Title V Permit Review
Chapter 127

April 5, 2022

TO: Mark J. Wejkszner
Air Quality Program Manager

THRU: Norman Frederick
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FROM: Gregory Weisenfluh
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NORTHEASTERN REGION:	Jessup Borough Lackawanna County
PERMIT NUMBER:	TV-35-00069
COMPANY NAME:	Lackawanna Energy Center, LLC
SOURCES:	(3) General Electric model 7HA.02 natural gas-fired combustion turbines (CT) with (3) heat recovery steam generators (HRSG) powering three (3) steam turbines in a nominal 1,500 MW electric generation plant, Ancillary Equipment
CONTROL EQUIPMENT:	Selective Catalytic Reduction (SCR), Oxidation Catalyst
LOCATION:	1000 Sunnyside Road, Jessup, PA 18434

GENERAL INFORMATION:

1. On July 10, 2020 the Department received a renewal Title V Operating Permit Application from Lackawanna Energy Center, LLC (LEC). The permittee is currently operating their facility under Plan Approval 35-00069B issued on July 12, 2016.
2. The facility is subject to the Title V Operating Permit requirements adopted in 25 Pa. Code 127, Subchapter G. The proposed renewal Title V Operating Permit incorporates all applicable air quality requirements for each significant source at the facility.
3. Notification in the Pennsylvania Bulletin was provided on November 13, 2021 to allow a 30-day comment period for the public to respond.

4. Public Notice was published in The Scranton Times from November 4, 2021 to November 6, 2021.

GENERAL INFORMATION:

The plant includes three (3) steam turbine generators and air-cooled condensers in place of the original planned single larger steam turbine and air-cooled condenser. Steam turbines and air-cooled condensers are not themselves air emission points since they run on steam generated in the Heat Recovery Steam Generator (HRSG) sections of the combined-cycle power plant. The three (3) steam turbines collectively use the same amount of steam that the original single steam turbine was planned to use. This configuration resulted in a physical layout with slightly different placement of the same original exhaust stacks serving each combustion turbine and associated HRSG. In addition, as a result of the layout change and detailed design, there are minor shifts in stack parameters for the ancillary equipment (i.e., auxiliary boiler, dew point heater, emergency generator, and fire water pump) stacks and tank sizes.

As a result of the minor changes in stack locations and structure locations, the air quality modeling analysis was updated with the revised plant layout to ensure continued compliance with the Prevention of Significant Deterioration (PSD) increments and National Ambient Air Quality Standards (NAAQS).

The facility consists of three identical 1 x 1 power blocks, each consisting of a combustion gas turbine (CGT or CT) with a heat recovery steam generator. The turbine model used for this facility include three General Electric (GE) 7HA.02 CTs, each in 1 x 1 single shaft combined-cycle power islands. The entire power block is rated at 1,500 MW to be distributed to the power grid for use.

Each CT combusts natural gas only. The HRSGs are equipped with selective catalytic reduction (SCR) to minimize nitrogen oxide (NOx) emissions and oxidation catalysts to minimize carbon monoxide (CO) and volatile organic compound (VOC) emissions from the CTs.

The facility also includes several pieces of ancillary equipment. The list of equipment includes:

One fuel gas dew-point heater, 12.0 MMBTU/hr, natural gas fired, common for all CTs
One auxiliary boiler, 184.8 MMBTU/hr, natural gas-fired
One diesel engine powered emergency generator
One diesel engine powered fire water pump
Diesel fuel, lubricating oil, and aqueous ammonia storage tanks

The facility is a "major source" of criteria air pollutants.

Air Quality Modeling Analysis

In accordance with the Prevention of Significant Deterioration (PSD) regulations in 40 CFR § 52.21 and 25 Pa. Code § 127.83, Lackawanna Energy Center LLC has conducted an air quality

analysis which utilizes dispersion modeling. Lackawanna Energy Center's air quality analysis satisfies the requirements of the PSD regulations and is consistent with the U.S. Environmental Protection Agency's (EPA) *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) and the EPA's air quality modeling policy and guidance.

In accordance with 40 CFR § 52.21(k), Lackawanna Energy Center's air quality analysis demonstrates that the emissions from Lackawanna Energy Center's facility would not cause or contribute to air pollution in violation of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than or equal to 2.5 micrometers in diameter (PM-2.5), or particulate matter less than or equal to 10 micrometers in diameter (PM-10). Lackawanna Energy Center's air quality analysis demonstrates that the emissions from Lackawanna Energy Center's facility would not cause or contribute to air pollution in violation of the increments for NO_2, PM-2.5, or PM-10.

In accordance with 40 CFR § 52.21(o), Lackawanna Energy Center provided a satisfactory analysis of the impairment to visibility, soils, and vegetation that would occur as a result of Lackawanna Energy Center's facility and general commercial, residential, industrial, and other growth associated with Lackawanna Energy Center's facility.

In accordance with 40 CFR § 52.21(p), written notice of Lackawanna Energy Center's facility has been provided to the Federal Land Managers of nearby Class I areas as well as initial screening calculations to demonstrate that the emissions from Lackawanna Energy Center's facility would not adversely impact air quality related values and visibility in nearby federal Class I areas.

