



COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office

MEMO

TO Air Quality Permit File GP5-26-00587D

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DATE July 30, 2015

RE Review of General Permit Application
Laurel Mountain Midstream Operating, LLC
Springhill #2 Compressor Station
Springhill Township, Fayette County
APS 870689 Auth 1073124 PF 719219

Background

On May 11, 2015, Laurel Mountain Midstream Operating, LLC (LMM) submitted an application to request authorization for modifications to the existing Springhill Compressor Station (Springhill) located in Springhill Township, Fayette County. On July 2, 2015, the Department received a revised application with revised engine catalyst information. Springhill provides compression and dehydration for a natural gas gathering system in the Marcellus Shale. Natural gas is drawn from nearby wells, compressed, dewatered, and discharged to a natural gas transmission pipeline. This site is located approximately 1.5 miles northeast of Point Marion at 585 Hope Hollow Road (T325). LMM has proposed authorization for the following:

- One (1) previously installed 1,500 bhp electric motor driven compressor
- Two (2) previously installed 1,380 bhp Caterpillar G3516B 4SLB natural gas-fired compressor engines; each controlled by a Miratech oxidation catalyst
- One (1) previously installed 25 MMscfd triethylene glycol dehydrator (regenerator) with associated 0.25 MMBtu/hr natural gas-fired reboiler
- One (1) **NEW** 40 MMscfd triethylene glycol dehydrator (flash tank controlled by reboiler and regenerator) with associated 0.75 MMBtu/hr natural gas-fired reboiler

- Four (4) previously installed produced water tanks – two (2) 150 bbl capacity, one (1) 100 bbl capacity, and one (1) 24 bbl capacity
- Compressor rod packing and engine crankcase emissions
- Startup/shutdown/maintenance (including blowdown) emissions
- Produced water truck load-out (11,000 bbl/yr total)
- Piping and equipment fugitive emissions

The following equipment authorized under GP5-26-00587B has been requested to be removed from this authorization. These engines have already physically been removed and replaced with the Caterpillar G3516B engines authorized under GP5-26-00587C:

- **REMOVE** two (2) 1,340 bhp Caterpillar G3516LE 4SLB natural gas-fired compressor engines

The following is a brief summary of the authorization history at this facility as described by LMM in an email dated July 28, 2015:

GP5-26-00587A authorized on December 9, 2009, was the initial Williams LMM authorization after the purchase of the facility. Authorization included two (2) Caterpillar G3516LE engines and one (1) dehydrator.

GP5-26-00587B authorized on January 9, 2012, authorized the addition of an oxidation catalyst to one of the Caterpillar G3516LE engines.

GP5-26-00587C authorized on December 23, 2013, authorized the replacement of the two (2) Caterpillar G3516LE engines with two (2) Caterpillar G3516B engines. Installation of the engines commenced in May 2015, within the 18-month construction period, and are currently operating.

GP5-26-00587D is for authorization for a proposed additional dehydrator. No change to the engines or other equipment has been requested.

Regulatory Analysis

Section A. General Conditions

GP-5 Section A Condition 9 – Compliance Requirements – Per GP-5 Condition 9(c), the emissions from all sources and associated air pollution control equipment located at a natural gas compression and/or processing facility shall not equal or exceed and of the following on a 12-month rolling sum basis:

- Nitrogen oxides (NOx) – 100 tons.
- Carbon monoxide (CO) – 100 tons.
- Sulfur oxides (SOx) – 100 tons.
- Particulate matter with an aerodynamic diameter less than 10 microns (PM10) – 100 tons.
- Particulate matter with an aerodynamic diameter less than 2.5 microns (PM2.5) – 100 tons.
- Volatile organic compounds (VOCs) – 50 tons.
- Any individual hazardous air pollutant (HAP) – 10 tons.

(viii) Total hazardous air pollutants (HAPs) – 25 tons.

