

## Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

March 15, 1991

### CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Alfred M. Dodd, P.E.  
E & W Engineering Manager  
City of Lakeland  
Department of Electric & Water Utilities  
501 East Lemon Street  
Lakeland, Florida 33801-5050

Dear Mr. Dodd:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit to construct and operate a 120 MW combined cycle gas turbine system.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Barry Andrews of the Bureau of Air Regulation.

Sincerely,

C. H. Fancy, P.E.  
Chief  
Bureau of Air Regulation

CHF/PL/plm

Attachments

c: Harry Kerns, SWD  
Jewell Harper, EPA

BEFORE THE STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of  
Application for Permit by:

City of Lakeland Department of  
Electric and Water Utilities  
501 E. Lemon Street  
Lakeland, Florida 33801-5050

---

DER File No. AC 53-190437  
PSD-FL-166

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue an air construction permit (copy attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, City of Lakeland-Charles Larson Power Plant, applied on December 17, 1990, to the Department of Environmental Regulation for a permit to construct and operate a 120 MW combined cycle gas turbine generator.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit is required for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days, in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department, at the address specified within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

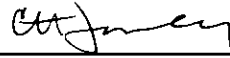
- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application(s) have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office in General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a

hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.  
Chief  
Bureau of Air Regulation

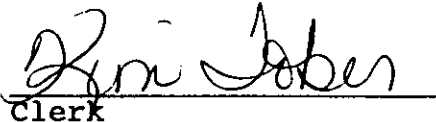
Copies furnished to:

Harry Kerns, SWD  
Jewell Harper, EPA

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on 3-15-91.

FILING AND ACKNOWLEDGEMENT  
FILED, on this date, pursuant to  
§120.52(9), Florida Statute, with  
the designated Department Clerk,  
receipt of which is hereby  
acknowledged.

  
Clerk

3-15-91  
Date

State of Florida  
Department of Environmental Regulation  
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to City of Lakeland-Charles Larsen Plant, 501 E. Lemon Street, Lakeland, Polk County, Florida 33801-5050, to construct and operate a 120 MW combined cycle gas turbine system. A determination of Best Available Control Technology (BACT) was required. The Class I particulate matter PSD increment consumed is 0.012 vs. 10 allowable 24-hour average and 0.001 vs. 5 allowable annual average, in micrograms per cubic meter. The Class I sulfur dioxide PSD increment consumed is 0.93 vs. 25 allowable 3-hour average, 0.20 vs. 5 allowable 24-hour average, and 0.015 vs. 2 allowable annual average, in micrograms per cubic meter. The Class I nitrogen dioxide increment consumed is 0.011 vs. 2.5 allowable annual average, in micrograms per cubic meter. The maximum predicted increases in ambient concentrations for the above three pollutants for all averaging times are less than significant in the Class II area surrounding the plant, thus no increment consumption was calculated. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Department of Environmental Regulation  
Southwest District  
4520 Oak Fair Blvd.  
Tampa, Florida 33601-7347

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

Further, a public hearing can be requested by any person. Such requests must be submitted within 30 days of this notice.

Technical Evaluation  
and  
Preliminary Determination

City of Lakeland-Charles Larsen Power Plant  
Lakeland, Florida

120 MW Combined Cycle Gas Turbine System

Permit Number: AC 53-190437  
PSD-FL-166

Department of Environmental Regulation  
Division of Air Resources Management  
Bureau of Air Regulation

March 15, 1991

## SYNOPSIS OF APPLICATION

### I. NAME AND ADDRESS OF APPLICANT

City of Lakeland  
Department of Electric and Water Utilities  
501 East Lemon Street  
Lakeland, Florida 33801-5050

### II. REVIEWING AND PROCESS SCHEDULE

Date of Receipt of Application: December 17, 1990.

### III. FACILITY INFORMATION

#### III.1 Facility Location

This facility is located at S.R. 92 and East Lake Parker Drive in the city of Lakeland, Polk County, Florida. The UTM coordinates are 409.185 km East and 3102.754 km North.

#### III.2 Facility Identification Code (SIC)

Major Group No. 49 - Electric, Gas and Sanitary Services.

Industry Group No. 493 - Combination Electric, Gas and Other Utility Services.

Industry Group No. 4931 - Electric and Other Services Combined.

#### III.3 Facility Category

The City of Lakeland-Charles Larsen Power Plant is classified as a major emitting facility. The proposed project will emit approximately 425 (gas) and 732 (oil) tons per year (TPY) of nitrogen oxides (NO<sub>x</sub>), 2.6 (gas) and 920 (oil) TPY of sulfur dioxide (SO<sub>2</sub>), 22 (gas) and 66 (oil) TPY of particulate matter (PM), and 20 (oil) TPY of volatile organic compounds (VOC), 0.01 (oil) TPY of beryllium, 0.12 (oil) TPY of lead, 0.01 (oil) TPY of mercury, and 27.6 (oil) TPY of sulfuric acid mist.

### IV. PROJECT DESCRIPTION

The City of Lakeland-Charles Larsen Power Plant proposes to construct and operate a 120 MW combined cycle gas turbine system. The unit will be located at the Charles Larsen Power Plant. The combustion turbine (CT) will be capable of generating approximately 80 MW while operating in simple cycle and 120 MW when in combined cycle operation. While in the combined cycle the heat recovery steam generator (HRSG) will power the existing Larsen Unit 5 steam turbine-generator. The primary fuel will be natural gas and No. 2 fuel oil with a sulfur content of 0.2 percent.



## V. RULE APPLICABILITY

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Chapter 17-2, Florida Administrative Code (F.A.C.).

The plant is located in an area designated attainment for all criteria pollutants in accordance with F.A.C. Rule 17-2.420.

The proposed project will be reviewed under F.A.C. Rule 17-2.500, Prevention of Significant Deterioration (PSD), because it will be a major modification to a major facility. This review consists of a determination of Best Available Control Technology (BACT) and unless otherwise exempted, an analysis of the air quality impact of the increased emissions. No air quality impact analysis is required for ozone, even though there will be a significant increase in VOC emissions, because this increase is less than 100 TPY. The review also includes an analysis of the project's impacts on soils, vegetation and visibility; along with air quality impacts resulting from associated commercial, residential and industrial growth.

This source shall comply with the New Source Performance Standards for Gas Turbines, Subpart GG, Appendix A, which is contained in 40 CFR 60, and is adopted by reference in F.A.C. Rule 17-2.660. The proposed source shall also comply with applicable provisions of F.A.C. Rule 17-2.700, Stack Test Procedures, and F.A.C. Rule 17-2.630, Best Available Control Technology.

## VI. SOURCE IMPACT ANALYSIS

### VI.1 Emission Limitations

The operation of the combined cycle plant will produce emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO, HC, sulfuric acid mist, PM, PM<sub>10</sub>, Be, Pb and Hg. The impact of these pollutant emissions are below the Florida ambient air quality standards (AAQS) and/or the acceptable ambient concentration levels (AAC). Table 1 lists each contaminant and its maximum expected emission rate, along with the proposed increase of emissions.

