TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Florida Power Corporation d/b/a
Progress Energy Florida, Inc.
299 First Avenue, North
St. Petersburg, Florida 33701

Crystal River Energy Complex
Facility ID No. 0170004

PROJECT

Project No. 0170004-040-AC
Coal Blend Testing/Post Combustion Controls Units 1 and 2

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

June 14, 2013

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 Chapters 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 in Rule 62-204.800, F.A.C.

1.2. Facility Description and Location

The Progress Energy Crystal River Energy Complex is an existing power plant, which is categorized under Standard Industrial Classification Code No. 4911. Refer to Figures 1 and 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 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).

Table 1 is a summary of Emissions Units (E.U.) from the Facility Title V Air Operation Permit 0170004-025-AV. Units 1 and 2 are the subject of the present permit application. Units 1 and 2 are tangentially-fired, dry bottom pulverized coal-fueled boilers with gross capacity ratings of 440.5 and 523.8 megawatts (MW), respectively. The units commenced commercial operation in 1966 and 1969, respectively.

Table 1. Summary of Emissions Units

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

Unit 1 is equipped with a 499 foot stack and unit 2 has a 502 foot stack. Each has an electrostatic precipitator (ESP) to control particulate matter (PM) and Low NO_X burners to control nitrogen oxides (NO_X). Each is equipped with Continuous emissions monitoring systems (CEMS) to measure and record NO_X and sulfur dioxide (SO_2) emissions and a continuous opacity monitoring system (COMS) to measure and record the opacity of the exhaust gas.

1.3. Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- The facility operates units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Title V major source of air pollution in accordance with Chapter 62-213, F.A.C.
- The 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.
- The facility is subject to the Clean Air Interstate Rule (CAIR) set forth in Rule 62-296.470, Florida Administrative Code (F.A.C.)
- The facility operates units subject to the Standards of Performance for New Stationary Sources (NSPS) pursuant to 40 CFR Part 60.

- The facility operates units that were certified under the Florida Power Plant Siting Act, 403.501-518, F.S.

1.4. Application

On May 30, 2013, Progress Energy Florida submitted an air construction permit application for Crystal River Energy Complex units 1 and 2. The application may be accessed by entering permit No. 0170004-040-AC on the following web site: http://www.dep.state.fl.us/air/emission/apds/default.asp.

1.5. Project Description

The test burn program conducted on units 1 and 2 at the Crystal River Energy Complex is an attempt to reduce overall emissions such as particulate matter, acid gases, and mercury. The results of the test burn program will determine the potential for units 1 and 2 to comply with the Mercury and Air Toxics Standards (MATS). New coal and coal blends consisting up to 40 percent Powder River Basin (PRB) coal with 60 percent West Bituminous (WB) will be fired in the boilers. The test burn program will also have additional temporary post combustion controls such as hydrated lime injection and activated carbon injection upstream to the electrostatic precipitator. The application noted coal blending will be done offsite in an effort to reduce fugitive emissions.

Material handling and storage emissions will result from the use of hydrated lime and activated carbon injection during the test burn program. The hydrated lime and activated carbon sorbents will be transported from a temporary sorbent silo to the injection points in the flue gas stream via pneumatic conveying system. There are two new air emission sources associated with the hydrated lime storage and two new air emissions associated with the activated carbon storage. These new sources are related to potential emissions that occur when displaced air entrains dust particles as the storage vessels are filled. To minimize the emissions, the exhaust from the storage vessels and the pneumatic conveyors are routed through fabric filters prior to exhausting to the ambient air. Figure 3 details the sorbent storage and pneumatic conveying equipment provided by the applicant

Figure 3. Proposed Sorbent Injection System

1.6. Processing Schedule

May 30, 2013 Received application.

June 14, 2013 Issued Draft Permit Package.

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(PSD), 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: CO, SO_2, NO_X, PM, PM smaller than 10 micrometers (µm) (PM_{10}), PM smaller than 2.5 µm ($PM_{2.5}$), volatile organic compounds (VOC), sulfuric acid mist (SAM), lead (Pb), fluorides (F), and mercury (Hg).

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 municipal solid waste (MSW) landfill emissions as non-methane organic compounds (NMOC).

As defined in Rule 62-210.200(Definitions), 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 (tons/year) or more of any PSD pollutant; <u>or</u>
- 100 tons/year or more of any PSD pollutant <u>and</u> 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". The given category applies to the Crystal River Energy Complex. The Crystal River Energy Complex is a major stationary source based on actual emissions of and potential to emit 100 tons/year or more of several individual PSD pollutants.

For major stationary sources such as the Crystal River Energy Complex, PSD applicability for modification projects is based on thresholds known as the significant emission rates (SER) as defined in Rule 62-210.200 (Definitions), F.A.C. Any "net emissions increase" as defined in Rule 62-210.200 (Definitions), 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 tons/year as applicable) for only one PSD pollutant, a project must include Best Available Control Technology (BACT) for any PSD pollutant increase in that equals or exceeds the corresponding significant emission rate given in Table1.

Table 1. List of Significant Emission Rates by PSD-Pollutant Relevant to the Facility [2]

Pollutant	SER (tons/year)	Pollutant	SER (tons/year)
PM	25	PM_{10}	15
$PM_{2.5}$	10	$PM_{2.5}$ (NO_X) [1]	40
$PM_{2.5}$ (SO_2) [1]	40	CO	100
SO_2		NO_X	40
Ozone (NO_X) [1]	40	Ozone (VOC) [1]	40
Sulfuric acid mist (SAM)	7	fluoride	3
mercury	0.1	lead	0.6

1. $PM_{2.5}$ is also regulated through precursors (NO_X and SO_2); Ozone (O_3) is regulated through precursors (VOC and NO_X).
2. There is federal SER of 75,000 tons/year for Greenhouse Gases (GHG) as carbon dioxide equivalent (CO_2e) that has not been incorporated into Department rules.

