Post | Class: 101 Legals  
Start Date: 1/11/2016 | Stop Date: 1/19/2016  
Insertions: 8 | Lines: 35.2135 ag

**AD COPY PROOF:**

*Not Shown Actual Size*

**010081679**

**January 11, 12, 13, 14, 15, 16, 18, 19**

**AIR QUALITY PERMIT NOTICE**

**Notice of Application**

Notice is given that M3 Appalachia Gathering, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit Registration per the requirements of 45CSR13 (New Source Review – Minor Air Emissions Source) for a Natural Gas Compressor Station located on an Access Road off of WV-218N, near Daybrook, in Monongalia County, West Virginia. The latitude and longitude coordinates are: (Latitude: 39.64194 N; Longitude: 80.205278 W.)

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Nitrogen Oxides (NOx) = 29.2 tons per year (tpy); Carbon Monoxide (CO) = 12.8 tpy; Volatile Organic Compounds (VOC) = 11.1 tpy; Sulfur Dioxide (SOx) = 0.1 tpy; Particulate Matter (PM10) = 0.12 tpy; Formaldehyde = 3.52 tpy; Hazardous Air Pollutants (HAPs) = 7.0 tpy; Carbon Dioxide Equivalents (CO2(eq)) = 24,800 tpy.

Startup of operation is planned to begin on or about the **first day of July 1, 2016**. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th 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 1250, during normal business hours.

Dated this the **7th** day of **January, 2015**.

By: **M3 Appalachia Gathering, LLC**  
**James C. Roberts V.P. Environmental, Health, and Safety**  
**742 Fairmont Road, Suite E**  
**Westover, WV 26501**

*Nikki Moon*  
*Classifieds Advisor*  
*Dominion Post*  
*1251 Earl L. Core Rd.*  
*Morgantown, WV 26505*  
*T. 304.291.9420*

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**From:** Nikki Moon  
**Sent:** Friday, January 08, 2016 12:08 PM  
**To:**