### VI.2 Air Toxics Evaluation

The operation of this source will produce emissions of chemical compounds that may be toxic in high concentrations. The emission rates of these chemicals shall not create ambient concentrations greater than the acceptable ambient concentrations (AAC) as shown below. Determination of the AAC for these organic compounds shall be determined by Department approved dispersion modeling or ambient monitoring.

$$AAC = \frac{OEL}{\text{Safety Factor}}$$

Where,

AAC = acceptable ambient concentration

Safety Factor = 50 for category B substances and 8 hrs/day  
 100 for category A substances and 8 hrs/day  
 210 for category B substances and 24 hrs/day  
 420 for category A substances and 24 hrs/day

OEL = Occupational exposure level such as ACGIH, ASHA and NIOSH published standards for toxic materials.

MSDS = Material Safety Data Sheets

## VI.3 Air Quality Analysis

### a. Introduction

The operation of the proposed 120 MW combined cycle gas turbine system will result in emissions increases which are projected to be greater than the PSD significant emission rates for the following pollutants: CO, NO<sub>x</sub>, SO<sub>2</sub>, PM, PM<sub>10</sub>, Be, and H<sub>2</sub>SO<sub>4</sub> mist. Therefore, the project is subject to the PSD review requirements contained in F.A.C. Rule 17-2.500 for these pollutants. Part of these requirements is an air quality impact analysis for these pollutants, which includes:

- An analysis of existing air quality;
- A PSD increment analysis (for SO<sub>2</sub>, PM, PM<sub>10</sub>, and NO<sub>x</sub>);
- An ambient Air Quality Standards analysis (AAQS);
- An analysis of impacts on soils, vegetation, visibility and growth-related air quality impacts; and
- A Good Engineering Practice (GEP) stack height determination.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses are based on air quality dispersion modeling completed in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the combined cycle gas turbine system, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A brief description of the modeling methods used and results of the required analyses follow. A more complete description is contained in the permit application on file.

b. ,Analysis of the Existing Air Quality

Preconstruction ambient air quality monitoring may be required for pollutants subject to PSD review. However, an exemption to the monitoring requirement can be obtained if the maximum air quality impact resulting from the projected emissions increase, as determined through air quality modeling, is less than a pollutant-specific de minimus concentration. The predicted maximum concentration increase for each pollutant subject to PSD review is given below:

	<u>CO</u>	<u>SO<sub>2</sub></u>	<u>TSP &amp; PM<sub>10</sub></u>	<u>NO<sub>x</sub></u>	<u>Be</u>
PSD de minimus Concentration (ug/m <sup>3</sup> )	575	13	10	14	.001
Averaging Time	8-hr	24-hr	24-hr	Annual	24-hr
Maximum Predicted Impact (ug/m <sup>3</sup> )	2.7	4.7	0.3	0.2	.000005

There are no monitoring de minimus concentrations for H<sub>2</sub>SO<sub>4</sub> mist. As shown above, the predicted impacts are all less than the corresponding de minimus concentrations; therefore, no preconstruction monitoring is required for any pollutant.

c. Modeling Method

The EPA-approved Industrial Source Complex Short-Term (ISCST) dispersion model was used by the applicant to predict the impact of the proposed project on the surrounding ambient air. All recommended EPA default options were used. Direction-specific downwash parameters were used because the stacks were less than the good engineering practice (GEP) stack height. Five years of sequential hourly surface and mixing depth data from the Tampa, Florida National Weather Service (NWS) station collected during 1982 through 1986 were used in the model. Since five years of data were used, the highest-second-high short-term predicted concentrations are compared with the appropriate ambient air quality standards or PSD increments. For the annual averages, the highest predicted yearly average was compared with the standards.

For this project emissions from fuel oil burning are significantly higher than those from natural gas combustion, while the gas flow characteristics are fairly similar thus resulting in higher predicted ground level-pollutant impacts from fuel oil combustion. All modeling impacts were, therefore, based on fuel oil consumption. Dispersion modeling for emissions from the HRSG (height of 155 feet) and bypass stacks (height of 100 feet) were performed.

#### d. Modeling Results

The applicant first evaluated the potential increase in ambient ground-level concentrations associated with the project to determine if these predicted ambient concentration increases would be greater than specified PSD significant impact levels for CO, SO<sub>2</sub>, NO<sub>x</sub>, PM and PM<sub>10</sub>. Dispersion modeling was performed with receptors placed along the 36 standard radial directions (10 degrees apart) surrounding the proposed source at the following downwind distances: 100 meter intervals from 100 to 1000 meters, 250 meter intervals from 1,250 to 3,000 meters, and 1,000 meter intervals from 4,000 to 10,000 meters. The results of this modeling presented below show that the increases in ambient ground-level concentrations for all averaging times are less than the PSD significant impact levels for CO, SO<sub>2</sub>, NO<sub>x</sub>, PM and PM<sub>10</sub>.

<u>Pollutant</u>	<u>Averaging Time</u>	<u>PSD Significance Level (ug/m3)</u>	<u>Ambient Concentration Increase (ug/m3)</u>
CO	8-hour	500	2.7
	1-hour	2000	9.4
SO <sub>2</sub>	Annual	1.0	0.2
	3-hour	25.0	19.7
	24-hour	5.0	4.7
NO <sub>2</sub>	Annual	1.0	0.2
PM/PM <sub>10</sub>	Annual	1.0	0.01
	24-hour	5.0	0.3

Therefore, further dispersion modeling for comparison with AAQS and PSD increment consumption were not required in this case.

The applicant did not model emissions from the noncriteria regulated pollutants Be and H<sub>2</sub>SO<sub>4</sub> for which no ambient air quality standards have been defined under PSD rules. However, based on modeling results provided by the applicant for SO<sub>2</sub> and pertinent information supplied by the applicant for Be and H<sub>2</sub>SO<sub>4</sub> mist emissions, the Department calculated predicted ambient air quality impacts, for informational purposes, for comparison with Department-derived de minimus concentration levels (AAC). The calculated value for Be is .000002 ug/m<sup>3</sup>, annual average, which is less than the de minimus level of .0004 ug/m<sup>3</sup>, annual average, while the calculated value for H<sub>2</sub>SO<sub>4</sub> mist is 0.14 ug/m<sup>3</sup>, 24-hr average, which is less than the de minimus level of 2.4 ug/m<sup>3</sup>, 24-hr average.

The Department performed dispersion modeling to determine the predicted ambient concentration increases in the Class I Chassahowitzka National Wilderness Area located 94 km away for the

pollutants with Class I increments. The maximum predicted SO<sub>2</sub> increases are 0.015 ug/m<sup>3</sup> for the annual averaging time, 0.20 ug/m<sup>3</sup> for the 24-hr averaging time and 0.93 for the 3-hr averaging time. The maximum predicted PM increases are 0.001 ug/m<sup>3</sup> for the annual averaging time and 0.012 for the 24-hr averaging time. The maximum predicted NO<sub>2</sub> increase is 0.011 ug/m<sup>3</sup> for the annual averaging time. These predicted values are all much less than the corresponding Class I increments.

e. Additional Impacts Analysis

The increased emissions at the City of Lakeland Power Plant are not expected to affect the visibility in the Chassahowitzka National Wilderness area located 94 km away because of the very small maximum predicted impacts. Because the impacts from the proposed pollutants are predicted to be less than PSD significance levels, no harmful effects on soils and vegetation is expected. In addition, the proposed modification will not significantly change employment, population, housing or commercial/industrial development in the area to the extent that a significant air quality impact will result.

