TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Gulf Power Company

One Energy Place
Pensacola, Florida 32520-0100

Crist Electric Generating Plant
Facility ID No. 0330045

PROJECT

Project No. 0330045-036-AC
Minor Revisions to NO_X and SO_2 Emissions Limits

COUNTY

Escambia County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
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1. GENERAL PROJECT INFORMATION

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.

Facility Description and Location

The Gulf Power Company operates the existing Crist Electric Generating Plant, which is categorized under Standard Industrial Classification Code No. 4911. The facility is located in Escambia County at Governor's Bayou off 10 Mile Road in Pensacola, Florida. The UTM coordinates of the existing facility are Zone 16, 478.5 km east, and 3381.44 km north. This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS). The plant includes four primarily coal-fired boilers, Units 4-7, with the following configurations:

- Units 4 and 5 (EU 004 and EU 005) are tangentially-fired, dry-bottom electric utility boilers manufactured by Combustion Engineering with a nominal generating capacity of 93 megawatt (MW) per unit. Units 4 and 5 control particulate matter with electrostatic precipitators (ESP) and control nitrogen oxides (NO_X) with selective non-catalytic reduction (SNCR). After control by the ESP and SNCR, there is a common bypass stack for Units 4 and 5 that allows operation while bypassing the flue gas desulfurization (FGD) system.
- Unit 6 (EU 006) is a front wall-fired, dry-bottom electric utility boiler manufactured by Foster Wheeler with a nominal generating capacity of 369 MW. Unit 6 controls particulate matter with an ESP and currently controls NO_X with low-NO_X burners and a new selective catalytic reduction (SCR) system. After control by the ESP and SCR, there is a common bypass stack for Units 6 and 7 that allows operation while bypassing the FGD system.
- Unit 7 (EU 007) is a rear wall-fired, dry-bottom electric utility boiler manufactured by Foster Wheeler with a nominal generating capacity of 578 MW. Unit 7 controls particulate matter with an ESP and controls NO_X with low-NO_X burners and a SCR system. After control by the ESP and SCR, there is a common bypass stack for Units 6 and 7 that allows operation while bypassing the FGD system.
- Units 4 - 7 control sulfur dioxide (SO_2) emissions with a common FGD system. Under normal operations, emissions from units 4 - 7 are exhausted through a common stack following the FGD system. In addition, Units 4 - 7 continuously monitor and record opacity, SO_2 and NO_X emissions.

The primary fuel for all four units is pulverized coal. Supplemental fuels include natural gas, fuel oil and on-specification used oil. For Units 6 and 7, fuel oil is only used for startup and as needed for flame stabilization. In addition, Units 4 and 5 may fire carbonaceous fuel (biomass to include wood, switch grass, sawdust and sander-dust). Finally, on-site generated "oil contaminated soil" is periodically combusted for energy recovery purposes. Boilers 4 and 5 were Acid Rain Phase I substitution Units. Boilers 6 and 7 were Acid Rain Phase I Units. All four boilers are subject to the Acid Rain Phase II and CAIR requirements.

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 (CAA).
- The facility is a Title V major source of air pollution in accordance with Chapter 62-213, F.A.C.
- The facility operates units subject to the Clean Air Interstate Rule (CAIR).
- 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.

Background Information

On August 28, 2002, Gulf Power Company and the Florida Department of Environmental Protection entered into an agreement titled, "Agreement for the Purpose of Ensuring Compliance with the Ozone Ambient Air Quality Standards" (Ozone Agreement). The following air construction permits authorized the installation of new equipment or are otherwise relevant to this permitting action.

