Florida Department of Environmental Protection

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PERMITTEE

Duke Energy Florida, LLC (DEF)
1601 Weedon Island Drive
St. Petersburg, FL 33702

Authorized Representative:
C. Wayne Toms, DEF

Air Permit No. 1030011-024-AC
(PSD-FL-381G)
P.L. Bartow Power Plant, Unit 4
Advanced Low-Load Turn Down
Expires: December 31, 2017

FACILITY AND LOCATION

This is the final air construction permit to change the method of compliance with carbon monoxide limits for simple cycle operation for the four combustion turbines of Unit 4 (Emission Unit Nos. 038 through 041) at the P.L. Bartow Power Plant. This permit changes the method of compliance from an annual stack test to a continuous emissions monitor. The facility is located at 1601 Weedon Island Drive, St. Petersburg, Pinellas County. The UTM coordinates are Zone 17, 343.87 kilometers (km) East and 3082.69 km North.

This final permit is organized into the following sections: Section 1 (General Information); Section 2 (Administrative Requirements); Section 3 (Emissions Unit Specific Conditions); Section 4 (Appendices). Because of the technical nature of the project, the permit contains numerous acronyms and abbreviations, which are defined in Appendix A of Section 4 of this permit. As noted in the Final Determination provided with this final permit, only minor changes and clarifications were made to the draft permit.

STATEMENT OF BASIS

This air pollution construction permit is issued under the provisions of: Chapter 403 of the Florida Statutes (F.S.) and Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297 of the Florida Administrative Code (F.A.C.). The permittee is authorized to conduct the proposed work in accordance with the conditions of this permit. This project is subject to the general preconstruction review requirements in Rule 62-212.300, F.A.C., and is not subject to the preconstruction review requirements for major stationary sources in Rule 62-212.400, F.A.C., for the Prevention of Significant Deterioration (PSD) of Air Quality.

Upon issuance of this final permit, any party to this order has the right to seek judicial review of it under Section 120.68 of the Florida Statutes by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel (Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000) and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice must be filed within 30 days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida

David Lyle Read, P.E.

David Lyle Read, P.E.
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For:

Syed Arif, P.E., Program Administrator
Office of Permitting and Compliance
Division of Air Resource Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this final air permit package (including the Final Determination and Final Permit with Appendices) was sent by electronic mail, or a link to these documents made available electronically on a publicly accessible server, with received receipt requested before the close of business on the date indicated below to the following persons.

C. Wayne Toms, Duke Energy Florida, LLC (CWayne.Toms@duke-energy.com)
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Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to Section 120.52(7), Florida Statutes, with the designated agency clerk, receipt of which is hereby acknowledged.

Lynn Scearce 2017.03.06 09:47:21 -05'00'

FACILITY DESCRIPTION

The P.L. Bartow Power Plant includes the following emissions units.

- Four 59 MW General Electric MS7000 simple cycle gas turbine peaking units, designated as Nos. P-1, P-2, P-3 and P-4 (EU 005-008);
- Combined cycle Unit 4 consisting of four 215 MW Siemens SGT6-5000F combined cycle gas turbine-electrical generators (CTs), four duct-fired heat recovery steam generators (HRSGs) (EU 038 - 041);
- Four 3 MMBtu/hour natural gas fired process heaters (EU 044);
- Two 3,500,000 diesel fuel storage tanks (EU 045);
- One 300 HP diesel fueled emergency fire pump (EU046); and
- Various insignificant emissions units.

The steam generated in the four Unit 4 HRSGs is used in a single nominal 420 MW steam turbine-electrical generator (STG).

PROPOSED PROJECT

This permit changes the method of compliance with carbon monoxide limits during simple-cycle operation from annual stack test to a continuous emissions monitoring system (CEMS). The following emissions units are affected by this project.

EU No.	Description
038	Unit 4A – One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
039	Unit 4B – One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
040	Unit 4C – One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
041	Unit 4D – One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator

REGULATORY CLASSIFICATION

The following federal regulations apply to the Bartow plant and this project.

