

COMMONWEALTH OF PENNSYLVANIA
 Department of Environmental Protection
 Southwest Regional Office

MEMO

TO Air Quality Permit File PA-26-00588A

FROM Alan A. Binder *AAB*
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THROUGH Mark R. Gorog, P.E. *MRG* Mark A. Wayner, P.E.
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DATE June 10, 2013

RE Comments and Response Document
 Natural Gas Production Facility
 Laurel Mountain Midstream, LLC
 Shamrock Compressor Station
 German Township, Fayette County
 APS # 765203, Auth # 902871, PF # 731038

The Pennsylvania Department of Environmental Protection ("Department") has received an application for plan approval to install and begin temporary operation of one new natural gas-fired compressor turbine, natural gas-fired emergency generator, dehydrator with reboiler, and produced water tank at Laurel Mountain Midstream, LLC's ("LMM's") Shamrock Compressor Station ("Shamrock") located in German Township, Fayette County. Review of this application by the Department has been completed and copies of the proposed plan approval and review memo were emailed to Lisa Sendek of Air Compliance Consultants, Inc. (acting as a project consultant for LMM) for review prior to issuance of the plan approval. This memo documents activity that has taken place since the review memo was finalized.

Notice of intent to issue the plan approval was published in the *Pennsylvania Bulletin* on September 29, 2012, published in the *Herald-Standard* on October 3-5, 2012, and sent to U.S. EPA on October 12, 2012, in accordance with the requirements of 25 Pa. Code §§ 127.44-127.45. All required methods of public notice were fulfilled as of October 5, 2012 and the normal 30-day public comment period ended at the close of business on November 5, 2012. The comment period was effectively extended until November 26, 2012, as a result of a public hearing held on November 13, 2012. EPA's 30-day comment period ended at the close of business on November 12, 2012. Notice of intent to issue was provided to the applicant on September 27, 2012, and the applicant fulfilled the requirement to publish the notice within 10 days of receipt.

Notice of a public hearing was published in the *Pennsylvania Bulletin* on September 29, 2012, and in the *Herald-Standard* on October 3-5, 2012 in accordance with the requirements of 25 Pa. Code § 127.48. The public hearing was originally to be held at 6:30PM on Tuesday, October 30, 2012, at the New Salem Volunteer Fire Department, 650 Footedale Road, New Salem, PA 15468. The public hearing was postponed until the November 13, 2012, in anticipation of inclement weather conditions caused by what was Hurricane Sandy at the time.

Notification of the rescheduled hearing was provided by telephone call to participants signed up to provide testimony, Department news release on November 5, 2012, and newspaper publication in the *Herald-Standard* on November 6, 2012.

After opening statements and presentations by representatives of LMM, the format of the hearing was structured first as an open house question and answer session participated in by both the Department and LMM, followed by a hearing at which testimony was given. Approximately 15 members of the public were in attendance and the open house and hearing lasted about 1.5 hours. A stenographer was present for the duration of the hearing and a transcript of the event was received by the Department on November 27, 2012. In accordance with 25 Pa. Code § 127.49(c), written statements and exhibits are accepted by the Department within 10 days after the hearing. The required public comment period was effectively extended to November 26, 2012, as a result of this hearing.

A single email approximately one page in length was received from Phyllis Carr on November 10, 2012.

Three individuals provided testimony at the public hearing on November 13, 2012. See the full list of names in Attachment 1 to this document.

A one-page comment letter was received from Melissa Troutman on behalf of Mountain Watershed Association on November 15, 2012.

A two-page comment letter was received via email from James Rosenberg on November 25, 2012, as a reproduction of oral testimony given at the public hearing.

A six-page comment letter was received via email from Jay Duffy on behalf of Clean Air Council on November 26, 2012

A five-page letter with three attachments was received via email from Joe Osborne on behalf of Group Against Smog and Pollution on November 26, 2012.

No comments were received by or on behalf of the applicant.

No comments were received from U.S. EPA.

The Department issued a revised General Plan Approval and/or General Operating Permit BAQ-GPA/GP-5 (GP-5) for Natural Gas Compression and/or Processing Facilities on February 1,

2013. Notice of this action was published in the *Pennsylvania Bulletin* on February 2, 2013. Updated Best Available Technology (BAT) requirements are established through this revised GP-5 including requirements for natural gas-fired simple cycle turbines. Natural gas-fired simple cycle turbines is a source category which is new to the GP-5 and inclusive of the Solar Titan 130 turbine proposed to be installed under this plan approval. Emission limitations proposed for the turbine have been reconsidered in light of the revised GP-5. See the Department's response under individual comment #6a for more information.

The response document is organized as follows: Some of the commenters had similar concerns and responses are provided for these "grouped" comments first. We then summarize and respond to individual comments. Commenters must recognize that this is an Air Quality Plan Approval and those issues that are within the scope of this application's review are those for which we are provided authority under the Pennsylvania Air Pollution Control Act and the Federal Clean Air Act and we have provided responses to those issues.