- Air Permit No. 0330045-005-AC: In accordance with the Ozone Agreement, this permit authorized the installation of a new SCR system on Unit 7 to reduce NO_X emissions and a new ESP to reduce particulate matter emissions.
- Air Permit No. 0330045-012-AC: In accordance with the Ozone Agreement, this permit authorized the installation of SNCR for Unit 6 to reduce NO_X emissions.
- Air Permit No. 0330045-013-AC: In accordance with the Ozone Agreement, this permit authorized the installation of SNCR on Units 4 and 5 to reduce NO_X emissions.
- Air Permit No. 0330045-015-AC: To provide flexibility with CAIR, this permit authorized the construction of a common wet FGD system (Model CT-121, licensed by Southern Company from Chiyoda Corporation) to reduce SO2 emissions from all four units. Construction of the wet FGD system was completed in December of 2009. A schematic of the wet FGD system is presented on the next page.
- Air Permit No. 0330045-018-AC: This permit authorized upgrades to the existing ESP for Units 4 and 5 to reduce particulate matter emissions.
- Air Permit No. 0330045-023-AC: This permit established a plant-wide SO_2 emissions limit for Units 4, 5, 6, and 7 of 886.0 tons during any 30-day rolling total of FGD scrubber operational days in addition to 2.4 lb SO_2/MMBtu.
- Air Permit No. 0330045-026-AC: This permit authorized installation of a temporary hydrated lime injection system to reduce sulfuric acid (SAM) emissions and mitigate a potential visible plume from the wet FGD system on existing Units 4-7.
- Air Permit No. 0330045-027-AC: This permit authorized upgrades to the high-pressure (HP), intermediate pressure (IP) and the low-pressure (LP) steam turbine sections of Unit 7 for an expected additional 21 MW of electrical generation.
- Air Permit No. 0330045-028-AC: This permit authorized the construction of a new SCR system for Unit 6. The SCR project greatly reduced NO_X emissions and did not affect carbon monoxide (CO), volatile organic compounds (VOC) or particulate matter. However, the new SCR catalyst converts additional uncontrolled SO_2 emissions to SO_3 and H_2SO_4 (SAM) and had the potential to increase SAM emissions above the PSD significant emissions rate of 7 tons per year. Therefore, the permit also required the installation and operation of a permanent hydrated lime injection (HLI) system to replace the temporary HLI system to control SAM emissions. Since the HLI system was designed to inject hydrated lime in a common duct prior to the wet FGD system, SAM emissions are controlled from all four units. For this reason, the permit included a cap on SAM emissions from all four units to ensure that the project did not trigger PSD preconstruction review.

- Air Permit No. 0330045-029-AC: This permit:
  1. Authorized a higher sulfur coal blend emission limit for Units 4-7 of 3.30 lb SO_2/MMBtu (equivalent to 2.1% sulfur by weight);
  2. An upgrade of the existing Unit 6 steam turbine;
  3. Established a sulfuric acid mist emissions cap (165.5 tons during any consecutive 12 months);
  4. Reduce the permitted SO_2 emissions rate during FGD bypass from 2.4 lb SO_2/MMBtu for Units 4-7 based on a 24-hour CEMS average to a mass-based emissions limit of 25,840 lb/hour based on a 3-hour CEMS average (which is equivalent to 2.1 lb SO_2/MMBtu);
  5. And authorized additional boiler additives for Units 4-7 contingent on successful use and testing on Unit 7.

Project Description

On November 13, 2012, Gulf Power Company submitted an application for an air construction permit to revise the plant-wide NO_X emissions limit for Units 4 - 7 of 0.20 pounds per million British thermal units (lb/MMBtu), based on a 30-day rolling average, including all emissions generated during periods of startup, shutdown and malfunctions for all four units and during periods of bypass operations for the Unit 6 and 7 SCRs. This limitation replaces the current NO_X limit of 0.35 lb/MMBtu based on 24-hour average for Unit 7 during SCR bypass periods, which can be excluded from the daily NO_X averages, as established in air construction permit No. 0330045-005-AC and revised in permit No. 0330045-017-AC. Also, the applicant requests removal of the performance restriction against the coal blend sulfur specification of 3.30 pounds of sulfur dioxide per MMBtu that was established in permit No. 0330045-029-AC.

