TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Lake Cogeneration, Ltd.
39001 Golden Gem Drive
Umatilla, Florida 32784

Lake Cogeneration Plant
ARMS Facility ID No. 0694801

PROJECT

Project No. 0694801-014-AC (PSD-FL-176D)
Application for Air Construction Permit
Updated Air Construction Permit

COUNTY

Lake, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
Chemicals and Combustion Key Industry Group
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

November 7, 2011

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.

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.

Facility Description and Location

Lake Cogeneration, Ltd. operates the Lake Cogeneration Plant, a combined cycle combustion turbine cogeneration power plant, which is categorized under Standard Industrial Classification code (SIC) No. 4931. The facility is located in Lake County at 39001 Golden Gem Drive in Umatilla, Florida. The UTM coordinates of the existing facility are Zone 17, 434 kilometer (km) East, and 3198.80 km North. This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to Ambient Air Quality Standards (AAQS).

The facility consists of a fuel oil storage tank (EU-002) and two 50 megawatt (MW) General Electric Model LM6000 combustion turbine-electrical generator sets (EU-003 and EU-004). Each combustion turbine is equipped with an inlet air chiller system, a heat recovery steam generator (HRSG) with natural gas-fired duct burners and an exhaust stack. Steam is delivered from both units to a common steam turbine-electrical generator set with a nominal rating of 26.5 MW. The primary fuel is pipeline natural gas with low distillate oil as a restricted alternate fuel. A spray inter-cooling (SPRINT) system was installed on each of the combustion turbines in 2007. Nitrogen oxides (NO_X) emissions are controlled with a water injection system. Carbon monoxide (CO) and volatile organic compounds (VOC) are controlled using oxidation catalyst system. A continuous emission monitoring system (CEMS) is installed on each unit for monitoring and reporting NO_X emissions.

Facility Regulatory Categories

- The facility does not operate 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 existing facility is a major stationary source of air pollution pursuant to Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.
- The existing facility is not a major source of hazardous air pollutants (HAP).
- The combustion turbines are subject to Clean Air Interstate Rule (CAIR) set forth in Rule 62-296.470, F.A.C.
- The existing combined cycle combustion turbine are subject to the applicable federal NSPS provisions in Subpart A (General Provisions) and Subpart KKKK (Stationary Combustion Turbines) of 40 CFR 60.

Permit History

The following permitting history summarizes the air construction permits and modification, revisions and amendments thereto since issuance of the original permit to the present action:

- *Permit No. AC35-196459 (PSD-FL-176):* The original permit was issued on 11/20/1991. The applicant was authorized to construct the two combustion turbines, heat recovery steam generators with duct burners and a common steam turbine.
- *Amendment to Permit No. AC35-196459 (PSD-FL-176):* On 03/10/1994, the original construction permit was revised for the following items:
  - Revised emissions Table 1A in Specific Condition 1;
  - Removed references to acceptable ambient concentrations (AAC) for beryllium, lead and mercury in Specific Condition 2;
  - Revised the maximum heat input rates based on the lower heating value while burning natural gas and distillate oil at compressor inlet condition of 51° F as well as 59° F (ISO conditions). It also revised the duct firing while burning natural gas and the limits in Specific Condition 6;
  - Removed references to an adjustment of NO_X emissions based on ISO conditions including calculations in Specific Condition 13;
  - Modified Specific Condition 16 pertaining to the combustion control of CO emissions and providing a space suitable for the later installation of an oxidation catalyst; and
  - In Specific Condition 20, revised the compliance requirements in Subparts GG and Dc of 40 CFR 60 and Rule 17-296.800(2) (a), F.A.C.
- *Amendment to Permit No. AC35-196459 (PSD-FL-176):* On 04/22/1994, the permit was amended to include a custom fuel monitoring schedule for SO_2 and NO_X to demonstrate compliance with NSPS Subpart GG in 40 CFR 60.
- *Amendment to Permit No. AC35-196459 (PSD-FL-176):* On 05/10/1994, the original construction permit was revised to allow additional time to complete the compliance testing for CO emissions.
- *Amendment to Permit No. AC35-196459 (PSD-FL-176A):* On 08/03/1994, the original construction permit was extended until December 30, 1994 and revised to correct (reduce) the CO concentrations upon which mass emission limits were based.
- *Amendments to Permit No. AC35-196459 (PSD-FL-176A):* On 12/28/1994 and 04/10/1995, the original construction permit was extended to 03/31/1995 and 06/30/1995, respectively.
- *Permit Amendment No. 0694801-003-AC:* On July 3, 1997, the original construction permit was amended to clarify that the ISO correction factor and requirement to test at four loads only applies to the NSPS Subpart GG provisions for NO_X.
- *Air Construction Permit No. 0694801-008-AC (PSD-FL-176B):* On 06/13/2007, a permit was issued to modify the combustion turbines as follows:
  - Installed the SPRINT system on the compressor of each combustion turbine to increase power output;
  - Increased the maximum heat input rate when firing natural gas from 423 to 425 MMBtu/hour per unit;
  - Increased the mass emission rate for CO and NO_X emissions; and
  - Required additional compliance tests for CO and NO_X emissions after completing construction of the SPRINT system and increasing the heat input rate.
- *Air Construction Permit Modification No. 0694801-010-AC (PSD-FL-176C):* On 06/23/2009, the previous permit was revised to increase the maximum heat input rate when firing natural gas, install a CEMS for NO_X, revise the averaging period for the NO_X standard, and identify that the combustion turbines will now be subject to the new NSPS Subpart KKKK for new, modified and reconstructed combustion turbines.

- *Air Construction Permit No. 0694801-012-AC*: On 06/04/2010, this permit authorized installation of an oxidation catalyst system in the HRSG associated with each of the two combustion turbines.
- *Air Construction Permit Modification No. 0694801-014-AC (PSD-FL-176D:* On February 1, 2011, the Department received an application to revise the past permits applicable to the existing Lake Cogeneration Plant as described below.

Project Description

The applicant requests the following modifications of the past permits:

- Correct the nominal electrical production rate from 52 MW to 50 MW;
- Include a performance curve identifying maximum heat input rate based on the fluctuating compressor inlet temperature;
- Correct and update the allowable emission limits;
- Remove the distinction between the normal operating mode and the SPRINT mode;
- Include authorization to replace limited components for maintenance and repairs of the combined cycle combustion turbine system; and,
- Change the annual test schedule from July 15th to within the federal fiscal year.

This application is being processed concurrently with an early Title V air operation permit renewal to incorporate the air construction permit changes.

2. PSD APPLICABILITY

General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal Ambient Air Quality Standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants.

PSD pollutants include: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); PM smaller than 10 micrometers (PM_{10}); volatile organic compounds (VOC); lead (Pb); Fluorides (F); sulfuric acid mist (SAM); total reduced sulfur (TRS), including H_2S; municipal waste combustor (MWC) organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (D/F); MWC metals measured as PM; MWC acid gases measured as SO_2 and hydrogen chloride (HCl); and mercury (Hg).

As defined in Rule 62-210.200(189)(a)1, F.A.C., a "major stationary source" (major PSD source) is any of 28 listed stationary sources of air pollutants which emits, or has the potential to emit, 100 tons per year (TPY) or more of any PSD pollutant. Link to Rule 62-210, F.A.C.

The list given in the citation includes the category of "fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input". The Lake Cogeneration Facility is a major stationary source based on its actual emissions and its potential to emit PSD pollutants. The major stationary source threshold for source categories not on the cited list is 250 TPY or more of any PSD pollutant.