(ix) N/A

Per GP-5 Section A Condition 9(d), the owner or operator of the facility shall annually submit to the Department a certification of compliance with the terms and conditions in the GP-5, for the previous year, including the emission limitations, standards or work practices. The Compliance Certification Form provided by DEP shall be signed by a Responsible Official (as defined in Pa. Code §121.1). The Compliance Certification Form submitted to the DEP shall contain a certification as to truth, accuracy, and completeness consistent with the requirements of 25 Pa. Code §127.402(d). The Compliance Certification Form must be postmarked or hand-delivered to the appropriate DEP Regional Office, no later than March 1st each year for the previous calendar year.

GP-5 Section A Condition 14 – Recordkeeping and Reporting Requirements – The owner or operator of the facility shall maintain records that clearly demonstrate to the Department that the facility is not a Title V facility. In addition, the owner or operator of the facility shall keep records to verify compliance with the facility-wide emission limitations. These records shall be maintained at a minimum on a monthly basis and the emissions shall be calculated on a 12-month rolling sum. These records shall be retained for a minimum of five (5) years and shall be made available to the Department upon request. The Department reserves the right to request additional information necessary to determine compliance with this General Permit.

GP-5 Section A Condition 15 – Annual Source Reporting Requirements – In accordance with 25 *Pa. Code* § 135.3, the owner or operator of natural gas compression and/or natural gas processing facilities shall submit to the Department by March 1st each year a source report for the preceding calendar year for all sources regulated under this General Permit. The report shall include all emissions information for all previously reported sources and new sources which were first operated during the preceding calendar year. Emissions data including, but not limited to the following, shall be reported: carbon monoxide, oxides of nitrogen (NO_x), particulate matter less than 10 micrometers in diameter (PM₁₀), particulate matter less than 2.5 micrometers in diameter (PM_{2.5}), sulfur dioxide, volatile organic compounds, total hazardous air pollutants (HAP), speciated individual HAP emissions, and greenhouse gases, expressed as CO₂e.

Pennsylvania Natural Diversity Inventory (PNDI) – According to #24 on the Department's GP-5 Application Instructions, an applicant seeking a GP-5 authorization for a new facility must obtain a PNDI review receipt and any required "Clearance Letters." However, according to the Department's Policy for PNDI Coordination During Permit Review and Evaluation document, applications for modifications to the operation and management of existing facilities that do not involve activities having potential impacts to land or water resources are exempt from this policy. According to the applicant, the proposed project at the existing facility will not impact land or water resources, therefore LMM is exempt from the PNDI policy.

Section B. Natural Gas-Fired Spark Ignition Internal Combustion Engines

GP-5 Section B – Requirements for Natural Gas-Fired Spark Ignition Internal Combustion Engines – The two (2) proposed Caterpillar G3516B engines (Source IDs 103 and 104) are considered new engines and are subject to the emission standards of Condition 2.

New Source Performance Standards (NSPS) from 40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition (SI) Internal Combustion Engines (ICE) applies to the two (2) proposed

G3516B engines. Applicable requirements include NO_x, CO, and VOC emission limits per § 60.4233. Note that the applicable emission standards of GP-5 are more stringent than those required by § 60.4233. Table 1 below compares the applicable emissions standards of GP-5 and NSPS JJJJ.

Table 1: GP-5 and NSPS JJJJ Emissions Standards Comparison

Pollutant	GP-5 ^a		NSPS JJJJ		Proposed
	g/bhp-hr	ppmvd @ 15% O ₂	g/bhp-hr	ppmvd @ 15% O ₂	g/bhp-hr
NO _x	0.5	-	1.0	82	0.5
CO	-	47 (or 93% reduction)	2.0	270	0.17 (93% reduction)
NMNEHC/VOC ^b	0.25	-	0.7	60	0.25
HCHO	0.05	-	-	-	0.05

^a GP-5 emissions standards for new stationary natural gas-fired lean burn engines > 500 bhp.

^b NMNEHC/VOC emissions do not include formaldehyde.

