

Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

December 18, 2002

## CERTIFIED MAIL

Mr. John Lindsay, Plant General Manager  
Florida Power & Light Company - Martin Plant  
P.O. Box 176  
Indiantown, FL 34956

Re: FPL Martin Plant  
Combustion Turbine 4B – Excess Emissions Authorization for Rotor Change-out  
Current Air Permit No. 0850001-007-AV

Dear Mr. Lindsay:

The Department has reviewed your request dated November 22, 2002 (by electronic mail) for excess emissions resulting from Full Speed No Load (FSNL) testing, which is required by the equipment manufacturer following a rotor change-out. The FSNL testing is scheduled for December with an initial testing date of December 18, 2002. Similar requests have previously been granted for Units 3A, 3B, and 4A. In accordance with Rule 62-210.700(1), F.A.C., the Department authorizes excess emissions due to FSNL testing provided:

- The operator adheres to best operational practices to minimize emissions.
- The operator minimizes the duration of excess emissions, which shall not exceed 15 hours for the entire period of FSNL testing.
- The operator notifies the Department's District Office for each day that FSNL testing is performed.
- The owner or operator submits a report summarizing the hourly NOx emissions during the FSNL testing.

This determination is issued pursuant to Chapter 403, Florida Statutes. A person whose substantial interests are affected by the proposed agency action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the Florida Statutes (F.S.). The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3), F.S., must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), F.S., however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code (F.A.C.)

*"More Protection, Less Process"*

*Printed on recycled paper.*

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action; and (g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation is not available in this proceeding.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542, F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2), F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of the EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

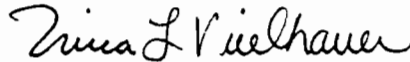
This determination is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition pursuant to Rule 62-110.106, F.A.C., and the petition conforms to the content requirements of Rules 28-106.201 and 28-106.301, F.A.C. Upon timely filing of a

petition or a request for extension of time, this action will not be effective until further order of the Department.

Any party to this order has the right to seek judicial review of it under Section 120.68, F.S., by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel, Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice must be filed within thirty (30) days after this order is filed with the clerk of the Department.

If you have any questions regarding this matter, please contact Jeff Koerner at 850/921-9536.

Executed in Tallahassee, Florida.



Trina Vielhauer, Chief  
Bureau of Air Regulation

cc: Mr. John C. Hampp, FPL  
Mr. Tom Tittle, SED  
EPA Region 4

# CARLTON FIELDS

ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S. E. SECOND STREET  
MIAMI, FLORIDA 33131

MAILING ADDRESS:  
P.O. BOX 019101, MIAMI, FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

February 24, 2003

Ms. Teresa Heron  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

**VIA FEDERAL EXPRESS**

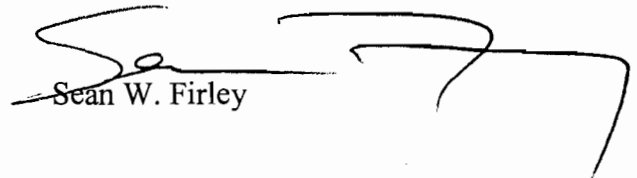
**Re: Caldwell Energy & Environmental, Inc. vs. Florida Power & Light Company  
Case No. CL 01-2415 AG, Palm Beach County Circuit Court  
Our File No. 44087-98622**

Dear Ms. Heron:

Enclosed please copies of the documents you supplied in response to the Subpoena Duces Tecum in this matter, which I have pre-marked with exhibit stickers for ease of reference.

By copy of this letter I am forwarding copies of the marked documents to the Court Reporter and to opposing counsel so that we all have a set for the telephonic deposition on February 26, 2003 at 9:30 a.m.

Sincerely,



Sean W. Firley

SWF:paw  
Enclosures (Heron Deposition Exhibits 1 - 17)

cc: Accurate Stenotype, 100 Salem Court, Tallahassee, FL 32301  
Attention: Kendra (w/enclosures)  
Spencer Sax, Esq. (w/enclosures)

**RECEIVED**

**FEB 25 2003**

**BUREAU OF AIR REGULATION**

MIA#2234583.2

MIAMI ORLANDO ST. PETERSBURG TALLAHASSEE TAMPA WEST PALM BEACH

IN THE CIRCUIT COURT OF THE 15TH  
JUDICIAL CIRCUIT IN AND FOR  
PALM BEACH COUNTY, FLORIDA

CASE NO. CL 01-2415 AG

CALDWELL ENERGY & ENVIRONMENTAL,  
INC., a foreign corporation,

Plaintiff,

vs.

FLORIDA POWER & LIGHT COMPANY,  
a Florida corporation,

Defendant.

RECEIVED

FEB 25 2003

BUREAU OF AIR REGULATION

**RE-NOTICE OF TAKING TELEPHONIC DEPOSITION DUCES TECUM**  
**(Change in Date and Time)**

PLEASE TAKE NOTICE that the undersigned attorneys will take the deposition of:

**Name and Address**

**Date and Time**

**Location**

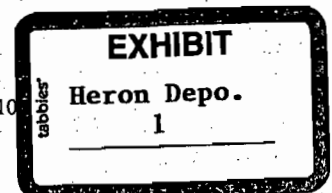
Ms. Teresa Heron  
State of Florida  
Dept. of Environmental Protection

February 26, 2002  
9:30 a.m.