COMMENTS AND RESPONSES:

GROUPED COMMENTS & RESPONSES:

1. HEALTH CONCERNS: Some of the comments received relate to health impacts of Shamrock. Specific areas of concern include the health of nearby families and children, and impacts considering other regional natural gas production facilities.

RESPONSE

Shamrock is not currently, nor will it become as a result of this project, a major source of criteria or hazardous air pollutants, or any other air contaminant other than greenhouse gases (GHG).

The Clean Air Act required EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment and establishes two levels of national air quality standards:

- 1) Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; and
- 2) Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Per 40 CFR 81.339, German Township, Fayette County is classified as an area of attainment for all National Ambient Air Quality Standards (NAAQS) except for 8-hour ozone. All of the Commonwealth of Pennsylvania is located in the Northeast Ozone Transport Region, and therefore is treated like a moderate ozone nonattainment area. Shamrock is not a Major Facility for purposes of non-attainment new source review. An attainment new source review has been conducted for this project as part of the plan approval application review process.¹ Emission increases as a result of this project have been shown to not exceed significant emission increase thresholds for all attainment pollutants except GHG, which does not have an applicable NAAQS.

Although outside of the scope of this plan approval application review, on November 1, 2010, the Department released findings obtained during a short-term five-week monitoring program conducted near several natural gas related facilities in the Washington and Greene County areas of Pennsylvania.² Sampling for carbon monoxide, nitrogen dioxide, and ozone, did not detect levels above National Ambient Air Quality Standards at any of the sampling sites. Canister sampling detected the following compounds which are most likely related to the Marcellus Shale drilling activities: acetone, benzene, n-heptane, propene, and toluene. Concentrations of these pollutants were at, or slightly higher than, levels detected at Department monitoring network sites. However, none were detected at levels of concern. Screening results found during the

¹ See Department of Environmental Protection Southwest Regional Office, Review of Plan Approval Application, PA-26-00588A, September 27, 2012 (Revised October 4, 2012), pages 11-18.

² http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/docs/Marcellus_SW_11-01-10.pdf

five-week study do not indicate a potential for major air-related health issues associated with the Marcellus Shale natural gas activities.

Also outside of the scope of this plan approval application review, on July 23, 2012, the Department announced the commencement of a long-term, one-year air monitoring study of Marcellus Shale development in Washington County. Additional background information about the long-term study can be found by following this link to the Department's press release.

[http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=19520&ty
peid=1](http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=19520&typeid=1)

For additional information, see below response to individual comments #7b and #7c.

2. AGGREGATION: Some of the comments received relate to the aggregation of sources within Shamrock and the aggregation of Shamrock with other air contamination sources and facilities.

RESPONSE

An emissions aggregation analysis and determination has been described in the Department's Review of Plan Approval Application memo.³ This determination has been made in accordance with the law and the Department's *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries* effective on October 12, 2011. A final version of this policy was made effective on October 6, 2012. It is substantively the same as the draft policy and the Department's determination remains unchanged at this time.

³ See Department of Environmental Protection Southwest Regional Office, Review of Plan Approval Application, PA-26-00588A, September 27, 2012 (Revised October 4, 2012), pages 21-25.

INDIVIDUAL COMMENTS & RESPONSES:

1. Phyllis Carr, email received on November 10, 2012.
 - a. Comment regarding health of children near New Salem and in Fayette County.

RESPONSE

See above response to grouped comment #1.

2. James Rosenberg, testimony provided on November 13, 2012, and written copy of testimony provided via email on November 25, 2012.
 - a. Comment regarding the notice published in the PA Bulletin being deficient for only publishing increases to potential to emit (PTE).

RESPONSE

In accordance with 25 Pa. Code § 127.45(b)(3) “The notice of proposed plan approval issuance required by § 127.44(b) must include... the type and quantity of air contaminants being emitted” While there are currently no air contaminants being emitted from sources proposed for installation or other changes under PA-26-00588A, the Department in this case has interpreted this requirement to be satisfied by publishing PTE increases from the sources to be authorized for installation and other changes under PA-26-00588A. Only the sources and changes to be authorized under PA-26-00588A are subject to this public comment process. Additionally, based on PTE, Shamrock is an existing major source of GHG emissions and PTE increases are particularly relevant for changes at any existing major facility.

- b. Comment regarding the application withholding information about violations at Shamrock and other Laurel Mountain Midstream (LMM)/Williams facilities including Prah Compressor Station and Lathrop Compressor Station.

RESPONSE

This plan approval application’s submittal date (November 2, 2011) and Administrative Completeness date (November 30, 2011) predate both the Shamrock violation penalty assessment date (January 20, 2012) and the Lathrop compressor building explosion date (March 29, 2012). Enforcement actions taken for violations at Prah Compressor Station were taken against the previous Owner/Operator, Atlas Pipeline PA, LLC. The most recent enforcement actions at Prah were closed out as of May 13, 2008. Additionally, as all the past violations have been closed out, they are not relevant to the review of this plan approval application.