In accordance with the public notice requirements in 25 Pa. Code § 127.45(b)(4), the degree of Class II and Class I increment consumption expected to result from the operation of Lackawanna Energy Center's facility is provided in the following tables:

Table 1 – Degree of Class II Increment Consumption from Operation of Lackawanna Energy Center's Facility

Pollutant	Averaging Period	Degree of Class II Increment Consumption		Class II Increment
		micrograms per cubic meter	% of Class II Increment	micrograms per cubic meter
NO_2	Annual	< 0.35345	< 1.42 %	25
PM-2.5	24-Hour	< 6.47317	< 71.93 %	9
	Annual	< 0.33259	< 8.32 %	4
PM-10	24-Hour	< 6.28462	< 20.95 %	30
	Annual	< 0.32620	< 1.92 %	17

Table 2 – Degree of Class I Increment Consumption from Operation of Lackawanna Energy Center's Facility

Pollutant	Averaging Period	Degree of Class I Increment Consumption	Class I Increment

		micrograms per cubic meter	% of Class I Increment	micrograms per cubic meter
NO_2	Annual	< 0.00179	< 0.08 %	2.5
PM-2.5	24-Hour	< 0.01112	< 0.56 %	2
	Annual	< 0.00123	< 0.13 %	1
PM-10	24-Hour	< 0.01079	< 0.14 %	8
	Annual	< 0.00119	< 0.03 %	4

PROCESS DISCRIPTION:

The facility consists of three identical "1 x 1" power blocks, each consisting of a CT, HRSG, and a ST. The major components of the facility include:

- Three CTs (General Electric (GE) 7HA.02)
- Three HRSGs - one for each CT and containing selective catalytic reduction (SCR) for NOx control and oxidation catalysts for CO and VOC control
- Three STs - one for each HRSG
- One auxiliary boiler, natural gas-fired
- One fuel gas heater,- natural gas fired, common for all CTs
- One diesel engine powered emergency generator
- One diesel engine powered fire water pump
- Diesel fuel, lubricating oil and aqueous ammonia storage tanks

Combustion Turbines and Heat Recovery Steam Generators:

In the combined-cycled process, ambient air is drawn into the compressor element of each of the CTs through an inlet air filtration and silencing system. Inlet evaporative cooling may take place during periods of warm ambient temperature and low relative humidity to further enhance overall production capability of the CTs. After the evaporative cooler section, air enters the compressor section where it is compressed and channeled to the fuel/mix combustion stage of the CT. This section of the CT is commonly referred to as the gas generator section. The gas generator is the component that that generates criteria and hazardous air pollutant emissions by means of the fuel combustion process. A transition duct within the CT directs the flow of hot gases from the gas generator to the power section of the turbine. Gas generator combustion products (hot gases) expand through the stages of the power turbine where the thermodynamic, or gas energy is converted to mechanical power. This power is transmitted through rotation of the shaft to the generator for the CT, which is directly coupled to the power turbine. The generator takes this rotational motion and converts it to electricity.

The hot gases produced in the CTs are directed into three HRSGs through an exhaust transition

duct where waste heat is captured and heat converted into steam energy before the exhaust gases exit the vertical stack for each HRSG.

The steam produced in the HRSGs is used in the STs to produce additional electrical power. Once the steam does its work in the STs, it is exhausted and condensed at a vacuum in an air-cooled condenser (ACC), one for each power block. The cycle is a closed loop system as the condensate is reused as feed water to the HRSGs.

Other Equipment:

Other sources of the facility include a diesel engine powered emergency generator and a diesel engine powered fire water pump. The fire water pump is used for emergency purposes in the event of a fire and for routine operations and testing as required by the National Fire Prevention Association (NFPA) Code. The proposed emergency diesel fire pump was rated at a maximum 315 BHP. The proposed emergency diesel engine powered standby generator, rated at a maximum 2,000 kilowatts (kW), allows maintenance of vital plant loads during power outages or maintenance on the switchyard. The diesel engine generator and fire pump are only operated during power interruptions to provide emergency power, lighting, and fire protection when the CTs are not operating and at most once per week for less than 30 minutes for operational testing purposes when the CTs are operational. LEC is proposing to accept operating restrictions on the emergency generator and fire pump through the operating permit that would limit annual cumulative non-emergency operation (e.g., engine testing) to less than 50 hours per consecutive 12-months for each engine. The 50-hour operational restriction for each engine would not apply towards operation during actual emergency situations.

Ultra-low sulfur (15 ppm by weight sulfur) diesel fuel is used in both the fire water pump and standby generator engines. One 3,500-gallon diesel storage tank is located on site to supply diesel fuel for the emergency generator engine. In addition, a 300-gallon diesel storage tank is used for the diesel fire water pump.

A natural gas-fired auxiliary boiler rated at 184.8 MMBtu/hr is used only to provide high temperature steam when the CTs are offline in order to accommodate more rapid ST startups after extended shutdowns. It shall not operate once the CTs have achieved steady-state operations. Total operation of the auxiliary boiler is anticipated to be less than 4,000 hours per 12-month period.