Additional requirements for the proposed engines include compliance requirements per § 60.4243, initial and subsequent performance testing per § 60.4244, and notifications, reporting and recordkeeping per § 60.4245. For each engine, LMM must demonstrate compliance with each applicable emission limitation by conducting an initial performance test and conducting subsequent performance testing every 8,760 hours or 3 years, whichever comes first. Each performance test must, according to §60.4244, be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements of §60.8 and the conditions specified by Table 2 of Subpart JJJJ. Three (3) separate test runs for each required performance test must be conducted.

In addition to the testing requirements of NSPS JJJJ, the proposed engines are required to be tested within 180 days after initial startup in accordance with GP-5 Section B Condition 4(b). LMM must also perform periodic monitoring for NO_x and CO in accordance with GP-5 Section B Condition 4(c).

NESHAPS from 40 CFR Part 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion

Engines (RICE) applies to the proposed compressor engines. Per 40 CFR § 63.6585, a person is subject to this subpart if they own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand. This facility is an area source of HAP emissions and does not include stationary RICE test cells/stands. Therefore the engines are subject to 40 CFR 63 Subpart ZZZZ.

Per 40 CFR § 63.6590(2)(iii), each proposed engine is classified as a “new” stationary RICE since construction commenced after June 12, 2006. Per 40 CFR 63.6590(c)(1), “new” stationary RICE have no further requirements under 40 CFR 63 Subpart ZZZZ, and must meet the requirements of this part by meeting the requirements of 40 CFR Part 60 Subpart JJJJ.

Section C. Natural Gas-Fired Simple Cycle Gas Turbines

GP-5 Section C – Requirements for Natural Gas-Fired Simple Cycle Gas Turbines does not apply. This facility does not include any turbines. As such, NSPS KKKK does not apply.

Section D. Natural Gas Compressors

GP-5 Section D – Requirements for Natural Gas Compressors – The owner or operator of natural gas compressors shall comply with the applicable requirements specified in 40 CFR Part 60, Subpart OOOO

NSPS from 40 CFR Part 60, Subpart OOOO—Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution applies to the proposed reciprocating compressors because they will be constructed after August 23, 2011 [§60.5365(c)]. Requirements include rod packing standards per §60.5385, as well as notification, recordkeeping, and reporting as required by §60.5420. Per §60.5385(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.” Paragraph (a)(3) allows collecting emissions from rod packing rather than replacing it in accordance with paragraph (a)(1) or (2).

NSPS OOOO does not apply to the reciprocating compressors driven by driven by the electric motor because it was constructed before August 23, 2011 [§60.5365(c)].

Section E. Storage Vessels/Storage Tanks

GP-5 Section E – Requirements For Storage Vessels/Storage Tanks – The owner or operator of each storage vessel/storage tank shall also comply with the applicable requirements specified in 40 CFR Part 60, Subparts Kb and OOOO and 40 CFR Part 63, Subpart HH.

New Source Performance Standards (NSPS) from 40 CFR 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 does not apply to the tanks at this facility. Per 40 CFR 60.110b(a), “the affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984”. No tanks at this facility are greater than or equal to 75 cubic meters (~471 bbl).

NSPS OOOO does not apply to the storage vessels (tanks) at this facility because they were constructed prior to August 23, 2011 [§60.5365].

National Emission Standards for Hazardous Air Pollutants (NESHAPS) from 40 CFR Part 63 Subpart HH - Oil and Natural Gas Production Facilities does not apply to the tanks at this facility. Per 40 CFR 670(b)(2), for area sources, this subpart only applies to the owners and operators of TEG dehydration units

GP-5 Section E Condition 2 – In accordance with 25 Pa. Code §§ 127.1 and 127.12(a)(5), the owner or operator of each storage tank with a capacity less than or equal to 40,000 gallons shall also comply with the requirements in 25 Pa. Code § 129.57. The requirements of 25 Pa. Code § 129.57 do not apply to the produced

water tanks at this facility. The results of sampling of the produced water at Springhill shows that the vapor pressure is less than 1.5 psia.

