TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

City of Lakeland, Lakeland Electric
501 East Lemon Street
Lakeland, FL 33801-5079

C.D. McIntosh, Jr. Power Plant
Facility ID No. 1050004

PROJECT

Draft Permit No. 1050004-035-AC
Application for Minor Source Air Construction Permit
Removal of Sulfuric Acid Mist Test Requirements for Unit 3 Project

COUNTY

Polk 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

April 24, 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 C.D. McIntosh, Jr. Power Plant is an existing electrical generation plant categorized under Standard Industrial Classification Number (No.) 4911. This existing facility is located in Polk County at 3030 East Lake Parker Drive in Lakeland, Florida.

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).

This project affects the following emissions units (E.U.):

Facility ID No. 1050004	
E.U. ID No.	**E.U. Brief Description**
006	McIntosh Unit 3 - Fossil Fuel Fired Steam Generator

1.3. Facility Regulatory Categories

- The existing facility is a major source of HAP.
- The existing facility is subject to the Acid Rain and Clean Air Interstate Rule (CAIR) provisions of the Clean Air Act (CAA).
- The existing facility is a Title V major source of air pollution in accordance with Chapter 62-213, F.A.C.
- The existing facility is a major stationary source in accordance with Rule 62-212.400 (PSD), F.A.C.
- The proposed project is not a modification of a major stationary source in accordance with Rule 62-212.400 (PSD), F.A.C.

1.4. Project Description

The applicant applied on April 10, 2014, to the Department for a minor source air construction (AC) permit & a concurrent Title V air operation permit revision. The minor source AC permit & the Title V air operation permit revision is for the removal of sulfuric acid mist test requirements for Unit 3 at the C.D. McIntosh, Jr. Power Plant.

1.5. Application Processing Schedule

Application for Air Construction Permit Revision & Title V Air Operation Permit Revision received on April 10, 2014 (complete application).

{Documents specifically related to this project are posted and available on the Department's World Wide Web site at http://appprod.dep.state.fl.us/air/emission/apds/default.asp by entering the project number shown above.}

Relevant Document(s)

- Permit No. 1050004-033-AV, Most Recent Title V Air Operation Permit (a renewal), issued on 11/18/2013.
- Permit No. 1050004-026-AC, Revised Permit No. 1050004-019-AC, issued on 06/21/2010.
- Permit No. 1050004-019-AC, Installation of New SCR System on Unit 3, issued on 08/31/2007.

2. PSD APPLICABILITY

2.1. General PSD Applicability

For areas currently in attainment with the state and federal AAQS or areas otherwise designated as unclassifiable, the Department regulates major stationary sources of air pollution in accordance with Florida's Prevention of Significant Deterioration (PSD) preconstruction review program as defined in Rule 62-212.400, F.A.C. Under preconstruction review, the Department first must determine if a project is subject to the PSD requirements ("PSD applicability review") and, if so, must conduct a PSD preconstruction review. A PSD applicability review is required for projects at new and existing major stationary sources. In addition, proposed projects at existing minor sources are subject to a PSD applicability review to determine whether potential emissions *from the proposed project itself* will exceed the PSD major stationary source thresholds. A facility is considered a major stationary source with respect to PSD if it emits or has the potential to emit:

- 250 tons per year or more of any regulated air pollutant; or
- 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the following 28 PSD-major facility categories: fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), Kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants and charcoal production plants.

Once it is determined that a project is subject to PSD preconstruction review, the project emissions are compared to the "significant emission rates" (SERs) defined in Rule 62-210.200, F.A.C. for the following pollutants: carbon monoxide (CO); NOx; sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); fluorides (F); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as PM; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as non-methane organic compounds (NMOC); and mercury (Hg). In addition, significant emissions rate also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 kilometers of a Class I area and have an impact on such area equal to or greater than 1 $\mu g/m^3$, 24-hour average.