For major stationary sources, PSD applicability is based on emissions thresholds known as the significant emission rates (SER) as defined in Rule 62-210.200 (Definitions), F.A.C. Emissions of PSD pollutants from the project exceeding these SER are considered "significant" and BACT must be employed to minimize emissions of each PSD pollutant and an air quality impact analysis must be conducted for the PSD pollutants for which AAQS are defined. SER also means any emissions rate or any net emissions increase of a PSD pollutant 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 gram per cubic meter, 24-hour average.

Although a facility may be "major" for only one PSD pollutant, a project must include BACT controls for any PSD pollutant that exceeds the corresponding SER given in Table 1.

Table 1 - List of SER by PSD-Pollutant [1, 4]

Pollutant	SER (TPY)	Pollutant	SER (TPY)
CO	100	NO_X	40
PM/PM_{10} [2]	25/15	Ozone (VOC) [3]	40
Ozone (NO_X) [3]	40	SAM	7
SO_2	40	F	3
Pb	0.6	TRS	10
H_2S	10	Hg	0.1

1. Excluding those defined exclusively for MWC and MSW landfills.
2. $PM_{2.5}$ is also a PSD pollutant, but an SER has not yet been defined in the Department's rules. It is regulated by its precursors and surrogates (e.g. PM/PM_{10} NH_3, SO_2 and NO_X).
3. Ozone (O_3) is regulated by its precursors (VOC and NO_X).
4. There is a federal SER of 75,000 TPY for Greenhouse Gases (GHG) as carbon dioxide equivalent (CO_2e) that has not been incorporated into Department rules. However, the applicability to the CO_2 component of GHG emissions from bioenergy and biogenic stationary sources was recently deferred by EPA until the second half of 2014. Refer to: Link to Final CO_2 PSD Deferral .

$PM_{2.5}$ is also a Federal PSD pollutant and the Department is in the process of adopting a SER of 10 TPY. Refer to Link to $PM_{2.5}$ Rule Development . Until the rule is finalized, projects in Florida are not subject to a SER for $PM_{2.5}$.

PSD Applicability for Project

The project is located in Lake County which is in an area that is currently in attainment with the AAQS or is otherwise designated as unclassifiable. The proposed project will not increase emissions for any PSD pollutant; therefore, the project is not subject to a PSD preconstruction review.

3. DEPARTMENT REVIEW

Nominal Electrical Production Rate

The applicant indicated that the nominal electrical production rate after completing the SPRINT project was actually 50 MW and not 52 MW. The draft permit reflects this change.

Permitted Capacity

The applicant initially requested removal of the references to 59 degrees Fahrenheit (°F). However, the Department explained that this represented ISO conditions, which are identified in the NSPS provisions for combustion turbines. So, instead, the references to 51° F were removed to clarify the permit. Mass emission rates are a function of the heat input rate and require a performance curve to identify emissions for a given set of operational conditions. For combustion turbines (CT), the maximum heat input rate varies with the compressor (CT) inlet temperature instead of limits in terms of mass emissions, which is the justification for specifying emissions limits in terms of concentration corrected to 15 % oxygen (O_2). Therefore, reference to the maximum heat input rates have been removed and a performance curve, Heat Input vs. CT Inlet Temperature Curve, has been included identifying the maximum heat input rate at a given inlet temperature, in accordance with Figure 1.

The performance curve identifies the nominal heat input values based on the lower heating value (LHV) of each fuel, 100% load, and inlet conditions of 59º F temperature, 60% relative humidity, and 14.7 pounds per square inch absolute (psia). These nominal heat input rates will vary depending upon inlet conditions and the combustion turbine characteristics. The corresponding "allowable" mass emissions rates will remain the same and there will not be an increase in emissions for any PSD pollutant. Therefore, no new air quality modeling analysis is required.