VII. CONCLUSION

Based on the information provided by the City of Lakeland Power Plant, the Department has reasonable assurance that the proposed installation of the 120 MW combined cycle gas turbine system, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

*Bruce S. [Signature]*  
#36624  
3-15-91

pollutants with Class I increments. The maximum predicted SO<sub>2</sub> increases are 0.015 ug/m<sup>3</sup> for the annual averaging time, 0.20 ug/m<sup>3</sup> for the 24-hr averaging time and 0.93 for the 3-hr averaging time. The maximum predicted PM increases are 0.001 ug/m<sup>3</sup> for the annual averaging time and 0.012 for the 24-hr averaging time. The maximum predicted NO<sub>2</sub> increase is 0.011 ug/m<sup>3</sup> for the annual averaging time. These predicted values are all much less than the corresponding Class I increments.

e. Additional Impacts Analysis

The increased emissions at the City of Lakeland Power Plant are not expected to affect the visibility in the Chassahowitzka National Wilderness area located 94 km away because of the very small maximum predicted impacts. Because the impacts from the proposed pollutants are predicted to be less than PSD significance levels, no harmful effects on soils and vegetation is expected. In addition, the proposed modification will not significantly change employment, population, housing or commercial/industrial development in the area to the extent that a significant air quality impact will result.

VII. CONCLUSION

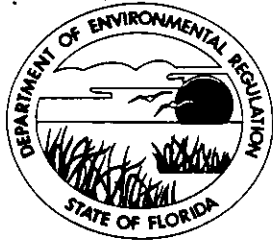
Based on the information provided by the City of Lakeland Power Plant, the Department has reasonable assurance that the proposed installation of the 120 MW combined cycle gas turbine system, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

*Barry D. Adams*  
# 36024  
3-15-91

TABLE 1  
ALLOWABLE EMISSION LIMITS  
Combined Cycle Combustion Turbine

Pollutant	Standards		Gas Turbine and HRSG <sup>(a)</sup>		Basis
	Gas Firing	No. 2 Fuel Oil Firing	Tons Per Year		
			Gas	Oil	
NO <sub>x</sub>	25 ppm at 15% oxygen on a dry basis	42 ppmv at 15 percent oxygen on a dry basis	425	181	BACT
SO <sub>2</sub>	Natural gas as fuel	0.2 percent S by weight	2.6	230	BACT
PM/PM <sub>10</sub>	0.006 lb/MMBtu	0.025 lb/MMBtu	22	16.5	BACT
VOC	-	-	9	5.0	BACT
CO	-	-	232	59.3	BACT
Mercury (Hg)	-	-	$3.0 \times 10^{-6}$ lbs/MMBtu	.003	Est. by Appl.
Lead (Pb)	-	-	$2.8 \times 10^{-6}$ lbs/MMBtu	0.03	" "
Beryllium (be)	-	-	$2.5 \times 10^{-6}$ lbs/MMBtu	.003	BACT
Sulfuric Acid Mist	Natural gas as fuel	Low sulfur content oil	$1.9 \times 10^{-5}$ lbs/MMBtu	$1.7 \times 10^{-3}$	BACT

(a) Emissions rates based on 100 percent capacity factor for natural gas and 25 percent capacity factor for oil firing.



## *Florida Department of Environmental Regulation*

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

**PERMITTEE:**

**City of Lakeland  
501 E. Lemon Street  
Lakeland, Florida 32961**

**Permit Number: AC 53-190437**

**Expiration Date: March 30, 1993**

**County: Polk**

**Latitude/Longitude: 28°02'56"N  
81°55'25"W**

**Project: 120 MW Combined Cycle  
Gas Turbine**

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of a 120 MW combined cycle gas turbine to be located at the City of Lakeland-Charles Larsen Power Plant in Lakeland, Florida. The UTM coordinates are 409.185 km East and 3102.754 km North.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. City of Lakeland-Charles Larsen Power Plant's application dated December 17, 1990.



**PERMITTEE:**  
**City of Lakeland**

**Permit Number: AC 53-190437**  
**Expiration Date: March 30, 1993**

**GENERAL CONDITIONS:**

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

**PERMITTEE:**  
**City of Lakeland**

**Permit Number: AC 53-190437**  
**Expiration Date: March 30, 1993**

**GENERAL CONDITIONS:**

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**GENERAL CONDITIONS:**

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- (x) Determination of Best Available Control Technology (BACT)
- (x) Determination of Prevention of Significant Deterioration (PSD)
- (x) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**GENERAL CONDITIONS:**

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

**SPECIFIC CONDITIONS:**

Emission Limits

1. The maximum allowable emissions from this facility shall not exceed the emission rates listed in Table 1.

2. Unless the Department has determined other concentrations are required to protect public health and safety, predicted acceptable ambient air concentrations (AAC) of the following pollutants shall not be exceeded:

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**SPECIFIC CONDITIONS:**

Pollutant	Acceptable Ambient Concentrations		
	8-hrs	24-hrs	Annual
Beryllium	0.02	0.005	0.0004
Lead	1.5	0.36	0.09
Mercury: allyl compounds	0.1	0.024	- RAC = 2
• all forms of vapor except allyl	0.5	0.12	-
• allyl & organic compounds	1	0.24	-

3. Visible emissions shall not exceed 10% opacity.

Operating Rates

4. This source is allowed to operate continuously (8760 hours per year).

5. This source is allowed to use natural gas as the primary fuel and No. 2 distillate oil as the secondary fuel (limited as shown in Specific Condition 6 below).

6. The permitted materials and utilization rates for the combined cycle gas turbine shall not exceed the values as follows:

- Maximum No. 2 fuel oil consumption shall not exceed either of the following limitations: 8,190 gals/hr; 17,936,100 gals/yr.
- Maximum annual firing using No. 2 fuel oil shall not exceed 25% of the annual capacity factor.
- Maximum sulfur (S) content in the oil shall not exceed 0.20 percent by weight.
- Maximum heat input shall not exceed 1055 MMBtu/hr (gas) or 1040 MMBtu/hr (oil).

7. Any change in the method of operation, equipment or operating hours shall be submitted to the DER's Bureau of Air Regulation and Southwest District offices.

8. Any other operating parameters established during compliance testing and/or inspection that will ensure the proper operation of this facility shall be included in the operating permit.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**SPECIFIC CONDITIONS:**

Compliance Determination

9. Compliance with the  $\text{NO}_x$ ,  $\text{SO}_2$ , CO, PM, and VOC standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1990) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 5. Determination of Particulate Matter Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 20. Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines

10. Method 5 must be used to determine the initial compliance status of this unit. Thereafter, the opacity emissions test may be used unless 10% opacity is exceeded.

11. Compliance with the  $\text{SO}_2$  emission limit can also be determined by calculations based on fuel analysis using ASTM D2880-71 for the sulfur content of liquid fuels and ASTM D1072-80, D3031-81, D4084-82 or D3246-81 for sulfur content of gaseous fuels.

12. Compliance with the total volatile organic compound emission limits will be assumed, provided the CO allowable emission rate is achieved; specific VOC compliance testing is not required.

13. During performance tests, to determine compliance with the proposed  $\text{NO}_x$  standard, measured  $\text{NO}_x$  emission at 15 percent oxygen will be adjusted to ISO ambient atmospheric conditions by the following correction factor:

$$\text{NO}_x = (\text{NO}_x \text{ obs}) \left( \frac{P_{\text{ref}}}{P_{\text{obs}}} \right)^{0.5} e^{19} (H_{\text{obs}} - 0.00633) \left( \frac{288^\circ\text{K}}{T_{\text{AMB}}} \right)^{1.53}$$

where:

$\text{NO}_x$  = Emissions of  $\text{NO}_x$  at 15 percent oxygen and ISO standard ambient conditions.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**SPECIFIC CONDITIONS:**

$NO_x$  obs = Measured  $NO_x$  emission at 15 percent oxygen, ppmv.