- c. Comment regarding PTE calculations not including a margin of error, and that a mere 2% error in the PTE calculation for NO_x will pass the threshold for Non-Attainment New Source Review (NNSR) Major Source.

RESPONSE

Under 25 Pa. Code § 121.1, *Potential to emit* (PTE) is defined, in relevant part as “the maximum capacity of a source to emit a pollutant under its physical and operational design.” *Id.* This definition includes consideration of physical or operational limitations which are federally enforceable. This plan approval application has been reviewed according to the physical and operational designs provided. Conditions have been included in the proposed plan approval to limit PTE and to require periodic demonstration of compliance with PTE limits.

Section E. Group Name: G101 Condition #001 of this proposed plan approval places an hours of operation limitation on the previously installed Caterpillar G3516B compressor engines. In conjunction with the above limitation, Site Level Condition #007a. requires recordkeeping for the number of hours of operation per month that each engine is operated. This limitation on hours of operation is federally enforceable and is taken into account when calculating PTE from these sources.

The Department relied on manufacturer warranted or “not to exceed” emission rates and control efficiencies when calculating PTE. These values represent either the maximum emission rate or minimum attainable control efficiency. Additional margins of error are not incorporated into PTE calculations. Actual emissions are always expected to be less than PTE.

- d. Comment regarding no proper analysis of probability of exposure to acute-effect toxic substance disease from the amounts of pollution permitted as Shamrock PTE.

RESPONSE

A discussion of HAP emissions and formaldehyde in particular, from Shamrock is included in the Department’s Review of Plan Approval Application Memo.⁴

Also, see below response to individual comment #7c.

- e. Comment regarding the plan approval not requiring appropriate BAT for leak detection (FLIR photography).

RESPONSE

The Department issued a revised GP-5 on February 1, 2013, which includes Requirements for Equipment Leaks under Section H. Requirements include a facility leak detection and repair program including, on a quarterly basis, use of FLIR cameras or other approved leak detection monitoring devices approved by the Department. While Shamrock is not eligible to be authorized for operation under a general permit due to its status as a Title V facility because of GHG PTE, the GP-5 serves as a reference for leak detection requirements in this case.

⁴ *Id.*, pages 32-33.

As originally worded, Section C. Condition #014 of the proposed plan approval required the Owner/Operator to incorporate the leak detection requirements of 40 CFR Part 98 Subpart W into a repair or maintenance program at Shamrock. This was the applicant's proposal to meet Best Available Control Technology (BACT) requirements for GHG emissions from component leaks. The Department has not determined applicability to Subpart W in this case⁵ but is incorporating the leak detection methods of Subpart W into leak detection and repair or maintenance condition in the plan approval. Leak detection frequency shall be conducted on a quarterly basis in order to be consistent with the frequency specified in the GP-5. Additionally, Section C. Condition #006 of the proposed plan approval requires the Owner/Operator to conduct facility wide inspections and document the results and any subsequent actions.

Site Level Conditions to Be Modified

1. Proposed Section C. Condition #014 – The Owner/Operator shall incorporate ~~[a] the leak detection requirements of 40 CFR Part 98 Subpart W into a~~ **[and]** repair or maintenance program at the Facility. Components subject to this program shall include but not be limited to valves, connectors, open ended lines, pressure relief valves, and meters. **[Frequency of leak detection shall be on a quarterly basis. Acceptable leak detection methods include any of the following:**
 - a. ***Optical gas imaging instrument.*** Use an optical gas imaging instrument for equipment leak detection in accordance with 40 CFR part 60, subpart A, § 60.18 of the *Alternative work practice for monitoring equipment leaks*, § 60.18(i)(1)(i); § 60.18(i)(2)(i) except that the monitoring frequency shall be annual using the detection sensitivity level of 60 grams per hour as stated in 40 CFR Part 60, subpart A, Table 1: *Detection Sensitivity Levels*; § 60.18(i)(2)(ii) and (iii) except the gas chosen shall be methane, and § 60.18(i)(2)(iv) and (v); § 60.18(i)(3); § 60.18(i)(4)(i) and (v); including the requirements for daily instrument checks and distances, and excluding requirements for video records. Any emissions detected by the optical gas imaging instrument is a leak unless screened with Method 21 (40 CFR part 60, appendix A-7) monitoring, in which case 10,000 ppm or greater is designated a leak. In addition, you must operate the optical gas imaging instrument to image the source types required by this subpart in accordance with the instrument manufacturer's operating parameters. Unless using methods in paragraph (b) of this condition, an optical gas imaging instrument must be used for all source types that are inaccessible and cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

⁵ *Id.*, page 9.