State of Florida.  
Dept. of Environmental Protection  
111 South Magnolia Drive - #4  
Tallahassee, FL 32399-2400

[Directions: 1 to 2 blocks North of US 27 on South Magnolia, in courtyard to the right of The Marketplace. There's a large parking lot and they are on the right side as you face the buildings. They are located on the bottom floor left hand side #4.

The deposition will be upon oral examination before Accurate Stenotype Reporters, or a Notary Public in and for the State of Florida at Large, or some other officer duly authorized by law to take depositions. The oral examination will continue from day to day until completed. The deposition is being taken for the purpose of discovery, for use at trial, or both of the foregoing, or for such other purposes as are permitted under the applicable and governing rules,



pursuant to Florida Rules of Civil Procedure. A list of the documents to be produced is attached hereto as Exhibit A.

**CERTIFICATE OF SERVICE**

I HEREBY CERTIFY that a true and correct copy of the foregoing was faxed and mailed on this 19<sup>th</sup> day of February, 2003, to: Spencer Sax, Esq. and Rachelle R. McBride, Esquire, Sachs, Sax & Klein, P.A., Post Office Box 810037, Boca Raton, Florida 33481-0037.

CARLTON FIELDS, P.A.  
Counsel for Caldwell Energy Environmental, Inc.  
Bank of America Tower at International Place  
100 Southeast Second Street, Suite 4000  
Miami, Florida 33131  
(305) 530-0050

By: 

MARIA C. MCGUINNESS  
Florida Bar No. 858137  
SEAN W. FIRLEY  
Florida Bar No. 0118567

Co-counsel for Plaintiff:

Robert M. Connolly, Esq.  
Stites & Harbison  
400 West Market Street  
Suite 1800  
Louisville, KY 40202-3352

Copy via Facsimile to:

Accurate Stenotype Reporters (850) 878-2254 fax

CARLTON FIELDS, P. A.  
Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050

## EXHIBIT A

All documents pertaining to Defendant Florida Power & Light Company's ("FPL") permit application, permit, construction and operation of inlet fogging systems at FPL's Martin County, Florida and Putnam County, Florida power generating plants, including but not limited to any documents discussing FPL's anticipated and estimated use of the fogging systems in hours and/or on an annual basis, expectations for increases in megawatt output through the use of the inlet fogging systems at these power plants and the effect of the fogging systems on NOx emissions.

CARLTON FIELDS, P. A .

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050

\*\*\*\*\*  
\*\*\* TX REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO 2058  
CONNECTION TEL #44087#98622#18509226979  
CONNECTION ID  
ST. TIME 02/19 16:47  
USAGE T 01'07  
PGS. SENT 4  
RESULT OK

**CARLTON FIELDS, P.A.**  
ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S.E. SECOND STREET  
MIAMI, FLORIDA 33131-9101

MAILING ADDRESS  
P.O. BOX 019101, MIAMI FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

FAX COVER SHEET

Date:	February 19, 2003	Phone Number	Fax Number
To:	Teresa Heron	850-921-9529	850-922-6979
From:	Sean W. Firley	(305) 530-0050	(305) 530-0055

Client/Matter No.: 44087.98622

Employee No.: 648

Total Number of Pages Being Transmitted, Including Cover Sheet: 4

Message: Dear Ms. Heron: Per your conversation with my secretary earlier today, enclosed please find a copy of the Re-Notice of Deposition, rescheduling your deposition for Wednesday, February 26, 2003, at 9:30 a.m. Thank you.

Original to follow Via Regular Mail  Original will Not be Sent  Original will follow via Overnight Courier



\*\*\*\*\*  
\*\*\* TX REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO 2053  
CONNECTION TEL #44087#98622#15619944985  
CONNECTION ID  
ST. TIME 02/19 16:37  
USAGE T 01'28  
PGS. SENT 4  
RESULT OK

### CARLTON FIELDS, P.A.

ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S.E. SECOND STREET  
MIAMI, FLORIDA 33131-9101

MAILING ADDRESS  
P.O. BOX 019101, MIAMI FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

#### FAX COVER SHEET

Date:	February 19, 2003	Phone Number	Fax Number
To:	Spencer Sax, Esq.		
and	Rachelle McBride, Esq.	(561) 994-4499	(561) 994-4985
From:	Sean W. Firley, Esq.	(305) 530-0050	(305) 530-0055

Client/Matter No.: 44087.98622

Employee No.: 648

Total Number of Pages Being Transmitted, Including Cover Sheet: 4

Message: Caldwell Energy & Environmental vs. Florida Power & Light Co. Case CL 01-2415 AG  
Re-Notice of Deposition of Teresa Heron follows.

