

FINAL DETERMINATION

Seminole Electric Cooperative, Inc.
Seminole Generating Station
DEP File No. 1070025-005-AC

The Department distributed a public notice package on August 25, 2006 to allow the applicant, Seminole Electric Cooperative, Inc. (SECI) to construct a new supercritical coal-fired steam generating unit at the existing Seminole Generating Station (SGS), located at 890 US Highway 17, North of Palatka, Putnam County. The Public Notice of Intent to Issue concerning the draft permit was published in the Palatka Daily News on September 8, 2006. Since the Draft Permit was issued, the federal Clean Air Interstate and Clean Air Mercury Rules (CAMR) have been vacated by the federal courts. This litigation is not yet final but it appears a case-by-case determination of maximum achievable control technology (MACT) will be required for SECI Unit 3 due to the vacature of CAMR. The Department will require an application for case-by-case MACT and will issue its determination thereof in a separate agency action.

COMMENTS/CHANGES

Comments were received by the Department from Mitchell Williams, a local resident on September 12, 2006. Comments were received from EPA Region 4 by letter dated October 5, 2006. Comments were received from the applicant by letter dated September 27, 2006. Comments were also received from the Sierra Club by letter dated October 9, 2006. On March 9, 2007 the applicant and the Sierra Club entered into a Settlement Agreement, to which the permitting authority was not a party and which was outside of the Prevention of Significant Deterioration (PSD) process that resolves all timely-received comments submitted by the applicant and the Sierra Club related to the draft PSD permit. To the extent the applicant wants to incorporate those changes into an air construction permit for that facility, an application to revise the PSD permit may be submitted. Finally, comments were received from the Natural Resources Defense Council and Southern Alliance for Clean Energy by letter dated July 3, 2008 almost 2 years after the end of the public comment period. These comments were not timely but are in the Department's files. Other timely received comments are addressed below:

EPA Comment 1. Netting Analysis

- a. Florida Department of Environmental Protection (FDEP) indicates on page 5 of the technical evaluation that the Unit 1 and Unit 2 baseline period for the nitrogen oxides netting analysis is calendar years 2001-2002. In accordance with FDEP's rules, the baseline period for EUSGUs must be "within the 5-year period immediately preceding the date a complete permit application is received by the Department." Since the Unit 3 PSD permit application was not deemed complete until July 3, 2006, not all of calendar year 2001 is available for baseline emissions calculations unless FDEP explicitly deems a different (earlier) period to be more representative of normal source operation. FDEP should explain why emissions during all of calendar year 2001 are available for baseline emissions calculations purposes.
- b. Referencing FDEP's regulations, a decrease in emissions is creditable in a netting analysis only if "It has approximately the same qualitative significance for public health and welfare as that attributed to the increase from the particular change." We do not find in the technical evaluation (which is a key part of the public record for this permitting action) any assessment of this qualitative significance requirement with regard to the creditable emissions decreases proposed for avoidance of PSD review for sulfur dioxide, nitrogen oxides, and sulfuric acid mist.

RESPONSE:

- a. During a February 2006 meeting which was held with the applicant to discuss the processing of the SGS Unit 3 application, FDEP agreed to calendar year 2001 as the first

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available year available for calculating baseline emissions. The application was received approximately 2 weeks later, on March 9, 2006.

- b. FDEP affirms that it has determined the increases from the SGS Unit 3 project have a lesser qualitative significance than do the decreases from the SGS Units 1 and 2 pollution control upgrade project.

EPA Comment 2: Clarification of Pound-per-Hour Emissions Limits

- a. Condition III.A.10 in the draft permit consists of a table with emissions limits labeled as either “BACT Emission Limits” or “Non-BACT Established Emission Limits.” (The acronym BACT means best available control technology.) The limits are listed in terms of pounds (lb)/ per million British thermal units (MMBtu) and in terms of lb/hour (hr) “equivalent.” We are not sure what is meant by the word “equivalent.” Specifically, we are not sure if the lb/hr “equivalent” values are enforceable permit limits. If not, they should be made enforceable unless the following statement in Condition III.A.4 represents an enforceable restriction: “The steam generator shall be designed for a maximum heat input of 7,500 MMBtu per hour of coal.” Unless the permit contains an enforceable restriction on maximum heat input, the lb/MMBtu limits by themselves do not provide an enforceable limit on total mass emissions to the atmosphere.
- b. The “equivalent” lb/hr rates for the most part are based on the limits in lb/MMBtu times 7,500 MMBtu/hr. There appears to be an error in the volatile organic compound (VOC) equivalent lb/hr rate of 16.7 lb/hr. The stated VOC limit is 0.0034 lb/MMBtu which yields a value of 25.5 lb/hr when multiplied by 7,500 MMBtu/hr.

