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MEMO

TO Air Quality Permit File: TVOP-26-00535
Duke Energy Fayette II, LLC/Fayette Energy Facility

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DATE July 16, 2012

RE Review of Application for Title V Operating Permit
Duke Energy Fayette II, LLC/Fayette Energy Facility
German Township, Fayette County

APS#748423; AUTH #877526; PF#563600

Background:

The Fayette Energy Facility is a 630 MW, natural gas-fired, combined cycle combustion gas turbine (CGT) power plant. Electrical generators are directly driven by two GE Model PG 7241FA combustion turbines, each equipped with a duct burner and a heat recovery steam generator. (HRSG) A single reheat steam turbine/generator, powered by steam from both HRSGs, generates electrical power in addition to the CGT combustion turbine generators. Each CGT system is capable of producing about 315 MW of gross electrical power.

On February 20, 2001, a plan approval application for the Fayette Energy Facility was received by the Department and given the identification PA-26-00535A. This application requested authorization to construct the combined cycle facility. The duct burners would be natural gas-fired and combustion turbines would combust either natural gas, or No. 2 fuel oil. The application was found to be administratively complete on March 29, 2001.

On September 7, 2001, Revision #1 for the plan approval application was sent to the Department. This revision requested revision of the estimated emissions of NO_x, SO₂, PM₁₀, and CO. On October 3, 2001, Revision #2 for the plan approval application was sent to the Department. On November 1, 2001, Revision #3 for the plan approval application was sent to the Department. This revision submitted the results of additional ambient air modeling analysis work that had previously been discussed with the Department.

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The Notice of Intent to Issue the Plan Approval was posted in the Pa. Bulletin on Saturday, December 8, 2001. The plan approval was issued on January 30, 2002. Plant startup using natural gas firing took place on March 16, 2003. The plan approval was valid for 180 days after startup. This fixed the expiration date of PA-26-00535A at September 12, 2003.

An announcement of the modification of Plan Approval PA-26-00535A was posted in the PA. Bulletin on Saturday, May 17, 2003. This modification redefined the definitions of cold, warm, and hot turbine startups, with regard to previous offline duration. It also extended exemption from emission limitations to periods of routine maintenance and turbine tuning.

The plan approval authorized construction of a system capable of oil firing the CGTs, but not the duct burners, as an alternative operating scenario. The equipment, such as oil storage tanks, piping, controls etc. to enable the oil firing, was never installed at the Fayette Energy Center. Since Plan Approval PA-26-00535A has expired, construction of the equipment for oil firing is no longer authorized. Therefore, potential air emissions from the facility actually constructed are different than those estimated for the natural gas and oil-fired combustion gas turbines in the plan approval.

In addition to the lack of construction of oil combustion equipment, two other changes were made to sources at the facility:

1. Three small diesel storage tanks were installed, instead of two large tanks.
2. Three chilling cooling towers with drift eliminators were installed, rather than the four in the plan approval
3. The Plan Approval authorized construction of 44.1 MMBtu/hour Auxiliary Boiler equipped with a low NOx burner. Instead, a boiler with a heat input capacity of 30.6 MMBtu/hour was installed.

Also, the operators of the Fayette Energy Facility had estimated in the plan approval application, for the purpose of annual emission limitation estimation, that the CGTs would start a maximum of 37 times, each, under cold, warm, and hot conditions every year. Each of these starts would eventually be followed by a shutdown period. Plan approval did not include limits on the number of starts and stops. (Emissions from all operating conditions are included in annual emission statements.) Fees are paid on all emissions, including non-steady state operations. Now, the company has found, at both the Fayette Energy Center and its identical sister plant, the Washington Energy Facility in Beverly, Ohio, that operation as an electric power peak load plant requires the CGTs to start and stop much more frequently than this. Operational data for 2010, for both facilities, demonstrates that the CGTs start, run for a period of a day, and

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shut down during the same day, on most days of the year. Duke wishes to build this scenario into their TVOP.

Testing to demonstrate compliance of the two combustion gas turbine systems (CT1 and CT2) with Plan Approval PA-26-00535A was conducted on May 22 and 23, 2003. The combustion turbines were found to comply with all emission limitations in the plan approval. In order to demonstrate compliance prior to issuance of the proposed Operating Permit, stack testing was repeated on the two CGT systems on August 10 & 11, 2011. The condensable particulate fraction was measured to be higher than the entire allowable emission for PM₁₀. Results for emissions of condensable particulate were more than an order of magnitude higher than during the 2003 stack test program. Concern about the accuracy of these results led to a decision by the Department to require repetition of the entire test program. The repeated stack test program was conducted by a different stack test company (GE) for emissions of PM₁₀, TOC, ammonia, and formaldehyde on March 27 through 29, 2012. Emissions of these pollutants from the CGTs were found to be in compliance with requirements. Duke requested that the Operating Permit be phrased to allow this test program, conducted prior to issuance of an Operating Permit, to be used as a demonstration of compliance with the proposed Operating Permit.

Testing required to certify the accuracy of continuous emission monitoring systems (CEMs) for NO_x and O₂ on the exhaust of CT1 and CT2 was also conducted on May 22 and 23, 2003. Periodic Relative Accuracy Test Audits (RATAs) have been conducted on these systems since that time. The most recent RATA was conducted on October 11, 2010. This audit only evaluated the CT1 CEM system. This was testing following replacement of the CT1 CEM system umbilical line on September 22, 2010. The system passed all required criteria. The CT2 CEM system was last audited on August 3, 2010. Both the CT1 and CT2 CEM systems were audited at that time and passed all required criteria.