$P_{ref}$  = Reference combustor inlet absolute pressure at 101.3 kilopascals (1 atmosphere) ambient pressure.

$P_{obs}$  = Measured combustor inlet absolute pressure at test ambient pressure.

$H_{obs}$  = Specific humidity of ambient air at test.

$e$  = Transcendental constant (2.718).

$T_{AMB}$  = Temperature of ambient air at test.

14. Test results will be the average of 3 valid runs. The Southwest District office will be notified at least 30 days in advance of the compliance test. The source shall operate between 90% and 100% of permitted capacity during the compliance test. Compliance test results shall be submitted to the Southwest District office no later than 45 days after completion.

15. Water injection shall be utilized for  $NO_x$  control. The water to fuel ratio at which compliance is achieved shall be incorporated into the permit and shall be continuously monitored. In addition, the Permittee shall install a duct module suitable for future installation of SCR equipment.

16. To determine compliance with the capacity factor condition for oil firing, the Permittee shall maintain daily records of fuel usage. All records shall be maintained for a minimum of three years after the date of each record and shall be made available to representatives of the Department upon request.

17. Sulfur, nitrogen content and lower heating value of the fuel being fired in the gas turbine shall also be recorded daily. These records shall also be kept by the company for at least three years and made available for regulatory agency's inspection.

18. Compliance with the acceptable ambient concentrations for Be, Lead, and Hg emissions shall be demonstrated based on calculations certified by a Professional Engineer registered in Florida, using actual operating conditions. Determination of the ambient concentrations for chemical compounds shall be determined by Department approved dispersion modeling. This compliance determination shall be made available upon request.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

**SPECIFIC CONDITIONS:**

Rule Requirements

19. This source shall comply with all applicable provisions of Chapter 403, Florida Statutes and Chapters 17-2 and 17-4, Florida Administrative Code.

20. This source shall comply with all requirements of 40 CFR 60, Subpart GG and F.A.C. Rule 17-2.660(2)(a), Standards of Performance for Stationary Gas Turbines.

21. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-2.210(1)).

22. This source shall comply with F.A.C. Rule 17-2.700, Stationary Point Source Emission Test Procedures.

23. Pursuant to F.A.C. Rule 17-2.210(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: sulfur, nitrogen content and lower heating value of the fuel being fired, fuel usage, hours of operation, air emissions limits, etc. Annual reports shall be sent to the Department's Southwest District office.

24. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

25. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).



PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

Issued this \_\_\_\_\_ day  
of \_\_\_\_\_, 1991

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL REGULATION

---

Carol M. Browner, Secretary

Best Available Control Technology (BACT) Determination  
City of Lakeland-Charles Larsen Power Plant  
Polk County

The applicant proposes to install a combustion turbine generator at their facility in Lakeland. The generator system will consist of a single nominal 80 megawatt (MW) combustion turbine, and a single heat recovery steam generator (HRSG) which will be used to repower an existing nominal 40 MW steam turbine.

The combustion turbine will be capable of both combined cycle and simple cycle operation. The applicant requested that the combustion turbine use either natural gas or distillate oil. The applicant has indicated the maximum annual tonnage of regulated air pollutants emitted from the facility based on 100 percent capacity and type of fuel fired at ISO conditions to be as follows:

Pollutant	Potential Emissions (tons/yr)		PSD Significant Emission Rate (tons/yr)
	Natural Gas	Fuel Oil	
NOx	425	732	40
SO <sub>2</sub>	2.6	920	40
PM	22.0	66	25
PM <sub>10</sub>	22.0	66	15
CO	232	237	100
VOC	9	20.0	40
H <sub>2</sub> SO <sub>4</sub>	0.8	27.4	7
Be	0.0	0.01	0.0004
Hg	0.0	0.01	0.1
Pb	0.0	0.12	0.6

Florida Administrative Code Rule 17-2.500(2)(f)(3) requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table.

Date of Receipt of a BACT Application

December 17, 1990

## BACT Determination Requested by the Applicant

<u>Pollutant</u>	<u>Determination</u>
NOx	25 ppmvd @ 15% O <sub>2</sub> (natural gas burning) 42 ppmvd @ 15% O <sub>2</sub> (diesel oil firing)
SO <sub>2</sub>	Firing of natural gas or No. 2 fuel oil with a maximum sulfur content of 0.20%
PM and PM <sub>10</sub>	Combustion control
H <sub>2</sub> SO <sub>4</sub>	Firing of No. 2 fuel oil with a maximum sulfur content of 0.20%.
Be	Firing of No. 2 fuel oil

## BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination the Department shall give consideration to:

- (a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).
- (b) All scientific, engineering, and technical material and other information available to the Department.
- (c) The emission limiting standards or BACT determinations of any other state.
- (d) The social and economic impact of the application of such technology.

The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine for the emission source in question the most stringent control available for a similar or identical source or source category. If it is shown that this level of control is technically or economically infeasible for the source in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

The air pollutant emissions from combined cycle power plants can be grouped into categories based upon what control equipment and techniques are available to control emissions from these facilities. Using this approach, the emissions can be classified as follows:

- o Combustion Products (Particulates and Heavy Metals). Controlled generally by good combustion of clean fuels.
- o Products of Incomplete Combustion (CO, VOC, Toxic Organic Compounds). Control is largely achieved by proper combustion techniques.
- o Acid Gases (SO<sub>x</sub>, NO<sub>x</sub>, HCl, F<sub>l</sub>). Controlled generally by gaseous control devices.

Grouping the pollutants in this manner facilitates the BACT analysis because it enables the equipment available to control the type or group of pollutants emitted and the corresponding energy, economic, and environmental impacts to be examined on a common basis. Although all of the pollutants addressed in the BACT analysis may be subject to a specific emission limiting standard as a result of PSD review, the control of "nonregulated" air pollutants is considered in imposing a more stringent BACT limit on a "regulated" pollutant (i.e., particulates, sulfur dioxide, fluorides, sulfuric acid mist, etc.), if a reduction in "nonregulated" air pollutants can be directly attributed to the control device selected as BACT for the abatement of the "regulated" pollutants.

#### Combustion Products

The City of Lakeland's projected emissions of particulate matter, PM<sub>10</sub>, and beryllium surpass the significant emission rates given in Florida Administrative Code Rule 17-2.500, Table 500-2 for No. 2 fuel oil firing only.

A PM/PM<sub>10</sub> emissions limitation of 0.014 lb/MMBtu for No. 2 fuel oil firing is reasonable as BACT for the Lakeland facility.

In general, the BACT/LAER Clearinghouse does not contain specific emission limits for beryllium from turbines. BACT for these heavy metals is typically represented by the level of particulate control. As this is the case, the emission factor of 0.014 lb/MMbtu for particulate matter PM<sub>10</sub> is judged to also represent BACT for beryllium.

#### Products of Incomplete Combustion

The emissions of carbon monoxide and volatile organic compounds are each below the significant level and therefore do not require a BACT analysis.

## Acid Gases

The emissions of sulfur dioxide, nitrogen oxides, and sulfuric acid mist, represent a significant proportion of the total emissions and need to be controlled if deemed appropriate. Sulfur dioxide emissions from combustion turbines are directly related to the sulfur content of the fuel being combusted.

