TECHNICAL EVALUATION
AND
PRELIMINARY DETERMINATION

APPLICANT

Duke Energy Florida, Inc.
299 First Avenue, North, Mail Code CN77
St. Petersburg, Florida 33701

Crystal River Plant
Facility ID No. 0170004

PROJECT

Permit Revision No. 0170004-045-AC

Fuel Use, and Ammonia and PM Testing

COUNTY

Citrus County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, MS #5505
Tallahassee, Florida 32399-2400

August 18, 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

The Duke Energy of Florida, Inc. (DEF) Crystal River Energy Complex is an existing power plant, which is categorized under Standard Industrial Classification Code No. 4911. Refer to **Figure 1** and **Figure 2**. The existing Crystal River Power Plant is located in Citrus County at 15760 West Power Line Street in Crystal River, Florida.

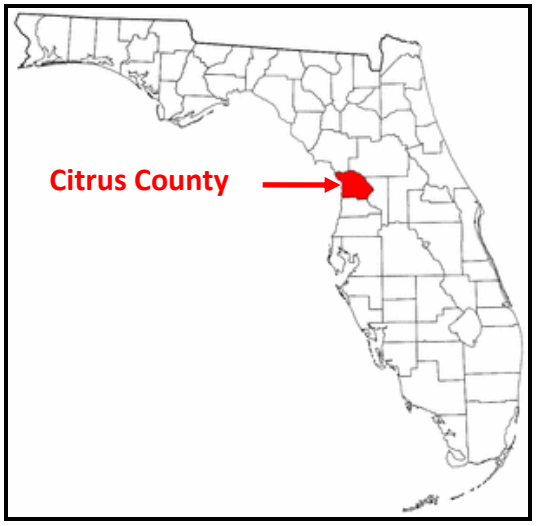

Figure 1. Citrus County, Florida.

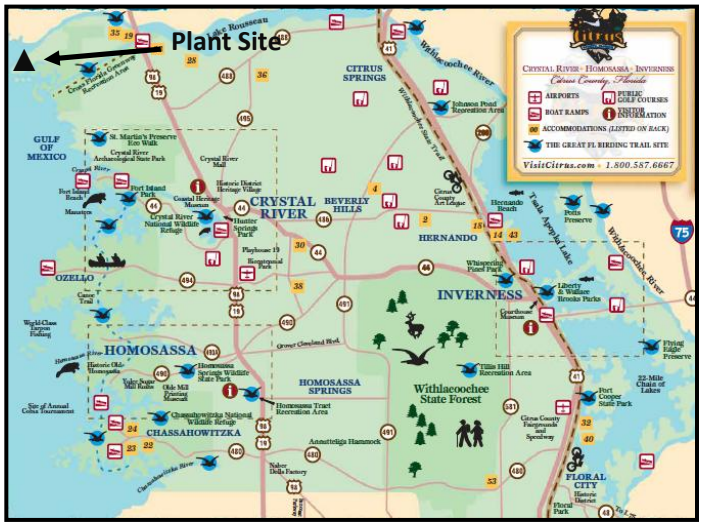

Figure 2. Location of Crystal River Energy Complex.

The UTM coordinates of the existing facility are Zone 17, 334.3 kilometers (km) East and 3204.5 km North. This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to Ambient Air Quality Standards (AAQS).

This facility consists of: four coal-fired fossil fuel steam generating (FFSG) units with electrostatic precipitators; two natural draft cooling towers for FFSG Units 4 and 5; helper mechanical cooling towers for FFSG Units 1, 2; coal, fly ash, and bottom ash handling facilities; limestone and gypsum material handling activities; hydrate lime storage and transfer system for Units 4 and 5; and, various fire pumps and generators. The facility continuously operates low-NO_X burners, selective catalytic reduction systems (SCR), flue gas desulfurization systems (FGD) which includes limestone and gypsum material handling activities and acid mist mitigation (AMM) systems for existing Units 4 and 5, as authorized by permits No. 0170004-023-AC (PSD-FL-383C) and 0170004-037-AC (PSD-FL-383E). In conjunction with the new control equipment, Units 4 and 5 are now also authorized to burn a blend of bituminous/sub-bituminous coal.

A list of the emission units (EU) at the facility is given in **Table 1** below.

TABLE 1 – LIST OF EMISSION UNITS AT THE CRYSTAL RIVER ENERGY COMPLEX.