The proposed project involves no physical changes and no obvious operational changes to the facility. It does not involve any maintenance, repair or replacement tasks. As a concurrent project, the Title V air operation permit is also being revised by project No. 0330045-037-AV to incorporate the changes being made in this air construction permit, and to incorporate several specific conditions from previously issued air construction permits. The changes requested by the applicant require changes to specific conditions in air construction permit No. 0330045-017-AC (previously revised permit No. 0330045-005-AC) and air construction permit No. 0330045-029-AC.

Processing Schedule

11/13/2012 Received the application for a minor source air pollution construction permit; application is incomplete.

12/10/2012 1st Request for additional information sent.

12/17/2012 Received response to1st request for additional information; application is incomplete.

01/16/2013 2nd Request for additional information sent.

04/01/2013 Received response to 2nd request for additional information.

AIR POLLUTION REGULATIONS AND APPLICABILITY DETERMINATIONS

Department 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:

Table 1. Applicable Air-Related Rules from the Florida Administrative Code

Chapter	Description
62-4	Permits
62-17	Power Plant Siting
62-204	Air Pollution Control – General Provisions
62-210	Stationary Sources of Air Pollution – General Requirements
62-212	Stationary Sources – Preconstruction Review
62-213	Operation Permits for Major Sources (Title V) of Air Pollution
62-296	Stationary Sources – Emission Standards
62-297	Stationary Sources – Emissions Monitoring

2. PSD APPLICABILITY

The project will revise miscellaneous underlying air construction/PSD permit conditions. No physical construction is required or authorized. The project will not cause or authorize any increases in emissions nor change the allowable capacity of the units. Therefore, this project is not subject to PSD preconstruction review.

3. TECHNICAL DISCUSSION

Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) is an add-on control technology in which ammonia is injected into the exhaust gas stream before a section of catalyst to inhibit the formation of NO_X. The ammonia combines with NO_X in the presence of the catalyst in a reduction reaction to form nitrogen and water. For conventional catalysts such as vanadium pentoxide, the exhaust gas temperature must be maintained between 450° F and 850° F for the reaction to proceed satisfactorily. Ammonia that escapes past the catalyst without reacting with NO_X is called "ammonia slip". If a fuel contains significant amounts of sulfur, high levels of ammonia slip can lead to the formation of bisulfates and other particulate matter, which can foul the catalyst and reduce heat transfer rates. To avoid these problems, SCR systems can be designed with very low levels of ammonia slip (< 5 ppmv) while still achieving control efficiencies greater than 90%. SCR is a commercially available, demonstrated control technology currently employed on numerous utility boilers and combined cycle gas turbine projects worldwide.

Hydrated Lime Injection

Hydrated Lime Injection (HLI) is a process to inject powdered hydrated lime into the flue gas stream at the discharge of the booster fans, upstream of the wet/dry interface at the Flue Gas Desulfurization (FGD) system to reduce acid aerosol mist emissions from the power plant. The acid aerosol mist is created in the combustion process, and is also increased across the SCR catalyst (where the catalyst converts SO_2 to sulfur trioxide (SO_3) in the NO_X reduction process). The Air Preheater (APH), Electrostatic Precipitator (ESP) and FGD all help remove the acid aerosol mist but do not necessarily remove it all.

When in operation, the HLI system will reduce the sulfuric acid mist (SAM) emissions that are generated by the oxidation of fuel sulfur during combustion. SAM emissions may also increase across the SCR catalyst as SO_2 is converted into SO_3 and then into SAM in the presence of moisture. The air pre-heater, ESP and wet FGD system will remove much of the SAM. SAM reacts with the hydrated lime and is removed as particulate matter in the downstream FGD system.

Bypass of the Wet FGD System

Currently, exhaust from Units 4 - 7 enters a common wet FGD system and exits a single stack that is 490 feet tall with a diameter of 35 feet and combined volumetric flow rate of 3,282,000 acfm at an exit temperature of 131° F. Previously, Units 4 and 5 shared a common stack that is 450 feet tall with a diameter of 18.0 feet and had a combined volumetric flow rate at permitted capacity of approximately 802, 500 acfm at an exit temperature of 290° F. Also, Units 6 and 7 previously shared a common stack that is 450 feet tall with a diameter of 23.2 feet and had a combined volumetric flow rate at permitted capacity of approximately 2,463,000 acfm at an exit temperature of 320° F.