If the increase in emissions from the project exceeds the defined significant emissions rate of a PSD pollutant, the project is considered "significant" for the pollutant and the applicant must employ the Best Available Control Technology (BACT) to minimize the emissions and evaluate the air quality impacts. Although a facility or project may be *major* with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several "significant" regulated pollutants.

3. APPLICANT REQUEST

The applicant applied on April 10, 2014, to the Department for a minor source air construction (AC) permit & a concurrent Title V air operation permit revision. The minor source AC permit & the Title V air operation permit revision is for the removal of sulfuric acid mist test requirements for Unit 3 at the C.D. McIntosh, Jr. Power Plant.

The applicant specifically requested the removal of the SAM testing requirements for Unit 3 contained in Permit No.

1050004-026-AC, Specific Condition 15. and where it is also reflected in the Title V air operation permit, Permit No. 1050004-033-AV, Specific Condition D.35.

3.1. PSD Applicability for Project

The applicant indicated that the requested revision is not a 'modification' to Unit 3, therefore, a PSD applicability determination did not have to be performed.

4. DEPARTMENT REVIEW

4.1. Background - Project

The applicant applied on April 10, 2014, to the Department for a minor source AC permit & a concurrent Title V air operation permit revision. The minor source AC permit & the Title V air operation permit revision is for the removal of sulfuric acid mist test requirements for Unit 3 at the C.D. McIntosh, Jr. Power Plant.

4.2. PSD Applicability for Project

The request is not a 'modification' to Unit 3, therefore, a PSD applicability determination does not need to be performed.

4.3. Unit 3 Description

McIntosh Unit 3 is a nominal 364 megawatt (MW) (electric) dry bottom wall-fired fossil fuel fired steam generator. The unit is fired on coal, residual oil, natural gas and petroleum coke. The maximum heat input rate is 3,640 million Btu per hour. McIntosh Unit 3 began commercial service in September, 1982.

4.4. Unit 3 Regulatory Categories

Unit 3 is regulated under Acid Rain, Phase II; Rule 62-296.405(2), F.A.C., Fossil Fuel Steam Generators with More than 250 million Btu per Hour Heat Input; and NSPS 40 CFR 60, Subpart D, PSD BACT; CAM; and, Rule 62-296.470, F.A.C., CAIR.

4.5. Air Pollution Control Devices, Techniques &/or Measures

Unit 3 is equipped with an electrostatic precipitator (ESP), a flue gas desulfurization system (FGD), low NOx burners (LNB) and an overfire air (OFA) system to control emissions.

An selective catalytic reduction (SCR) system was voluntarily installed in 2010 to comply with CAIR. Permit No. 1050004-019-AC authorized the installation of the SCR system to reduce NOx emissions and a sorbent injection system to reduce sulfuric acid mist (SAM) emissions.

4.6. Removal of SAM Testing Requirements

4.6.1. SAM Testing Requirements Removal Justification

SAM emissions testing requirements were originally required by Permit No. 1050004-019-AC when the new SCR system was authorized to be installed on Unit 3. Specific Condition 15. in Permit No. 1050004-019-AC contains requirements for evaluating SAM emissions through emissions testing. Permit No. 1050004-026-AC subsequently revised the SAM testing requirements.

SAM emissions testing was performed on February 1-10, 2010. The applicant provided SAM test data results in a April 26, 2010 submittal to the Department {see this Link for the transmittal letter and this Link for the actual test report}. The applicant provided the same SAM test data results again in this permit application to justify the removal of the SAM emissions testing requirements.

As Golder Associates indicated in its April 21, 2010 letter in the permit application, the SAM emissions testing showed very clearly an increase in the generation of SAM by the catalyst in the SCR system as one would expect {see Table 1 of the permit application}. After reviewing the data as presented in Table 1 of the permit application, SO_3 emissions before the SCR system were converted by up to 2-3 times at loads of 74% & 88%, while at loads of 100% SO_3 emissions generation were up to 4 times the SO_3 rate before the SCR system. This confirms that at higher loads the temperature in the SCR catalyst is likely higher, thus, converting more sulfur compounds to SO_3. Of note here in the Table 1 of the permit application is that the test data results data for SAM emissions without sorbent injection &

without sorbent injection for the 12 scenarios show no reductions to SAM emissions when looking at the data presented on a "lb/MMBtu" or mass per heating value basis.