E.U. No.	Brief Description
Regulated Emission Units	
001	Fossil Fuel Steam Generator, Unit 1
002	Fossil Fuel Steam Generator, Unit 2
004	Fossil Fuel Steam Generator, Unit 4
003	Fossil Fuel Steam Generator, Unit 5
006	Fly ash transfer (Source 1) from Unit 1
008	Fly ash storage silo (Source 3) for Units 1 and 2
009	Fly ash transfer (Source 4) from Unit 2
010	Fly ash transfer (Source 5) from Unit 2
014	Bottom ash storage silo for Units 1 and 2
012	Relocatable diesel generators
013	Cooling towers for Units 1, 2, and 3
015	Cooling towers for Units 4 and 5
016	Material handling activities for coal-fired steam units
020	Portable Cooling Towers for Units 1 and 2
028	3500 kW diesel generator associated with Unit 3
023	Limestone and Gypsum Material Handling Activities
029	Diesel fire pump, south yard
030	Emergency generator (meteorological weather station)
Unregulated Emissions Units and/or Activities	
017	Fuel and lube oil tanks and vents
018	Sewage treatment, water treatment, lime storage
019	Two 3500 kW diesel generators associated with Unit 3

1.3. Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is major stationary source in accordance with Rule 62-212.400, F.A.C., for the Prevention of Significant Deterioration (PSD) of Air Quality.

1.4. Project Description

- DEF is no longer utilizing coal briquette and used oil as fuel sources at the Crystal River plant. Therefore, DEF requests that reference to these fuel types and the associated permit conditions in the Title V permit be removed. In addition, DEF requests that Crystal River be allowed the option to utilize sub-bituminous coal that is not limited to Powder River Basin as long as the facility meets the sulfur content limitation of 5.5 lb/MMBtu as outlined in Specific Condition **B.2.** in the Title V permit.

- DEF requests that DEP remove the requirement to test annually for opacity at the stack for Units 3 and 4 as required in Specific Condition **B.29.** Crystal River currently utilizes a COMS to continuously monitor the opacity in the ductwork just after the ESP as specified in Condition **B.22.d.**. and Appendix CAM of the Title V permit. Since the CAM plan requires that the facility continuously monitor opacity using a

COMS, and confirm that the boiler and ESP are maintaining opacity within the constraints of the CAM plan, additional annual Method 9 testing at the stack is not necessary.

- DEF requests that DEP provide Crystal River the option of using a PM CEMS in lieu of PM stack testing and COMS opacity monitoring for Units 4 and 5. The PM emissions limitations established in Condition **B.6.a.** and **B.6.b.** are based on 40 CFR 60.42(a) requirements and Condition **B.6.c.** emission limitation was determined as Best Available Control Technology (Permit No. 0170004-023-AC) based on 40 CFR Part 60, Subpart Da PM emission limitations. If DEF chooses to use PM CEMS rather than PM stack testing and COMS, DEF will also request that the PM CAM plan (Permit Appendix CAM) for EU003 and EU004 also be removed at the time of the PM CEMS installation.
- DEF requests that DEP allow Crystal River to test for ammonia slip only once per permit term. DEF has consistently tested for ammonia slip emissions significantly below the permit limit of 5 parts per million by volume (ppmv) per Specific Condition **B.10.** As provided in Appendix G of the application, ammonia slip test results were 0.4 ppmv for Unit 4 and 0 ppmv for Unit 5 per testing conducted on September 17 and 18, 2013, respectively.
- DEF requests that Specific Condition **F.5.** and its associated PM emission limits be removed from the permit. The cooling towers for FFSG 1 and 2 (EU 013) are equipped with high efficiency drift eliminators that were designed to meet the 0.004% drift rate which is the basis of the PM emission limits. In addition, these cooling towers are "helper cooling towers" that are limited in hours of operation, further reducing the need for a PM limit due to work practice standards and operational constraints. Additionally, more recent DEP cooling tower permitting (Permit No. 017004-010-AC) for the portable cooling towers for FFSG Units 1 and 2 (EU020) set the drift emission rate as BACT and did not include associated PM emission limits. The PM emission limits set for EU 013, although they do not have associated PM testing required, oblige the facility to pay additional Title V fees annually since PM is set in the permit as a regulated pollutant for this source. In addition to Permit 017004-010-AC, DEP has recently permitted other saltwater cooling towers at facilities, such as DEF's Anclote Power Plant (Facility ID: 1010017) and Florida Power and Light's Turkey Point Power Plant (Facility ID: 0250003), that do not have associated PM emission limits. According to DEF, since the Crystal River facility has PM emission limits in their permit, they are being penalized into paying additional Title V fees that are not required at all similar facilities. DEF requests that the PM emission limits in Specific Condition **F.5.** be removed from the permit, to remove the fee penalty that is inconsistent with other cooling tower permitting.