- The existing facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality and Rule 62-210.200 (Definitions), F.A.C.
- This project (as discussed below) does not trigger a PSD review and a requirement to conduct Best Available Control Technology (BACT) determinations pursuant to Department Rule 62-212.400, F.A.C.
- The existing facility is a major source of hazardous air pollutants (HAP).
- The existing facility has units regulated under Clean Air Act, Title IV, Acid Rain provisions, Phase II.
- The existing facility is a Title V major source of air pollution in accordance with Chapter 62-213, F.A.C.
- The proposed project includes units subject to the New Source Performance Standards (NSPS) of 40 CFR 60.
- The proposed project includes units subject to the National Emission Standards of Hazardous Air Pollutants NESHAP of 40 CFR 63.

RELEVANT DOCUMENTS

The permit application and additional information received to make it complete are not a part of this permit. However this information can be accessed at the following Webpage.
Application for Duke Bartow CO CEMS project (click “Public Oculus Login” button)

GENERAL REQUIREMENTS

1. Permitting Authority: The permitting authority for this project is the Office of Permitting and Compliance in the Division of Air Resource Management of the Department of Environmental Protection (Department). The Office of Permitting and Compliance mailing address is 2600 Blair Stone Road (MS #5505), Tallahassee, Florida 32399-2400, and the office's email address is DARM_Permitting@dep.state.fl.us.
2. Compliance Authority: All documents related to compliance activities such as reports, tests, and notifications shall be submitted to the District Office and Local Air Program. The Compliance Authority is the Air Quality Division of the Pinellas County Department of Environmental Management Office at 300 South Garden Avenue, Clearwater, Florida 34616.
3. Appendices: The following Appendices are attached as part of this permit:
   a. Appendix A. Citation Formats and Glossary of Common Terms;
   b. Appendix B. General Conditions;
   c. Appendix C. Common Conditions; and
   d. Appendix D. Common Testing Requirements.
4. Applicable Regulations, Forms and Application Procedures: Unless otherwise specified in this permit, the construction and operation of the subject emissions units shall be in accordance with the capacities and specifications stated in the application. The facility is subject to all applicable provisions of: Chapter 403, F.S.; and Chapters 62-4, 62-204, 62-210, 62-212, 62-213, 62-296 and 62-297, F.A.C. Issuance of this permit does not relieve the permittee from compliance with any applicable federal, state, or local permitting or regulations.
5. New or Additional Conditions: For good cause shown and after notice and an administrative hearing, if requested, the Department may require the permittee to conform to new or additional conditions. The Department shall allow the permittee a reasonable time to conform to the new or additional conditions, and on application of the permittee, the Department may grant additional time. [Rule 62-4.080, F.A.C.]
6. Modifications: No emissions unit shall be constructed or modified without obtaining an air construction permit from the Department. Such permit shall be obtained prior to beginning construction or modification. [Rules 62-210.300(1) and 62-212.300(1)(a), F.A.C.]
7. Construction and Expiration. The expiration date shown on the first page of this permit provides time to complete the physical construction activities authorized by this permit. Notwithstanding this expiration date, all specific emissions limitations and operating requirements established by this permit shall remain in effect until the facility or emissions unit is permanently shut down. For good cause, the permittee may request that that a permit be extended. Pursuant to Rule 62-4.080(3), F.A.C., such a request shall be submitted to the Permitting Authority in writing before the permit expires.
   [Rules 62-4.070(4), 62-4.080 & 62-210.300(1), F.A.C.]
8. Source Obligation:
   a. At such time that a particular source or modification becomes a major stationary source or major modification (as these terms were defined at the time the source obtained the enforceable limitation) solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements of subsections 62-212.400(4) through (12), F.A.C., shall apply to the source or modification as though construction had not yet commenced on the source or modification.
   b. At such time that a particular source or modification becomes a major stationary source or major modification (as these terms were defined at the time the source obtained the enforceable limitation) solely by exceeding its projected actual emissions, then the requirements of subsections 62-212.400(4)

through (12), F.A.C., shall apply to the source or modification as though construction had not yet commenced on the source or modification.

[Rule 62-212.400(12), F.A.C.]

9. Application for Title V Permit: A Title V air operation permit is required for regular operation of the permitted emissions unit. The permittee shall apply for a Title V air operation permit at least 90 days prior to expiration of this permit, but no later than 180 days after commencing low-load simple-cycle operation. To apply for a Title V operation permit, the applicant shall submit the appropriate application form, compliance test results, and such additional information as the Department may by law require. The application shall be submitted to the appropriate Permitting Authority with copies to the Compliance Authority. [Rules 62-4.030, 62-4.050, 62-4.220 and Chapter 62-213, F.A.C.]