Section F. Glycol Dehydrators

GP-5 Section F – Requirements for Glycol Dehydrators – The owner or operator of each glycol dehydrator located at natural gas compression and/or processing facility shall comply with the applicable requirements established in 40 CFR Part 63, Subpart HH. The owner or operator of each glycol dehydrator located at natural gas compression, and/or processing facility shall also comply with the visible emissions and malodor requirements in Conditions 2 (d) and (e) of this section.

The previously authorized 25 MMscfd dehydrator (Source ID 201) is considered an existing glycol dehydrator with total uncontrolled potential VOC emissions less than 10 tpy. As such, this unit is not subject to the control requirements of Section F Condition 2(a), but must meet the visible emissions and malodor requirements in Conditions 2 (d) and (e) of this section.

The proposed 40 MMscfd dehydrator (Source ID 202) is considered a new glycol dehydrator with total uncontrolled potential VOC emissions less than 5 tpy. As such, this unit is not subject to the control requirements of Section F Condition 3. In accordance with Section F Condition 4, LMM shall comply with the requirements in Conditions 2 (d), (e), and (j) of Section F.

NESHAPS HH applies to both the previously authorized and proposed dehydrator at this facility. Per 40 CFR 670(b)(2), for area sources, this subpart applies to the owners and operators of TEG dehydration units that are located at oil and natural gas production facilities that meet the specified criteria in paragraph (a) of this section. The TEG dehydration units meet the criteria of paragraph (a); therefore this subpart applies.

Per § 63.764(e)(1)(ii), the dehydrators are exempt from the requirements of § 63.764(d) since the actual average emissions of benzene are less than 0.9 Mg (1 ton) per year based on the GRI-GLYCalc report included by the applicant. Records of the exemption must be maintained as required in § 63.774(d)(1). Required records are either actual average benzene emissions (in terms of benzene emissions per year) using GRI-GLYCalc Version 3.0 or higher, by direct measurement, or an alternative method according to § 63.7(f).

Section G. Processing Plants

GP-5 Section F – Requirements for Onshore Natural Gas Processing Plants – does not apply to this facility because it does not meet the definition of a natural gas processing plant because it does not engage in the extraction of natural gas liquids from field gas. As such, 40 CFR Part 60, Subpart KKK – Standards of Performance for Equipment Leaks of VOCs from Onshore Natural Gas Processing Plants also does not apply.

Section H. Equipment Leaks

GP-5 Section H – Requirements for Equipment Leaks – The entire facility, including existing equipment, is subject to the requirements for equipment leaks in this Section. Requirements include monthly audible, visual, and olfactory (AVO) inspections as well as initial and subsequent quarterly leak detection using a monitoring device approved by the Department for the detection of fugitive leaks.

Section I. Pneumatic Controllers

GP-5 Section I – Requirements for Pneumatic Controllers – The owner or operator of each pneumatic controller affected facility shall also comply with the applicable requirements specified in 40 CFR Part 60, Subpart OOOO. NSPS OOOO does not apply to the pneumatic controllers at this facility because their bleed rate is less than 6 scfh [§60.5365(d)(1)].

New Source Review (NSR) Applicability and Single Source Determination

Springhill is located in Springhill Township, Fayette County which is classified as an area of attainment for all National Ambient Air Quality Standards (NAAQS) except for 8-hour ozone, per 40 CFR § 81.339. The entire Commonwealth is considered a “moderate” ozone nonattainment area for NO_x and VOCs because Pennsylvania is a jurisdiction in the Ozone Transport Region established by operation of law under Section 184 of the Clean Air Act. Recognized precursor pollutants for ozone are NO_x and VOCs. For purposes of nonattainment NSR, a facility is major if the PTE equals or exceeds 100 tons of NO_x or 50 tons of VOCs per year. Based on the provided emission estimates, after this project Springhill will emit up to 13.8 tons of NO_x and 24.45 tons of VOC and is therefore not a major facility for either of these pollutants

