TECHNICAL EVALUATION
AND
PRELIMINARY DETERMINATION

Duke Energy Florida, Inc.

d.b.a. Duke Energy

P.L. Bartow Power Plant

Unit 4 Revisions to Permit 1030011-010-AC

Gas-fueled Combined Cycle Unit

Pinellas County

DEP File No. 1030011-019-AC

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance

July 21, 2014

1. GENERAL PROJECT INFORMATION

1.1. Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control – General Provisions); 62-210 (Stationary Sources – General Requirements); 62-212 (Stationary Sources – Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources – Emissions Monitoring). Specifically, air construction permits are required pursuant to Rules 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations on a quarterly basis in Rule 62-204.800, F.A.C.

1.2. Facility Description and Location

Duke Energy Florida, Inc. (DEF) operates the P.L. Bartow Plant, which is an existing power plant (SIC No. 4911). This power plant consists of: four simple cycle gas turbine peaking units designated as Nos. P-1, P-2, P-3 and P-4; four combined cycle combustion turbine-electrical generators (CCCT), designated as Unit 4; and, its ancillary equipment: four natural gas fired fuel heaters; two diesel fuel storage tanks; and, a diesel fueled emergency fire pump. The plant is located on Weedon Island on the eastside of St. Petersburg, Pinellas County. The location with respect to other DEF facilities in Florida is shown in **Figure 1**. Also shown is the location of Weedon Island within Tampa Bay.

Figure 1. Bartow Power Plant in DEF System and Location of Weedon Island and Plant.

The plant is located approximately 83 km south of the PSD Class I Chassahowitzka Wilderness Area. The facility UTM coordinates are Zone 17, 342.4 km East and 3,082.6 km North.

1.3. Facility Regulatory Categories

<u>Title III</u>: The facility is identified as a major source of hazardous air pollutants (HAP).

<u>Title IV</u>: The facility operates units subject to the acid rain provisions of the Clean Air Act. Units 1, 2 and 3 were shut down on June 1, 2009. The allowances for SO_2 that were allocated for Units 1, 2 and 3 were preserved by the facility and are now allocated for new Unit 4.

Title V: The facility is a Title V major source of air pollution in accordance with Chapter 62-213, Florida Administrative Code (F.A.C.).

PSD: The facility is a Prevention of Significant Deterioration (PSD)-major source of air pollution in accordance with Rule 62-212.400, F.A.C.

NSPS: The facility operates units subject to the New Source Performance Standards (NSPS) of 40 Code of Federal Regulations (CFR) 60.

NESHAP: The facility operates units subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) of 40 CFR 63.

CAIR: The facility is subject to the Clean Air Interstate Rule (CAIR) set forth in Rule 62-296.470, F.A.C.

CAM: Compliance Assurance Monitoring (CAM) does not apply to any of the units at the facility. Unit 4 is equipped with Acid Rain continuous emissions monitoring systems (CEMS) that are also used to demonstrate continuous compliance with the nitrogen oxides (NO_X) limits.

GHG: The facility is identified as a major source of greenhouse gas (GHG) pollutants.

Standard Industrial Classification (SIC) Code: 4911 – Electrical Generation.

North American Industry Classification System (NAICS) Code: 221112 - Fossil Fuel Electric Power Generation

Florida Power Plant Siting Act (Siting): The facility was not certified pursuant to Siting under 403.501-519, F.S. or Chapter 62-17, F.A.C. [Design; Letter from Applicant to Siting Office dated December 19, 2005]

1.4. Project Description

DEF requested several revisions to the specific conditions of air construction permit 103001-010-AC (revised by 1030011-012-AC) for the 1,280 megawatts (MW) combined cycle unit (Power Block Unit 4).

Figure 2. P.L. Bartow Unit 4 – 1280 MW Combined Cycle Unit.

Emissions Unit 4 consists of four ("4-on-1") Siemens SGT6-501 F gas turbine-electrical generator set (Units 4A-4D) with a generating capacity of 215 MW (each) for gas firing at ISO conditions when practicing power (steam) augmentation. Exhaust from each gas turbine passes through a separate supplementary 500 MMBtu/hr gas fired heat recovery steam generator (HRSG). Steam from each HRSG is delivered to the 420 MW single steam turbine-electrical generator (STG).ach combustion turbine (CT) has 2 stacks that are equipped with continuous emissions monitoring systems (CEMS) to measure and record NO_X in simple-cycle and CO and NO_X

emissions in combined-cycle, as well as flue gas oxygen or carbon dioxide content. **Figure 2** above shows an aerial view of Unit 4 at the Bartow Power Plant.