Permitted Capacity with/without SPRINT Operation

The earlier conversion from the LM6000PA to the LM6000PC combustion turbines provided the capability of operating at higher inlet temperatures in either SPRINT or non-SPRINT mode. Although the combustion turbine typically operates with the SPRINT system on, it is capable of operating without the SPRINT system. Therefore, the applicant has requested that the distinction between the normal operating mode and the SPRINT mode be removed.

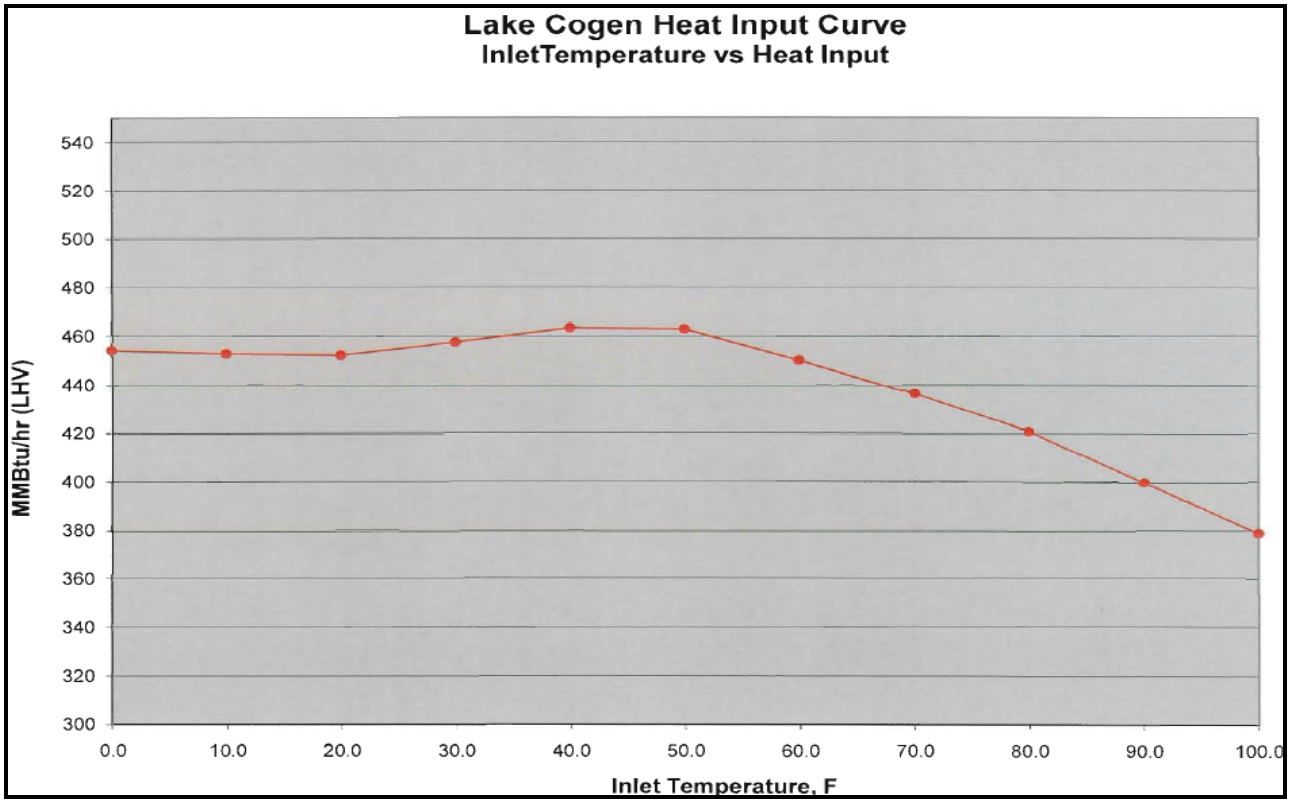

Figure 1 - Heat Input vs. CT Inlet Temperature Curve

Component Replacement

The combustion turbine system generally consists of the following components: gas turbine, accessory drive system, air inlet and filtration system, fuel delivery system, cooling system, lubrication system, control system, starting system and exhaust system with stack. This aero-derivative gas turbine is designed with modular components to facilitate quick repairs. Common "wear items" include compressor vanes, turbine nozzles, compressor blades, turbine blades, fuel nozzles, combustion chambers and seals. The concept of modular design extends to the complete replacement of major components of the gas turbine. Therefore, the applicant has requested authorization to replace some of the components without acquiring a permit.