- b. *Method 21.* Use the equipment leak detection methods in 40 CFR part 60, appendix A-7, Method 21. If using Method 21 monitoring, if an instrument reading of 10,000 ppm or greater is measured, a leak is detected. Inaccessible emissions sources, as defined in 40 CFR part 60, are not exempt from this subpart. Owners or operators must use alternative leak detection devices as described in paragraph (a) or (b) of this condition to monitor inaccessible equipment leaks or vented emissions.
- c. *Infrared laser beam illuminated instrument.* Use an infrared laser beam illuminated instrument for equipment leak detection. Any emissions detected by the infrared laser beam illuminated instrument is a leak unless screened with Method 21 monitoring, in which case 10,000 ppm or greater is designated a leak. In addition, you must operate the infrared laser beam illuminated instrument to detect the source types required by this subpart in accordance with the instrument manufacturer's operating parameters.
- d. *Acoustic leak detection device.* Use the acoustic leak detection device to detect through-valve leakage. When using the acoustic leak detection device to quantify the through-valve leakage, you must use the instrument manufacturer's calculation methods to quantify the through-valve leak. When using the acoustic leak detection device, if a leak of 3.1 scf per hour or greater is calculated, a leak is detected. In addition, you must operate the acoustic leak detection device to monitor the source valves required by 40 CFR Part 60 Subpart W in accordance with the instrument manufacturer's operating parameters. Acoustic stethoscope type devices designed to detect through valve leakage when put in contact with the valve body and that provide an audible leak signal but do not calculate a leak rate can be used to identify non-leakers with subsequent measurement required to calculate the rate if through-valve leakage is identified. Leaks are reported if a leak rate of 3.1 scf per hour or greater is measured.

If any leak is detected, the Owner/Operator shall repair the leak as expeditiously as practicable, but no later than fifteen (15) days after the leak is detected, except as provided in 40 CFR § 60.482-9.]

- 2. Proposed Section C. Site Level Condition #007 – The Owner/Operator shall maintain the following comprehensive and accurate records:
 - a. The number of hours per month that each engine and turbine operated.
 - b. The number of hours per month that either turbine is not operational.
 - c. The amount of fuel used per month by each engine and turbine.
 - d. Records of actual throughput per day and the glycol circulation rate for the dehydrator.

- e. Records including a description of testing methods, results, all turbine and engine operating data collected during tests, and a copy of the calculations performed to determine compliance with emission standards for the each turbine and engine.
 - f. Copies of the report that demonstrates that the turbine was operating at maximum routine operating conditions and within plus or minus 25 percent of 100 percent peak load during performance testing.
 - g. Copies of the manufacturer's recommended maintenance schedule for each turbine, engine, and catalyst.
 - h. Records of any maintenance conducted on each turbine, engine, and catalyst.
 - i. The total sulfur content of the natural gas being fired in the turbines or the demonstration that the natural gas does not exceed potential sulfur emissions of 0.060 lb SO₂/MMBtu of heat input consistent with 40 CFR §60.4365.
 - j. Records of a fractional gas analysis performed at least once six months on the inlet natural gas to the facility.
 - k. Records of facility-wide inspections including the date, time, name, and title of the observer, along with any corrective action taken as a result.
 - l. **[Records of any leak detected and associated repair activity through the leak detection and repair or maintenance program.]**
- f. Comment regarding the application submissions of municipal notification being deficient because they refer to public comment periods which were never advertised and did not take place.

RESPONSE

Under 25 Pa. Code § 127.43a, "The applicant for a plan approval shall notify the local municipality and county where the air pollution source is to be located that the applicant has applied for the plan approval as required by section 1905-A of The Administrative Code of 1929 (71 P. S. § 510-5). The notification shall clearly describe the source and modifications that are to take place. The notice shall state that there is a 30-day comment period which begins upon receipt of the notice by the municipality and county." Municipal notification letters provided with this application have fulfilled this requirement. The letters do not refer to public comment periods and are in fact direct notification of German Township and Fayette County officials.

3. Marigrace Butella, testimony provided on November 13, 2012.
 - a. Comment regarding major source determination and requiring the major source threshold to be based upon evaluations of both single source emissions within the facility and a facility-wide assessment of all similar sources. This comment was derived from a letter from the American Lung Association, American Public Health Association, American Thoracic Society, and Asthma and Allergy

Foundation of America Trust for America's Health dated November 30, 2012, to the U.S. Environmental Protection Agency. The referenced letter has been submitted along with this verbal testimony.

RESPONSE

The Department considers and combines emissions from all air contamination sources within a facility when determining a facility's status as a major or minor source of air contaminants.

Also, see above response to grouped comment #2.

- b. Comment regarding 316 or 317 individuals throughout the country who have experienced health symptoms and illness from compressor stations as well as other gas facilities and so forth. A document titled "List of the Harmed" by the Pennsylvania Alliance for Clean Water and Air lists of 316 individuals (including class action groups), and has been submitted along with this verbal testimony.

RESPONSE

See above response to grouped comment #1.