Duke has requested, as part of conversion of the authorization from a plan approval to an Operating Permit, to remove the annual hours of operation limitation on use of the auxiliary boiler at the Fayette Energy Center. Operation of this boiler is limited in the Plan Approval to 2500 hours annually. While to date, this limitation has not been exceeded at Fayette, additional operation of the auxiliary boilers has been found to be necessary for heat tracing and other uses at two sister stations operated by Duke. These stations are the Hanging Rock Energy Facility, located in Ironton, Ohio, and the Washington Energy Facility, located in Beverly, Ohio. Hanging Rock is a larger facility, containing four CGTs and two auxiliary boilers identical to those at Fayette, which should reduce the number of hours for steam to be required from the auxiliary boiler.

M. Hochhauser inspected the Fayette Energy Facility on August 10, 2011. All equipment, whose construction and temporary operation that had been authorized by Plan Approval PA-26-00535, with the exception equipment required for oil fired operation and the

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Auxiliary Boiler (Source ID 031), had been installed as per the authorization. A smaller boiler, of 30.6 MMBtu/hour heat input, also equipped with a low NO_x burner, had been installed as the Auxiliary Boiler, rather than the larger unit described in the Plan Approval.

Emissions and Control:

The combined cycle CGTs are fired by natural gas. Duct burners, which are part of the combustion turbine system, also combust natural gas. Maximum heat input is 1,745 MMBtu/hour for each CGT alone and 589 MMBtu/hour for the associated downstream duct burners, for a total heat input of 2,343 MMBtu/hour to each of turbine systems. Both CGTs have inlet air chilling systems to increase combustion air throughput when ambient air is above 50 °F. Emission controls are dry, low NO_x combustors, selective catalytic reduction (SCR) to reduce emissions of NO_x, and a precious metal oxidation catalyst, which reduces emission of CO, VOCs, and organic HAPs. The combustion turbine systems can be operated in two different combined cycle modes. For high electrical outputs, both the combustion turbine and duct burner are fired by natural gas and the downstream HRSG produces steam which powers a separate turbine that produces electricity, in addition to the combustion turbine. At lesser electrical outputs, the duct burners do not operate, producing lower flue gas temperatures and lesser steam production in the HRSG, and lower electrical output from the steam turbine generator. The CGTs cannot operate as simple cycle units.

A 30.6 MMBtu/hour auxiliary boiler provides steam for facility startup, freeze protection, and other processes that consume steam. The facility also has cooling towers, a 489-bhp, diesel emergency generator engine, and a 265-bhp, diesel emergency firewater pump engine.

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Potential emissions of criteria pollutants from the emission processes at the Fayette Energy Facility are estimated to be the following:

Table 1
Fayette Energy Center (TVOP-26-00535)
Normal Operation
Potential to Emit Criteria Pollutants

Sources	PM ₁₀		SO ₂		CO		NO _x ⁷		VOC ⁸	
	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr
101 – CT 1 with operating Duct Burner #1 in operation. ¹	34.8 ⁴	309.8 ⁵	19.7 ⁴	173.0 ⁵	15.7 ⁴	562.3 ⁵	21.6 ⁴	286.7 ⁵	10.0 ⁴	87.3 ⁵
102 – CT 2 with operating Duct Burner #2 in operation. ¹	34.8 ⁴		19.7 ⁴		15.7 ⁴		21.6 ⁴		10.0 ⁴	
031 – Auxiliary Boiler ² (30.6 MMBtu/hr)	0.31	1.34	0.03	0.13	3.34	14.61	1.07	4.69	0.49	2.14
104 ⁶ – Emergen. Diesel Firewater Pump Engine ³ (265-bhp)	0.44	0.11	0.40	0.10	1.32	0.33	6.20	1.55	0.52	0.13
105 ⁶ – Emergen. Diesel Gener. Engine ³ (489-bhp)	0.72	0.18	4.00	1.0	15.2	3.8	12.4	3.1	1.76	0.44
106 – Cooling Towers ³	0.36	1.56								
Total	71.4	313.0	43.7	174.2	51.3	581.0	62.8	296.0	22.8	90.0

¹ Emission limitations for CT 1 and CT 2 were established under the authority of 25 PA Code 127.1 (BAT) and LAER for NO_x and VOC, and BACT for PM₁₀, CO and SO₂.

² Emission Limitations for the Auxiliary Boiler are based on the manufacturer's guarantee.

³ Emission estimates for these sources are based on AP-42 emission factors.

⁴ Hourly Emissions for the CGTs are based on emission limitations during steady-state (ISO) operation only.

⁵ Annual Emissions for the CGTs include all emissions, including startup, ISO operation and shutdown.

⁶ Operation of the Firewater Pump and Diesel Generator Engines are limited to 500 hours per year.

⁷ Expressed as nitrogen dioxide. (NO₂)

⁸ Expressed as methane. (CH₄)

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Emissions of Hazardous Air Pollutants (HAPs) were also estimated. Results for the facility are shown in Table 2:

Table 2
Fayette Energy Center (TVOP-26-00535)
Potential to Emit Hazardous Air Pollutants

HAP	lb/hr	ton/yr
Formaldehyde	1.01	4.38
Hexane	0.05	0.24
Toluene	0.03	0.13
Other HAPs	0.05	0.17
Total HAPs	1.14	4.92

Emission estimates are based on CGT emission limitations for formaldehyde and AP-42 emission factors.

Emissions of formaldehyde and toluene are primarily from the CGT systems. The Auxiliary Boiler was the main source of hexane emissions.