The applicant has proposed the use of natural gas and No. 2 fuel oil with a maximum sulfur content of 0.20% to control sulfur dioxide emissions. A review of the latest edition (1990) of the BACT/LAER Clearinghouse indicates that sulfur dioxide emissions from combustion turbines have been controlled by limiting fuel oil sulfur content to a range of 0.1 to 0.3%, with the average for the facilities listed being approximately 0.24 percent. As this is the case, the applicant's proposal to use No. 2 fuel oil with a maximum sulfur content of 0.20% is judged to represent BACT.

The applicant has stated that BACT for nitrogen oxides will be met by using wet (water or steam) injection necessary to limit emissions to 42 ppmvd or 25 ppmvd at 15% oxygen when burning No. 2 fuel oil or natural gas, respectively.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NOx emission limit established to date for a combustion turbine is 4.5 ppmvd at 15% percent oxygen. This level of control was accomplished through the use of water injection and a selective catalytic reduction (SCR) system.

Selective catalytic reduction is a post-combustion method for control of NOx emissions. The SCR process combines vaporized ammonia with NOx in the presence of a catalyst to form nitrogen and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NOx with a new catalyst. As the catalyst ages, the maximum NOx reduction will decrease to approximately 86 percent.

Given the applicant's proposed BACT level for nitrogen oxides control stated above, an evaluation can be made of the cost and associated benefit of using SCR as follows:

The applicant has indicated that the total levelized annual cost (operating plus amortized capital cost) to install SCR for natural gas firing at 100 percent capacity factor is \$2,190,000. Taking into consideration the total levelized annual cost, a cost/benefit analysis of using SCR can now be developed.

Based on the information supplied by the applicant, it is estimated that the maximum annual NOx emissions with wet injection from the Lakeland facility will be 425 tons/year. Assuming that SCR would reduce the NOx emissions by an additional 80-85%, the SCR would

control at least 340 tons of NOx annually for natural gas firing. When this reduction is taken into consideration with the total levelized annual cost of \$2,190,000, the cost per ton of controlling NOx is \$6,441. This calculated cost is higher than has previously been approved as BACT.

Since SCR has been determined to be BACT for several combined cycle facilities, the EPA has clearly stated that there must be unique circumstances to consider the rejection of such control on the basis of economics.

In a recent letter from EPA Region IV to the Department regarding the permitting of a combined cycle facility (Tropicana Products, Inc.), the following statement was made:

"In order to reject a control option on the basis of economic considerations, the applicant must show why the costs associated with the control are significantly higher for this specific project than for other similar projects that have installed this control system or in general for controlling the pollutant."

A review of the combined cycle facilities in which SCR has been established as a BACT requirement indicates that the majority of these facilities are also intended to operate at high capacity factors. As this is the case, the proposed project is similar to other facilities in which SCR has been established as BACT, thereby supporting SCR as BACT for the proposed facility.

For fuel oil firing, the cost associated with controlling NOx emissions must take into account the potential operating problems that can occur with using SCR in the oil firing mode.

A concern associated with the use of SCR on combined cycle projects is the formation of ammonium bisulfate. For the SCR process, ammonium bisulfate can be formed due to the reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate formed has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. As this is the case, SCR has been judged to be technically infeasible for oil firing in some previous BACT determinations.

The latest information available now indicates that SCR can be used for oil firing provided that adjustments are made in the ammonia to NOx injection ratio. For natural gas firing operation NOx emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater injection ratio. By lowering the injection ratio for oil firing, testing has indicated that NOx can be controlled with efficiencies ranging from 60 to 75 percent. When the injection ratio is lowered there is not a problem with ammonium bisulfate formation since essentially all of the ammonia is able to react with the nitrogen oxides present in the combustion gases.

Based on this strategy SCR has been both proposed and established as BACT for oil fired combined cycle facilities with NOx emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control established.

Assuming that the lowered ammonia injection ratio strategy was used to control NOx emissions by 65%, the SCR would control 476 tons (65% of 732 tons/yr) of NOx annually for oil firing. When this reduction is taken into consideration with the total annual cost of \$2,190,000, the cost per ton of controlling NOx is \$4,600. This cost is lower than that determined for natural gas firing and is more consistent with what has been accepted as BACT.

#### Environmental Impact Analysis

The predominant environmental impacts associated with this proposal are related to the use of SCR for NOx control. The use of SCR results in emissions of ammonia, which may increase with increasing levels of NOx control. In addition, some catalysts may contain substances which are listed as hazardous waste, thereby creating an additional environmental burden. Although the use of SCR does have some environmental impacts, the disadvantages do not outweigh the benefit which would be provided by reducing nitrogen oxide emissions by 80 percent. The overwhelming benefit of NOx control by using SCR is substantiated by the fact that nearly one half of all BACT determinations have established SCR as the control measure for nitrogen oxides over the last five years.

In addition to the criteria pollutants, the impacts of toxic pollutants associated with the combustion of natural gas and No. 2 fuel oil have been evaluated. Beryllium for oil fired operation exceeds PSD significant levels. Other toxics are expected to be emitted in minimal amounts, with the total emissions combined to be less than 0.1 tons per year.

Although the emissions of the toxic pollutants could be controlled by particulate control devices such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. As this is the case, the Department does not believe that the BACT determination would be affected by the emissions of the toxic pollutants associated with the firing of natural gas or No. 2 fuel oil.

#### Potentially Sensitive Concerns

With regard to controlling NOx emissions with SCR, the applicant has identified the following technical limitations:

1. SCR would reduce output of combustion turbines by one percent.
2. SCR could result in the release of unreacted quantities of ammonia to the atmosphere.

3. SCR would require handling of ammonia by plant operators. Since it is a hazardous material, there is a concern about safety and productivity of operators.
4. SCR results in contaminated catalyst from flue gas trace elements which could be considered hazardous. Safety of operators and disposal of spent catalyst is a concern.

#### BACT Determination by DER

##### NOx Control

A review of the permitting activities for combined cycle proposals across the nation indicates that SCR has been required and most recently proposed for installations with a variety of operating conditions (i.e., natural gas, fuel oil, capacity factors ranging from low to high). However, the cost and other concerns expressed by the applicant are valid.

The information that the applicant presented and Department calculations indicates that the incremental cost of controlling NOx (\$6,441/ton) for natural gas is high compared to other BACT determinations which require SCR. However, the cost of controlling NOx emissions for oil firing (\$4,600/ton) could be considered reasonable. Based on the information presented by the applicant and the studies conducted, the Department believes that the use of SCR for NOx control is not justifiable at this time as BACT. Therefore, the Department is willing to accept low NOx combustors with the firing of natural gas as the primary fuel. However, No. 2 distillate oil firing must be limited to 25% of the annual capacity factor. The applicant is also expected to design the facility to accommodate SCR should additional oil usage become necessary and SCR becomes a BACT requirement in the future.

##### SO<sub>2</sub> Control

For sulfur dioxide BACT is represented by firing natural gas or No. 2 fuel oil with an average sulfur content not to exceed 0.20 percent.

##### Other Emissions Control

The emission limitations for PM and PM<sub>10</sub>, are based on previous BACT determinations for similar facilities, with the heavy metal beryllium being addressed through the particulate limitation and sulfuric acid mist being addressed through the sulfur dioxide limitation.