4. Gregory Peck, testimony provided on November 13, 2012.
 - a. Comment regarding concerns for the health of the Peck family including three children.

RESPONSE

See above response to grouped comment #1.

5. Melissa Troutman on behalf of Mountain Watershed Association, letter received November 15, 2012.
 - a. "Are the requirements for pollution control for this facility the absolute best they can be according to current best available technology?"

RESPONSE

New sources are required to be controlled to the maximum extent, consistent with the best available technology as determined by the Department as of the date of issuance of a plan approval for a new source. BAT is defined as equipment, devices, methods, or techniques as determined by the Department which will prevent, reduce or control emissions of air contaminants to the maximum degree possible and which are available or may be made available. The Department's review of BAT for these new sources has been summarized in the Review of Plan Approval Application memorandum.⁶ The Department's BAT determination has also been revised, where applicable, to be consistent with the new GP-5 issued on February 1, 2013. Relevant BAT revisions have been documented in this memorandum.

⁶ *Id.*, pages 9-11.

Additionally, BACT requirements have been applied to this project for emissions of GHG from new sources.⁷

- b. “Has this pollution source and its allotted emissions been considered as part of or alongside a cumulative, aggregate study of regional emissions to ensure that ambient air quality standards are in no danger of worsening?”

RESPONSE

A cumulative aggregate study of regional emissions is outside of the scope of this plan approval application review. The emissions from Shamrock are below the regulatory levels that are expected to cause a significant impact for pollutants in an area of attainment with the NAAQS; consequently modeling is not required.

Also see above response to grouped comment #1.

6. Jay Duffy, on behalf of Clean Air Council, letter received via email on November 26, 2012.

- a. Comments regarding an insufficient BAT analysis by the PA DEP. Specific concerns include combining the proposed source with existing sources when evaluating control device feasibility, the possibility of circumvention of pollution control requirements by not considering scalability for future control feasibility, evaluating SCR and SoLoNO_x control from the same baseline emission concentration, and conducting a consistent BAT analysis for all pollutants.

RESPONSE

Under 25 Pa. Code § 127.1, “...New sources shall control the emission of air pollutants to the maximum extent, consistent with the best available technology as determined by the Department as of the date of issuance of the plan approval for the new source.” Application of BAT is limited to the new sources proposed under this plan approval. Inclusion of previously authorized sources or hypothetical future sources is outside the scope of this plan approval application review process.

Circumvention is referenced in two locations within Title 25 of the Pennsylvania Code:

Circumvention, as detailed under 25 Pa. Code § 121.9 states, “No person may permit the use of a device, stack height which exceeds good engineering practice stack height, dispersion technique or other technique which, without resulting in reduction of the total amount of air contaminants emitted, conceals or dilutes an emission of air contaminants which would otherwise be in violation of this article, except that with prior approval of the Department, the device or technique may be used for control of malodors.” This section is in relation to dispersion and not relevant to a BAT analysis conducted for a plan approval application.

⁷ *Id.*, pages 18-21.

Circumvention, as detailed under 25 Pa. Code §127.216 states, “Regardless of the exemptions provided in this subchapter, an owner or other person may not circumvent this subchapter by causing or allowing a pattern of ownership or development, including the phasing, staging, delaying or engaging in incremental construction, over a geographic area of a facility which, except for the pattern of ownership or development, would otherwise require a permit or submission of a plan approval application.” This section is in relation to new source review and not relevant to a BAT analysis conducted for a plan approval application.

Additional information has been solicited from LMM as a result of receipt of public comments. The following information has been provided directly from LMM relevant to employing SCR to control combined exhaust streams:

“Combining the Solar Titan 130 turbine exhaust with other existing sources at the facility would amount to redesigning the facility at an enormous cost for an uncertain benefit. The feasibility and operability of such a design is highly questionable as each turbine is in a separate building from the compressor engines and the system would need to be able to accommodate highly variable operating scenarios. These scenarios could range from one engine being in service to the full permitted capacity of all engines and both turbines.”

BAT for control of NO_x has been summarized in the Review of Plan Approval Application memorandum.⁸ A NO_x emission rate of 15 ppmvd @ 15% O₂ is representative of the application of BAT to the proposed Titan 130 turbine. This determination is consistent with the Department’s revised General Plan Approval and/or General Operating Permit (BAQ-GPA/GP-5) for Natural Gas, Coal Bed Methane or Gob Gas Production or Recovery Facilities issued on February 1, 2013. While Shamrock is not eligible to be authorized for operation under a general permit due to its status as a Title V facility because of GHG PTE, the GP-5 serves as a reference for BAT requirements in this case. The revised GP-5 reflects the Department’s most recent BAT determination for natural gas-fired simple cycle gas turbines. *See* BAQ-GPA/GP-5, Section A, No. 5.