   {Permitting note: The applicant has submitted a concurrent application for a Title V operation permit revision with this air construction permit application.}

The specific conditions in this section apply to the following emissions unit:

EU ID	Emissions Units Comprising Combined Cycle Unit 4
038	Unit 4A–One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
039	Unit 4B–One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
040	Unit 4C–One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator
041	Unit 4D–One 215 MW (ISO) Combustion Turbine with Duct-fired Heat Recovery Steam Generator

Combined cycle Unit 4 consists of the four gas-fueled Siemens SGT6-5000F combustion turbines (CTs) and the four duct-fired heat recovery steam generators (HRSGs) listed above. The steam generated in the four HRSGs is used in a single nominal 420 MW steam turbine-electrical generator (STG).

Each CT is permitted to also operate in simple cycle mode by directing the exhaust to a bypass stack instead of the respective HRSG. The four CTs in aggregate are capable of firing low sulfur distillate fuel oil for the equivalent of 4000 hours per year. Unit 4 entered commercial operation in the summer of 2009.

TESTING REQIREMENTS

1. Restriction on Operation at Low Load: The permittee is no longer required to perform a low-load stack test of CO emissions under simple-cycle operation. The lower limit on permitted operating loads for these turbines in simple-cycle mode is hereby removed. [Permit Nos. 1030011-010-AC, 1030011-019-AC, and 1030011-023-AC; Application No. 1030011-024-AC]

   {Permitting note: The shift from CO compliance by stack test for simple cycle operation to CO compliance by CEMS eliminates the need for a lower bound on permitted operating loads.}

EMISSIONS LIMITATION

2. Carbon Monoxide: Emissions of carbon monoxide during simple-cycle operation shall not exceed the following limits:

Pollutant	Fuel	Method of Operation [a]	Stack Test, 3-Run Average		CEMS, Block Average
			Parts per million by volume, dry, corrected to 15% O_2 (ppmvd @ 15% O_2)	lb/hr [b]	ppmvd @ 15% O_2
CO	Oil	Simple Cycle CT	8.0	40.4	8.0, 24-hour [c]
	Gas	Simple Cycle CT	4.1	20.8	6, 12-month [d]

a. CT means operation of a combustion turbine (CT) in simple cycle or in combined cycle without use of the duct burner (DB). CT & DB means operation in combined cycle mode and using the DB.
b. The mass emission rate standards are based on a turbine inlet condition of 59° F and may be adjusted to actual test conditions in accordance with the performance curves and/or equations on file with the Department.
c. Compliance with the continuous 24-hour CO standards shall be demonstrated based on data collected by the required CEMS. The initial and annual EPA Method 10 tests associated with the certification of the CEMS instruments may also be used to demonstrate compliance with the individual standards for natural gas, fuel oil, or duct burner modes.
d. *Rolling Average*. Enforcement discretion may be exercised for up to 12 months with respect to the 6 ppmvd @15% O_2 limit for any CT/Duct-fired HRSG upon notification by the permittee of intent to install oxidation catalyst. The permittee shall have 12 months to complete the oxidation catalyst installation. From time of notification to installation of the catalyst all partial or complete calendar months shall be excluded from the 12-month rolling average.

The emission limits for all other pollutants, and the emission limits for combined-cycle operation, are unaffected by this permit.

[Rule 62-210.200(Definitions – BACT) and 62-212.400 F.A.C.; Permit No. 1030011-010-AC; Application No. 1030011-024-AC]