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Finally, the potential of the facility to emit greenhouse gases was also evaluated. Results of this evaluation are shown in Table 3:

Table 3
Fayette Energy Center (TVOP-26-00535)
Facility Potential to Emit Greenhouse Gases

Source	Greenhouse Gas							
	CO ₂		CH ₄		N ₂ O		Total CO ₂ e	
	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr
101 – CT 1 with operating Duct Burner #1 in operation.	257,730	1,128,857	20	88	7	31	258,470	1,132,099
102 – CT 2 with operating Duct Burner #2 in operation.	257,730	1,128,857	20	88	7	31	258,470	1,132,099
103 – Auxiliary Boiler	3,600	15,768	0	0	0	0	3,911	17,132
104 – Firewater Pump ¹ Engine	305	76	0	0			305	76
105 – Diesel Generator ¹ Engine	562	141	0	0			563	141
106 – Cooling Towers	0	0	0	0	0	0	0	0
Total	519,927	2,273,700	40	177	14	62	521,720	2,281,548

¹ Operation of the Firewater Pump and Diesel Generator Engines are limited to 500 hours per year. All emissions are based on AP-42. (1 Ton CH₄ = 21 Tons CO₂e and 1 Ton N₂O = 310 Tons CO₂e)

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The facility also contains process sources that produce insignificant amounts of emissions. These process sources are listed in Table 4.

Table 4
Fayette Energy Facility (TVOP-26-00535)
Insignificant Process Emission Units

Process Emission Unit
Bulk Tank in Main Cooling Tower Tank Farm
Bulk Tank in River Intake Structure
Cooling Tower Tank Farm
Demineralized Water Tank Farm
Demineralized Water Chemical Storage Area
Chiller Chemical Storage Area
Chemical Storage Area North of Chillers
Batteries in PDC (50% H ₂ SO ₄)
Batteries at Each Gas Turbine (50% H ₂ SO ₄)
Batteries at Switch Yard (50% H ₂ SO ₄)
Steam Turbine Generator No. 1
Hydrogen Supply Trailer
Hydrogen Supply Trailer
Diesel Storage Tank No. 1
Diesel Storage Tank No. 2
Diesel Storage Tank No. 3
Kerosene Storage Tank No. 1
Natural Gas Condensate Storage Tank
Parts Washer

2010 operating and emission data from the two CGT systems at each of the two sister facilities is contained in the attached spreadsheet. Both plants monitor CGT emissions of NO_x. The continuous emission monitors at Washington record CGT emissions of CO and VOC, which Fayette does not. CGT emission estimates for various scenarios at the Fayette facility are based on the Washington CO and VOC data. This is also discussed in the spreadsheet.

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Regulatory Analysis:

This facility is a major source of air emissions for PM₁₀, NO_x, VOC, CO, and SO₂. However, it is an area source of Hazardous Air Pollutant (HAP) emissions. A review of potentially applicable Federal New Source Pollution Standards (NSPS), Federal National Emission Standards for Hazardous Air Pollutants (NESHAPs), and Pennsylvania air pollution control regulations was made and the results are shown below.

I. NSPS

a. **40 CFR Part 60 Subpart D – Standards of Performance for Fossil-Fuel-Fired Steam Generators.** – This subpart applies to any fossil-fuel-fired steam generating unit that has a maximum heat input capacity of more than 250 MMBtu per hour and last commenced construction or modification after August 17, 1971 and prior to December 23, 1976. No source at the Fayette Energy Center was constructed prior to 2001. Therefore, no boiler at the facility is subject to the requirements of 40 CFR Part 60, Subpart D.

b. **40 CFR Part 60 Subpart Da – Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978.** – The heat recovery steam generator (HRSG) portions of both combined cycle combustion gas turbines (CT1 and CT2) are subject to Subpart Da, since each HRSG exceeds 250 MMBtu/hour heat input and supplies more than 25 MW of power to the electrical grid. The Subpart Da filterable particulate emission limitation is 0.03 lb/MMBtu. Since almost all particulate emissions from CGTs are expected to be smaller than 2.5 microns, this requirement is met by the emission limitation of 0.025 lb/MMBtu of PM₁₀ (which includes both filterable and condensable components.) for the exhaust of CT1 and CT2 determined by analysis under BAT. NO_x emissions are limited under Subpart Da to 1.6 lb/MW gross electrical output. If the conversion efficiencies to electricity of combined cycle systems are only 33%, this limitation would be 0.15 lb/MMBtu NO_x. The energy conversion efficiencies of CT1 and CT2 are much greater than this, approaching 60%. The maximum allowable emission of NO_x in the exhaust of CT1 and CT2 determined by analysis under BAT is 0.08 lb/MMBtu. Monitoring requirements under Subpart Da are met by complying with the requirements of the Acid Rain Program.

c. **40 CFR Part 60 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.** – This subpart applies to any fossil-fuel-fired steam generating unit that has a maximum heat input capacity of more than 100 MMBtu per hour, less than 250 MMBtu per hour, and last commenced construction or modification after June 19, 1984, or oil fired oil-fired units with a heat input capacity greater than 250 MMBtu per hour and subject to Subpart D. The HRSGs and the auxiliary boiler are the only steam generating units at the Fayette Energy Center. According to the definitions of applicability in Subpart Db, the HRSGs are exempt from the requirements of Db since they are subject to

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Subpart Da. The 30.6 MMBtu/hr heat input capacity of the auxiliary boiler is too small for it to be covered by Subpart Db. Therefore, no source at the Fayette Energy Center is subject to the requirements of Subpart Db.

d. 40 CFR Part 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. - Subpart Dc is applicable to facilities with steam generating units constructed after June 9, 1989 with a minimum heat input capacity of 10 MMBtu/hour and a maximum heat input capacity of 100 MMBtu/hour. The auxiliary boiler has a maximum heat input capacity of 30.6 MMBtu/hour and meets these requirements. Since this boiler will only fire natural gas, the only applicable requirement is daily monitoring of fuel consumption.

e. 40 CFR Part 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. - This NSPS regulation was considered applicable to sources at the facility for plan approval PA-26-00535A. However, since the large distillate oil storage tanks that it applied to were never constructed, this regulation is not applicable to any source at the Fayette Energy Center.