The major source threshold for Prevention of Significant Deterioration (PSD) is potential emissions of 250 tpy of a single attainment pollutant for this type of facility. The Title V major source criteria for Hazardous Air Pollutants (HAPs) is an emission potential of 10 tpy of a single HAP or 25 tpy of the sum of all emitted HAPs. A facility with a PTE that does not exceed major source thresholds for HAPs is known as an area source. HAP emission calculations provided by LMM indicate that the single HAP emitted from Springhill in the most significant quantity is xylenes in the amount of 2.44 tpy. The aggregated total of all HAPs is 10.80 tpy. As such, Springhill will remain classified as an area source of HAPs.

As stated above, Springhill does not have PTE in excess of any major source thresholds. Whether or not emissions from Springhill and emissions from any other exploration, extraction, or production activities should be considered a single source has been examined to determine the applicability of permitting requirements including the PSD, nonattainment NSR, and Title V permitting programs. The determination has been made in accordance with the Department’s final technical guidance document 270-0810-006, *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, effective October 6, 2012.

For PSD and Title V, the three-part regulatory criteria to determine whether emissions from two or more facilities should be aggregated and treated as a single source are whether the activities:

1. Belong to the same industrial grouping;
2. Are located on one or more contiguous or adjacent properties; and
3. Are under control of the same person (or persons under common control).

For NNSR applicability, the case-by-case determination is a two-part test which considers whether the air contamination sources or combination of sources are:

1. Located on one or more contiguous or adjacent properties; and
2. Owned and operated by the same person under common control.

According to Attachment A, Questionnaire and Checklist for Single Source Determination, Springhill moves natural gas collected by gathering pipelines from an upstream producer's wells. The production wells that send natural gas to Springhill are owned and operated by Atlas Energy L.P. or Chevron Appalachia, LLC. LMM and parent company Williams have no ownership interest in Atlas Energy L.P. or Chevron Appalachia, LLC or any of their respective parents, subsidiaries or affiliates. Natural gas from Springhill discharges directly to a Columbia transmission pipeline. The nearest facility owned and operated by LMM is the Brown Compressor Station located over 7 miles away.

Single Source Determination

The Department's Single Source Guidance Document establishes a quarter mile rule of thumb when determining if sources are located on contiguous or adjacent properties. Properties located within a quarter mile are considered contiguous or adjacent and properties located beyond this quarter mile range may only be considered contiguous or adjacent on a case-by-case basis. The application of the quarter mile or less rule takes a "common sense approach" to determining if sources are located on adjacent or contiguous properties and does not aggregate pollutant-emitting activities that as a group would not fit within the ordinary meaning of "building," "structure," "facility," or "installation."

Neither Pennsylvania nor federal regulations define the terms "contiguous" or "adjacent" or place any definitive restrictions on how distant two emission units can be and still be considered located on contiguous or adjacent properties for the purposes of a single source determination. The Department has taken the plain meaning of these words and considers that they mean and relate to a spatial relationship or spatial distance or proximity. While interdependence may be considered when conducting a single source determination, the plain meaning of the terms "contiguous" and "adjacent" should be the dispositive factor when determining whether stationary sources are located on contiguous or adjacent properties. An expansive operation covering multiple square miles does not comport with the "common sense notion of a plant." Sources spread throughout such a large geographical area are not consistent with the plain meaning of the terms contiguous or adjacent.

Based upon the information provided, the upstream production wells do not meet the common control requirement and are therefore not considered a single source. Furthermore, there are no wells considered contiguous or adjacent to Springhill. Similarly, the Brown Compressor Station does not fit within the ordinary meaning of "building," "structure," "facility," or "installation," and is not consistent with the meanings of "contiguous" or "adjacent." As such, emissions from Springhill shall not be aggregated with emissions from any other sources.