3. CEM Systems: The permittee shall calibrate, maintain, and operate continuous emission monitoring systems (CEMS) to measure and record the emissions of CO from the simple-cycle stacks in a manner sufficient to demonstrate continuous compliance with the CEMS emission standards of this subsection. Each monitoring system shall be installed, calibrated, and properly functioning prior to the initial performance tests. Within one working day of discovering emissions in excess of a CO standard (and subject to the specified averaging period), the permittee shall notify the Compliance Authority.
   a. *CO Monitors.* The CO monitors shall be certified pursuant to 40 CFR 60, Appendix B, Performance Specification 4 or 4A within 60 calendar days of achieving permitted capacity as defined in Rule 62-297.310(2), F.A.C., but no later than 180 calendar days after initial startup. Quality assurance procedures shall conform to the requirements of 40 CFR 60, Appendix F, and the Data Assessment Report of Section 7 shall be made each calendar quarter, and reported semiannually to the Compliance Authority. The RATA tests required for the CO monitor shall be performed using EPA Method 10 in Appendix A of 40 CFR 60. The CO monitor span values shall be set appropriately considering the allowable methods of operation and corresponding emission standards.
   b. *Diluent Monitors.* The oxygen (O_2) or carbon dioxide (CO_2) content of the flue gas shall be monitored at the location where CO is monitored to correct the measured emissions rates to 15% oxygen. If a CO_2 monitor is installed, the oxygen content of the flue gas shall be calculated using F-factors that are appropriate for the fuel fired. Each monitor shall comply with the performance and quality assurance requirements of 40 CFR 75.

   [Application No. 1030011-024-AC]

4. CEM Data Requirements:
   a. *Data Collection*. Emissions shall be monitored and recorded at all times including startup, operation, shutdown, and malfunction except for continuous monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments. The CEMS shall be designed and operated to sample, analyze, and record data evenly spaced over an hour. If the CEMS measures concentration on a wet basis, the CEM system shall include provisions to determine the moisture content of the exhaust gas and an algorithm to enable correction of the monitoring results to a dry basis (0% moisture). Alternatively, the owner or operator may develop through manual stack test measurements a curve of moisture contents in the exhaust gas versus load for each allowable fuel, and use these typical values in an algorithm to enable correction of the monitoring results to a dry basis (0% moisture). Final results of the CEMS shall be expressed as ppmvd of CO corrected to 15% oxygen. The CEMS shall be used to demonstrate compliance with the CEMS emission standards for CO as specified in this section. For purposes of determining compliance with the CEMS emissions standards of this section, missing (or excluded) data shall not be substituted. Upon request by the Department, the CEMS emission rates shall be corrected to ISO conditions.
   b. *Valid Hour*. Hourly average values shall begin at the top of each hour. Each hourly average value shall be computed using at least one data point in each fifteen-minute quadrant of an hour, where the unit combusted fuel during that quadrant of an hour. Notwithstanding this requirement, an hourly value shall be computed from at least two data points separated by a minimum of 15 minutes (where the unit operates for more than one quadrant of an hour). If less than two such data points are available, the hourly average value is not valid. An hour in which any oil is fired is attributed towards compliance with the permit standards for oil firing. The permittee shall use all valid measurements or data points collected during an hour to calculate the hourly average values.
   c. *24-hour Block Averages*. A 24-hour block shall begin at midnight of each operating day and shall be

calculated from 24 consecutive hourly average emission rate values. If a unit operates less than 24 hours during the block, the 24-hour block average shall be the average of all available valid hourly average emission rate values for the 24-hour block. For purposes of determining compliance with the 24-hour CEMS standards, the missing data substitution methodology of 40 CFR Part 75, subpart D, shall not be utilized. Instead, the 24-hour block average shall be determined using the remaining hourly data in the 24-hour block. [Rule 62-212.400(BACT), F.A.C.]

d. *Data Exclusion.* Each CEMS shall monitor and record emissions during all operations including episodes of startup, shutdown, malfunction, fuel switches and ULN tuning. Some of the CEMS emissions data recorded during these episodes may be excluded from the corresponding CO CEMS compliance demonstration subject to the provisions of Condition Nos. **5** or **6** of this subsection. All periods of data excluded shall be consecutive for each such episode and only data obtained during the described episodes (startup, shutdown, malfunction, fuel switches, ULN tuning) may be used for the appropriate exclusion periods. The permittee shall minimize the duration of data excluded for such episodes to the extent practicable. Data recorded during such episodes shall not be excluded if the episode was caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure, which may reasonably be prevented. Best operational practices shall be used to minimize hourly emissions that occur during such episodes. Emissions of any quantity or duration that occur entirely or in part from poor maintenance, poor operation, or any other equipment or process failure, which may reasonably be prevented, shall be prohibited.

e. *Availability*. Monitor availability for the CEMS shall be 95% or greater in any calendar quarter. The quarterly excess emissions report shall be used to demonstrate monitor availability. In the event 95% availability is not achieved, the permittee shall provide the Department with a report identifying the problems in achieving 95% availability and a plan of corrective actions that will be taken to achieve 95% availability. The permittee shall implement the reported corrective actions within the next calendar quarter. Failure to take corrective actions or continued failure to achieve the minimum monitor availability shall be violations of this permit.