f. 40 CFR Part 60, Subpart GG – Standards of Performance for Stationary Gas Turbines. – This Subpart is applicable to units that have a peak load input of 10 MMBtu/hour or greater and which commence construction, modification, or reconstruction after October 3, 1977. The combustion gas turbines (GT1 and GT2) meet this requirement. This Subpart sets emission limitations for NO_x and SO₂ from applicable sources. The limitation determined for NO_x emissions from affected units is the result of a formula that allows greater emissions for higher electrical conversion efficiency. The lowest emission limitation calculated by the determination in Subpart GG is 108.8 ppmvd NO_x at 15% O₂. The actual proposed limitation for NO_x emissions in the exhaust of CT1 and CT2 is 2.5 ppmvd NO_x at 15% O₂. Subpart GG requires fuel combusted in the turbines to contain no more than 0.8% sulfur by weight. In the proposed permit, the sulfur concentration in the natural gas combusted will be no more than 2 grains per 100 SCF. This is equivalent to 0.0069% sulfur by weight in the natural gas.

Subpart GG contains provisions for monitoring sulfur in the fuel. However, Section § 60.334(h) contains options that do not require actual testing of sulfur in the fuel by the operator; Use of FERC tariff sheets or purchase contracts which show that the fuel contains 20.0 grains or less of total sulfur per 100 standard cubic feet is sufficient for monitoring sulfur content in the fuel. Also, this section contains a provision to not require testing of fuel bound nitrogen, provided the operator does not take credit for the fuel bound nitrogen in determination of the NO_x emission limitation.

g. 40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. - The Fayette Energy Center contains

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two diesel engines which are stationary compression ignition (CI) internal combustion engines, the engines of the emergency generator and the firewater pump. However, since startup of the facility took place on March 16, 2003, the model years of these engines are earlier than 2007, which is the earliest model year of engines subject to this Subpart. Therefore, no source at the Fayette Energy Center is subject to the requirements of Subpart IIII.

h. 40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. - The Fayette Energy Center contains no engines which are stationary spark ignition internal combustion engines. Therefore, no source at the Fayette Energy Center is subject to the requirements of Subpart IIII.

II. NESHAPs

a. 40 CFR Part 63 Subpart Q – National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers. – This Subpart is applicable to Major Sources of HAPs with cooling towers that use chromium based water treatment chemicals. The Fayette Energy Center is not a Major Source of HAPs; neither do the cooling towers at the facility use chromium based water treatment chemicals. Therefore, this Subpart does not apply to the facility.

b. 40 CFR Part 63 Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines. - This Subpart is applicable to Major Sources of HAPs with Combustion Turbines. It does not apply to the duct burner or HRSG in combined cycle systems. However, the Fayette Energy Center is not a Major Source of HAPs. Therefore, this Subpart does not apply to the facility.

c. 40 CFR Part 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE). - Subpart ZZZZ establishes national emissions limitations and operating limitations for HAPs emitted by RICE at major and area sources of HAP emissions. The Fayette Energy Center is an area source of HAP emissions. The two emergency engines are compression ignition (CI), RICE. Paragraph 63.6590(c) of this subpart states that CI engines located at area sources of HAP emissions, meet the requirements of Subpart ZZZZ by meeting the requirements of 40 CFR PART 60, Subpart IIII, Standards of Performance for Stationary Compression Internal Combustion Engines. Therefore, these engines must meet the requirements of 40 CFR PART 60, Subpart IIII, in order to comply with Subpart ZZZZ. As mentioned above, the emergency engines at Fayette have no requirements under PART 60, Subpart IIII.

d. 40 CFR Part 63 Subpart DDDDD - National Emission Standards for Industrial, Commercial, Institutional (ICI) Boilers and Process Heaters. – Subpart DDDDD

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establishes national emissions limitations and operating limitations for HAPs emitted by boilers at major sources of HAP emissions. Units that are classified as EGUs or solid waste incineration units are not considered boilers for the purposes of this subpart. The Fayette Energy Center is an area source of HAP emissions. The requirements of this subpart are not applicable to any unit at the facility, since Fayette is a minor source of HAPs.

e. **40 CFR Part 63 Subpart UUUUU - National Emission Standards for Hazardous Air Pollutants (NESHAP) for electric utilities.** - This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from coal- and oil-fired electric utility steam generating units. (EGUs) The natural gas-fired EGUs at the Fayette Energy Center, CT1 and CT2, (Source IDs 101 & 102) are not fired by either coal or oil. Therefore, Subpart UUUUU does not apply to any source at the Fayette Energy Center.

f. **40 CFR Part 63 Subpart JJJJJ - National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers.** - Subpart JJJJJ establishes national emissions limitations and operating limitations for HAPs emitted by boilers at area sources of HAP emissions. The Auxiliary Boiler (Source ID 031) at the Fayette Energy Center is classified as an existing gas-fired boiler by the subpart. However, §63.11195(e) states that a boiler defined as a gas-fired boiler in the subpart is not subject to Subpart DDDDDD. Therefore, this Subpart does not apply to any source at the Fayette Energy Center.

III. Air Programs

a. **40 CFR Part 64, Compliance Assurance Monitoring. (CAM)** - This part was promulgated on October 22, 1997. The CAM Rule requires monitoring sufficient to provide a reasonable assurance of compliance with applicable emission requirements. It applies to processes that have an emission limit or standard; reduce emissions of a specific pollutant with a control device; and have pre-control emissions that are equivalent to or greater than the major source threshold for that pollutant.