BAT for control of CO and VOC has been summarized in the Review of Plan Approval Application memorandum.⁹ The BAT analysis was based upon the information available at the time the application was received and up until the review memo was completed. CO and VOC are primarily products of incomplete combustion from the turbine for which complete combustion and oxidation are the only control options expected to be potentially feasible. Annual cost to control values included in the memo were calculated by the applicant using capital investment costs set forth in the appendices to the BACT analysis section of the plan approval application.

⁸ *Id.*, page 10.

⁹ *Id.*, pages 10-11.

The Department has reconsidered the BAT determination for emissions of CO from the proposed Solar Titan 130 turbine in light of the revised GP-5 issued on February 1, 2013. Accordingly, the draft plan approval is being modified to be consistent with the new GP-5 CO emission limit for natural gas-fired simple cycle gas turbines rated greater than or equal to 15,000 bhp. The Department has found oxidation catalyst technology to be a cost effective option for CO control at an uncontrolled baseline CO emission level of 25 ppm @ 15% O₂. The Department has also found actual emission data from new turbines rated equal to or greater than 15,000 bhp that indicates 10 ppm of CO at 15% O₂ has been achieved without any add on control. However, a cost effectiveness evaluation for oxidation catalyst technology for these turbines with uncontrolled CO emissions of 10 ppmvd @ 15% O₂ shows that cost effectiveness exceeds \$14,000 per ton of CO and VOC removed and is cost prohibitive.¹⁰

Similarly, the BAT determination for emissions of VOC from the proposed Solar Titan 130 turbine has been reconsidered in light of the Department's revised GP-5. Accordingly, the draft plan approval is being modified to be consistent with the new GP-5 VOC emission limit of 5 ppmvd (as propane) @ 15% O₂ for natural gas-fired simple cycle gas turbines rated greater than or equal to 15,000 bhp.¹¹

These changes will result in a decrease of the facility-wide PTE for CO and VOC as follows:

Table 1: Facility-Wide Potential to Emit

Air Contaminant ^a	Emission Rate ^b (tpy)
NO _x	98.51
CO	95.35 [73.37]
PM/PM ₁₀	21.21
PM _{2.5}	16.21
SO _x	4.67
VOC	26.38 [26.11]
Formaldehyde	7.42
HAP ^a	10.76
CO ₂ e	187,820

¹⁰ See Pennsylvania Department of Environmental Protection, Bureau of Air Quality, *Technical Support Document General Permit GP-5*, January 31, 2013 (amended April 9, 2013), pages 39-41 and 75, http://www.dep.state.pa.us/dep/deputate/airwaste/airwaste/aq/permits/gp/Technical_Support_Document_GP-5_1-31-2013-final.pdf

¹¹ The VOC concentration limit needed to be corrected downward from the 25 ppmv @15% O₂ limit proposed in the plan approval in any case. An unburned hydrocarbon (UHC) emission rate of 25 ppmvd (as methane) @ 15% O₂, equivalent to 5.23 lb/hr, has been warranted by the manufacturer, and the 5.23 lb/hr mass emission rate was then reduced by 80% to arrive at a 1.05 lb/hr mass emission rate. This mass emission rate actually corresponds to a VOC emission rate of 5.4 ppmvd (as propane) @ 15% O₂ because of molecular weight differences and weighting according to accepted test methods for measuring VOC concentrations.

^a Total HAP includes slightly more than 1.1 tpy of unknown HAP estimated from fugitive emissions and a mixture of acetaldehyde, acrolein, methanol, and n-Hexane from the internal combustion engines. Formaldehyde is the primary HAP of concern at this facility and is listed separately as well as included in the total.

^b Values may be slightly inconsistent out to the second decimal due to rounding

The following condition has been modified in the proposed PA-26-00588A:

Source Level Condition to Be Modified

1. Proposed Source ID: 113 Condition #002 - Emission rates from the Solar Titan 130 turbine shall be limited as follows [25 Pa. Code §127.12b]:

Air Contaminant	Operating Condition	Emission Rate
NO _x	Normal	15 ppmv[d] @ 15% O ₂
	Normal	9.00 lb/hr
	All	36.22 tpy
CO ^[1]	Normal	25[10] ppmv[d] @ 15% O ₂
	Normal	9.13[3.65] lb/hr
	All	46.64[24.66] tpy
VOC	Normal	25[5] ppmv[d (as propane)] @ 15% O ₂
	Normal	1.05[0.98] lb/hr
	All	4.31[4.04] tpy
PM ₁₀	Normal	3.38 lb/hr
	All	14.80 tpy
PM _{2.5}	Normal	2.23 lb/hr
	All	9.80 tpy

[¹ If the Owner/Operator cannot demonstrate to the Department, during the shakedown period, that this turbine is capable of meeting the CO emission limit of 10 ppmvd @ 15% O₂, the Owner/Operator shall install an oxidation catalyst to reduce CO emissions to meet the standard. The Owner/Operator shall demonstrate compliance with the CO emission limit according to test methods or procedures deemed appropriate by the Department.]