Another small natural gas combustion unit associated with CT operation is a fuel gas dew- point heater, rated at 12.0 MMBtu/hr. One common unit is used for all three CTs. The dew- point heater operates as necessary to condition the natural gas prior to combustion to prevent condensation.

A potential (trivial) source of VOC emissions is the storage and use of turbine lubricating oil. Each CT skid and the ST includes a lubricating oil sump with a system capacity of approximately 10,000 gallons. Each CT and ST is equipped with lubricating oil vents, which include electrostatic precipitators/demisters for lubricating oil mist control.

The facility uses electrical circuit breakers insulated with sulfur hexafluoride (SF6), a regulated greenhouse gas (GHG). The circuit breakers are state-of-the art sealed units, equipped with low pressure alarms for leak detection and a low-pressure lockout to minimize fugitive losses of SF6.

The facility uses an air-cooled condenser (ACC) in lieu of conventional wet cooling towers for ST steam condensation. Therefore, the facility does not generate PM emissions typically associated with wet cooling tower drift losses.

REGULATORY ANALYSIS:

The following regulations and standards were reviewed for applicability to the facility:

- National Ambient Air Quality Standards (NAAQS);

National Ambient Air Quality Standards and Project Area Attainment Classification

The CAA directed EPA to develop, implement, and enforce numerical concentration-based standards, or NAAQS, for pollutants that have been determined to affect human health and the environment. The EPA established both primary and secondary NAAQS for six criteria air pollutants: ozone (OZ), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), respirable particulate matter (including PM_{10}, $PM_{2.5}$) and lead. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Geographic areas that meet the NAAQS for a given pollutant are classified as "attainment" areas, while those that do not meet the NAAQS are classified as "non-attainment" areas. Areas where there is insufficient monitoring data to determine whether the area has attained the NAAQS are designated as "unclassifiable," however, these areas are treated as attainment areas for permitting purposes. The federal NAAQS for criteria pollutants are incorporated, by reference as part PADEP' s ambient air quality standards in 25 Pa. Code Chapter 131.

The current federal air quality classification for the facility in Lackawanna County is designated as attainment or unclassifiable for all criteria pollutants. However, the entire state of Pennsylvania is located in the Northeast Ozone Transport Region.

The designation of an area has particular importance for a project as it determines the type of permit review to which an application is subject. A project falls into one of three NSR categories: PSD, NANSR, and Minor New Source Review. Which set of regulations applies depends on the attainment status of the project location and whether the project source(s) exceed specific emissions thresholds established in state and Federal regulations. Based on project potential emissions summarized in the following table the project was major with respect to emissions of NO2, CO, total PM, PM10 and PM2.5. The project is also located in an Ozone Transport Region and NO2 and VOC emissions exceed the applicable ozone precursor major source threshold, the project is also subject to NSR requirements for NO2 and VOC

Summary of LAER, BACT, and BAT Determinations

Based on the previous LAER/BACT/BAT analyses, Table 1 summarizes the project's LAER, BACT, and BAT proposals for each applicable pollutant and emissions source. In addition to the technology and emission limitation determination, the compliance demonstration basis (e.g., stack test, CEM, and averaging period) is presented for each pollutant.

TABLE 1
GE 7HA.02

Pollutant	BACT/LAER Technology	LAER, BACT and/or BAT Permit Limit[1]	Compliance Demonstration Basis
Combined-Cycle CTs			
PM/PM_{10}/$PM_{2.5}$ (BACT)	Exclusive natural gas, high-efficiency inlet air filters and DLN	PM -0.003 lb/MMBtu PM_{10}/$PM_{2.5}$ 0.0059 lb/MMBtu	Stack Test (EPA Reference Methods 201 or 201A for filterable PM and Method 202 (revised 12/10/11 for condensable PM).
CO (BACT)	Exclusive natural gas, combustion controls and oxidation catalysts	2.0 ppm all normal operating loads	CO CEMS (1-hour average)
CO (BACT)	Rapid Response Startup, Combustor Tuning, and less than 500 hours of startup/shutdowns in any 12 consecutive month period	Cold/Warm Startup: 581.1 lb/hr Hot Startup: 770.8 lb/hr Shutdown: 732.9 lb/hr	CO CEMS (1-hour average)
VOC (LAER)	Exclusive natural gas, combustion controls and oxidation catalysts	1.0 ppm all normal operating loads	Stack test + CO CEMS (as surrogate)

[1] All ppm concentration limits are ppmvd, corrected to 15% O_2.