The Department agrees that the replacement of certain components will not require an application for an air construction permit provided the following requirements are met:

a. The components (e.g., combustors and high-speed turbines) shall be replaced with equivalent "like-kind" equipment. Replacement components shall not increase the maximum heat input rate, capacity or emissions from the combustion turbine. Replacement components shall be designed to comply with the emissions standards specified in this permit.

b. With the exception of leased engines, the permittee shall conduct emissions stack test to demonstrate compliance with the emission standards for CO and visible emissions within 90 days of replacing a gas turbine. The permittee shall comply with the requirements for notification, test methods, test procedures, and reporting required by this permit.

c. To up-rate the gas turbine or increase the maximum heat input rate or capacity above that represented on Figure 1 above, Heat Input vs. CT Inlet Temperature Curve (attached as Figure 1 to the permit), the permittee shall submit an application for an air construction permit.

Allowable Emission Limit Table

The following table included in Condition III.A.10 of the permit contains the maximum allowable emissions standards based on the original and subsequent permits and modifications thereto.

Pollutant	Fuel [b]	Source [a, c]	Maximum Allowable Emission Standards [a, d]	Equivalent Emissions @ 59ºF [k]	
				lb/hour	TPY [k]
NO_X [e]	NG	CT	BACT Limit: 25 ppmvd at 15% O_2 as determined by a 24-hour CEMS block average	82.7	422.1
		DB	0.1 lb/MMBtu	18.0	
		CT & DB	BACT Limit: 25 ppmvd at 15% O_2 as determined by a 24-hour CEMS block average	100.7	
		ALL	NSPS Subpart KKKK Limit: 42 ppmvd at 15% O_2 as determined a 30-day rolling CEMS average.	---	
	DFO	CT	BACT Limit: 42 ppmvd at 15% O_2 as determined by a 24-hour CEMS block average	143.9	
			NSPS Subpart KKKK limit: 96 ppmvd at 15% O_2 as determined a 30-day rolling CEMS average.	---	
CO [f]	NG	CT	BACT Limit: 28 ppmvd at 15% O_2	54.6	341.6
		DB	BACT Limit: 0.2 lb/MMBtu	36.0	
		CT & DB	---	90.6	
	DFO	CT	BACT Limit: 18 ppmvd at 15% O_2	33.0	
PM/PM_{10} [g]	NG	CT	BACT Limit: 0.0065 lb/MMBtu	5.0	31.3
		DB	BACT Limit: 0.006 lb/MMBtu	2.6	
		CT & DB	---	7.6	
	DFO	CT	BACT Limit: 0.026 lb/MMBtu	20.0	
SO_2 [h]	NG	CT & DB	Limit: 1 grain S/100 scf of natural gas, annual average based on vendor data	---	15.0
	DFO	CT	Limit: 0.05% sulfur by weight	---	
VOC [i]	NG	CT	There is no standard for VOC emissions.	3.3	30.8
		DB	There is no standard for VOC emissions.	5.4	
		CT & DB	There is no standard for VOC emissions.	8.7	
	DFO	CT	There is no standard for VOC emissions.	8.3	
SAM	DFO	CT	Limit: 0.05% sulfur by weight	---	0.8
Opacity [j]	ALL	CT & DB	BACT Limit: 10% Opacity	---	---