The emission limits for the City of Lakeland project are thereby established as follows:

Pollutant	Emission Limit	
	Natural Gas Firing	No. 2 Fuel Oil Firing
NOx	25 ppmvd @ 15% O <sub>2</sub>	42 ppmvd @ 15% O <sub>2</sub> *
SO <sub>2</sub>	Natural gas as fuel	Sulfur content not to exceed 0.20%
PM & PM <sub>10</sub>	0.006 lb/MMBtu	0.025 lb/MMBtu
Sulfuric Acid Mist	Emissions limited by natural gas and No. 2 fuel oil firing	
Beryllium	Emissions limited by natural gas and No. 2 fuel oil firing	

\* No. 2 fuel oil usage limited to 25% of the total heat input on an annual basis.

Details of the Analysis May be Obtained by Contacting:

Preston Lewis, P.E., BACT Coordinator  
Department of Environmental Regulation  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended by:

Approved by:

\_\_\_\_\_  
C. H. Fancy, P.E., Chief  
Bureau of Air Regulation

\_\_\_\_\_  
Carol M. Browner, Secretary  
Dept. of Environmental Regulation

\_\_\_\_\_  
Date 1991

\_\_\_\_\_  
Date 1991

TABLE 1  
ALLOWABLE EMISSION LIMITS  
Combined Cycle Combustion Turbine

Pollutant	Standards		Gas Turbine and HRSG <sup>(a)</sup>			Basis
	Gas Firing	No. 2 Fuel Oil Firing	Tons Per Year			
			Gas	Oil		
NO <sub>x</sub>	25 ppm at 15% oxygen on a dry basis	42 ppmv at 15 percent oxygen on a dry basis	425	181	BACT	
SO <sub>2</sub>	Natural gas as fuel	0.2 percent S by weight	2.6	230	BACT	
PM/PM <sub>10</sub>	0.006 lb/MMBtu	0.025 lb/MMBtu	22	16.5	BACT	
VOC	-	-	9	5.0	BACT	
CO	-	-	232	59.3	BACT	
Mercury (Hg)	-	-	$3.0 \times 10^{-6}$ lbs/MMBtu	.003	Est. by Appl.	
Lead (Pb)	-	-	$2.8 \times 10^{-6}$ lbs/MMBtu	0.03	" "	
Beryllium (be)	-	-	$2.5 \times 10^{-6}$ lbs/MMBtu	.003	BACT	
Sulfuric Acid Mist	Natural gas as fuel	Low sulfur content oil	$1.9 \times 10^{-5}$ lbs/MMBtu	$1.7 \times 10^{-3}$	BACT	

(a) Emissions rates based on 100 percent capacity factor for natural gas and 25 percent capacity factor for oil firing.

## SYNOPSIS OF APPLICATION

### I. NAME AND ADDRESS OF APPLICANT

City of Lakeland  
Department of Electric and Water Utilities  
501 East Lemon Street  
Lakeland, Florida 33801-5050

### II. REVIEWING AND PROCESS SCHEDULE

Date of Receipt of Application: December 17, 1990.

### III. FACILITY INFORMATION

#### III.1 Facility Location

This facility is located at S.R. 92 and East Lake Parker Drive in the city of Lakeland, Polk County, Florida. The UTM coordinates are 409.185 km East and 3102.754 km North.

#### III.2 Facility Identification Code (SIC)

Major Group No. 49 - Electric, Gas and Sanitary Services.

Industry Group No. 493 - Combination Electric, Gas and Other Utility Services.

Industry Group No. 4931 - Electric and Other Services Combined.

#### III.3 Facility Category

The City of Lakeland-Charles Larsen Power Plant is classified as a major emitting facility. The proposed project will emit approximately 425 (gas) and 732 (oil) tons per year (TPY) of nitrogen oxides (NO<sub>x</sub>), 2.6 (gas) and 920 (oil) TPY of sulfur dioxide (SO<sub>2</sub>), 22 (gas) and 66 (oil) TPY of particulate matter (PM), and 20 (oil) TPY of volatile organic compounds (VOC), 0.01 (oil) TPY of beryllium, 0.12 (oil) TPY of lead, 0.01 (oil) TPY of mercury, and 27.6 (oil) TPY of sulfuric acid mist.

### IV. PROJECT DESCRIPTION

The City of Lakeland-Charles Larsen Power Plant proposes to construct and operate a 120 MW combined cycle gas turbine system. The unit will be located at the Charles Larsen Power Plant. The combustion turbine (CT) will be capable of generating approximately 80 MW while operating in simple cycle and 120 MW when in combined cycle operation. While in the combined cycle the heat recovery steam generator (HRSG) will power the existing Larsen Unit 5 steam turbine-generator. The primary fuel will be natural gas and No. 2 fuel oil with a sulfur content of 0.2 percent.

TABLE 1  
ALLOWABLE EMISSION LIMITS  
Combined Cycle Combustion Turbine

Pollutant	Gas Firing	Standards	Gas Turbine and HRSG (a)				Basis	
		No. 2 Fuel Oil Firing	Tons Per Year					
			Gas	Oil				
NO <sub>x</sub>	25 ppm at 15% oxygen on a dry basis	42 ppmv at 15 percent oxygen on a dry basis	425	<del>181</del> 244			BACT	X
SO <sub>2</sub>	Natural gas as fuel	0.2 percent S by weight	2.6	<del>230</del> 307			BACT	X
PM/PM <sub>10</sub>	0.006 lb/MMBtu	0.025 lb/MMBtu	22	<del>16.5</del> 22			BACT	X
VOC	-	-	9	<del>5.0</del> 6.7			BACT	X
CO	-	-	232	<del>69.2</del> 79			BACT	X
Mercury (Hg)	-	-	<div>3.0 x 10<sup>-6</sup> lbs/MMBtu</div>			.003	Est. by Appl.	XX
Lead (Pb)	-	-	<div>2.8 x 10<sup>-6</sup> lbs/MMBtu</div>			0.03	"	
Beryllium (be)	-	-	<div>2.5 x 10<sup>-6</sup> lbs/MMBtu</div>			.003	BACT	
Sulfuric Acid Mist	Natural gas as fuel	Low sulfur content oil	1.9 x 10 <sup>-5</sup> lbs/MMBtu	1.7 x 10 <sup>-3</sup>			BACT	X

(a) Emissions rates based on 100 percent capacity factor for natural gas and ~~25 percent~~ capacity factor for oil firing.

one third

Not consistent with application

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

SPECIFIC CONDITIONS:

Compliance Determination

9. Compliance with the NO<sub>x</sub>, SO<sub>2</sub>, CO, <sup>(oil)</sup> ~~PM~~, and <sup>and visible emission</sup> ~~VOC~~ standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1990) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 5. Determination of Particulate Matter Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 20. Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines

10. Method 5 must be used to determine the initial compliance status of this unit. Thereafter, the opacity emissions test may be used unless 10% opacity is exceeded.

11. Compliance with the SO<sub>2</sub> emission limit can also be determined by calculations based on fuel analysis using ASTM D2880-71 for the sulfur content of liquid fuels, and ~~ASTM D1073-80, D3091-81, D4084-82 or D3246-81 for sulfur content of gaseous fuels.~~

12. Compliance with the total volatile organic compound emission limits will be assumed, provided the CO allowable emission rate is achieved; specific VOC compliance testing is not required.