Pollutant	BACT/LAER Technology	LAER, BACT and/or BAT Permit Limit[1]	Compliance Demonstration Basis
VOC (LAER)	Rapid Response Startup, Combustor Tuning, and less than 500 hours of startup/shutdowns in any 12 consecutive month period	Cold/Warm Startup: 72.0 lb/hr Hot Startup: 94.6 lb/hr Shutdown: 360.0 lb/hr	Stack test + CO CEMS (as surrogate)
NOx (LAER)	Exclusive natural gas, DLN and SCR	2.0 ppm	NOx CEMS (1-hour average)
NOx (LAER)	Rapid Response Startup, Combustor Tuning, and less than 500 hours of startup/shutdowns in any 12 consecutive month period	Cold Startup: 327.4 lb/hr Warm Startup: 260.6 Hot Startup: 279.2 lb/hr Shutdown: 34.3 lb/hr	NOx CEMS (1-hour average)
NH_3 slip (BAT)	Exclusive natural gas, NH_3 injection optimization and catalyst volume optimization	5.0 ppm	NH_3 CEMS (1-hour average)
SO_2 (BAT) and H_2SO_4 mist (BACT)	Exclusive natural gas	0.4 grains/100 SCF Sulfur 0.0011 lb/MMBtu SO_2 0.00086 lb/MMBtu H_2SO_4	Fuel supplier certifications/monitoring records
GHG (BACT)	Good combustion, oxidation catalysts, exclusive natural gas, energy efficiency	1,629,115 TPY total CO_2e, 12-month rolling	Design, performance specifications and testing, CO_2e monitoring
All pollutants during normal and startup/shutdown operations	Good Operating Practices	Good Operating Practices	Maintained in accordance with manufacturer specifications

Auxiliary Equipment

Pollutant	BACT/LAER Technology	LAER, BACT and/or BAT Permit Limit[2]	Compliance Demonstration Basis
Emergency Diesel Engine Generator			
NOx, NMHC, CO, PM and fuel sulfur (LAER for NO_X and VOC, BACT for all other pollutants)	Emergency operation only, < 50 hours/year each for maintenance checks and readiness testing purposes (i.e., not including actual emergencies), designed to meet NSPS Subpart IIII	NO_X =5.3 g/hp-hr CO=0.18 g/hp-hr VOC=0.08 g/hp-hr PM = 0.024 g/hp-hr Fuel Sulfur = 15 ppm	Monitoring of operating hours, manufacturer certification and other applicable Subpart IIII requirements
GHG (BACT)	Emergency operation only, < 50 hours/year each for maintenance checks and readiness testing purposes (i.e., not including actual emergencies),	80.0 TPY total CO2e, 12-month rolling	Monitoring of fuel consumption or hours of operation and use of default emission factors for diesel engines
Emergency Diesel Engine Fire Pump			
NOx, NMHC, CO, PM and fuel sulfur (LAER for NO_X and VOC, BACT for all other pollutants)	Emergency operation only, < 50 hours/year each for maintenance checks and readiness testing purposes (i.e., not including actual emergencies), designed to meet NSPS Subpart IIII	NO_X= 2.69 g/hp-hr CO = 0.4 g/hp-hr VOC = 0.06 g/hp-hr PM = 0.06 g/hp-hr Fuel Sulfur = 15 ppm	Monitoring of operating hours, manufacturer certification and other applicable Subpart IIII requirements

[2] All ppm concentration limits are ppmvd, corrected to 15 percent unless otherwise noted.

Pollutant	BACT/LAER Technology	LAER, BACT and/or BAT Permit Limit[2]	Compliance Demonstration Basis
GHG (BACT)	Emergency operation only, < 50 hours/year each for maintenance checks and readiness testing purposes (i.e., not including actual emergencies),	8.0 TPY total CO_2e, 12-month rolling	Monitoring of fuel consumption or hours of operation and use of default emission factors for diesel engines
Auxiliary Boiler and Fuel Gas Heater			
NO_X (LAER)	ULN Burner	Boiler: 5 ppmvd @ 3% O_2 (0.006 lb/MMBtu) Fuel Gas Heater: 9 ppmvd @ 3% O_2 (0.011 lb/MMBtu)	Stack test, fuel consumption monitoring, recordkeeping
CO (BACT)	Good combustion	Boiler: 0.037 lb/MMBtu Fuel Gas Heater: 0.022 lb/MMBtu	Stack test, fuel consumption monitoring, recordkeeping
VOC (LAER)	Good combustion	0.005 lb/MMBtu	Stack test, fuel consumption monitoring, recordkeeping
$PM/PM_{10}/PM_{2.5}$ (BACT)	Exclusive natural gas	PM 0.002 lb/MMBtu $PM_{10}/PM_{2.5}$ 0.007 lb/MMBtu	Stack test, fuel consumption monitoring, recordkeeping
SO_2/H_2SO_4 (BAT/BACT)	Exclusive natural gas	0.4 grains/100 SCF Sulfur 0.0011 lb/MMBtu SO_2 0.00014 lb/MMBtu H_2SO_4	Fuel supplier certifications/monitoring records

Pollutant	BACT/LAER Technology	LAER, BACT and/or BAT Permit Limit[2]	Compliance Demonstration Basis
GHG (BACT)	Exclusive natural gas	Auxiliary Boiler: 44,107 TPY total CO2e, 12-month rolling Fuel Gas Heater: 6,272 TPY total CO2e, 12-month rolling	Monitoring of fuel consumption or hours of operation and use of default emission factors for natural gas combustion
All Auxiliary Equipment			
GHG (BACT)	Good Operating Practices	Good Operating Practices	Maintained in accordance with mfg. specifications
Fugitive GHG from Natural Gas Piping			
GHG (BACT)	Good operating practices	Daily AVO inspection walk-throughs	Daily AVO inspection walk-throughs
Fugitive GHG from SF_6 Insulated Electrical Equipment			
GHG (BACT)	Equipment design specifications	Equipment design specifications - low pressure alarm and a low pressure lockout. 79.8 TPY total CO2e, 12-month rolling	Monitoring/recordkeeping per 40 CFR Part 98, Subpart DD, Equation DD-1, which requires tracking of the amount of SF_6 dielectric fluid added to the circuit breakers for each month of facility operation