NO_x, CO, SO₂, VOC, PM₁₀, and formaldehyde are emitted by the Fayette Energy Center. Emissions of NO_x, CO, SO₂, VOC, and PM₁₀, are greater than the major source threshold of 100 tons per year. Emissions of VOC are greater than the major source threshold of 50 tons per year of VOC in the Ozone Transport Region. Formaldehyde emissions are less than the major source threshold of 10 tons per year of a single HAP; however, formaldehyde has emissions greater than its major source threshold of 10 tons per year of a single HAP prior to control by the catalytic oxidation units in the CGT systems. NO_x emissions from the CGTs are measured with CEMs. Emissions of CO are controlled by the catalytic oxidation units. This

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means the CGT systems are subject to CAM for the pollutants VOC, formaldehyde, and CO, and a CAM Plan must be submitted for the facility.

The company has submitted a CAM Plan for the two CGTs (Source IDs 101 & 102) at Fayette. In this plan, the company has proposed to continuously monitor the inlet and outlet temperature of the oxidation catalysts downstream of the CGTs to ensure it is operating in the temperature range recommend by the manufacturer and periodically visually inspect the catalysts for physical degradation as the methods of assuring compliance.

b. **NO_x Allowance Program/CAIR/PA CAIR/CSAPR.** - The applicability of 25 Pa Code Sections §§145.201-145.233, Subchapter D has been evaluated. These sections were adopted by PA DEP on April 11, 2008 and became effective on April 12, 2008. These regulations addressed the requirements of EPA's Clean Air Interstate Rule (CAIR) with some requirements specific to emission sources in Pennsylvania. These conditions superseded the requirements in both the PA Code and also the Federal Code of Regulations which comprised the default CAIR program for Pennsylvania. The requirements in this subchapter, as well as the remaining applicable federal requirements, are known as "PA CAIR." EPA announced final acceptance of these requirements as a revision to the State Implementation Plan (SIP) for the Commonwealth of Pennsylvania on December 10, 2009.

On December 23, 2008, the US Court of Appeals for the DC Circuit decided that EPA had exceeded its authority under the Clean Air Act in adopting CAIR. The court decision remanded the CAIR rule, and required EPA to develop a rule within a reasonable time, under court guidelines to replace it. However, the CAIR rule was not vacated by this decision. Until CAIR was replaced, its implementation, including review of modifications of the federal requirements allowed by states, would continue. This allowed EPA to review and approve the requirements for PA CAIR after the date that the CAIR Rule was remanded.

On July 6, 2011, EPA finalized the Cross-State Air Pollution Rule ("CSAPR") which was intended to replace CAIR and achieve greater reasonable progress towards the goal of achieving natural visibility conditions in Class I areas than the source-specific BART, in those states covered by the Transport Rule. Within this proposed rule, EPA stated that it anticipates the Transport Rule will result in greater emission reductions overall than CAIR. This rule had an effective date of January 1, 2012 and replaced the requirements of PA specific CAIR. However, the United States Court of Appeals for the D.C. Circuit issued an order granting a motion to stay CSAPR on December 30, 2011. Per this order, "*Respondent [EPA] is expected to continue administering the Clean Air Interstate Rule pending the court's resolution of these petitions for review.*" Final action has not yet been taken on these proposals. Therefore, at this time, the Pennsylvania specific rule for CAIR remains in effect and CAIR NO_x and SO₂ Trading Programs of 25 Pa Code Subchapter D, Sections §§145.201-145.223 and 40 CFR Part 97 Federal NO_x

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Budget Trading Program and CAIR NO_x and SO₂ Trading Program are still incorporated into the Title V Operating Permit.

c. **40 CFR Part 98, Mandatory Greenhouse Gas Reporting.** - This part was promulgated on October 30, 2009. Per 40 CFR Section 98.2(a), the Greenhouse Gas (GHG) reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to the owners and operators of any facility that is located in the United States and that meets the requirements of either paragraph (a)(1), (a)(2), or (a)(3) of this section. Electricity generation units that are subject to the Acid Rain Program are also subject to this part under (a)(1) of this section. Units at the Fayette Energy Center are subject to the Acid Rain Program and the facility is therefore subject to this part. Therefore, the station will be subject to 40 CFR Part 98 Subpart C for the calendar year 2010 and later years. This makes the station subject to the specific requirements of Subpart D-Electricity Generation of Part 98.

However, public comments to the Greenhouse Gas Mandatory Reporting Rule (GHG MRR) questioned the requirements of this rule to meet current definitions of “applicable requirement” at 40 CFR 70.2 and 71.2. The commentators requested that USEPA confirm their interpretation of the regulations. The EPA provided the following response: “As currently written, the definition of “applicable requirement” in 40 CFR 70.2 and 71.2 does not include a monitoring rule such as today’s action, which is promulgated under CAA sections 114(a)(1) and 208.” The preamble of the final version of the GHG MRR, located at 74 Fed Reg 209, pp. 56287-56288, states that the GHG MRR is not considered an “applicable requirement” under the Title V Operating Permit program. Therefore, this Subpart, while an obligation for the Fayette Energy Center, is not considered an applicable condition for this Title V Operating Permit.

The Greenhouse Gas Tailoring Rule was issued in May 2010. This rule establishes a process for conducting Prevention of Significant Deterioration (PSD) reviews, including Best Available Control Technology (BACT) determinations for control of greenhouse gases (GHG) when a new source or a modification to an existing source results in emissions of GHGs in excess of certain thresholds. Since May, 2010, there have not been any modifications to the Fayette Energy Center that triggered a GHG PSD review.

IV. Pennsylvania Air Pollution Control Regulations

The Pennsylvania Department of Environmental Protection (PADEP) is authorized to enforce rules for the control of air pollution. The following State Air Pollution Control regulations were evaluated for their applicability to proposed operating permit:

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a. **25 Pa Code 123.1 (Prohibition of Certain Fugitive Emissions)** - Operation of this facility will have applicable emission generating activities from the use of plant roads which are limited under this regulation.

b. **25 Pa Code 123.2 (Fugitive Particulate Matter)** - The operation of this facility has applicable emission generating activities which are limited under this regulation.

c. **25 Pa Code 123.11 (Combustion Units)** – Combustion units are defined in §123.1 as stationary equipment used to burn fuel primarily for the purpose of power or heat by indirect heat transfer. This definition includes external combustion sources, but excludes internal combustion sources since they operate by direct heat transfer. The Auxiliary Boiler (Source ID 031) and the duct burners in both CT1 and CT2 (Source IDs 101 and 102) are combustion units.