For purposes of this condition, the "normal" operating scenario excludes startup, shutdown, and low temperature operating scenarios. Startup is defined as beginning when air contaminants begin to be emitted to the atmosphere, and shall have a duration no greater than 10 minutes. Shutdown is defined as ending when contaminants are no longer being emitted to the atmosphere, and shall have a duration no greater than 10 minutes. Low temperature is defined as less than 0°F.

- b. Comments regarding additional analysis being required for the GHG BACT determination.

RESPONSE

Thermal efficiencies examined in the BACT analysis are for simple-cycle, natural gas-fired turbines. This is considered to be within the source category for the proposed Solar Titan 130 turbine. Thermal efficiencies from 70-80% represented by Solar Turbines in its *Turbomachinery Systems For Oil and Gas Applications* brochure are for combined-cycle, natural gas-fired turbines. Combined-cycle turbines are used almost exclusively in cogeneration or utility power generation applications. The Department does not have the authority to redefine the source category as proposed.

Many of the EPA Natural Gas STAR Program recommendations provided by comment are not applicable to the new sources proposed for installation under this plan approval. For example, this plan approval does not include internal combustion engines or reciprocating compressors. Some of the recommendations overlap and become unnecessary when one or the other is selected. For example, piping the glycol dehydrator to a vapor recovery unit and zero emissions dehydrators are mutually exclusive recommendations. Additionally, some of the recommendations such as optimizing glycol circulation rate would be considered to fall under "good air pollution control practices" which is currently a requirement of the proposed plan approval.

Additional information has been solicited from LMM as a result of receipt of public comments. The following information has been provided directly from LMM relevant to its current participation in EPA's Natural Gas Star Program:

"... LMM already voluntarily employs the following Gas Star protocols and technologies at the Shamrock Compressor Station:

- Compressors
 - Scheduling the operation of compressors, based on anticipated gas volumes to maximize runtime and reduce natural gas venting,
 - Testing and repairing of pressure safety valves on a periodic basis,
 - Utilization of a pressurized hold on the turbine/compressor set during normal shut down, keeping gas within piping and reducing emissions when taking compressors off-line, and expedite start-up,
 - Using automated air to fuel controls,
 - Using electric start motors, and,
 - Using dry gas seals.
- Dehydrators
 - Installation of new zero emissions glycol dehydrator unit that recycles both the flash tank offgas and still vent emissions as reboiler fuel,
 - Modification of the existing dehydrator to capture and recycle the still vent emissions as reboiler fuel,
 - Capturing and recycling the existing flash tank offgas as reboiler fuel, and,

- Utilization of electric glycol pumps.
- Other
 - Utilization of instrument air in pneumatic controls where feasible, and
 - Implementation of directed inspection and maintenance, including routing operator inspection, defined preventative maintenance procedures, and station alarms/controls.”
- c. Comments regarding a flawed Aggregation Analysis by PA DEP.

RESPONSE

See above response to grouped comment #2.

7. Joe Osborne, on behalf of Group Against Smog and Pollution, letter received via email on November 26, 2012.
- a. Comment stating that the Department must combine emissions increases from GP5-26-00588A and PA-26-00588 with those from PA-26-00588A for the Shamrock PSD applicability analysis in order to avoid PSD circumvention.

RESPONSE

The Department has conducted a PSD review and determination as part of this plan approval application review process.¹² This includes consideration of the possibility of PSD circumvention.

- b. Comment regarding emissions from Shamrock, as proposed in PA-26-00588A, likely violating the 1-hour NAAQS for NO_x.

RESPONSE

Under 25 Pa. Code §127.12(a)(6), “An application for approval shall: Show that the source will not prevent or adversely affect the attainment or maintenance of ambient air quality standards when requested by the Department.” Minor sources of air contamination (with respect to criteria pollutants) are not normally expected to cause and exceedance of the NAAQS or exceed the significant impact levels for the NAAQS. Such a modeling demonstration is normally required for new air contamination sources triggering Prevention of Significant Deterioration (“PSD”) requirements. However, LMM has voluntarily submitted the results of Industrial Source Complex Short Term Version 3 (ISCST3) modeling during this public comment response process. The ISCST3 model incorporates additional information when compared to the SCREEN3 modeling previously conducted. Multiple emission point sources are modeled simultaneously and hourly meteorological data is included. LMM also utilized EPA’s Tier 2 modeling approach for the 1-hour NO₂ NAAQS which allows the assumption that only 80% of NO_x is NO₂. Results of this modeling show that maximum 1-hour NO₂ concentrations at the facility property line do not exceed the 1-hour NO₂ NAAQS

¹² See Department of Environmental Protection Southwest Regional Office, Review of Plan Approval Application, PA-26-00588A, September 27, 2012 (Revised October 4, 2012), pages 11-18.

value. This result is not unexpected considering to the earlier more conservative SCREEN3 modeling results and application of EPA's Tier 2 modeling approach.

Also, see above response to grouped comment #1.