1.5. Application Processing Schedule

Application for an Air Construction Permit Revision received on May 20, 2014. Application was deemed complete.

2. PSD APPLICABILITY

2.1. General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal ambient air quality standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants. Commonly addressed PSD pollutants in the power industry include: carbon monoxide (CO), NO_X, particulate matter (PM), PM with a mean diameter of 10 microns or less (PM_{10}), PM with a mean diameter of 2.5 microns or less ($PM_{2.5}$), sulfur dioxide (SO_2), volatile organic compounds (VOC), lead (Pb), fluorides (F), sulfuric acid mist (SAM), and mercury (Hg). According to state and federal rules, six greenhouse gases (GHG), are also subject to PSD review.

Additional PSD pollutants that are more common to certain other industries include: hydrogen sulfide (H_2S), TRS including H_2S, reduced sulfur compounds (RSC) including H_2S, municipal waste combustor (MWC) organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (dioxin/furan), MWC metals measured as PM; MWC acid gases measured as SO_2 and HCl, and MSW landfill emissions as non-methane organic compounds (NMOC).

As defined in Rule 62-210.200(189)(a)1, F.A.C., a stationary source is a "major stationary source" (major PSD source) if it emits or has the potential to emit (PTE):

- 250 tons per year (TPY) or more of any PSD pollutant; or
- 100 TPY or more of any PSD pollutant and the facility belongs to one of the 28 listed PSD major facility categories.

The list given in the citation includes the category of "fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input". This category applies to the Crystal River Plant before and after the proposed project. The Crystal River Plant is a major stationary source based on actual emissions of and potential to emit 100 TPY or more of several individual PSD pollutants.

For major stationary sources such as the Crystal River Plant, PSD applicability for modification projects is based on thresholds known as the significant emission rates (SER) as defined in Rule 62-210.200(274), F.A.C. Any "net emissions increase" as defined in Rule 62-210.200(204), F.A.C. of a PSD pollutant from the project that equals or exceeds the respective SER is considered "significant". SER also means any emissions rate or any net emissions increase of a PSD pollutant associated with a major stationary source or major modification which would construct within 10 km of a Class I area and have an impact on such area equal to or greater than 1 gram per cubic meter, 24-hour average.

Although a facility may be "major" (i.e. emits or has the potential to emit 100 or 250 TPY as applicable) for only one PSD pollutant, a project must include BACT controls for any PSD pollutant that exceeds the corresponding SER given in **Table 2**.

TABLE 2 – LIST OF SER BY PSD-POLLUTANT. [1]

Pollutant	SER (TPY)	Pollutant	SER (TPY)
CO	100	NO_X	40
$PM/PM_{10}/PM_{2.5}$	25/15/10	Ozone (VOC) [2]	40
$PM_{2.5}$ (NO_X)	40	$PM_{2.5}$ (SO_2)	40
Ozone (NO_X) [2]	40	SAM	7
SO_2	40	Pb	0.6
Hg	0.1	GHGs	0 [3]

1. Excluding fluoride and pollutants specific to the Pulp and Paper industry, MWCs, MSW landfills.
2. Ozone (O_3) is regulated by its precursors (VOC and NO_X). PSD for $PM_{2.5}$ can be triggered by its precursors (NO_X and SO_2).
3. Pursuant to 40 CFR 52.21(b)(23)(ii), pollutants with no SER listed at 40 CFR 52.21(b)(23)(i) have a SER of zero tons/year.

2.2. PSD Applicability for Project

The project will revise permit conditions to reflect changes to fuel use, and ammonia and PM testing at the facility. There will be no emissions increases and the project is not subject to PSD preconstruction review.

3. DEPARTMENT REVIEW

3.1. Response to Requested Revisions

3.1.1. Coal Briquette and Used Oil as Fuel

Since DEF is no longer utilizing coal briquette and used oil as fuel sources at the Crystal River plant the Department agrees to removes all references to these fuel from the Title v permit renewal. In addition, the Department agrees to DEF requests that Crystal River be allowed the option to utilize sub-bituminous coal and not just Powder River Basin coal so long as the coal meets the sulfur content limitation of 5.5 lb/MMBtu. To accomplish these revisions the following air construction permit conditions must be changed.

