TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Lakeland Electric
501 East Lemon Street
Lakeland, Florida 33801-5079

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

PROJECT

Project No. 1050004-038-AC

Application for Minor Source Air Construction Permit

Upgrades for McIntosh Unit 3 Flue Gas Desulfurization Unit (FGD)

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

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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. Glossary of Common Terms

Because of the technical nature of the project, the permit contains numerous acronyms and abbreviations, which are defined in Appendix A of the permit.

1.3. Facility Description and Location

The C.D. McIntosh, Jr. Power Plant consists of three fossil fuel fired steam generators, three diesel powered engines, and two gas turbines. Fossil fuel fired steam generator Unit 1 is fired with natural gas, No. 6 fuel oil or on-specification used oil generated by the City of Lakeland. Fossil fuel fired steam generator Unit 2 is fired with natural gas, propane, No. 2 fuel oil or No. 6 fuel oil. Fossil fuel fired steam generator Unit 3 is fired with coal, fuel oil and natural gas. Gas Turbine Peaking Unit 1 is primarily fired with natural gas or No. 2 fuel oil with a maximum sulfur content of 0.5 percent by weight. McIntosh Unit 5, a 370 megawatts (MW) combined cycle stationary combustion turbine (CT), is fired with natural gas, or No. 2 or superior grade fuel oil with a maximum sulfur content of 0.05 percent by weight. The three diesel engines are: a 25 horsepower non-emergency Lister Coal Tunnel Sump diesel engine; a 300 horsepower emergency Fire Water UPS Diesel No. 32 engine; and a 500 horsepower black-start CT Startup Diesel engine.

A list of the regulated emission units (EU) at the C.D. McIntosh Jr. Power Plant is given below in **Table 1**.

TABLE 1 - REGULATED EMISSION UNITS AT THE C. D. MCINTOSH POWER PLANT.

E.U. ID No.	Emission Units Description
001	McIntosh Unit 1 - Fossil Fuel Fired Steam Generator
004	Gas Turbine Peaking Unit 1
005	McIntosh Unit 2 - Fossil Fuel Fired Steam Generator
006	McIntosh Unit 3 - Fossil Fuel Fired Steam Generator
008	Diesel drive coal tunnel sump engine
010	Fire water UPS diesel No. 32
011	CT startup diesel
028	McIntosh Unit 5 - 370 MW Combined Cycle Stationary Combustion Turbine

Also included at the facility are miscellaneous unregulated/insignificant emissions units and/or activities.

The existing C. D. McIntosh, Jr. Power Plant is located at 3030 East Lake Parker Drive, Lakeland, in Polk County. UTM Coordinates are: Zone 17, 409.0 kilometers (km) East and 3106.2 km North. Latitude is: 28° 04' 50" North; and, Longitude is: 81° 55' 32" West. 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).

Figure 1 shows the location of C. D. McIntosh Power Plant in Florida while **Figure 2** shows a view of the C. D. McIntosh Power Plant. A satellite view of the power plant is given in **Figure 3** below:

Figure 1. Location of C. D. McIntosh Power Plant. **Figure 2. View of C. D. McIntosh Power Plant**.

Figure 3. Satellite View of C. D. McIntosh Power Plant.

1.4. 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, Florida Administrative Code (F.A.C).
- The facility is a Prevention of Significant Deterioration (PSD) major stationary source of air pollution in accordance with Rule 62-212.400, F.A.C.
- The facility operates units subject to the New Source Performance Standards (NSPS) of Title 40 Code of Federal Regulations (CFR) Part 60.
- The facility operates units subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) of 40 CFR Part 63.
- The facility operates units subject to NESHAP: Coal- and Oil-Fired Electric Utility Steam Generating Units. This emissions unit shall comply with Appendix 40 CFR 63 Subpart UUUUU.
- The facility is subject to the Federal Clean Air Interstate Rule (CAIR) as implemented by FDEP in Rule 62-296.470, F.A.C.

1.5. Project Description

On October 23, 2014, The applicant submitted an application to the Department requesting authorization to upgrade the existing wet flue gas desulfurization (FGD) system for the McIntosh fossil-fuel steam generator Unit 3 (EU 006) to improve sulfur dioxide (SO_2) emissions reduction efficiency as required by NESHAP 40 CFR 63, Subpart UUUUU - National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units (MATS). Subpart UUUUU has a compliance date for existing units of April 16, 2015.