MONITORING, TESTING AND RECORDKEEPING REQUIREMENTS:

The facility is required to monitor, test, and keep records of all pollutants. Records shall be kept on a 12-month rolling basis for all pollutants for the entire site to include short term limits which shall be monitored via CEMs for NOx, NH3, and CO. In addition to other requirements the facility shall be required to comply with CAM and Greenhouse gas monitoring and reporting.

Compliance Assurance Monitoring

Under 40 CFR 64, the Compliance Assurance Monitoring (CAM) Regulations, facilities are required to prepare and submit monitoring plans for certain emission units, along with the Title V application. The CAM Plans are to provide an on-going and reasonable assurance of

compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. The CAM rule also provides exemptions for units with pollutants subject to certain emission limitations or standards, including NSPS and NESHAPs proposed after November 15, 1990, ARP requirements, emissions trading programs, and where a facility's Title V permit specifies a continuous compliance determination method.

This applicability evaluation only addresses CO and VOC emissions of the CTs, which employ catalytic oxidizers to control CO and VOCs and potentially have uncontrolled emissions greater than major source thresholds. Although uncontrolled NOx emissions from the CTs are greater than the major source threshold and SCR is used to control NOx emissions, NOx emissions from the CTs are specifically exempted from CAM requirements because the they are limited by 40 CFR Subpart KKKK - Standards of Performance for Stationary Combustion Turbine Emissions. All other units at the facility emit pre-controlled emissions less than the major source thresholds and/or do not use a control device as defined by the CAM regulations. Therefore, no other units or pollutants are subject to CAM regulations.

For CO and VOC, the facility monitors the concentration of CO and oxygen in the exhaust to the atmosphere. This approach provides a direct measurement for the CO permit limitation and an indirect assurance that the VOC emissions are within their permitted limitation, since the generation and removal of these pollutants are related.

Mandatory Greenhouse Gas Reporting

On October 30, 2009, EPA published in 40 CFR Part 98 Mandatory Greenhouse Gas Reporting requirements. This rule requires facilities that emit greater than 25,000 metric tons per year of CO2e to report their greenhouse gases. Subpart D of 40 CFR Part 98 outlines the requirements for Electricity Generation. The facility emits more than 25,000 metric tons of CO2e; therefore, greenhouse gas reporting is required. The facility monitors CO2e emissions according to the applicable requirements of 40 CFR Part 98. CH4 and N2O is estimated based on the procedures in Subpart C.

ADDITIONAL REQUIRMENTS:

FEDERAL REGULATIONS

Subpart Db - Standards of Performance for Industrial- Commercial-Institutional Steam Generating Units

The auxiliary boiler is subject to Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS, 40 CFR Part 60, Subpart Db). However, since the boiler combusts only natural gas, there are no emissions requirements only monitoring, recordkeeping, and notification requirements. As such, LEC shall keep records of the amount of natural gas combusted in the boiler.

Subpart IIII Standards of Performance for Stationary Compression Ignition Combustion Engines

40 CFR Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, promulgated July 11, 2006 and amended June 28, 2011, applies to the emergency fire pump engine and the emergency standby generator at the facility. The rule requires manufacturers of such engines to meet emission standards that are phased in for the size, type of engine application, and model year of the engine. Owners and operators of covered engines are required to configure, operate, and maintain the engines according to specifications and instructions provided by the engine manufacturer and to maintain records demonstrating compliance. The facility shall comply with the requirements applicable to owners and operators of covered engines.

Emergency diesel engines must be certified by manufacturers to meet the applicable emissions standards for new non-road compression ignition engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113. For model year 2006 and later emergency engines with power ratings greater than 560 kW (greater than 751 BHP), the applicable standards in g/kW-hr are 6.4, 3.5 and 0.2 for non-methane hydrocarbons (NMHC)+NOx, CO, and PM, respectively. The engines are subject to Tier 2 certified diesel engine requirements and require submittal of EPA compliance documentation to PADEP.

Fire pump engines must comply with the emission standards listed in Table 4 to 40 CFR Part 60, Subpart IIII. For model year 2009 and later fire pump engines with power ratings between 225 and 450 kW (between 300 and 600 BHP), the applicable standards in g/kW-hr are 4.0 and 0.2 for NMHC+NOx and PM, respectively.

Diesel engines are subject to Subpart IIII must also meet the ultra-low sulfur content standard specified in 40 CFR Part 80.510(b) of 15 ppm.

Subpart KKKK - Standards of Performance for Stationary Combustion Turbine Emissions

40 CFR Part 60 Subpart KKKK, Standards of Performance for Stationary Combustion Turbines, promulgated July 6, 2006, applies to each stationary combustion turbine with a heat input at peak load equal to or greater than 10 MMBtu/hr based on the higher heating value, which commenced construction, modification, or reconstruction after February 18,2005.