13. During performance tests, to determine compliance with the proposed NO<sub>x</sub> standard, measured NO<sub>x</sub> emission at 15 percent oxygen will be adjusted to ISO ambient atmospheric conditions by the following correction factor:

$$NO_x = (NO_x \text{ obs}) \left[ \frac{(P_{ref})}{(P_{obs})} \right]^{0.5} e^{19 \left[ (H_{obs} - 0.00633) \right]} \left[ \frac{(288^\circ K)}{T_{AMB}} \right]^{1.53}$$

where:

include as exponent

NO<sub>x</sub> = Emissions of NO<sub>x</sub> at 15 percent oxygen and ISO standard ambient conditions.

An initial compliance test shall be performed using both fuels.

10. Annual <sup>NO<sub>x</sub></sup> compliance tests shall be performed with the fuel(s) used for more than 170 hours in the preceding 12 month period.

PERMITTEE:  
City of Lakeland

Permit Number: AC 53-190437  
Expiration Date: March 30, 1993

SPECIFIC CONDITIONS:

$NO_x$  obs = Measured  $NO_x$  emission at 15 percent oxygen, ppmv.

$P_{ref}$  = Reference combustor inlet absolute pressure at 101.3 kilopascals (1 atmosphere) ambient pressure.

$P_{obs}$  = Measured combustor inlet absolute pressure at test ambient pressure.

$H_{obs}$  = Specific humidity of ambient air at test.

$e$  = Transcendental constant (2.718).

$T_{AMB}$  = Temperature of ambient air at test.

14. Test results will be the average of 3 valid runs. The Southwest District office will be notified at least 30 days in advance of the compliance test. The source shall operate between 90% and 100% of permitted capacity during the compliance test. Compliance test results shall be submitted to the Southwest District office no later than 45 days after completion.

15. Water injection shall be utilized for  $NO_x$  control. The water to fuel ratio at which compliance is achieved shall be incorporated into the permit and shall be continuously monitored. In addition, the Permittee shall install a duct module suitable for future installation of SCR equipment.

16. To determine compliance with the capacity factor condition for oil firing, the Permittee shall maintain daily records of fuel usage. All records shall be maintained for a minimum of three years after the date of each record and shall be made available to representatives of the Department upon request.

17. Sulfur, nitrogen content and lower heating value of the fuel being fired in the gas turbine shall also be recorded <sup>per fuel oil shipment.</sup> ~~daily~~. These records shall also be kept by the company for at least three years and made available for regulatory agency's inspection. \*

18. Compliance with the acceptable ambient concentrations for Be, Lead, and Hg emissions shall be demonstrated based on calculations certified by a Professional Engineer registered in Florida, using actual operating conditions. Determination of the ambient concentrations for chemical compounds shall be determined by Department approved dispersion modeling. This compliance determination shall be made available upon request.

## Acid Gases

The emissions of sulfur dioxide, nitrogen oxides, and sulfuric acid mist, represent a significant proportion of the total emissions and need to be controlled if deemed appropriate. Sulfur dioxide emissions from combustion turbines are directly related to the sulfur content of the fuel being combusted.

The applicant has proposed the use of natural gas and No. 2 fuel oil with a maximum sulfur content of 0.20% to control sulfur dioxide emissions. A review of the latest edition (1990) of the BACT/LAER Clearinghouse indicates that sulfur dioxide emissions from combustion turbines have been controlled by limiting fuel oil sulfur content to a range of 0.1 to 0.3%, with the average for the facilities listed being approximately 0.24 percent. As this is the case, the applicant's proposal to use No. 2 fuel oil with a maximum sulfur content of 0.20% is judged to represent BACT.

The applicant has stated that BACT for nitrogen oxides will be met by using wet (water or steam) injection necessary to limit emissions to 42 ppmvd or 25 ppmvd at 15% oxygen when burning No. 2 fuel oil or natural gas, respectively.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NOx emission limit established to date for a combustion turbine is 4.5 ppmvd at 15% percent oxygen. This level of control was accomplished through the use of water injection and a selective catalytic reduction (SCR) system.

Selective catalytic reduction is a post-combustion method for control of NOx emissions. The SCR process combines vaporized ammonia with NOx in the presence of a catalyst to form nitrogen and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NOx with a new catalyst. As the catalyst ages, the maximum NOx reduction will decrease to approximately 86 percent.

Given the applicant's proposed BACT level for nitrogen oxides control stated above, an evaluation can be made of the cost and associated benefit of using SCR as follows:

The applicant has indicated that the total levelized annual cost (operating plus amortized capital cost) to install SCR for natural gas firing at 100 percent capacity factor is \$2,190,000. Taking into consideration the total levelized annual cost, a cost/benefit analysis of using SCR can now be developed.

Based on the information supplied by the applicant, it is estimated that the maximum annual NOx emissions with wet injection from the Lakeland facility will be 425 tons/year. Assuming that SCR would reduce the NOx emissions by an additional 80-85%, the SCR would

The air pollutant emissions from combined cycle power plants can be grouped into categories based upon what control equipment and techniques are available to control emissions from these facilities. Using this approach, the emissions can be classified as follows:

- o Combustion Products (Particulates and Heavy Metals). Controlled generally by good combustion of clean fuels.
- o Products of Incomplete Combustion (CO, VOC, Toxic Organic Compounds). Control is largely achieved by proper combustion techniques.
- o Acid Gases (SOx, NOx, HCl, F1). Controlled generally by gaseous control devices.

Grouping the pollutants in this manner facilitates the BACT analysis because it enables the equipment available to control the type or group of pollutants emitted and the corresponding energy, economic, and environmental impacts to be examined on a common basis. Although all of the pollutants addressed in the BACT analysis may be subject to a specific emission limiting standard as a result of PSD review, the control of "nonregulated" air pollutants is considered in imposing a more stringent BACT limit on a "regulated" pollutant (i.e., particulates, sulfur dioxide, fluorides, sulfuric acid mist, etc.), if a reduction in "nonregulated" air pollutants can be directly attributed to the control device selected as BACT for the abatement of the "regulated" pollutants.

#### Combustion Products

The City of Lakeland's projected emissions of particulate matter, PM<sub>10</sub>, and beryllium surpass the significant emission rates given in Florida Administrative Code Rule 17-2.500, Table 500-2 for No. 2 fuel oil firing only.

*025* Different than Table 1

A PM/PM<sub>10</sub> emissions limitation of 0.014 lb/MMBtu for No. 2 fuel oil firing is reasonable as BACT for the Lakeland facility.

In general, the BACT/LAER Clearinghouse does not contain specific emission limits for beryllium from turbines. BACT for these heavy metals is typically represented by the level of particulate control. As this is the case, the emission factor of 0.014 lb/MMBtu for particulate matter PM<sub>10</sub> is judged to also represent BACT for beryllium.

#### Products of Incomplete Combustion

The emissions of carbon monoxide and volatile organic compounds are each below the significant level and therefore do not require a BACT analysis.

*025*  
Carbon monoxide emissions exceed PSD Significant emission rate of 100 tpy. (3) Refer to application for BACT determination.



control at least 340 tons of NOx annually for natural gas firing. When this reduction is taken into consideration with the total levelized annual cost of \$2,190,000, the cost per ton of controlling NOx is \$6,441. This calculated cost is higher than has previously been approved as BACT.

Not  
Valid  
Criteria

Since SCR has been determined to be BACT for several combined cycle facilities, the EPA has clearly stated that there must be unique circumstances to consider the rejection of such control on the basis of economics.