When it is necessary to operate the boilers without the wet FGD system, the applicant is authorized to use the previous shared stacks to bypass the wet FGD system. As shown in the following process flow diagrams, the flue gas exhaust is controlled for NO_X (by SNCR or SCR) and particulate matter (by ESP) prior to each existing shared stack. The FGD exhaust stack and the bypass stacks are equipped with CEMS for determining emissions of carbon dioxide (CO_2), NO_X and SO_2 and continuous monitoring systems for stack gas flow rates. For Units 4 - 6, COMS installed in the ductwork record opacity during normal and bypass operations. For Unit 7, separate COMS are installed in the normal ductwork as well as in the bypass ductwork to record opacity during normal and bypass operations.

As shown in the following process flow diagrams, the flue gas subsystem is used to transport boiler flue gas to the FGD vessel for SO_2 emission control. The flue gas subsystem consists of fans, ductwork, dampers and a unit stack. Each unit is equipped with dampers between the induced draft fan discharge, existing stack and new ductwork to the scrubber vessel so that the wet FGD system can be bypassed to the existing stack configurations during startup, shutdown, malfunction and FGD maintenance.

<u>Bypass of the FGD system is allowed for</u>:

- Startup and shutdown of each unit. SO_2 data collected from the CEMS during startup and shutdown may be excluded from the permit limit of 886 tons based on a 30-day rolling total. Although not limited, such periods of bypass are estimated to be less than 96 hours per year per unit.
- Short-term maintenance periods, which are not considered part of long-term maintenance (annual routine maintenance, periodic preplanned maintenance or repair for force majeure scrubber outages). SO_2 data collected from the CEMS during short-term maintenance periods must be included in the compliance averages to determine compliance with the permit limit of 886 tons based on a 30-day rolling total.
- Annual routine maintenance. Up to 360 hours of SO_2 data collected from the CEMS during annual routine maintenance may be excluded from the permit limit of 886 tons based on a 30-day rolling total.
- Scrubber repairs due to force majeure outages. Up to 360 hours of SO_2 data collected from the CEMS during annual routine maintenance may be excluded from the permit limit of 886 tons based on a 30-day rolling total.
- During a FGD scrubber bypass, each unit shall remain in compliance with all other valid SO_2 emissions standards, which is currently 25,840 lb/hour based on a 3-hour CEMS average, which is equivalent to 2.1 lb SO_2/MMBtu.

Figure 1. Wet FGD (Scrubber) Bypass System

Figure 2. Wet FGD (Scrubber) System Diagram

4. DEPARTMENT REVIEW

Nitrogen Oxides

A plant-wide NO_X limit was established through an agreement between Gulf Power and the Department on August 28, 2002. This limit was established as an enforceable restriction in Specific Condition 3.B.2. of permit No. 0310045-005-AC. This requirement was later revised by Specific Condition 3. of permit No. 0330045-017-AC to provide clarification of when emissions related to Unit 7 SCR bypass operations could be excluded from the compliance averages. Unit 6 changed from SNCR to SCR (Permit No. 0330045-028-AC).

The revised plant-wide NO_X emissions limit of 0.20 lb/MMBtu for the combined operation of Units 4, 5, 6 and 7, based on a 30-day rolling average, includes all emissions generated during periods of startup, shutdown and malfunctions for all four units and during periods of bypass operations for the Unit 6 and 7 SCR and the removed of the NO_X emissions limit of 0.35 lb/MMBtu during Unit 7 SCR bypass periods is more stringent than the current NO_X limit of 0.35 lb/MMBtu based on 24-hour average for Unit 7 during SCR bypass periods.

The plant-wide NO_X emission standard of 0.20 lb/MMBtu shall be achieved by utilizing the SCR systems for Units 6 and 7 and the SNCR systems for Units 4 and 5. This limit shall apply when either Unit 6 or 7 is on-line.