The applicant has determined that the FGD upgrades will increase the SO_2 removal efficiency to more than 95 percent in order to achieve the SO_2 emissions limit required by MATS. The FGD upgrades will also help the permittee met the particulate matter (PM) emission limit in MATS. The pollutant emission limits in MATS are discussed in more detailed in **Section 3** of this document.

A complete description of this project by is given in the application available at: http://Lakeland Electric Application

Table . Shows the emissions unit at the C. D. McIntosh Power Plant affected by this project.

TABLE 2. EFFECTED EMISSION UNIT.

EU ID No.	Emission Unit Description
006	McIntosh Unit 3 - Fossil Fuel Fired Steam Generator

McIntosh Unit 3 is a nominal 364 megawatt (electric) dry bottom wall-fired fossil fuel fired steam generator. The unit is fired on coal, residual oil and natural gas. The maximum heat input rate is 3,640 million Btu per hour (MMBtu/hr). Unit 3 is equipped with: an electrostatic precipitator (ESP) to control PM emissions; a FGD to control SO_2 emissions; and low NO_X burners (LNB) and an over fire air (OFA) system to control nitrogen oxide (NO_X) emissions. McIntosh Unit 3 began commercial service in September, 1982. The stack parameters are: a height of 250 feet with a diameter of 18 feet; a gas exit temperature of 125 degrees Fahrenheit (°F); and an actual stack gas flow rate of 1,260,536 actual cubic feet per minute (acfm). This emissions unit is regulated under Acid Rain and CAIR programs.

2. PSD APPLICABILITY

The project is located in Polk County which is in an area that is currently in attainment with the AAQS or is otherwise designated as unclassifiable. The McIntosh Power Plant is a major facility under FDEP rules. Based on Rule 62-210.200(205), F.A.C., modification is defined as any physical change in, change in the method of

operation of, or addition to a facility which would result in an increase in the actual emissions of any pollutant subject to new source review regulations under the CAA. While the FGD upgrades are a physical change, emissions of SO_2 and PM will go down as a result of the project while all other emissions will remain the same. Therefore, the proposed project is not a "modification" as defined in Rule 62-210.200(185), F.A.C. and the project is not subject to a PSD review and will only require a minor-source AC permit.

3. DEPARTMENT REVIEW

McIntosh emissions Unit 3 is subject to the MATS rules beginning April 16, 2015, which has the following applicable emissions standards:

- *Filterable Particulate Matter (PM)*. Emissions of PM shall not exceed either 0.030 pounds per million British thermal units (lb/MMBtu) or 0.30 pounds per megawatt-hour (lb/MWh). In lieu of the filterable PM emission limit, the permittee may select to meet a total non-Hg HAP metals emission limit of either 5.0 x 10^{-5} lb/MMBtu or 0.50 pounds per gigawatt-hour (lb/GWH). Finally, in lieu of ether filterable PM or total non-Hg HAP metals emission limits the permittee my meet the following individual HAP metal emission limits:
  - Antimony (Sb) - 0.80 pounds per terra Btu (lb/TBtu) or 8.0 x 10^{-3} lb/GWh.
  - Arsenic (As) - 1.1 lb/TBtu or 0.020 lb/GWh.
  - Beryllium (Be) - 0.20 lb/TBtu or 2.0 x 10^{-3} lb/GWh.
  - Cadmium (Cd) - 0.30 lb/TBtu or 3.0 x 10^{-3} lb/GWh.
  - Chromium (Cr) - 2.8 lb/TBtu or 0.030 lb/GWh.
  - Cobalt (Co) - 0.80 lb/TBtu or 8.0 x 10^{-3} lb/GWh.
  - Lead (Pb) - 1.2 lb/TBtu or 0.020 lb/GWh.
  - Manganese (Mn) - 4.0 lb/TBtu or 0.050 lb/GWh.
  - Nickel (Ni) - 3.5 lb/TBtu or 0.040 lb/GWh.
  - Selenium (Se) - 5.0 lb/TBtu or 0.060 lb/GWh.
- *Hydrogen Chloride (HCl)*. Emissions of HCl shall not exceed either 2.0 x 10^{-3} lb/MMBtu or 0.020 lb/MWh. In lieu of HCl emission limit, the permittee may select to meet a SO_2 emission limit of either 0.20 lb/MMBtu or 1.5 lb/GWH.
- *Mercury (Hg)*. Emissions of Hg shall not exceed either 1.2 lb/TBtu or 0.013 lb/GWh.

