



Farzie Shelton, chE: REM

Associate GM Technical Support

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APR 03 2007

BUREAU OF AIR REGULATION

Mr. Al Linero, P.E.  
Program Administrator  
Permitting South Section  
Florida Department of Environmental Protection  
Bureau of Air Regulation  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

March 29, 2007

RE: C.D. McIntosh, Jr. Power Plant  
Title V Permit # 1050004-019-AC and PSD-FL-387(A)  
Addition of Selective Catalytic Reduction to Unit No. 3  
Request for Additional Information

Dear Al:

We are in receipt of your letter dated February 19, 2007 requesting further information in regards to control of sulfur trioxide production associated with the installation of SCR using ammonia injection subsystem. At this time, Lakeland is intending to utilize sorbent injection system of hydrated lime, Sorbacal H<sup>TM</sup>, soda ash and Trona for SAM control and therefore, engineering evaluation is still underway for this system (please see attached Mr. Ken Kosky's of Golder Associate letter addressing the Department's questions).

Additionally, you will note that Ken is referencing conditions from previous permits issued by the Department associated with sorbent injection system.

In conclusion, as always, Lakeland greatly values all the help and cooperation you and the Department have extended to us in our permitting efforts. Please feel free to contact me, if you should have any further questions.

Sincerely

A handwritten signature in black ink that reads "Farzie Shelton".

Farzie Shelton

Enc.

City of Lakeland • Department of Electric Utilities

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**Golder Associates Inc.**

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March 28, 2007

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Lakeland Electric  
501 E. Lemon Street  
Lakeland, Florida 33801-5079

BUREAU OF AIR REGULATION

Attention: Ms. Farzie Shelton, Associate General Manger Technical Support

**RE: C.D. McIntosh, Jr. Power Plant  
DEP File No. 1050004-019-AC and PSD-FL0387(A)  
Addition of Selective Catalytic Reduction to Unit No. 3  
Request for Additional Information**

Dear Farzie:

Presented below is the additional information requested by the Florida Department of Environmental Protection (FDEP) in the letter dated February 19, 2007. The information is provided in the same order as requested.

**FDEP Questions Regarding SCR Addition to McIntosh Unit 3:**

We note that you have updated the Process Flow Diagram to include the ammonia injection subsystem to control sulfur trioxide production. Please provide more details regarding the operating parameters of this subsystem. Specifically, please provide comments concerning the development of an ammonia injection rate curve, and associated algorithm, such that the sulfuric acid mist (SAM) emissions do not exceed the baseline annual emissions by the PSD significant emission rate (7 tons/year or more) annually.

Using an appropriate experimental design, we recommend that the ammonia injection rate be developed for different operating loads. At each operating load, stack testing should be done for differing values of sulfur content of the fuel used. The stack tests will measure the controlled SAM emissions rate, and the data points can be used to develop an ammonia injection rate curve for each load and varying sulfur content of the fuel. The testing should be done annually. The initial ammonia injection rate curve should be submitted to the Department within six months after initial operation of the SCR system.

**Additional Information:**

As discussed with the additional information supplied to address the Department's January 23, 2006 Request for Additional Information (RAI), the sorbent injection system had not been selected since engineering studies are underway. At this time, the engineering evaluation is still underway but the sorbents being considered for McIntosh Unit 3 are hydrated lime, Sorbacal H<sup>TM</sup>, soda ash and Trona. Ammonia is currently not being considered further as mitigation for SAM emissions. Sorbacal H<sup>TM</sup> is a hydrated lime product produced by Chemical Lime Company that has a high surface area for SO<sub>3</sub> sorption. Each of these products can be used in either a wet or dry system and depending upon cost can be used interchangeably in reducing SO<sub>3</sub> and subsequent SAM emissions. All sorbents are capable of removing SO<sub>3</sub> at removal necessary to achieve the necessary SAM control indicated in Table RAI-2A that was previously submitted to address the January 23<sup>rd</sup> letter. Injection of the

sorbents will be either prior to the air heater or prior to the ESP. Engineering is continuing on the design of this system.