Sources, Control Devices, and Emissions

Compressor Engines – Two (2) 1,380 bhp Caterpillar G3516B engines

Emissions from the proposed compressor engines were calculated by LMM based upon Caterpillar's "not to exceed" emission data, the proposed oxidation catalyst control efficiency, GP-5 emission limits, AP-42 factors, and an operating time of 8,760 hours per year. Each identical proposed engine is ultra-lean burn and are capable of meeting the applicable GP-5 NOx standard of 0.5 g/bhp-hr according Caterpillar's "not to exceed" emission data. In order to meet the applicable GP-5 CO, NMNEHC, and HCHO standards, each engine will be equipped with a Miratech (or equivalent) oxidation catalyst. Compliance with the emission standards will be

demonstrated by performance testing required under Section B Condition 4. Calculations have been found acceptable and emissions from the compressor engines are shown in Table 2 below.

Table 2: Caterpillar G3616B w/Miratech Oxidation Catalyst Emissions^a

Pollutant	GP-5 Limit	Pre-Control	Post-Control	lbs/hr	tpy
	g/bhp-hr	g/bhp-hr	g/bhp-hr		
NO _x	0.50	0.50	0.50	1.52	6.66
NMNEHC ^b	0.25	0.48	0.25	0.76	3.33
VOC ^c	-	0.91	0.28	0.85	3.73
CO	-	2.43	0.17	0.52	2.27
HCHO ^d	0.05	0.43	0.03	0.09	0.40

^a Emissions from each engine.

^b NMNEHC is non-methane, non-ethane hydrocarbons excluding HCHO.

^c VOC is NMNEHC + HCHO.

^d HCHO calculated based upon the catalyst manufacturer's guaranteed post control emission rate.

Dehydrators – Two (2) TEG dehydrators; 25 MMscfd and 40 MMscfd

Emissions from the glycol dehydrators were calculated by the applicant using GRI-GLYCalc version 4.0, site specific natural gas analysis, the maximum natural gas throughput, and an operation time of 8,760 hours per year. Emissions from the reboilers were calculated by the applicant based upon emission factors from AP-42 Tables 1.4-1 and 2. Table 3 below summarizes the natural gas analysis from February 13, 2014, input into the GRI-GLYCalc model.

Table 3: Natural Gas Analysis

Component	Mol %
Nitrogen	0.2620
CO ₂	0.3320
Methane	97.3540
Ethane	1.9750
Propane	0.0770
Benzene	0.0001
Ethylbenzene	0.0001
n-Hexane	0.0001
Toluene	0.0001
2,2,4 TMP	0.0001
Xylenes	0.0001
Total VOCs	0.0776
Total HAPs	0.0006

The representative extended gas analysis actually shows the HAP content as "NIL." LMM has conservatively assumed the above "worst case" values.

The 25 MMscfd dehydrator (Source ID 201) is considered an existing dehydrator and potential VOC emissions are less than 10 tpy, therefore LMM is not required to meet the control requirements of GP-5 Section F Condition 2 for this dehydrator. As such, this unit is not equipped with a control device. Table 4 shows the actual estimated emissions based on the representative gas analysis and the GRI-GLYCalc results. Table 5 shows the applicant's estimated worst case PTE. Worst case total HAP PTE calculations assumed 0.0006 Mol% of total HAPs and added a safety factor. Worst case VOC PTE is based upon the GP-5 emission threshold of 10 tpy for existing dehydrators.

Table 4: 25 MMscfd Dehydrator Actual Emissions

Source	NOx		CO		VOC		HAPs ^a	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Reboiler	0.03	0.12	0.02	0.10	<0.01	0.01	-	-
Regenerator	-	-	-	-	0.46	2.04	0.28	1.24

^a No HAPs actually detected in gas. LMM conservatively assumed a 0.0006 Mol% of total HAPs.