- **Specific Condition 2.** of permit No. 0170004-006-AC is changed as follows:

2. Fuel: The emissions units described above may combust a mixture of bituminous coal and sub-bituminous coal ~~briquettes~~. [Rule 62-210.200, F.A.C, Definitions-potential to emit (PTE)]

- **Specific Condition 3.** of permit No. 0170004-006-AC is changed as follows:

3. Sulfur Limitation: The maximum sulfur content of the ~~coal/briquette mixture~~ bituminous coal and sub-bituminous shipment, averaged on an annual basis, shall not exceed the following:

3.1.2. Test Annually for Opacity and Ammonia Slip at the Stack

Since Crystal River plant currently utilizes a COMS to continuously monitor the opacity in the ductwork just after the ESP, the Department agrees that an additional annual Method 9 VE test at the stack is not necessary. However, if requested by the Department, a VE testing using EPA Method 9 will still be required.

With regard to the annual ammonia slip testing, the Department agrees that all test results are well below the permitted limit of 5 ppmv. In addition, the primary purpose of this testing is to diagnose SCR catalyst degradation. The requirements for continuous monitoring of nitrogen oxides (NO_X) and ammonia flow already serve to provide a representative characterization of catalyst performance. Consequently, the Department agrees to this request so long as the amount of ammonia required to meet permitted NO_X emission limits is recorded with the records keep on site.

To accomplish these revisions the following air construction permit condition must be changed. Note, the PM change is also related to the PM CEMS request discussed in **subsection 3.1.3** below.

- **Specific Condition A.19.b.** of permit No. 0170004-023-AC is changed as follows:

A.19.b. *Subsequent Tests: D*uring each federal fiscal year (October 1st to September 30th), Units 4 and 5 shall be tested to determine emissions of ~~ammonia slip, opacity,~~ PM, and SAM. Ammonia slip stack testing shall be required prior to permit renewal. If requested by the Department, a VE test shall be conducted. If a PM CEMS is installed on the units, an annual PM/PM_{10} stack test is no longer required. A RATA test can be used instead.

[§60.48Da(f); Rules 62-4.070(3), 62-212.400(BACT) and 62-297.310, F.A.C.]

3.1.3. PM CEMS and COMS Opacity Monitoring for Units 4 and 5

The Department agrees that if a PM CEMS are installed on Units 4 and 5 that annual PM stack testing is no longer required per §60.48Da(f). In addition, a COMS is no longer required per §60.42Da(b)(1) and 40 CFR 75.14(e) and the units are exempt from the opacity standard per §60.49Da(a)(4)(ii). Finally, if a PM CEMS is installed to demonstrate continuous compliance with the BACT PM limit of 0.030 pounds per million British thermal units (lb/MMBtu), the previously used annual stack test to demonstrative compliance with this limit can be removed and the RATA testing required by the CEMS substituted.

To accomplish the PM revisions see the changes made to **Specific Condition A.19.b.** of permit No. 0170004-023-AC above. To accomplish COMS revisions the following air construction permit conditions must be changed

- **Specific Condition A.13.** of permit No. 0170004-023-AC is changes as follows:

13. Existing CEMS/COMS: For Units 4 and 5, the permittee shall continue to calibrate, operate, and maintain continuous monitoring equipment to measure and record opacity, NO_X and SO_2 in terms of the applicable standards. The permittee shall either relocate the existing CEMS to the new stack configurations or replace the monitoring systems. Due to the wet stack, the existing COMS shall be relocated or new COMS installed in the ductwork after the ESP and prior to the wet FGD system. Each COMS and CEMS shall be installed such that representative measurements of emissions or process parameters from the facility are obtained. The monitors shall be installed, operated and maintained in accordance with the existing requirements of 40 CFR 60.45, as well as the provisions of the federal acid rain program. If a PM CEMS is installed, COMS is no longer required. [40 CFR 75.14(e); §60.42Da(b)(1) and Rule 62-4.070(3), F.A.C.]