The final engineering and testing will determine the algorithms for injection. Since this information will not be completed, the following conditions as part of the permit issued by FDEP would address the questions raised in the RAI. Similar conditions have been placed on coal-fired units in Florida that have installed SCR to meet the FDEP CAIR rules.

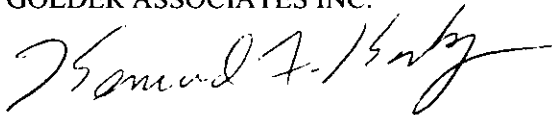
1. Sorbent Injection Systems: The permittee shall construct, tune, operate and maintain new sorbent injection systems to mitigate the formation of SAM due to the increased oxidation of  $\text{SO}_2$  to  $\text{SO}_3$  across the new SCR reactors. Sorbents will be injected downstream of the SCR reactor and upstream of the existing ESP. The control system regulating the amount of sorbent injected to control SAM will be integrated into the plant digital control system. The sorbents will react with  $\text{SO}_3$  to form particles, which will be collected in the ESP. With the sorbent injection systems, there will be no PSD-significant emissions increases due to the installation of SCR system. The proposed equipment includes storage tanks, piping, injectors, a control system and other ancillary equipment. The sorbent injection systems shall be operable when the SCR system is initially available for service.
2. Sorbent Injection for SAM Emissions Control: On an annual basis, the permittee must demonstrate that SAM emissions as a result of this project do not exceed 153 tons per year. The permittee shall install and operate the sorbent injection system at a frequency and injection rate for SAM control to satisfy this requirement. An automated control system will be used to adjust the sorbent flow rate for the given set of operating conditions based on the most recent performance test results.
3. Initial Performance Tests – Sorbent Injection for SAM Emissions Control: Within 90 days of completing construction of the SCR system, the permittee shall conduct a series of initial performance tests to determine the SAM emissions rate under a variety of operating scenarios that documents the impact of sorbent injection on reducing SAM emissions and results in the development of correlation/curves between injection rates, operating conditions and emissions.
  - a. For each set of operating conditions being evaluated, the permittee shall conduct at least a 1-hour test run to determine SAM emissions. At least nine such test runs shall be conducted to evaluate the effect of SAM emissions on such parameters as the  $\text{SO}_2$  emission rate prior to the SCR catalyst (and FGD system), the unit load, the flue gas flow rate, the sorbent injection rate and the current catalyst oxidation rate.
  - b. Tests shall be conducted under a variety of fuel blends and load rates that are representative of the actual operating conditions. Sufficient tests shall be conducted to establish the SAM emissions rates for the following scenarios: bypass of the SCR reactor, SCR reactor in service without sorbent injection, and SCR reactor in service under varying operating conditions and levels of sorbent injection.

- c. At least 15 days prior to initiating the performance tests, the permittee shall submit a test notification, preliminary test schedule and test protocol to the Bureau of Air Regulation and the Compliance Authority.
- d. Within 45 days following the last test run conducted, the permittee shall provide a report summarizing the emissions tests and results. All SAM emissions test data shall be provided with this report.
- e. Within 45 days following the submittal of the emissions test report and no later than 90 days following the last test run conducted, the permittee shall submit a project report summarizing the following:
  - Identify each set of operating conditions evaluated, identify each operating parameter evaluated,
  - Identify the relative influence of each operating parameter, describe how the automated control system will adjust the sorbent injection rate based on the selected parameters,
  - Identify the frequency with which operational parameters will be reevaluated and adjusted within the automated control system,
  - Provide the algorithm used for the automated control system or a series of related performance curves, and
  - Provide details for calculating and estimating the SAM emissions rate based on the level of sorbent injection and operating conditions. The test results shall be used to adjust the sorbent injection control system and estimate SAM emissions.

Please contact me if there are any questions related to the information contained in this evaluation. A certification has been provided.

Sincerely,

GOLDER ASSOCIATES INC.



Kennard F. Kosky, P.E.  
Principal

KFK/nav

RAI Response to FDEP 2-19-06 LTR.doc