Table 5: 25 MMscfd Dehydrator PTE

Source	NOx		CO		VOC ^a		HAPs ^b	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Reboiler	0.03	0.12	0.02	0.10	<0.01	0.01	-	-
Regenerator	-	-	-	-	2.26	9.90	0.80	3.50

^a VOC PTE based upon the GP-5 emission threshold of 10 tpy for existing dehydrators.

^b No HAPs actually detected in gas. LMM conservatively assumed a 0.0006 Mol% of total HAPs and added a safety factor to the GRI-GLYCalc results.

The proposed 40 MMscfd dehydrator (Source ID 202) is considered a new dehydrator and potential VOC emissions are less than 5 tpy, therefore LMM is not required to meet the control requirements of GP-5 Section F Condition 3 for this dehydrator. Although emissions are not required to be controlled, emissions from the flash tank will be controlled by at least 30% by routing to the reboiler as fuel. Table 6 shows the actual estimated emissions based on the representative gas analysis and the GRI-GLYCalc results. Table 7 shows the applicant's estimated worst case PTE. Worst case total HAP PTE calculations assumed 0.0006 Mol% of total HAPs and added a safety factor. Worst case VOC PTE is based upon the GP-5 emission threshold of 5 tpy for new dehydrators.

Table 6: Proposed 40 MMscfd Dehydrator Actual Emissions

Source	NOx		CO		VOC		HAPs ^a	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Reboiler	0.08	0.36	0.07	0.30	<0.01	0.02	-	-
Regenerator/Flash	-	-	-	-	0.83	3.65	0.56	2.44

^a No HAPs actually detected in gas. LMM conservatively assumed a 0.0006 Mol% of total HAPs.

Table 7: Proposed 40 MMscfd Dehydrator PTE

Source	NOx		CO		VOC ^a		HAPs ^b	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Reboiler	0.08	0.36	0.07	0.30	<0.01	0.02	-	-
Regenerator/Flash	-	-	-	-	1.12	4.90	1.00	4.40

^a VOC PTE based upon the GP-5 emission threshold of 5 tpy for new dehydrators.

^b No HAPs actually detected in gas. LMM conservatively assumed a 0.0006 Mol% of total HAPs and added a safety factor to the GRI-GLYCalc results.

Other Sources

Other emission sources include produced water storage tanks, truck load-out, startup/shutdown/maintenance (SSM) including blowdowns and pigging, and fugitive emissions from component leaks. Potential emissions were calculated by the applicant from the produced water tank based upon factors from EPA-450/3-85-001a – Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems; from truck load-out based upon emission factors from AP-42 Section 5.2; startup, shutdown, maintenance, blowdown, and pigging emissions based upon operational data; and fugitive emissions from component leaks based upon emission factors from EPA-453/R-95-017 – Protocol for Equipment Leak Emission Estimates. All calculations have been found acceptable and are included in the facility-wide emissions in Table 8 below.

Table 8: Springhill #2 Facility-Wide PTE

Source	VOC ^a		NOx		CO		HCHO		Ethylbenzene ^b		Total HAPs		GHG (CO ₂ e)	
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
CAT G3516B (1,380 bbl)	0.85	3.73	1.52	6.66	0.52	2.27	0.09	0.40	-	-	0.21	0.90	1,744	7,639
CAT G3516B (1,380 bbl)	0.85	3.73	1.52	6.66	0.52	2.27	0.09	0.40	-	-	0.21	0.90	1,744	7,639
Delhy (25 MMBscfd)	2.26	9.90	-	-	-	-	-	-	0.18	0.80	0.80	3.50	2,397	14,750
Reboiler (0.25 MMBtu/hr)	-	0.01	0.03	0.12	0.02	0.10	-	-	-	-	-	-	33	144
Delhy (40 MMBscfd) ^e	1.12	4.9	-	-	-	-	-	-	0.25	1.10	1.00	4.40	3,396	14,875
Reboiler (0.75 MMBtu/hr)	0.005	0.02	0.08	0.36	0.07	0.30	-	-	-	-	-	-	98	431
Produced Water Tanks ^d	0.21	0.94	-	-	-	-	-	-	-	0.02	0.19	0.84	15	68
Component Leaks	0.03	0.15	-	-	-	-	-	-	-	-	-	0.004	181	793
Truck Load Out	-	0.37	-	-	-	-	-	-	-	0.01	-	0.11	-	-
RPC ^e	0.09	0.39	-	-	-	-	0.02	0.10	-	-	0.03	0.12	249	1,092
Compressor Blowdowns ^f	-	0.28	-	-	-	-	-	0.01	-	-	-	-	-	1,456
Pigging ^g	-	0.02	-	-	-	-	-	-	-	-	-	4.80E-04	-	84
Facility-Wide PTE^h	5.42	24.45	3.15	13.8	1.13	4.93	0.21	0.90	0.44	1.93	2.44	10.80	11,215	49,125