- **Specific Condition A.25.** of permit No. 0170004-023-AC is changes as follows:

25. Control Device – Parametric Monitoring:

    a. *SCR System*: The permittee shall continuously monitor and record the ammonia injection rate of the SCR

control system. Data shall be reduced to 1-hour block averages. [Rule 62-4.070(3), F.A.C.]

b. *FGD System*: The permittee shall continuously monitor and record the limestone slurry injection rate of the FGD control system. Data shall be reduced to 1-hour block averages. [Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]

c. *Alkali Injection System*: The permittee shall continuously monitor and record the alkali injection rate of the alkali injection system. Data shall be reduced to 1-hour block averages. Operation of the alkali injection system shall be determined by the automated control system, which shall be set in accordance with the preliminary performance and compliance tests for SAM emissions. [Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]

d. *ESP*: The permittee shall continuously monitor and record the opacity in the ductwork just after the ESP for use as part of the Compliance Assurance Monitoring Plan under Title V. Operation of the ESP shall be based upon COMS data collected during satisfactory PM emissions compliance tests. If a PM CEMS is installed, operation of the ESP shall be based upon CEMS data. [Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]

3.1.4. Cooling Towers for FFSG 1 and 2 (EU 013)

The Department agrees with the applicant that the PM emission limit for the cooling towers FFSG 1 and 2 (EU 013) is out dated. The towers are equipped with high efficiency drift eliminators designed to meet the 0.004% drift rate which is typically all that is required for a BACT determination for cooling towers in a PSD permit. After construction of the cooling towers, after the drift rate is confirmed the towers normally become "*Unregulated Emissions Units and/or Activities.*"

To effect this changes, the air construction permit conditions are revised as follows:

- **Specific Condition 2.** of permit No. AC 09-162037 is deleted:

~~**2.** The maximum allowable emissions of particulate matter form each cell (stack) is 11.89 #/hour. This is based on a 0.004% drift rate (ratio of drift to the circulate rate) and the following table:~~

~~**Flow Rate (gpm)**~~	~~**Total PM (from all 36 cells)**~~		~~**PM10**~~	
	~~#/hr~~	~~T/yr~~	~~#/hr~~	~~T/yr~~
~~**735,000**~~	~~**428**~~	~~**925**~~	~~**214**~~	~~**462**~~

~~(PM$_{10}$ is approximately 50% of total PM)~~

- **Specific Condition 1.a.** of permit No. PSD-FL-007 is deleted:

~~**1.** Emission Limitations~~
~~a. Cooling tower emissions from each unit individually shall not exceed the following:~~
~~Total Suspended Particulate: 175 lb/hr~~

- **Specific Condition 2.a.** of permit No. PSD-FL-007 is deleted:

~~**2.a.** Unit 4 tower shall be tested after October 1, 1998, but no later than December 31, 1988. The first compliance test for unit 5 tower shall be conducted after January 1, 1992, but not later than May 1, 1992. Additionally, units 4 and 5 shall be tested no less than once every five years thereafter, during the same periods of the respective calendar years.~~

- **Specific Condition 4.b.** of permit No. PSD-FL-007 is deleted:

~~b. Should either tower emissions rate exceed 175 lb/hr, the permittee shall do the following:~~

~~(1) Notify EPA and the Florida Department of Environmental Regulation (FDER) of the occurrence within 10 days of becoming aware of the situation.~~

~~(2) Provide an assessment of necessary corrective actions and a proposed schedule of implementation within an additional 20 days.~~

~~(3) Expeditiously complete .corrective actions~~

~~(4) Retest the tower within three months after the correction is completed.~~

~~(5) Submit the testing report within 45 days after completion of said tests.~~

- **Specific Condition 2.b.** of permit No. PSD-FL-007 is deleted:

~~b. The following test methods and procedures shall be used for compliance testing:~~

~~(1) Particulate emissions shall be measured by the sensitive paper (SP) method for each cooling tower.~~

~~(2) Testing shall be done at either the drift eliminator level within the tower or at the tower exit plane.~~

~~(3) For· demonstrating compliance with the applicable emission limits, not less than three tests shall be conducted. All valid data from each of these tests shall be averaged in demonstration compliance. No individual test result shall determine compliance or noncompliance or. The emissions rate reported as a percent of the circulated water as well as lb/hr and total dissolved solids in the cooling tower basin(s) and intake water shall be reported for each test.~~

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 any increase in emissions.

Tom Cascio is the project engineer responsible for reviewing the application and drafting the permit revision. Additional details of this analysis may be obtained by contacting him by telephone at 850/717-9077 or by e-mail at tom.cascio@dep.state.fl.us in the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.