Only the heat input rate to the CT should be included when determining whether this NSPS is applicable to the turbines. Any additional heat input to the associated HRSGs should not be included when determining the peak heat input. However, the NSPS does apply to emissions from any associated HRSG.

Construction of the CTs commenced after February 2005. The peak load heat input rate of each of the turbines (without the heat input of DBs) is greater than 10 MMBtu/hr firing natural gas. Therefore, the CTs are subject to this regulation.

Emission Limits for NOx

The CTs are subject to an emission standard of 15 ppm at 15 percent O_2 or 0.43 lb/MWh when fired with natural gas. If the CTs operate at partial load (less than 75 percent of peak load) or if they operate at temperatures less than O°F, a NOx limit of 96 ppm at 15 percent O_2 or 4.7 lb/MWh applies. If the HRSGs operate independently of the combustion turbines, the HRSGs are subject to an emission standard of 54 ppm at 15 percent O_2 or 0.86 lb/MWh when fired with natural gas.

The facility has chosen to comply with concentration-based NOx emission standards. The turbines shall reduce NOx emissions to 2 ppm at 15 percent O_2 using low-NOx combustors and selective catalytic reduction while burning natural gas.

Emission Limits for SO2

The CTs are subject to an emission limit of 0.9 lb/MWh gross output or the CTs must not burn any fuel which contains the total potential sulfur emissions in excess of 0.06 lb SO2/MMBtu heat input.

The facility shall comply with input-based emission standard for SO2. The CTs burn only natural gas. Using 0.4 grains sulfur/100 ft3 sulfur content and approximately 1,030 Btu/ft3 (HHV) heat content for natural gas, the SO2 emission rate for each CT is estimated as 0.0011 lb/MMBtu.

Emission Limits for CO2

On April 13, 2012 EPA proposed and on January 8, 2014 withdrew the original proposal and re-proposed new standards for CO_2 emissions from stationary combustion turbines commencing construction after the proposed rule publication date in the Federal Register. EPA currently proposes to limit CO_2 emissions from new combustion turbines with design heat inputs to the turbine greater than 250 MW (850 MMBtu/hr) to 1,000 pounds CO_2/MWh of electricity generated on a gross basis on a 12-operating month rolling average. Based on the definition of *stationary combustion turbine* in the rule, the MWh output is based on the combined cycle CT, not just the CT itself.

Subpart TTTT - GHGs NSPS from EGUs

The EPA issued the final NSPS rule for greenhouse gases on August 3, 2015 and created subpart TTTT to include all GHG standards of performance for covered sources in the newly created subpart. This subpart contains two different categories, one for utility boilers and EGU units and one for natural gas fired stationary combustion turbines. CO2 emissions standards that would apply to large natural gas-fired combustion turbines are identical in Subpart KKKK and TTTT.

Additional Federal Regulations

Additional federal regulations that have been reviewed and determined not applicable are as follows. For detailed analysis of this determination can be found in the LEC

application.

Subpart Kb-Standards of Performance for Volatile Organic Liquid Storage Vessels
National Emissions Standards for Hazardous Air Pollutants (40 CFR 61)
National Emission Standards for Hazardous Air Pollutants for Source Categories (40 CFR 63)
Subpart JJJJJJ (Area Source Boilers/Process Heaters)
Subpart YYYY (Stationary Combustion Turbines)
Subpart ZZZZ (Stationary Reciprocating Internal Combustion Engines)
Risk Management Program (RMP)

40 CFR Parts 72-78 – Acid Rain Program (ARP) Regulations

The Acid Rain Program is codified in 40 CFR Parts 72 through 78. This program aims to reduce acid rain by reduction of SO2 and NOx from utility units that have a nameplate electricity generation capacity greater than 25 MW. A "unit" is defined as a "fossil fuel-fired combustion device" and "fossil fuel-fired" is defined as "the combustion of fossil fuel, alone or in combination with any other fuel, independent of the percentage of fossil fuel consumed in any calendar year". Each of the combined-cycle power blocks have a generation capacity greater than 25 MW and are subject to Acid Rain program requirements. However, the units are not affected units under the NOx Emission Reduction Program (40 CFR 76) as they are not coal-fired utility units.

Applicability of ARP regulations require the facility to:

•Apply for a Phase II Acid Rain Permit to include the new utility units;

•Install CEMS to demonstrate compliance with the ARP provisions meeting the requirements specified in 40 CFR 75; and

•Hold allowances equivalent to annual SO2 emissions.

40 CFR Part 96 – Clean Air Interstate Rule (CAIR) and 40 CFR Part 97 – Cross-State Air Pollution Rule (CSAPR)

On March 10, 2005, EPA issued the Clean Air Interstate Rule (CAIR). This rule provides states with a solution to the problem of power plant pollution that drifts from one state to another. On July 6, 2011, EPA finalized the Cross-State Air Pollution Rule (CSAPR) to replace CAIR. Due to the capacity of the plant, LEC is subject to the requirements of CSAPR. LEC is required to meet the applicable requirements of the rule including Subparts AAAAA, BBBBB, CCCCC, EEEEE, and GGGGG including applicable monitoring and recordkeeping requirements.