Each CT within the combined-cycle unit system is permitted to operate in simple-cycle by directing the exhaust to a bypass stack instead of the respective heat recovery steam generator (HRSG) exhaust stack. All 8 stacks measure approximately 120 feet in height. Each CT is capable of firing backup low sulfur (<0.05% S) distillate fuel oil for the equivalent of 1,000 hours per year (hr/yr). All CTs are equipped with evaporative coolers to condition incoming air at high ambient temperatures.

Emissions of CO, PM/PM_{10}, SAM, SO_2 and VOC are controlled by the efficient combustion of natural gas and restricted firing of low sulfur distillate fuel oil. NO_X emissions are controlled by Ultra Low-NO_X (ULN) combustion technology for gas firing and water injection for oil firing.

1.5. Processing Schedule

- Received concurrent AC and AV Application on May 19, 2014.
- Application complete on May 19, 2014.
- Intent to Issue Permits distributed July 21, 2014.

2. PSD RULE APPLICABILITY

The project is a revision/clean-up of several old permit conditions. The permit does not authorize any new construction, nor does it relax any previously established operational or emissions limitations; therefore, the project is not subject to PSD preconstruction review. The revision to the permit specific conditions will not cause a significant impact or cause or contribute to a violation of any ambient air quality standard or PSD increment. Consequently, no air modeling was submitted and a BACT determination was not required.

A full PSD review was conducted for this Unit in 2006. Link to 2006 Technical Review

3. DEPARMENT PROJECT REVIEW OF SPECIFIC CONDITIONS

The applicant requested the following revisions to Unit 4 of original permit PSD-FL-381 (No. 1030011-010-AC). The proposed revisions to permit language do not affect concentration emissions rates, production rates or any other significant change. Descriptions of these requests are stated below, followed by the Department's position on the requested changes. Details of the agreed upon changes are listed within the permit itself, including what and how the different conditions are being changed. This permit is being processed simultaneously with the Title V renewal/revision Permit No. 1030011-020-AV.

This permitting action affects the following emissions units:

E.U. 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
045	Two Nominal 3,500,000 gallon Distillate Fuel Oil Storage Tanks
046	One Nominal 300 horsepower Diesel-fueled Emergency Fire Pump

3.1. Requested Changes to Specific Permit Conditions

The requested changes can be grouped into the following categories.

1. ***Unit 4 (EUs 4A through 4D) Subsection A*** (Title V Subsection D): Request to revise the following conditions:

   1.a. *General:* DEF requests to change the NO_X references from dry low NO_X (DLN) to ultra-low NO_X (ULN) in this subsection in order to maintain consistency throughout the permits (AC and AV).

Department Response: The Department agrees with the request and revises the appropriate language.

1.b. *Specific Condition No. 12, Permitted Capacity – Combustion Turbines (Title V Condition B.10):* DEF requests to delete the references about the submission of the manufacturer's performance curves (or equations) since they have already submitted these curves during the initial compliance testing.

Department Response: The Department agrees with the request and revises this condition accordingly.

1.c. *Specific Condition No.15 c. Restricted Operation (Title V Condition B.14.c.):* DEF is requesting a change in the duct burners (DB) compliance metric from 9,736 hours to the equivalent 4.7 billion cubic feet of natural gas per year. DEF states that the reasons for this request include greater reliability and lower operations and maintenance (O&M) costs. DEF believes the harder the duct burners operate the greater the "wear & tear" on the pressure and non-pressure parts of the HRSG resulting in component failure (reliability) and replacement (O&M cost).

DEF argues that the original PSD application requested the limit be based on the total gas consumption of the duct burners and that operating the DB at full-load for 2,434 hours per year per duct burner (9,736 total DB-firing hours) is equivalent to 4.7 billion cubic feet of natural gas per year (pages 5 & 8 of the initial Bartow PSD permit application.). DEF adds that it is worth noting that the DBs rarely operate at the full-load.

Department Response: The Department agrees with the request and revises this condition accordingly.

1.d. *Specific Condition No. 17, New Source Performance Standards (Title V Condition B.16)*: DEF states that the NO_X compliance metric for 40 CFR Part 60, Subpart KKKK applicable units is included in 60.4320(a) - Table 1. DEF requests to revise and clarify this Condition by adding to the emissions table and to the notes. Specifically, the NO_X emission standard of 96 ppm on a 30 days basis while operating at or <u>below</u> 75% peak load in units of ppm corrected to 15% oxygen was added.