[Application No. 1030011-024-AC and Rules 62-213.440 and 62-212.400(12), F.A.C.]

5. Allowable Data Exclusions: As per the procedures in this condition, limited amounts of CO CEMS emissions data may be excluded from the corresponding SIP-based compliance demonstration, provided that best operational practices to minimize emissions are adhered to and the duration of data excluded is minimized. As provided by the authority in Rule 62-210.700(4), F.A.C., these conditions replace the provisions in Rule 62-210.700(1), F.A.C. For each CT/HRSG system or CT in simple-cycle mode, excess emissions resulting from startup, shutdown, and documented malfunctions shall not exceed 120 minutes (non continuous) in any 24-hour period except for the specific cases listed below. A "documented malfunction" means a malfunction that is documented within one working day of detection by contacting the Compliance Authority by telephone, facsimile transmittal, or electronic mail.

   a. *Steam Turbine/HRSG System Cold Startup*: For cold startup of the steam turbine system, up to 480 minutes of excess emissions from any CT/HRSG system may be excluded in any 24-hour period. A cold "startup of the steam turbine system" is defined as startup of the combined cycle system following a shutdown of the steam turbine 24 hours or longer.

   b. *Steam Turbine/HRSG Hot Startup:* For hot startup of the steam turbine system, up to 240 minutes of excess emissions from any CT/HRSG system may be excluded in any 24-hour period. A "hot startup of the steam turbine system" is defined as startup of the combined cycle system following a shutdown of the steam turbine lasting less than 24 hours.

   c. *Shutdown Combined Cycle Operation*: For shutdown of the combined cycle operation, up to 180 minutes in any 24-hour period of excess emissions from any CT/HRSG system can be excluded.

   d. *CT/HRSG System Cold Startup*: For cold startup of a CT/HRSG system, up to 240 minutes in any 24-hour period can be excluded. "Cold startup of a CT/HRSG system" is defined as a CT/HRSG starting

up and blending into *combined-cycle* service after that CT/HRSG has been off-line for 4 hours or longer.

e. *CT/HRSG System Hot Startup*: For hot startup of a CT/HRSG system, up to 180 minutes in any 24-hour period can be excluded. "Hot startup of a CT/HRSG system" is defined as a CT/HRSG starting up and blending into *combined-cycle* service after that CT/HRSG has been off-line for less than 4 hours.

f. *Fuel Switching*: For fuel switching, up to 120 minutes in any 24-hour period can be excluded.

{Permitting Note: During a cold startup of the steam turbine system, each CT/HRSG system is sequentially brought on line at low load to gradually increase the temperature of the steam-electrical turbine and prevent thermal metal fatigue. Note that shutdowns and documented malfunctions are separately regulated in accordance with the requirements of this condition. The following table summarizes the excess emissions allowable data exclusion hours during various conditions.}

Start-Up Conditions	Hours Off-Line	Excess Emissions Data Exclusion Allowance
Steam Turbine/HRSG Starts		
ST/HRSG System Cold Startup	≥24	480 minutes
ST/HRSG Hot Startup	<24	240 minutes
CT/HRSG Blend Ins		
CT/HRSG Cold Startup	≥4	240 minutes
CT/HRSG Hot Startup	<4	180 minutes
Fuel Switching		
Fuel Switching		120 minutes

[Application No. 1030011-024-AC; Permits 1030011-010-AC, 1030011-012-AC and 1030011-019-AC]

6. ULN Tuning: CEMS data collected during initial or other major ULN tuning sessions shall be excluded from the CEMS compliance demonstration provided the tuning session is performed in accordance with the manufacturer's specifications. A "major tuning session" would occur after completion of initial construction, a combustor change-out, a major repair or maintenance to a combustor, or other similar circumstances. Prior to performing any major tuning session, the permittee shall provide the Compliance Authority with an advance notice that details the activity and proposed tuning schedule. The notice may be by telephone, facsimile transmittal, or electronic mail. [Design; Rule 62-213.440, F.A.C; and, Permits 1030011-010-AC & 1030011-019-AC]