STATE REGULATIONS

Commonwealth of PA Regulations (25 Pa. Code Article III Air Resources)

In general, the PADEP retains jurisdiction within Lackawanna County with full delegation from the EPA to enforce the air quality programs under the CAA. The emission sources presented in this document shall comply with applicable PADEP regulations promulgated under 25 Pa. Code Article III - Air Resources. This section highlights the applicable state regulations and citations with regulatory requirements pertinent to the facility.

25 Pa. Code § 121. General Provisions

This chapter provides definitions and other general administrative requirements for the control and prevention of air pollution in the Commonwealth. The facility shall comply with the general provisions as outlined in 25 Pa. § 121.

25 Pa. Code § 122. National Standards of Performance for New Stationary Sources

This Chapter sets forth the basis for the PADEP adopting the EPA Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources, promulgated in 40 CFR Part 60 (NSPS). The NSPS are adopted in their entirety by the Department and incorporated by reference.

25 Pa. Code § 123. Standards for Contaminants

This Chapter contains emissions standards and other requirements applicable to the facility.
Specific Commonwealth of Pennsylvania emissions standards contained in 25 Pa. Code Chapters 121-129 and 131-145 are applicable to the facility. Applicable requirements are as follows:
Section 123.1 requires facility owners/operators to take all reasonable actions to prevent particulate matter from becoming airborne, including:

•The use of water or chemicals for control of dust from construction operations, the grading of roads, or the clearing of land;
•Application of asphalt, oil, water, or suitable chemicals on dirt roads, material stock piles, and other surfaces which contribute to airborne dust;
•Paving and maintenance of roadways; and
•Prompt removal of earth or other material from unpaved streets onto which earth or other material has been transported by trucks or earthmoving equipment erosion by water, or other means.

Section 123.11 limits emissions of particulate matter from combustion units firing at a rate equal to or greater than 600 MMBtu per hour to no more than 0.1 pound per MMBtu heat input. The CTs have firing rates in excess of the 600 MMBtu/hour and, therefore, are subject to this limitation. However, the BACT limit for the CTs (less than 0.0063 lb/MMBtu) easily complies with this limit.

Section 123.22 generally prohibits combustion units from:

•Emitting sulfur oxides from any combustion unit in excess of 4 pounds per MMBtu of heat input over any 1-hour period, expressed as SO2; and

•Using commercial fuel oil that contains sulfur in excess of 0.5 percent sulfur by weight for No.2 and lighter oils, and 2.8 percent by weight for Nos. 4, 5, 6, and heavier oils. Because the facility only uses natural gas in the CTs and very limited amounts of ULSD fuel oil in the emergency generator and fire pump engines, SO2 emissions from combustion units (0.0011 lb/MMBtu from natural gas firing in the CTs and 0.0015 lb/MMBtu from ULSD firing in the emergency engines) shall comply these requirements.

Section 123.41 limits visible emissions to the atmosphere to less than: (a) 20 percent opacity, except for a period or periods totaling no more than three minutes in anyone-hour period; and (b) no more than 60 percent opacity at any time. The facility shall comply with these limitations through use of natural gas combustion in the CTs and ULSD in the emergency generator and fire pump engines.

25 Pa. Code § 124. National Emissions Standards/or Hazardous Air Pollutants (NESHAPs)

This Chapter sets forth the basis for the PADEP adopting the EPA NESHAPs, promulgated in 40 CFR Part 61. The NESHAPs are adopted in their entirety by the Department and incorporated by reference.

25 Pa. Code § 127. Construction, Modification, Reactivation and Operation of Sources

Chapter 127 of PADEP's regulations (concerning Construction, Modification, Reactivation, and Operation of Sources) specifies the Commonwealth's new source permitting requirements, and includes the adoption of Subchapter D of the federal PSD standards in its entirety

(25 Pa. Code § 127.83) Because PSD review has been delegated to the Commonwealth; PADEP reviews the PSD application under the authority of EPA Region III. Acceptance of the PSD application by the Commonwealth constitutes acceptance of the application for "plan approval" to construct a proposed facility. Section 127.11 requires the owner/operator of all new air contamination sources to obtain plan approval prior to construction of the source.

Chapter 127, Subchapter B specifies Plan Approval requirements, including requirements for the content of applications, exemptions, notifications, and other administrative requirements. Sections 127.1 and 127.12(a)(5) require new sources to control emissions of air contaminants to the maximum extent, consistent with BAT, a standard which is essentially the same as BACT for a PSD source (except that BAT is a technology-based standard and BACT is a rate-based standard and applies to minor sources).