Department Response: The Department agrees with the request and revises this condition accordingly. This facility netted out of PSD review for NO_X by 852 tons per year during the construction of Unit 4.

1.e. *Specific Condition No. 25 Allowable Data Exclusion (Title V Condition B.23):* DEF requests and states several revisions to this condition paragraphs:

- To change the documental malfunction time metric in the first paragraph of this Condition from "2 hours" to "120 minutes" since 120 minutes non-continuous is equivalent to 2 hours.
- To change the *Steam Turbine/HRSG System Cold Startup* timing from "at least 48 hours" to "24-hours or longer".
- To add new condition/definition/paragraph **b**. for a *Hot Startup of the Steam Turbine/HRSG* provisions.
- To modify the *CT/HRSG System Cold Startup* definition by deleting language referring to the steam drum pressure and replacing it by a more specific language "CT/HRSG starting up and blending into combined cycle service after that CT/HRSG have seen off-line for 4 hours or longer."
- To delete reference to the *Simple CT Start up* since this unit was not built.
- To add a Compliance Requirements table for clarity.
- To delete the permitting notes of this Condition.

DEF believes these modifications are necessary as the plant has gained experience in the operation of the CT/HRSG and steam turbine and as the result of feedback received from the vendor on the startup of the steam turbine and the result of an out of compliance determination.

Department Response: The Department agrees with the request and revises this condition accordingly.

1.f. *Specific Condition No. 30 Annual Compliance Tests (Title V Condition B.31):* DEF requests that the condition be broken out to specifically identify by paragraph the specific Annual Compliance Test for each pollutant.

Department Response: The Department agrees with the request and revises this condition accordingly.

1.g. *Specific Condition No. 32 CEM Data Requirements (Title V Condition B.27):* DEF requests to revise the *Availability* paragraph of this condition to clarify that the 95 % or greater monitor availability in any calendar quarter shall be when the unit operates more than 760 hours.

Department Response: The Department does not agree with the request since these are acid rain units. This condition will not be modified.

1.h. *Specific Condition No. 36 Fuel Sulfur Records (Title V Condition B.38):* DEF requests to add the sulfur analysis method ASTM D7039-07 for fuel oil containing 2 to 500 ppm sulfur.

Department Response: The Department agrees with the request and revises this condition accordingly.

2. ***Two nominal 3,500,000 gallon distillate fuel oil storage tanks (EU 045) Subsection C (****Title V Subsection F in 1030011-016-AV****):*** *DEF* requests to delete this emission unit subsection. DEF considers these units as insignificant activities and included them in the updated list of Appendix I of Title V permit. DEF believes the tanks do not have any unit specific applicable requirements or the potential to emit more than 5 tons per year of VOC.

Department Response: The Department agrees with the request and deletes this Subsection as requested.

3. ***One nominal 300 horsepower diesel-fueled emergency fire pump (EU 046), Specific Conditions 4 and 5 Subsection D*** (*Title V – Subsection D, Conditions D.4 and D.8)*: DEF states that *"per 40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engine, specifically, Part 60.4211(f) authorizes up to 100 hours for maintenance and testing"* and requests to change the allowable hours of operation of this unit (40 hour/yr) to reflect the rule. In addition, DEF requests to add the sulfur analysis method ASTM D7039-07 to Condition G.8 for fuel oil containing 2 to 500 ppm sulfur.

Department Response: The Department agrees with the request and revises this condition accordingly.

3.2. Previously Authorized Construction Project Related to the Current Request

The following link shows the relevant documents, the original Technical Evaluations and Preliminary

Determinations (TEPD) and all permits/projects modifications affected by this review. Refer to facility ID No. 1030011: Link to Previous Permits

3.3. Changes to Permits

This project is being processed as line-item changes to applicable specific conditions of the previously issued air construction (AC) permit. Through the conditions of this permit changes are made to the original permit conditions. For ease of identification, all changes are highlighted in yellow in the draft permit. Additions are shown with underlined formatting and deletions are shown as ~~strikethrough~~.

In general, the Department finds the requested changes acceptable based on the applicant's assurance that these Units are in compliance with all the emissions limits. Where helpful, clarifications will be made to better define the language of the specific conditions. See the draft permit for detailed changes.

4. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. No air quality modeling analysis is required because the project does not result in a significant increase in emissions. David Read is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting the

project engineer at the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, by email at david.read@dep.state.fl.us or by phone at 850-717-9075.