According to 40 CFR 52.21, six greenhouse gases (GHG), are also subject to regulation at new stationary sources According to 40 CFR 52.21, six greenhouse gases (GHG), are also subject to regulation at new stationary sources that will emit or have the potential to emit 100,000 tons/year (SER equal to 75,000 tons/year) expressed as the carbon dioxide equivalent emissions (CO_2e). This requirement has not been incorporated into Department rules but is a separate requirement of the EPA.

2.2. PSD Applicability for Project

The project is located in Citrus County, which is in an area that is currently in attainment with the state and federal AAQS or otherwise designated as unclassifiable.

Methodology for Calculations of Baseline Actual Emissions and Projected Actual Emissions

To determine whether the project causes net emissions increases equal to or greater than the respective SER (triggering PSD) requires a comparison of recent "baseline actual emissions" with future "projected actual emissions". According to Rule 62-210.200(Definitions), F.A.C., for any existing electric utility steam generating unit:

"Baseline actual emissions" means the average rate, in tons per year, at which the unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding the date a complete permit application is received by the Department. The Department shall allow the use of a different time period upon a determination that it is more representative of normal source operation".

1. The average rate shall include fugitive emissions to the extent quantifiable, and emissions associated with startups and shutdowns.
2. The average rate shall be adjusted downward to exclude any non-compliant emissions that occurred while the source was operating above any emission limitation that was legally enforceable during the consecutive 24-month period.
3. For a PSD pollutant, when a project involves multiple emissions units, only one consecutive 24-month period must be used to determine the baseline actual emissions for the emissions units being changed. A different consecutive 24-month period can be used for each PSD pollutant.
4. The average rate shall not be based on any consecutive 24-month period for which there is inadequate information for determining annual emissions, in tons per year, and for adjusting this amount if required by subparagraph 2., above.

According to Rule 62-210.200(Definitions), F.A.C., for an existing unit (other than an electric steam generating unit):

"Projected Actual Emissions" means the maximum annual rate, in tons/year, at which an existing emissions unit is projected to emit a PSD pollutant in any one of the 5 years following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that PSD pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source. One year is one 12-month period. In determining the projected actual emissions, the Department:

(a) Shall consider all relevant information, including historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans or orders, including consent orders; and

(b) Shall include fugitive emissions to the extent quantifiable and emissions associated with startups and shutdowns; and

(c) Shall exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions and that are also unrelated to the particular project including any increased utilization due to product demand growth; or

(d) In lieu of using the method set out in paragraphs (a) through (c) above, may be directed by the owner or operator to use the emissions unit's potential to emit, in tons per year.

Department's Assessment of PSD Applicability

The applicant provided Arch Coal, Inc.'s, property analysis of the PRB and WB coal shown in Table 2. The coal characteristics which currently fuel units 1 and 2 are also included in Table 2 for a complete analysis of potential emissions increase.

Table 2. Proposed Coal and Characteristics.

Characteristics	Current Coal	Black Thunder (PRB)	West Elk (W. Bituminous)
Ash Content	11.15 %	5.20 %	8.47 %
Sulfur Content	1.02 %	0.25 %	0.41 %
Nitrogen Content	1.35 %	0.99 % (dry basis)	1.55 % (dry basis)
Moisture Content	5.98 %	26.42 %	10.68 %
Heating Value	11,700 Btu/lb	8,910 Btu/lb	11,391 Btu/lb
Hardgrove Grindability Index	44	56	50

A comparison of coal characteristics provided by the applicant indicates combustion of the current coal results in higher quantities of SO_2, PM loading into the ESP, and NO_x when compared to coal blending. However, if 100 percent WB coal is fired a slight increase in NO_x emissions is anticipated due to the higher nitrogen content of the coal.

To project the actual PM emissions from the material handling and storage silos a truck unloading rate of 2,000 cfm for six hours a day was assumed. The additional PM, 1.1 tons per year from the material handling operation is conservative since it assumes the test burn program will last for a twelve month period.

Visible emissions from the proposed dry sorbent storage systems will meet a 5 percent opacity standard over a six minute period. The bag filters shown in Figure 3 will ensure compliance with the opacity standards.

5. PRELIMINARY DETERMINATION

The permit will authorize the applicant to conduct a test burn program using new coal and/or coal blends accompanied by the injection of activated carbon and hydrated lime prior to the EPS. Due to the lower concentrations of SO_2 and NO_x in the coal blend the test burn program will potentially result in emission decreases of these pollutants. Hydrogen chloride and mercury emissions will potentially decrease due to the hydrated lime and activated carbon injection, while emissions of VOC and CO should remain relatively unchanged. PM emissions may increase slightly but not to significant levels. In summary, except for possible fugitive PM emissions caused by the equipment required to apply the sorbents to the flue gas stream during the test, pollutant emissions increases, if any, should be adequately controlled by the existing add-on controls during testing. The applicant will be required to comply with all existing valid permit conditions during the test burn program. Thus, the Department has reasonable assurance that no significant increase in any air pollutant will result from conducting this test.

Additional details of this analysis may be obtained by contacting the project engineer at leigh.pell@dep.state.fl.us, 850/717-9033, or the Department's Office of Permitting and Compliance, 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400.