RESPONSE:

- a. The intent of the permit is to make the heat input an enforceable restriction. The lb/hr “equivalent” values are listed for informational purposes only.
- b. Agreed that this was a calculation error. This error will be corrected when the Department issues a case-by-case MACT determination in the near future.

EPA Comment 3: Particulate Matter Emissions Limits

- a. The particulate matter (PM)/PM less than 10 microns (PM₁₀) emissions limit specified in Condition III.A.15 of the draft permit is for filterables only. Condensables are to be measured and reported but are not restricted by an emissions limit. Most recent permits for EUSGU pulverized coal boilers have included an emissions limit for condensables in addition to (or in combination with) and emissions limit for filterables. We recommend that the final permit include place holder language that will allow setting an emissions limit for condensables after testing has demonstrated that condensables can be measured accurately.
- b. In Condition III.A.15, FDEP specifies that the PM/PM₁₀ emissions limit of 0.013 lb/MMBtu applies “while firing 100% coal.” We recommend that this condition be rephrased to indicate the emissions limit that applies when firing a mixture of coal and petcoke as well as when firing coal only.

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RESPONSE:

- a. As EPA suggests, if testing demonstrates that condensables can be measured accurately, the Department may address this issue in the future.
- b. The Department will delete the words “while firing 100% coal” from Condition III.A.15 when the Department issues its case-by-case MACT determination in the near future.

EPA Comment 4: PM Continuous Emissions Monitoring System (CEMS)

- a. The draft permit does not require use of a PM CEMS to assess compliance with the filterable PM/PM₁₀ emissions limit. Since a PM CEMS can be used with a wet plume, we recommend that a PM CEMS be required to demonstrate compliance with the filterables limit.
- b. If a PM CEMS is not required, we recommend that FDEP require some other continuously monitored parameter to indicate acceptable performance of the dry electrostatic precipitator which is the primary PM control device. Please advise us if FDEP intends to wait until issuance of a title V permit before specifying such parameter monitoring requirements.

RESPONSE: The Department intends to wait until issuance of the Title V permit before specifying parameter monitoring requirements.

EPA Comment 5: Startup and Shutdown

- a. Startup and shutdown are part of normal source operation for Unit 3. Any pollutants emitted from Unit 3 during startup and shutdown that are subject to PSD review are therefore subject to BACT requirements. If the numeric BACT emissions limits for regular operation can not be met during startup and shutdown, then numeric limits need to be established for startup and shutdown operations or work practice BACT requirements should be established. We understand that FDEP intends for best management practices (including the 60-hour-per-month restriction in Condition III.A.29.b) to be used for minimization of emissions during startup and shutdown. If it is FDEP’s position that adherence to best management practices represents BACT for startup and shutdown, we request that this be stated in the final determination. Please note that numeric emissions limits for startup and shutdown have been addressed by the EPA Environmental Appeals Board (EAB) in two recent PSD permit appeals for coal-fired EUSGUs. (See the August 24, 2006, EAB order for the Prairie State Generating Station project in Illinois and the September 27, 2006, EAB order for the Indeck-Ellwood project in Illinois.)
- b. The allowance of 60 hours per month (equivalent to 30 days per year) for startup, shutdown, and malfunction seems excessive for a 750-megawatt EUSGU. We would expect such a unit would not be in a condition of startup, shutdown, or malfunction this often throughout its lifetime.
- c. Condition III.A.30 of the draft permit contains a parenthetical phrase indicating that emissions measured during startup, shutdown, and malfunction are to be included for demonstration of compliance with annual emissions limits. We recommend that the final permit contain a direct statement rather than just a parenthetical phrase making clear that startup, shutdown, and malfunction emissions must be included when demonstrating compliance with annual emissions limits.

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RESPONSE:

- a. The Department intends for the adherence to “best management practices” to represent BACT for the purpose of startup and shutdown.
- b. The Department does not expect that this large steam generating unit will be in a startup or shutdown condition very often. However, the Department is aware that supercritical boilers have fairly complicated start-up systems due to ramping operation being required and difficulty in establishing metal matching conditions (see: <http://www.hitachi.us/supportingdocs/forbus/powerindustrial/CG2004.pdf>).
- c. The permit requires startup, shutdown, and malfunction emissions be included when demonstrating compliance with annual emissions limits regardless of whether that phrase is in parenthesis or not. No change is required.