In a recent letter from EPA Region IV to the Department regarding the permitting of a combined cycle facility (Tropicana Products, Inc.), the following statement was made:

"In order to reject a control option on the basis of economic considerations, the applicant must show why the costs associated with the control are significantly higher for this specific project than for other similar projects that have installed this control system or in general for controlling the pollutant."

A review of the combined cycle facilities in which SCR has been established as a BACT requirement indicates that the majority of these facilities are also intended to operate at high capacity factors. As this is the case, the proposed project is similar to other facilities in which SCR has been established as BACT, thereby supporting SCR as BACT for the proposed facility.

For fuel oil firing, the cost associated with controlling NOx emissions must take into account the potential operating problems that can occur with using SCR in the oil firing mode.

A concern associated with the use of SCR on combined cycle projects is the formation of ammonium bisulfate. For the SCR process, ammonium bisulfate can be formed due to the reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate formed has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. As this is the case, SCR has been judged to be technically infeasible for oil firing in some previous BACT determinations.

The latest information available now indicates that SCR can be used for oil firing provided that adjustments are made in the ammonia to NOx injection ratio. For natural gas firing operation NOx emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater injection ratio. By lowering the injection ratio for oil firing, testing has indicated that NOx can be controlled with efficiencies ranging from 60 to 75 percent. When the injection ratio is lowered there is not a problem with ammonium bisulfate formation since essentially all of the ammonia is able to react with the nitrogen oxides present in the combustion gases.

Based on this strategy SCR has been both proposed and established as BACT for oil fired combined cycle facilities with NOx emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control established.

Assuming that the lowered ammonia injection ratio strategy was used to control NOx emissions by 65%, the SCR would control 476 tons (65% of 732 tons/yr) of NOx annually for oil firing. When this reduction is taken into consideration with the total annual cost of \$2,190,000, the cost per ton of controlling NOx is \$4,600. This cost is lower than that determined for natural gas firing and is more consistent with what has been accepted as BACT.

#### Environmental Impact Analysis

The predominant environmental impacts associated with this proposal are related to the use of SCR for NOx control. The use of SCR results in emissions of ammonia, which may increase with increasing levels of NOx control. In addition, some catalysts may contain substances which are listed as hazardous waste, thereby creating an additional environmental burden. Although the use of SCR does have some environmental impacts, the disadvantages do not outweigh the benefit which would be provided by reducing nitrogen oxide emissions by 80 percent. The overwhelming benefit of NOx control by using SCR is substantiated by the fact that nearly one half of all BACT determinations have established SCR as the control measure for nitrogen oxides over the last five years.

In addition to the criteria pollutants, the impacts of toxic pollutants associated with the combustion of natural gas and No. 2 fuel oil have been evaluated. Beryllium for oil fired operation exceeds PSD significant levels. Other toxics are expected to be emitted in minimal amounts, with the total emissions combined to be less than 0.1 tons per year.

Although the emissions of the toxic pollutants could be controlled by particulate control devices such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. As this is the case, the Department does not believe that the BACT determination would be affected by the emissions of the toxic pollutants associated with the firing of natural gas or No. 2 fuel oil.

#### Potentially Sensitive Concerns

With regard to controlling NOx emissions with SCR, the applicant has identified the following technical limitations:

1. SCR would reduce output of combustion turbines by one percent.
2. SCR could result in the release of unreacted quantities of ammonia to the atmosphere.

3. SCR would require handling of ammonia by plant operators. Since it is a hazardous material, there is a concern about safety and productivity of operators.
4. SCR results in contaminated catalyst from flue gas trace elements which could be considered hazardous. Safety of operators and disposal of spent catalyst is a concern.

#### BACT Determination by DER

##### NOx Control

A review of the permitting activities for combined cycle proposals across the nation indicates that SCR has been required and most recently proposed for installations with a variety of operating conditions (i.e., natural gas, fuel oil, capacity factors ranging from low to high). However, the cost and other concerns expressed by the applicant are valid.

The information that the applicant presented and Department calculations indicates that the incremental cost of controlling NOx (\$6,441/ton) for natural gas is high compared to other BACT determinations which require SCR. However, the cost of controlling NOx emissions for oil firing (\$4,600/ton) could be considered reasonable. Based on the information presented by the applicant and the studies conducted, the Department believes that the use of SCR for NOx control is not justifiable at this time as BACT. Therefore, the Department is willing to accept low NOx combustors with the firing of natural gas as the primary fuel. However, No. 2 distillate oil firing must be limited to one third ~~25%~~ of the annual capacity factor. The applicant is also expected to design the facility to accommodate SCR should additional oil usage become necessary and SCR becomes a BACT requirement in the future.

##### SO<sub>2</sub> Control

For sulfur dioxide BACT is represented by firing natural gas or No. 2 fuel oil with an average sulfur content not to exceed 0.20 percent.

##### Other Emissions Control

The emission limitations for PM and PM<sub>10</sub>, are based on previous BACT determinations for similar facilities, with the heavy metal beryllium being addressed through the particulate limitation and sulfuric acid mist being addressed through the sulfur dioxide limitation.

The emission limits for the City of Lakeland project are thereby established as follows:

Pollutant	Emission Limit	
	Natural Gas Firing	No. 2 Fuel Oil Firing
NOx	25 ppmvd @ 15% O <sub>2</sub>	42 ppmvd @ 15% O <sub>2</sub> *
SO <sub>2</sub>	Natural gas as fuel	Sulfur content not to exceed 0.20%
PM & PM <sub>10</sub>	0.006 lb/MMBtu	0.025 lb/MMBtu
Sulfuric Acid Mist	Emissions limited by natural gas and No. 2 fuel oil firing	
Beryllium	Emissions limited by natural gas and No. 2 fuel oil firing	

\* No. 2 fuel oil usage limited to ~~25%~~ of the total heat input on an annual basis.

*one third*

Details of the Analysis May be Obtained by Contacting:

Preston Lewis, P.E., BACT Coordinator  
Department of Environmental Regulation  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended by:

Approved by:

\_\_\_\_\_  
C. H. Fancy, P.E., Chief  
Bureau of Air Regulation

\_\_\_\_\_  
Carol M. Browner, Secretary  
Dept. of Environmental Regulation

\_\_\_\_\_  
Date 1991

\_\_\_\_\_  
Date 1991

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check boxes for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

<b>3. Article Addressed to:</b> Mr. Alfred M. Dodd Engineering Manager Lakeland Dept. of Electric and Water Utilities 501 E. Lemon Street Lakeland, FL 33801-5050	<b>4. Article Number:</b> P 407 852 627 <b>Type of Service:</b> <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED
<b>5. Signature — Addressee</b> X	<b>8. Addressee's Address (ONLY if requested and fee paid)</b>
<b>6. Signature — Agent</b> X Mary Joseph	
<b>7. Date of Delivery</b> 03/18/91	

PS Form 3811, Apr. 1989 U.S.G.P.O. 1989-238-815 DOMESTIC RETURN RECEIPT

P 407 852 627

**RECEIPT FOR CERTIFIED MAIL**

NO INSURANCE COVERAGE PROVIDED  
 NOT FOR INTERNATIONAL MAIL  
 (See Reverse)

U.S.G.P.O. 1989-234-555

Sent to	Mr. Alfred M. Dodd, City of
Street and No.	Lakeland 501 E. Lemon St.
P.O., State and ZIP Code	Lakeland, FL 33801-5050
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	Mailed: 3-15-91
	Permit: AC 53-190437
	PSD-FL-166

PS Form 3800, June 1985