- c. Comment stating that formaldehyde emissions from Shamrock posing an unacceptably high cancer risk.

RESPONSE

PTE for formaldehyde from Shamrock has been calculated to be 7.42 tons per year. This is less than 10 tons per year and Shamrock is therefore categorized as a minor facility with respect to formaldehyde emissions. A summary of formaldehyde screening results for facilities with higher formaldehyde PTE and also the previous configuration of Shamrock (under PA-26-00588) is included in the Review of Plan Approval Application memorandum.¹³

LMM previously submitted results of SCREEN3 modeling during the public comment response process for PA-26-00588. A chronic inhalation cancer risk factor of 5.50E-09 per micro-gram per cubic meter ($m^3/\mu g$) was used when calculating cancer risks due to formaldehyde exposure. This risk factor was published in 1999 by the CIIT Centers for Health Research (formerly the Chemical Industry Institute of Toxicology). It is consistent with other formaldehyde modeling that has been received by the Department and with formaldehyde modeling performed by EPA for its 1999 National Scale Assessment and in development of National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines. EPA has since reverted to using an inhalation risk factor of 1.3E-05 $m^3/\mu g$ which is based on a 1987 study and published in EPA's Integrated Risk Information System (IRIS) database.

EPA is currently in the process of revising its IRIS formaldehyde assessment in part because the 1987 study did not undergo external scientific peer review. The current draft assessment has been reviewed by the National Academy of Sciences but EPA has stated that it is not appropriate for quotation or citation and does not constitute Agency policy.

LMM has voluntarily submitted the results of Industrial Source Complex Short Term Version 3 (ISCST3) modeling during the public comment response process for this pending plan approval. The ISCST3 model incorporates additional information when compared to the SCREEN3 modeling previously conducted. Multiple emission point sources are modeled simultaneously and hourly meteorological data is included. Results of this modeling show maximum annual formaldehyde concentrations at the property line and nearest residence of 0.844 and 0.203 $\mu g/m^3$ respectively. Applying the IRIS chronic inhalation risk factor of 1.3E-05 $m^3/\mu g$ results in cancer risks at the property line and nearest residence of 11.0 and 2.6 in a million respectively. In general, the USEPA considers excess

¹³ *Id.*, pages 32-33.

cancer risks that range between 1E-06 and 1E-04 to be acceptable, although this is evaluated on a case-by-case basis.”¹⁴ Modeled cancer risks from formaldehyde PTE at Shamrock do not exceed 1.1E-05 beyond the property line or 2.6E-06 at the nearest residence, and fall within the generally acceptable range.

The Department has previously identified the formaldehyde ambient air concentration which is generally accepted to be protective of public health in an Administrative Order issued to Armstrong World Industries, Inc. (“AWI”) and executed on April 25, 2008. Determination G. of the Order states, “AWI’s modeling showed that under certain meteorological and manufacturing conditions, ambient air concentrations of formaldehyde at AWI’s property line had the potential to exceed 68 micro-grams per cubic meter ($\mu\text{g}/\text{m}^3$), a level generally accepted to be protective of public health.” This statement would be valid for a 1-hour concentration of formaldehyde. The maximum formaldehyde concentration predicted by either the previous SCREEN3 model or the ISCST3 model is a 1-hour property line concentration of $27.11 \mu\text{g}/\text{m}^3$ which is less than $68 \mu\text{g}/\text{m}^3$. Worst case formaldehyde concentrations modeled at the property line and nearest residence to Shamrock are therefore generally accepted to be protective of public health. Actual concentrations and calculated impacts are expected to be less than the modeled results because ISCST3 is a Gaussian dispersion model and considered to be conservative in nature. Additionally, actual emissions of formaldehyde and source hours of operation are expected to be less than that which was used as modeled inputs.

Modeled annual and 1-hour property line concentrations are also below additional inhalation reference concentrations listed for formaldehyde on the Risk Assessment Information System (“RAIS”).¹⁵ Chronic, short-term, and acute inhalation reference concentrations from the Agency for Toxic Substances & Disease Registry are listed as well as reference doses for oral exposure. The chronic inhalation reference concentration of $9.83 \mu\text{g}/\text{m}^3$ is greater than the maximum annual concentration of $2.17 \mu\text{g}/\text{m}^3$ predicted by either model. Similarly, the short-term and acute inhalation reference concentrations of 36.8 and $49.1 \mu\text{g}/\text{m}^3$ respectively are both greater than the maximum 1-hour concentration of $27.11 \mu\text{g}/\text{m}^3$ predicted by either model.

¹⁴ http://www.epa.gov/region8/r8risk/hh_risk.html

¹⁵ http://rais.onrl.gov/cgi-bin/tools/TOX_search?select=chem and retrieve values for formaldehyde.

Attachment 1

Public Hearing Testimony Providers

1. Mr. James Rosenberg
2. Ms. Marigrace Butella
3. Mr. Gregory Peck