The test data results as shown in Table 2 of the permit application show that reductions of SAM emissions are in fact being achieved by the ESP/FGD (scrubber) of up to 80%.

The test data results of the SAM emissions without sorbent injection & with sorbent injection were tabulated and corresponding calculated TPY mass values were presented in Table 3 of the permit application. Pertinent excerpts of interest from the permit application {extracted from Table 3 of the permit application} for reviewing changes to SAM emissions are show in **Table 1** below. :

TABLE 1 - % REDUCTION BY SORBENT INJECTION.

w/o Sorbent Injection SAM Emissions, tons per year (TPY)	w/ Sorbent Injection SAM Emissions, TPY	Difference SAM Emissions, TPY	% Reduction by Sorbent Injection
38.3	40.9	+2.6	-
41.8	41.0	-0.8	1.9%
41.9	41.0	-0.9	2.1%
17.7	17.6	-0.1	0.6%
17.4	17.6	+0.2	-
15.6	15.8	+0.2	-

As shown here, SAM emission reductions with sorbent injection are estimated to be up to only about 2% based on this test data. An overall review of this test data as illustrated here in **Table 1** indicates that one could conclude that SAM emissions are negligibly reduced by sorbent injection when looking at the data extrapolated to a TPY mass basis. As previously mentioned the ESP/FGD (scrubber) reduced SAM emissions up to 80%. Larger SAM emission reductions are therefore being achieved by the ESP/FGD (scrubber) than the sorbent injection alone. From a unit operations standpoint, relying upon the existing equipment, the ESP/FGD (scrubber), as the primary SAM emissions control technology makes sense as more reductions are achieved there.

TABLE 2 - POTENTIAL EFFECTS ON SAM EMISSIONS W/O SORBENT INJECTION ON UNIT 3.

w/o Sorbent Injection SAM Emissions, tons per year (TPY)	w/ Sorbent Injection SAM Emissions, TPY	Difference SAM Emissions, TPY	w/o Sorbent Injection Potential Effects on SAM Emissions, TPY
38.3	40.9	+2.6	-
41.8	41.0	-0.8	~+1
41.9	41.0	-0.9	~+1
17.7	17.6	-0.1	negligible
17.4	17.6	+0.2	-
15.6	15.8	+0.2	-

Of note is that the SAM emissions testing was performed at a sulfur content of 1.72% {see **Table 2** above). Extrapolating linearly this data to a 3.4% sulfur content coal without sorbent injection could result in worst-case SAM emissions being about 2 TPY [~+1 TPY from **Table 2** x 3.4/1.72 or ~2].

The project's baseline actual emissions (BAE) for SAM are 136 TPY as established by Specific Condition 24. in Permit No. 1050004-026-AC. In this permit application the applicant calculates projected actual emissions (PAE) for SAM of 84.1 TPY without sorbent injection. Therefore, based on this BAE and PAE the project net emissions are calculated to be -51.9 TPY. At a higher 3.4% sulfur content coal without sorbent injection an additional ~1 TPY

could be added to the PAE which would result in project net emissions calculated to be -50.9 TPY.

Based on the SAM test data results submitted by the applicant, the follow up data analysis by Golder Associates in their April 21 & 26, 2010 letters and Part II of this permit application, further SAM emissions testing is not reasonably warranted, therefore, removal of the SAM testing requirements is justified at this time.

5. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state rules 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.

Mr. Scott M. Sheplak, P.E. is the permit processor responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting him by telephone at 850/717-9074 or by email at scott.sheplak@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.