The particulate emission limitation of 0.1 pounds per MMBtu described in Part (c) of this section applies to the CTs at the Fayette Energy Center. This restriction would limit emissions of filterable particulate from each CGT to 234 pounds per hour. The CTs also have an emission limitation of 34.8 pounds per hour of PM₁₀ determined by BAT analysis. Filterable particulate emissions from combustion turbines and natural gas burners are almost entirely PM_{2.5}. The PM₁₀ limitation under BAT makes listing the §123.11 restriction in the proposed Operating Permit unnecessary.

The Auxiliary Boiler at the station has a maximum heat input less than 50 MMBtu per hour and is subject to the limitation of 0.4 pounds per MMBtu described in Part (a) of the section. Compliance with this limit is based on filterable particulate only.

d. **25 Pa Code 123.13 (Processes)** – Processes which are not combustion units at the Fayette Energy Center are subject to this regulation, which limits emission of particulate. In the regulation, certain emission processes have limitations based on rate of material throughput. None of the emission limitations based on the material throughput of specific emission processes exist at Fayette. Therefore, the emission limitation in §123.13(c) of 0.02 grains per dry standard cubic foot (SDCF) applies to the Emergency Firewater Pump Engine (Source ID 104), Emergency Diesel Generator Engine (Source ID 105), and the Cooling Towers (Source ID 106) at the station.

e. **25 Pa Code 123.25 (Monitoring Requirements)** – The requirements of this section apply to the CGTs at the Fayette Energy Center.

f. **25 Pa Code 123.31 (Odor Emissions)** – The facility is subject to this regulation and daily inspections demonstrate compliance.

g. **25 Pa Code 123.41 (Limitations — Visible Emissions)** – This regulation will be met by a general requirement that the opacity of the exhaust from all sources at this facility shall not exceed 10% at any time facility established in the plan approval under BAT. Daily inspections demonstrate compliance.

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h. 25 Pa Code 123.42 (Exceptions — Visible Emissions) - These exceptions are applicable to the limitations in paragraph 123.41 and the opacity limitation established under BAT.

i. 25 Pa Code Chapter 127.441 (Operating permit terms and conditions) – Operators of the Fayette Energy Center will fulfill the following requirements:

1. The permittee shall maintain comprehensive, accurate records which, at a minimum, shall include:
 - a. The number of hours per month that each piece of equipment operated.
 - b. The amount of fuel used per month in each piece of equipment.
2. The owner/operator shall keep daily records of all product delivery. These records shall be kept on site for a period of five years and be made available to the Department upon request.

V. Conditions in Plan Approval

Emission limitations and other conditions from the plan approval were carried forward into this Operating Permit with some deletions, changes, and additions. Since the equipment to fire the CGTs on oil was never installed, all conditions and references relating the necessary equipment and operation with oil firing are irrelevant and have been deleted from the proposed Operating Permit.

An emission limitation for emissions of formaldehyde from the CGTs, as well as a testing requirement for the compound, was added in the proposed Operating Permit. This emission limitation is 0.50 pounds per hour and 2.19 tons per year for each combustion turbine system, based on the turbine manufacturers, GE, performance specification. The frequency of stack emission testing was fixed at five years, with testing required in the first year of the effective term of the permit. These additions were made under the authority of 25 Pa Code 127.441 which requires the permit to contain terms and conditions that the Department deems necessary to assure proper operation of the source.

The Plan Approval contains annual limitations for emissions from the sum of the two CGTs (Source IDs 101 & 102) for NO_x, CO, SO₂, VOC, PM₁₀ and ammonia. It also contains hourly emission limitations for these pollutants from each CGT during ISO operation. However, the Plan Approval also states that that these hourly emission limitations do not apply during startup and shutdown of the CGTs. To ensure compliance with the annual emission limitations, it was necessary to determine short term emission limitations in the proposed Operating Permit that apply during startups and shutdowns of the CGTs. The basis for the proposed emission limitations during startups and shutdowns is shown in the spreadsheet contained in Appendix A.

Potential emissions of VOC from the facility under the requirements in the plan approval were found to be greater than the amount allowed, based on the emission offsets purchased to allow construction of the plant. Average emissions of VOC from the CGTs at the Washington Energy Facility during ISO operation were found to average 1.13 ppm corrected to a 15% O₂ dry gas basis. Therefore, allowable VOC emissions from each of the two CGTs, CT-1 and CT-2, were reduced from 5.3 ppm VOC, corrected to a 15% O₂ dry gas basis, to 3.3 ppm VOC, corrected to a 15% dry gas O₂ basis. This reduced potential emissions of VOC to 43.65 tons per year from each CGT system, which is less than the 44.28 tons per year made possible by purchase of emission offsets for the systems in the plan approval. The calculations for this decision are shown and discussed in Tasks 5 and 6 of the spreadsheet in Appendix A.

The hourly emissions limitation for CO from the CGTs during ISO operation in the Plan Approval was also reduced in the Operating Permit. This reduction in potential emissions of CO

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during ISO operation was necessary to add hourly CO emission limitations to the proposed Operating Permit that also comply with annual CO emission limitations. The basis of the annual CO emission limitation of 581 tons per year for the proposed Operating Permit is discussed in Task 3 of the calculations in Appendix A of this document.