The permittee (Lakeland Electric) has elected to meet the SO_2 emission limit of 0.20 lb/MMBtu on a 30 day rolling average with compliance demonstrated by a SO_2 continuous emission monitoring system (CEMS). The permittee has also elected to meet the PM emission limit of 0.030 lb/MMBtu with compliance shown by a PM CEMS, a continuous parametric monitoring system (CPMS) or quarterly stack testing.

3.1. Wet FGD Description

Refer to **Figure 4** for the pollution control configuration on Unit 3. The existing wet FGD with a forced oxidation system has two B&W absorber tower modules that can each process 50 percent of the flue gas flow or can bypass the flue gas flow. It also has a flue gas reheat system that reheats the processed flue gas to a certain temperature in order to keep the stack liner dry. Each tower has:

- An absorption tray;
- Three levels of slurry spray nozzles;
- Primary and secondary moisture separators with spray headers for cleaning the moisture separators;
- Forced oxidation system with blowers, lances and agitators; and
- Three absorber recirculation pumps each with a dedicated spray header - two pumps in service and one spare pump.

Figure 4. Process Flow Diagram of Lakeland Electric C. D. McIntosh Power Plant

3.2. FGD System Modifications

With the FGD equipment modifications, two absorber recirculation pumps would normally be in service and the third pump will be in service while burning higher sulfur coals. The following modifications are proposed by the applicant:

- Modify the tray bottoms in the existing absorber tray;
- Add new second level absorber tray;
- Replace mist eliminator trays;
- Add nozzles per layer (optional);
- Change nozzle design (optional); and
- Increase absorber pump speed (optional).

The FGD upgrades for the McIntosh Unit 3 will increase the SO_2 removal efficiency to more than 95 percent in order to achieve a SO_2 emission rate below 0.20 lb/MMBtu on a 30-day rolling average basis as required by MATS. The FGD upgrades will also reduce the PM emissions to meet the MATS emission limit of 0.03 lb/MMBtu.

3.3. Performance Guarantees from the FGD Vendor

Table 2 shows a summary of performance guarantees that the Vendor is providing for the Lakeland Electric McIntosh Unit 3, wet FGD upgrades project:

TABLE 2 - PERFORMANCE GUARANTEES FROM THE FGD VENDOR.

Par. No.	Parameter	Applicable Performance Conditions (Note 1)	Applicable Test Codes and Comments	Guarantee Value
1	SO_2 Removal Efficiency	Specified range of coals up to 3.4% S at any steady load operation from 36% to 100% MCR[1]	EPA Method 6C or Certified CEMS – properly calibrated	$\geq$ 96.6% removal

Par. No.	Parameter	Applicable Performance Conditions (Note 1)	Applicable Test Codes and Comments	Guarantee Value
2	Filterable Particulate Matter Emissions	Specified range of coals at any steady load operation from 36% to 100% MCR	EPA Method 5B	≤ 0.03 lb per million BTU heat
3	Mist Eliminator Carryover	Specified range of coals as at any steady load operation from 36% to 100% MCR	Fulfillment of this guarantee shall be demonstrated by meeting the Filterable Particulate	≤ 0.00019 gpm/sq. ft.
4	Absorber Pressure Drop Increase	Design Coal up to 3.4% S at steady load 100% MCR	Properly calibrated instrumentation	≤ 5.6 in. w.c.
5	WFGD Electrical Load Increase	Design Coal up to 3.4% S at steady load 100% MCR	Properly calibrated instrumentation	0 kW
6	Gypsum Quality	Specified range of coals up to 3.4% S at any steady load operation from 36% to 100% MCR		No adverse effect on gypsum quality

Note 1: MCR is defined as maximum continuous rating.

The performance guarantees are based on steady load operating conditions.

3.5. Department Analysis

The Department finds the requested project acceptable based on the applicant's assurance that this emission unit is in compliance with all the emissions limits. The Department authorizes the upgrades to the existing wet FGD system for the McIntosh fossil-fuel steam generator Unit 3 (EU 006) in order to comply with the SO_2 and PM emission limits in MATS.

4. 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 him by telephone at (850) 717-9078 or by e-mail at yousry.attalla@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.