Chapter 127, Subchapter E is PADEP's NANSR permitting requirements applicable to major sources of non-attainment pollutants or, the case of the project, major sources of ozone precursors located in an Ozone Transport Region. As discussed in Section 4.4, the facility is a major source of NOx and VOCs. Therefore, only NOx and VOC emissions from the project are subject to the special permit conditions specified in Subchapter E for New Source Review, including:

•LAER technology is required

•Existing sources with potential emissions equal to or greater than emissions thresholds specified in Section 127.203 must be in compliance (or on a schedule approved by PADEP for compliance) with all applicable emission limitations and standards; and

•The maximum allowable emissions from a new source must be offset by emission reductions from existing sources or emission offset credits banked in accordance with Sections 127.210 and 127.211 in the non-attainment area or from a source impacting the non-attainment area.

•NOx and VOC emissions from the facility were offset for the Transport Area at a ratio of 1.15:1 in accordance with Section 127.210.

25 Pa. Code § 129. Construction, Modification, Reactivation and Operation of Sources

Section 129.202 contains an allowable NOx emission rate of 0.17 lb/MMBtu for a stationary combustion turbine with a nameplate capacity greater than 250 MMBtu/hr that is not subject to § 145.8(c) or (d) (relating to transition to CAIR NOx trading programs).

25 Pa. Code § 131. Ambient Air Quality Standards

This Chapter sets for the basis for the PADEP incorporating, by reference, the National Ambient Air Quality Standards, as part of the standards in § 131.3. The Project's demonstration of compliance with the NAAQS is presented in the Plan Approval application.

25 Pa. Code § 145. CAIR NOx and SOx Trading Programs

CAIR is currently implemented in Pennsylvania through this Chapter. However, CSAPR will eventually replace CAIR. Challenges to the CSAPR rule were rejected by the United States Court of Appeals for the District of Columbia Circuit on July 28, 2015, which also remanded the rule to EPA to revise 2014 ozone season budgets for several states, including Pennsylvania.

The facility shall comply with the CSAPR requirements as they are eventually promulgated by implementing specified monitoring, recordkeeping, and reporting procedures (anticipated to be largely equivalent to procedures required under the ARP), acquiring the required allowances (if new unit allocations are insufficient to offset actual

SO2 and NOx emissions) and complying with other applicable permitting and administrative requirements of the program.

Initial Title V Operating Permit Changes:

Changes to the initial Title V Operating Permit from Plan Approval 35-00069B include the following:

Duct burner references have been removed from the operating permit, as the facility has not installed the supplementary equipment. Emission limits for the combustion turbines without the duct burners are more stringent and/or equally as stringent as the limits previously included for the installation of supplementary duct burners. 12-month rolling sum VOC emissions restrictions and pound per hour emission limits from all listed pollutants for each turbine have been reduced to reflect the lower emissions from the combined cycle turbines without duct burners. Request to update the thermal efficiency testing language was included according to the agreed-upon language in a Department-approved email dated 11/27/2019, for which testing is required to take place within 180 days of the issuance date of the initial Title V Operating Permit. Thermal efficiency testing for heat rate was proposed as BAT/BACT to assure compliance with GHG emissions. Ammonia slip was corrected to state the ammonia slip limit shall be calculated on a 12-month rolling average basis, calculated monthly in addition to the existing ammonia data availability requirements. Data availability standards have been updated to require data availability for lb/hr values, in addition to the existing ppmvd values for CO, NOx, and ammonia as required.

CO2e has been added in reference to all greenhouse gas emissions as the unit of measure for greenhouse gas emissions. Public utility supply reference to natural gas fuel has been removed. Natural gas fuel is required to meet the definition in each of the regulations which apply to the facility. Daily site-level inspection requirements have clarified the use of EPA Method 22 and Method 9 for visible emission detection. Reference to 40 CFR Part 60 Subpart JJJJ has been corrected to the applicable Subpart IIII reference, and inclusion of reference to the applicable 40 CFR Part 60 Subpart TTTT has been included. The applicable standards for 40 CFR Part 97 Subpart GGGGG have been also included in the initial Title V Operating Permit.

Additional corrections to the initial Title V Operating Permit include correcting the PM (filterable) value for the fuel gas heater to the correct 0.1 tpy on a 12-month rolling average basis value. This value is directly associated with both the application and the 0.002 lb/MMBtu value for the fuel gas heater. The low-NOx burner reference was updated to indicate it is for the fuel gas heater.

Emission limits were reduced for the emergency generator and fire pump to reflect the lower emissions of the installed equipment. The emergency generator was proposed with a maximum rating of 2,682 BHP, whereas the selected generator was 2,292 BHP. The fire pump engine was proposed at a maximum rating of 315 BHP, whereas the selected fire pump was 282 BHP. The carbon monoxide emission factor for the fuel gas heater was

reduced to reflect the corrected emission factor supplied with the Title V Operating Permit application.

The permittee proposed to demonstrate compliance via stack testing every 5 years rather than every 2 years given that initial testing demonstrated emission levels less than half of the applicable limits. The Department has denied this request for the initial Title V Operating Permit, and the company shall continue to test every 2 years for the initial Title V Operating Permit. The testing frequency may be revised in future renewals based upon the satisfactory demonstration of compliance with the emission limitations. Comparison of measured pollutant emissions to pollutant emission limits shall be established to request testing frequency revision.

RECOMMENDATION:

It is recommended the initial Title V Operating Permit be issued For Lackawanna Energy Center LLC incorporating all applicable regulatory conditions.