Based on the above reasons, the Department agrees to revise the plant-wide NO_X emissions limit of 0.20 lb/MMBtu for Units 4 - 7 to include all periods of startup, shutdown and malfunctions for all four units and during periods of bypass operations for the Unit 6 and 7 SCR. This limitation replaces the current NO_X limit of 0.35 lb/MMBtu based on 24-hour average for Unit 7 during SCR bypass periods as described above as requested. Reasonable assurance of compliance is not reduced by this change.

Sulfur Dioxide

The permittee provided the results of process (not certified) CEMS data at the inlet to scrubber versus certified CEMS data at the scrubber stack in the table below that shows the data while scrubber in operation.

Table 2. Process CEMS at the Inlet to Scrubber versus Certified CEMS at the Scrubber Stack

Date	Not Certified Process CEMS at the Inlet to Scrubber	Fuel Sampling Composed	Fuel Sampling Composed	Scrubbing	Certified CEMS at the Scrubber Stack	Daily Emissions	30-Day Rolling Emissions (Limit 886)
SO_2	Daily lb/MMBtu	Daily lb/MMBtu	Daily %S		Daily lb/MMBtu	TONS	TONS
8/25/2012	3.324	2.848	1.76	Yes	0.05	2.6	64.9
9/16/2012	3.356	2.405	1.48	Yes	0.02	0.9	39.4
9/17/2012	3.408	2.794	1.73	Yes	0.02	0.7	38.9
9/18/2012	3.386	1.678	0.98	Yes	0.01	0.5	38.3
9/19/2012	3.320	3.056	1.88	Yes	0.01	0.4	37.8

Daily fuel analyses were compared to the inlet CEMS results. All fuel samples on the 5 high inlet CEMS days were averaging 3.30 lb SO_2 /MMBtu. Furthermore, the inlet CEMS was compared to fuel sampling for each day from January 2012 to September 2012. During this period, the fuel-sampling SO_2 averaged 2.557 lb/MMBtu while the CEMS averaged 2.465, only a 4% difference. It was however noted that there were significant differences on a daily basis by an average of 15%.

The performance restrictions against the coal blend sulfur specification of 3.30 lb SO_2 /MMBtu monitored by the process CEMS at the inlet to the scrubber (as required in air construction permit No. 0330045-029-AC) is unnecessary and restricts the flexibility of the plant. The condition requires a rate-based measurement at the inlet of the scrubber on a continuous basis which is not reflective of compliance with the 30-day rolling average mass based standard of 886 tons of SO_2 (equivalent to 0.20 lb/MMBtu) at the outlet of the scrubber. The scrubber does not

have a percent SO_2 reduction requirement; therefore, there is no driver for an inlet SO_2 limit. The scrubber outlet SO_2 CEMS provides reasonable assurance of compliance with the 2.4 lb/MMBtu emissions standard. In addition, the scrubber bypass outlet SO_2 CEMS provides similar reasonable assurance with the standard by not exceeding the volunteered 25,840 pounds of SO_2 per hour mass limit (equivalent to 2.1 lb SO_2/ MMBtu) based on a 3-hour block CEMS average. The Crist CEMS SO_2 monitoring systems are subject to the Acid Rain Part 75 provision which require greater than 95% availability of the system. The Crist SO_2 monitoring system typically achieves availability at greater than 99% annually; thus there is very little actual CEMS downtime of concern and compliance during these periods can be demonstrated through EPA alternative data routines under the Acid Rain and CAIR programs. In addition, Crist has unit-by-unit daily fuel information which can be used to calculate compliance with the mass emissions stack limits.

Based on the above reasons, the Department agrees to remove the coal blend sulfur specification of 3.30 lb SO_2/ MMBtu that was established in permit No. 0330045-029-AC as an unnecessary limit as requested. Reasonable assurance of compliance is not reduced by this change.

See draft permit for a detailed descriptions of the changes being made as part of the project. These documents along with all other associated documents in the issued permit package can be accessed by entering file number in the permit number field at the web link given below.

http://www.dep.state.fl.us/air/emission/apds/default.asp

5. 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. Yousry (Joe) Attalla 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.