a. CT = 2 combustion turbines, DB = 2 duct burners. The allowable emissions standards apply to each unit at all times.
b. NG = natural gas, DFO = distillate fuel oil
c. As specified by this permit, compliance with the Maximum Allowable Emission Standards shall be demonstrated for CT limits and CT&DB limits based on data from CEMS, stack tests or data from the annual RATA.
d. These are the Maximum Allowable Emission Standards that shall never be exceeded at any temperature and/or operating configuration.
e. Continuous compliance with the 24-hour block and 30-day rolling averages shall be demonstrated with data collected by the required CEMS. [Rule 62-212.400(BACT), F.A.C. and NSPS Subpart KKKK in 40 CFR 60]
f. Compliance with the CO emissions standard shall be determined by EPA Method 10. [Rule 62-212.400(BACT), F.A.C.]
g. As determined by fuel specifications, emissions of PM/PM_{10} shall be minimized by the use of natural gas as the primary fuel with a maximum sulfur content of 1 grain S/100 scf and the limited use of distillate oil with a maximum sulfur content of 0.05% by weight. [Rule 62-212.400(BACT), F.A.C.]
h. As determined by fuel specifications, emissions of SO_2 shall be minimized by the use of natural gas as the primary fuel with a maximum sulfur content of 1 grain S/100 scf and the limited use of distillate oil with a maximum sulfur content of 0.05% by weight. Pursuant NSPS Subpart KKKK provisions in 40 CFR 60, the maximum sulfur content of any fuel fired in the combustion turbine shall not exceed 0.06 lb SO_2/MMBtu. This data shall be submitted with the annual operating report.
i. There is no standard for VOC emissions. *{Permitting Note: Based on vendor data and installation of the oxidation catalyst, estimated maximum VOC emissions are less than 40 tons per year for the project to avoid PSD preconstruction review.}*
j. Compliance with the opacity standard shall be determined by EPA Method 9 observations. [Rule 62-212.400(BACT), F.A.C.]
k. The "Equivalent Emissions @ 59ºF" are the total emissions from Units 1 and 2. Estimated annual emissions are *for informational proposes only* and are based on the most stringent emissions rate when the CT is firing natural gas for 8,520 hours/year, the emissions while firing DFO for 240 hours/year and DB emissions firing only natural gas for approximately 5,833 hours/year.

Annual Test Schedule

The current permit requires an annual test to be conducted within 60 days prior to July 15th. However, Rule 62-297.310(7), F.A.C., allows compliance testing to be conducted within the federal fiscal year (October 1st to September 30th). The permit was revised accordingly.

Conclusion

The applicant's requests are acceptable. An air construction permit (draft attached) will be issued for the Lake Cogeneration facility that replaces and supersedes the previous air construction permit No. AC35-196459 (PSD-FL-176) and subsequent permits and modifications thereto. It will include updated equipment specifications and regulatory requirements. The requirements of the original best available control technology (BACT) determination issued on November 20, 1991 pursuant to the rules for the Prevention of Significant Deterioration (PSD) are maintained and re-established therein. The updated permit will also be consistent with more recent air construction permits for combined cycle combustion turbines, including but not limited to:

- Including a performance curve identifying maximum heat input rate based on the fluctuating compressor inlet temperature;
- Identifying the allowable emission standards and the equivalent emissions given at an inlet temperature of 59 ºF in Specific Condition III.A.10 of this permit.
- Identifying the maximum fuel sulfur specification as the limitations for SO_2 and PM/PM_{10} emissions.
- Clarifying that the VOC emissions are "estimated maximum emissions" and not limits since total VOC emissions are much less than the PSD significant emissions rates following the installation of an oxidation catalyst.
- Clarifying that compliance with the NO_X standards is based on data collected by the required CEMS and not stack testing.
- Clarifying that the required annual compliance tests are for CO and visible emissions.

Although the proposed project does not increase the permitted capacity or emissions, the Department will require a 30-day comment period concurrent with that of the renewed Title V air operation permit.

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. Tammy McWade 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.