Conditions in the Plan Approval relating to the Auxiliary Boiler (Source ID 031) were also modified in the Operating Permit. The Plan Approval authorized construction of 44.1 MMBtu/hour boiler equipped with a low NO_x burner. Instead, a smaller boiler, of 30.6 MMBtu/hour heat input, also equipped with a low NO_x burner, of the same type and manufacturer was installed. This boiler is a Cleaver-Brooks Scotch Boiler, Model CBI 700 750 200, manufactured during 2002. The applicant also requested that emission limitations for this boiler be based on the manufacturer's guarantee and that the operating time limitation of 2,500 hours per year be removed. Emission factors which are used for determination of emission limitations are shown in Table 5:

Table 5
Fayette Energy Facility (TVOP-26-00535)
Emission Factors for Determination of Limitations-Source ID 031-Auxiliary Boiler

Sources	PM ₁₀	SO ₂	CO	NO _x	VOC
	Lb/MMBtu	Lb/MMBtu	Lb/MMBtu	Lb/MMBtu	Lb/MMBtu
031 – Auxiliary Boiler (as authorized in PA-26-00535) ¹	0.010	0.0011	0.151	0.038	0.016
031 – Proposed Auxiliary Boiler ²	0.010	0.0010	0.109	0.035	0.016

¹ The Auxiliary Boiler authorized in PA-26-535 has a Heat Input capacity of 44.1 MM/Btu/hour.

² The proposed Auxiliary Boiler has a Heat Input capacity of 30.61 MM/Btu/hour.

The net change in emissions from the Auxiliary Boiler resulting from installation of a smaller unit and removal of the restriction on hours of operation is shown in Table 6:

Table 6
Fayette Energy Facility (TVOP-26-00535)
Emissions from Source ID 031-Auxiliary Boiler

Sources	PM ₁₀		SO ₂		CO		NO _x		VOC	
	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr
031 – Auxiliary Boiler (as authorized in PA-26-00535) ¹	0.44	0.55	0.05	0.06	6.64	8.3	1.68	2.1	.70	0.88
031 – Proposed Auxiliary Boiler ²	0.31	1.34	0.03	0.13	3.34	14.61	1.07	4.69	0.49	2.14
Net Increase in emissions from the Auxiliary Boiler ²	-0.13	0.79	-0.02	0.07	-3.29	6.31	-0.61	2.59	-0.21	1.26

¹ The Auxiliary Boiler authorized in PA-26-535 has a Heat Input capacity of 44.1 MM/Btu/year and operates a maximum of 2,500 hours/year.

² The proposed Auxiliary Boiler has a Heat Input capacity of 30.6 MM/Btu/year and operates a maximum of 8,760 hours/year.

Annual emissions limitations for the facility were not affected by this change. Corresponding annual emission decreases also were made to limitations on the sum of the two CGTs (Source IDs 101 & 102) to compensate for increases due to operation of the actual Auxiliary Boiler as proposed.

The Plan Approval determined that use of a low NO_x burner, for control of NO_x, was Best Available Technology (BAT) for the 44.1 MMBtu/hour input boiler previously authorized. The boiler actually installed has a maximum heat input capacity of 30.6 MMBtu/hour and emits lower emissions of NO_x and CO on a heat input basis. Therefore, the 30.6 MMBtu/hour Auxiliary Boiler meets the requirements of BAT.

Since the changes in the Auxiliary Boiler produces no net change in emissions from the facility, the provisions of Non-Attainment New Source Review (NNSR) and Prevention of Significant Deterioration (PSD) are not applicable to this change.

Section 25 Pa Code Chapter 127.449 (De minimis emission increases) defines deminimis emission increases as less than four tons of CO, one ton of NO_x, or one tons of VOC annually from a single source. The increase in emissions due to the change in conditions for the Auxiliary

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Boiler is greater than this, but in a similar range to the maximum deminimis increases. Also, there is no corresponding emission increase from the facility and boiler actually installed meets the requirements of BAT. Therefore, submission of a Plan Approval due to this change is not considered to be necessary.

Table 1

Table 1: Comparison of Maximum Allowable Daily Load (MADL) and Maximum Daily Load (MDL) for various pollutants.

Table 1: Comparison of Maximum Allowable Daily Load (MADL) and Maximum Daily Load (MDL) for various pollutants.

Pollutant	MDL (lb/day)	MADL (lb/day)
SO ₂	100	100
NO _x	100	100
CO	100	100
PM ₁₀	100	100
PM _{2.5}	100	100
VOC	100	100
TOC	100	100
DOC	100	100
Chloride	100	100
Ammonia	100	100
Ammonium	100	100
Phosphate	100	100
Fluoride	100	100
Iron	100	100
Copper	100	100
Zinc	100	100
Lead	100	100
Cadmium	100	100
Mercury	100	100
Chromium	100	100
Nickel	100	100
Manganese	100	100
Selenium	100	100
Vanadium	100	100
Antimony	100	100
Barium	100	100
Boron	100	100
Bromine	100	100
Calcium	100	100
Chlorine	100	100
Cobalt	100	100
Fluorine	100	100
Gallium	100	100
Germanium	100	100
Indium	100	100
Iodine	100	100
Iron	100	100
Lithium	100	100
Magnesium	100	100
Manganese	100	100
Molybdenum	100	100
Nickel	100	100
Niobium	100	100
Phosphorus	100	100
Platinum	100	100
Potassium	100	100
Rubidium	100	100
Selenium	100	100
Silver	100	100
Sodium	100	100
Sulfur	100	100
Tantalum	100	100
Tellurium	100	100
Thallium	100	100
Tin	100	100
Titanium	100	100
Vanadium	100	100
Zinc	100	100
Zirconium	100	100

The table above compares the Maximum Allowable Daily Load (MADL) and Maximum Daily Load (MDL) for various pollutants. The MDL values are generally higher than the MADL values, indicating that the facility is currently operating within the allowed limits. The pollutants listed include SO₂, NO_x, CO, PM₁₀, PM_{2.5}, VOC, TOC, DOC, Chloride, Ammonia, Ammonium, Phosphate, Fluoride, Iron, Copper, Zinc, Lead, Cadmium, Mercury, Chromium, Nickel, Manganese, Selenium, Vanadium, Antimony, Barium, Boron, Bromine, Calcium, Chlorine, Cobalt, Fluorine, Gallium, Germanium, Indium, Iodine, Iron, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Phosphorus, Platinum, Potassium, Rubidium, Selenium, Silver, Sodium, Sulfur, Tantalum, Tellurium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium.