EPA Comment 6: Compliance Demonstration for Coal/Petcoke Blend

- a. In Condition III.A.22 of the draft permit, FDEP requires an initial compliance demonstration “when firing 100% coal.” Please consider whether an initial compliance test is also needed for a blend of 70 percent coal and 30 percent petcoke. In other words, please assess whether a coal/petcoke blend might be the worst case for some pollutants. This comment is prompted in part by the fact that the carbon monoxide emissions limits in Conditions III.A.10 and 11 are higher for the all-fuel case than for the 100-percent coal case.
- b. Condition III.A.23 of the draft permit does not include a specification of the fuel blend to be evaluated during subsequent annual compliance testing. We recommend that FDEP indicate whether such testing is to be based on firing 100 percent coal only, a coal/petcoke blend only, or both.

RESPONSE: The Department expects only few differences in “worst-case” emissions depending upon the fuel-type being fired. For example, it is anticipated that the BACT established emission level of PM may be higher while firing 100% coal versus the coal/petcoke blend, as will the emissions of mercury. However, the elevated sulfur levels in petcoke make the removal of sulfur dioxide (SO₂) emissions more challenging for the co-firing operation, even though the SO₂ limit was not established by BACT. It is not anticipated that the emissions of carbon monoxide (CO) will be significantly different depending upon the fuel being fired. The higher CO emission level (0.15 lb/MMBtu) which is authorized in Condition III.A.11.b is intended to accommodate the wide variety of “non-steady-state” conditions which the unit will be subject to, such as load-changing, soot-blowing, etc. No change was made.

EPA Comment 7: Facility-wide Emissions Limits

In Condition III.A.2 of the draft permit, FDEP establishes facility-wide emissions limits for sulfur dioxide, sulfuric acid mist, mercury, and nitrogen oxides. FDEP further states that these limits apply to Units 1, 2, and 3, the zero liquid discharge spray dryers, and the cooling towers. Please check to make sure that FDEP meant to include cooling towers. Cooling towers do not typically emit the four pollutants with facility-wide emissions limits.

RESPONSE: It is correct that cooling towers do not typically emit these four pollutants; however, no change is made to the permit in response to this comment.

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EPA Comment 8: Coal Preparation and Nonmetallic Mineral Processing

In the technical evaluation (page 9 and 10), FDEP states that the emissions units affected by the PSD permit have to comply with a list of regulations. The regulations in this list include the federal new source performance standards (NSPS) for coal preparation plants and nonmetallic mineral processing plants. However, the draft permit does not include permit conditions for coal preparation units or limestone (nonmetallic mineral) handling units. If any of the NSPS listed in the technical evaluation do not apply, please delete them.

RESPONSE: The coal preparation units and limestone handling units are existing units and the applicable requirements are already identified in the facility's other permits. There is no need to repeat these requirements in this permit. No change was required.

EPA Comment 9: Carbon Burnout Permit Provision

Condition III.A.43 of the draft permit (applicable to Unit 3), specifies daily recordkeeping requirements for the "operation and configuration" of a carbon burnout unit "such that the permittee can demonstrate compliance with the emission limitations of the affected emissions units." We recommend that FDEP specify exactly what records are required by this condition.

RESPONSE: The unit must comply with NSPS limits, recordkeeping and reporting. In addition, this unit will have a CEMS. These provisions will adequately address this issue and no change was made to the permit.

EPA Comment 10: Integrated Gasification Combined Cycle (IGCC)

FDEP's technical evaluation (pages 11-12) contains a brief discussion of reasons for not considering IGCC as part of a BACT analysis for the proposed PC boiler. We will point out that, pursuant to section 165(a)(2) of the Clean Air Act, it may be necessary for FDEP to address any substantive comments proposing IGCC as an alternative to the proposed project.

RESPONSE: The Department is satisfied that this issue has been adequately addressed.

EPA Comment 11: Unit 3 Nitrogen Oxides Emissions

Based on the netting analysis, PSD review (including a best available control technology determination) is not required for nitrogen oxides (NO_x) emissions. For the record, however, we wish to comment that the proposed NO_x emissions limit for Unit 3 of 0.07 lb/MMBtu is not representative of the lowest emission rate that could be expected for a newly designed supercritical pulverized coal boiler firing bituminous coal.

RESPONSE: No response required.

Mitchell Williams Comment:

"I suggest that you put an immediate hold on the construction of the third coal plant by Seminole Electric Co-op in Palatka at this time. This is 2006 not 1936. I assume that the design is a familiar one that any plant manager in 1936 would recognize (Babcock & Wilcox turbo-alternators with reheat etc). Only the computer control room would look new. Same old low efficiency antique stuff.