^a VOC includes formaldehyde.^b Ethylbenzene is the largest single HAP.^c Emissions from the 40 MMBscfd dehydrator flash tank controlled by the reboiler at a minimum of 30%.^d A total of four (4) existing produced water tanks are to be included in this authorization; two (2) 150 bbl capacity tanks, one (1) 100 bbl capacity tank, and one (1) 24 bbl capacity tank.^e RPC is compressor rod packing/engine crankcase emissions. Includes electric driven compressor.^f Compressor blowdown emissions includes electric driven compressor.^g Pigging calculations based upon the natural gas analysis, 52 events per year, 3,061 sfc/event, process conditions (900 psig), and receiver size (50 scf).^h PM₁₀, PM_{2.5}, and SOx PTE are 1.03 tpy, 1.03 tpy, and 0.06 tpy respectively.

The Clean Air Act required the EPA to set NAAQS for pollutants considered harmful to public health and the environment and establishes two levels of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Springhill is classified as a natural minor facility and as such, would not typically be required to perform modeling to demonstrate that the emissions from this facility will not cause or contribute to a violation of any NAAQS. As a minor facility, worst case potential emissions are not expected to exceed the NAAQS or significant impact limits for the NAAQS.

Conclusions and Recommendations

After review, I have determined that LMM has demonstrated in this application that the installation and/or operation of the proposed engines and dehydrator and continued operation of the previously installed equipment meets the requirements of the GP-5, NSPS, and NESHAP, and is not expected to cause air pollution as defined in 25 Pa. Code § 121.1. The facility is below the thresholds for Title V, NNSR, and PSD, and is not considered a Major Source by these programs. Therefore, I recommend the authorization to install and/or operate the following equipment:

- One (1) previously installed 1,500 bhp electric motor driven compressor
- Two (2) previously installed 1,380 bhp Caterpillar G3516B 4SLB natural gas-fired compressor engines; each controlled by a Miratech oxidation catalyst
- One (1) previously installed 25 MMscfd triethylene glycol dehydrator (regenerator) with associated 0.25 MMBtu/hr natural gas-fired reboiler
- One (1) **NEW** 40 MMscfd triethylene glycol dehydrator (flash tank controlled by reboiler and regenerator) with associated 0.75 MMBtu/hr natural gas-fired reboiler
- Four (4) previously installed produced water tanks – two (2) 150 bbl capacity, one (1) 100 bbl capacity, and one (1) 24 bbl capacity
- Compressor rod packing and engine crankcase emissions
- Startup/shutdown/maintenance (including blowdown) emissions
- Produced water truck load-out (11,000 bbl/yr total)
- Piping and equipment fugitive emissions

Authorization to use the GP-5 will be granted for a period of 5 years in accordance with GP-5 Condition 12 of Section A. GP5-26-00587D will include all authorized sources at this facility; therefore, I also recommend inactivating GP5-26-00587B and GP5-26-00587C after authorizing GP5-26-00587D.