The table above compares the Maximum Allowable Daily Load (MADL) and Maximum Daily Load (MDL) for various pollutants. The MDL values are generally higher than the MADL values, indicating that the facility is currently operating within the allowed limits. The pollutants listed include SO₂, NO_x, CO, PM₁₀, PM_{2.5}, VOC, TOC, DOC, Chloride, Ammonia, Ammonium, Phosphate, Fluoride, Iron, Copper, Zinc, Lead, Cadmium, Mercury, Chromium, Nickel, Manganese, Selenium, Vanadium, Antimony, Barium, Boron, Bromine, Calcium, Chlorine, Cobalt, Fluorine, Gallium, Germanium, Indium, Iodine, Iron, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Phosphorus, Platinum, Potassium, Rubidium, Selenium, Silver, Sodium, Sulfur, Tantalum, Tellurium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium.

The table above compares the Maximum Allowable Daily Load (MADL) and Maximum Daily Load (MDL) for various pollutants. The MDL values are generally higher than the MADL values, indicating that the facility is currently operating within the allowed limits. The pollutants listed include SO₂, NO_x, CO, PM₁₀, PM_{2.5}, VOC, TOC, DOC, Chloride, Ammonia, Ammonium, Phosphate, Fluoride, Iron, Copper, Zinc, Lead, Cadmium, Mercury, Chromium, Nickel, Manganese, Selenium, Vanadium, Antimony, Barium, Boron, Bromine, Calcium, Chlorine, Cobalt, Fluorine, Gallium, Germanium, Indium, Iodine, Iron, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Phosphorus, Platinum, Potassium, Rubidium, Selenium, Silver, Sodium, Sulfur, Tantalum, Tellurium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium.

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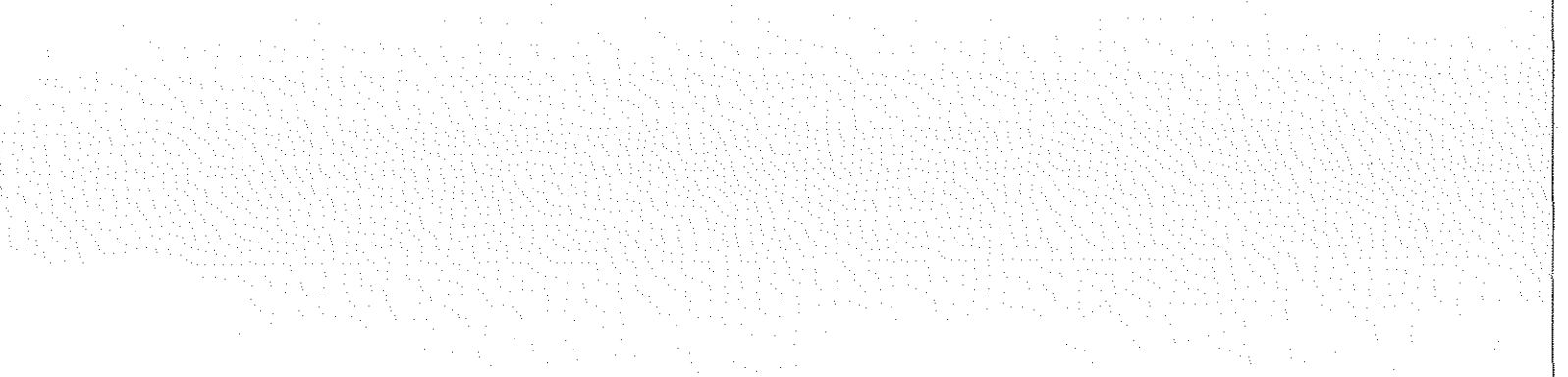
Conclusions and Recommendations:

Kristin Edwards, Permit Manager for the Duke Energy Fayette and Tim Kunst, Supervisor of Air Quality Inspection of DEP for the facility, have reviewed a copy of the draft permit.

Duke Fayette Energy has proposed in this application to operate a combustion gas turbine powered electrical power plant in German Township, Fayette County. I recommend the issuance of an Operating Permit for this application subject to the following conditions.

Permit Authorized by this Authorization			
Quantity	Facility Name	PF ID:	563600
1	Duke Fayette Energy – Fayette Energy Center (OP-26-00535)		
		APS ID: 748423	Auth. ID: 877526
Short Descr.	Electric Power Plant with 2-NG-Fired, 315MW, Combined-Cycle, CGTs		
Permits Inactivated by this Authorization			
Permit #			
OP-26-00535	Duke Fayette Energy – Fayette Energy Center: Modification		
		APS ID: 70581	Auth. ID 810423
PA-26-00535A	Duke Fayette Energy – Fayette Energy Center		
		APS ID: 342455	Auth. ID 350555

The following information is provided for your information. It is not intended to be a substitute for professional advice. Please consult your attorney for more information.



Information provided by the Administration	
Category	Activity Name
1	Basic Training (Level 1) (12/15/16)
2	Intermediate Training (Level 2) (12/15/16)
3	Advanced Training (Level 3) (12/15/16)
Information provided by the Administration	
Category	Activity Name
4	Specialized Training (Level 4) (12/15/16)
5	Advanced Training (Level 5) (12/15/16)