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In its place they should be allowed to build a 21 Century plant and get Florida ahead of (not behind) California.

Here is what is needed. A coke-fired furnace (no scrubber needed) using 95% pure oxygen for combustion. To keep the gasifier cool enough to prevent melting, a heavy injection of superheated steam would be mixed with the stream of pure oxygen. At these temperatures (1800°F plus) steam reduces the carbon to carbon monoxide and the hydrogen is released to BURN AGAIN. Meaning that the plant runs partly on water. Possibly as much as 25% of the fuel could be water injected as superheated steam. This same trick can be used with a hot, air breathing furnace but the inert gases in the air prevent full efficiency of the process, and only 2 or 3% of the fuel can be water.

By using oxygen, coke, and steam you might reduce the total coke consumption by nearly half for the same power output. Meaning the exhaust from the plant would have half as much CO₂ (reduced greenhouse gases) and no nitrous oxides at all.

Since you then would have a really hot fire at your fingertips you might as well go whole hog in optimizing the design.

Throw out all the steam pipes except the ones to supply the steam to the gasifier. In their place substitute a closed cycle gas turbine with helium or CO₂ as the working fluid. All this shrinks down the entire plant to a fraction of its original size.

It also might be built much faster with modified jet, rocket, and refrigeration parts.

Making all this oxygen at the plant will mean they will have rivers of surplus liquid nitrogen and hot water to sell for cooling and heating purposes. This could help reduce the waste of electricity for these purposes.

And the fuel efficiency of the plant should be VERY HIGH. This same trick can be done with any fuel burning plant that has a high carbon content in the fuel (wood, oil, sewage, sludge, goat manure etc). It will be less effective with natural gas as there is less carbon in it, so only a reduced amount of water can be burned with it. However, pure oxygen can also greatly increase the efficiency of any fuel burning plant by eliminating the inert gases from the system. Convection heat is greatly reduced and radiant heat is greatly increased making even steam plants much smaller for a given output.

If you should have any doubts concerning what is presented here you can ask any of the rocket people at the Cape. They are always quick to tell you how the turbo-pumps on the Space Shuttle Main Engines (about the size of outboard motors) produce 100,000 horsepower each, and could easily light a small city.”

RESPONSE: {Note: The following was excerpted from the July 6, 2006 Public Service Commission Staff Analysis for Seminole Unit 3 Need Determination}

“As part of the evaluation process, Seminole hired Burns & McDonnell to assist them in selecting the appropriate technology and provide a detailed, screening level evaluation of the cost of building and operating the preferred alternative. This request initially led to the August 2004 Feasibility Study. This study contains the results of the economic analyses of three alternative self-build projects: A new Brownfield 600 MW sub-critical solid fuel generating unit; a new Brownfield 600 MW supercritical solid fuel generating unit; and a new Greenfield 500 MW gas fired combined cycle unit. Other generating technologies were assessed, but were not considered for new generation at this time due to insufficient operational experience and information on cost and reliability of technology. The study found that the 20 year levelized bus bar cost for the three viable alternatives showed that the supercritical unit was the lowest at \$52.77/MWh; sub-critical unit at \$52.97/MWh; and combined cycle unit at \$75.48/MWh. Seminole’s interest in increasing the output of SGS Unit 3 from 600 MW to 750 MW led to the February 2005 Feasibility Study. This study, which is an update of Seminole’s August 2004 Feasibility Study, concluded that both the supercritical and sub-critical solid fuel generating units were feasible and would be substantially more economically sized at 750 MW than at 600 MW (the 20 year levelized bus bar cost declined to \$48.85/MWh for the supercritical coal unit, and to

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\$49.15/MWh for the sub-critical coal unit). Both remained far less expensive than a conventional gas fired combined cycle unit. Therefore, Seminole decided that 750 MW of base load capacity should be added in the 2012 time frame. The estimated capital cost for the 750 MW supercritical SGS Unit 3 project is approximately \$1.4 billion in 2012 dollars. SGS Unit 3 will be located at Seminole's Generating Station (SGS) on a 1922 acre site in northeast Putnam County, approximately five miles from the City of Palatka. SGS Unit 3 will be a pulverized coal, balanced draft unit employing supercritical steam pressure and temperature with a mechanical draft cooling tower for condenser cooling water. The primary advantages of supercritical steam cycles over sub-critical steam cycles are improved plant efficiency due to elevated operating pressure and temperature, lower emissions and lower fuel consumption. SGS Unit 3 will also employ state-of-the-art emission control equipment to further reduce emissions.”

CONCLUSION

The final action of the Department is to issue the permit with no changes from the draft permit.