Original to follow Via Regular Mail     Original will Not be Sent     Original will follow via Overnight Courier

\*\*\*\*\*  
\*\*\* TX REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO 2086  
CONNECTION TEL #44087#98622#18508782254  
CONNECTION ID  
ST. TIME 02/20 14:51  
USAGE T 02'24  
PGS. SENT 4  
RESULT OK

### CARLTON FIELDS, P.A.

ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S.E. SECOND STREET  
MIAMI, FLORIDA 33131-9101

MAILING ADDRESS  
P.O. BOX 019101, MIAMI FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

#### FAX COVER SHEET

Date:	February 20, 2003	Phone Number	Fax Number
To:	Accurate Stenotype ATTN: Kendra	850-878-2221	850-878-2254
From:	Patty Watson for Sean W. Firley	(305) 530-0050	(305) 530-0055

Client/Matter No.: 44087.98622

Employee No.: 256

Total Number of Pages Being Transmitted, Including Cover Sheet: 4

**Message: Caldwell vs. Florida Power**

Per our conversation yesterday, a copy of Re-Notice of Taking Telephonic Deposition Duces Tecum follows resetting the deposition of Teresa Heron for 2/26/03 at 9:30 a.m. Please calendar and arrange to have a court reporter present for this deposition. Both counsel will appear telephonically for this deposition. If you have any questions or require additional information, please contact Sean Firley or Patty Watson at 305-530-0050. Thank you.

Please note that this deposition was previously noticed for 2/20 by Corey Collins of our firm. Mr. Firley of our firm will be appearing telephonically for the rescheduled deposition on 2/26.

Please call me at 305-530-0050 if you have any questions.

Original to follow Via Regular Mail  Original will Not be Sent  Original will follow via Overnight Courier

501 / 237-6812 Spencer Sax

**RECEIVED**

MAR 29 1999

BUREAU OF  
AIR REGULATION

APPLICATION FOR AIR PERMIT  
INSTALLATION OF DIRECT WATER  
SPRAY FOGGING SYSTEMS  
MARTIN PLANT

Prepared For:

Florida Power & Light, Inc.  
700 Universe Blvd.  
Juno Beach, Florida 33408

Prepared By:

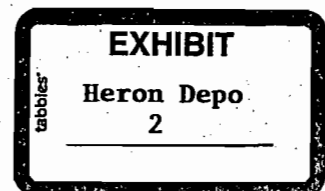
Golder Associates Inc.  
6241 NW 23rd Street, Suite 500  
Gainesville, Florida 32653

March 1999  
9737572Y/F3

*SE District*

DISTRIBUTION:

6 Copies - Florida Power & Light, Inc. (4 signatures, 2 photocopy signatures)  
2 Copies - Golder Associates Inc.



PART I  
APPLICATION FOR AIR PERMIT  
LONG FORM

**RECEIVED**

FEB 25 2003

BUREAU OF AIR REGULATION

# Department of Environmental Protection

T-D  
File

## DIVISION OF AIR RESOURCES MANAGEMENT

### APPLICATION FOR AIR PERMIT - LONG FORM **RECEIVED**

See Instructions for Form No. 62-210.900(1)

FEB 25 2003

#### I. APPLICATION INFORMATION

BUREAU OF AIR REGULATION

This section of the Application for Air Permit form identifies the facility and information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

#### Identification of Facility Addressed in This Application

Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

1. Facility Owner/Company Name: <b>Florida Power &amp; Light Company</b>	
2. Site Name: <b>Martin Plant</b>	
3. Facility Identification Number: <b>0850001</b> <span style="float: right;"><input type="checkbox"/> Unknown</span>	
4. Facility Location Information: Street Address or Other Locator: <b>7m N of Indiantown on SR 710</b> City: <b>Indiantown</b> County: <b>Martin</b> Zip Code: <b>34956</b>	
5. Relocatable Facility? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6. Existing Permitted Facility? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<b>March 29, 1999</b>
2. Permit Number:	<b>0850001-005-AC</b>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official: <b>John Lindsay, Plant General Manager</b>
2. Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: <b>FPL - Martin Plant</b> Street Address: <b>P.O. Box 176</b> City: <b>Indiantown</b> State: <b>FL</b> Zip Code: <b>34956-0176</b>
3. Owner/Authorized Representative or Responsible Official Telephone Numbers:  Telephone: <b>(561) 597-7106</b> Fax: <b>(561) 597-7416</b>
4. Owner/Authorized Representative or Responsible Official Statement:  <i>I, the undersigned, am the owner or authorized representative* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.</i>  Signature <u><i>JM Lindsay</i></u> Date <u><i>3/10/99</i></u>

\* Attach letter of authorization if not currently on file.

**Scope of Application**

This Application for Air Permit addresses the following emissions unit(s) at the facility. An Emissions Unit Information Section (a Section III of the form) must be included for each emissions unit listed.

Emissions Unit ID		Description of Emissions Unit	Permit Type
Unit. #	Unit ID		
1	003	CT3A - Combustion Turbine with HRSG	AC1B
2	004	CT3B - Combustion Turbine with HRSG	AC1B
3	005	CT4A - Combustion Turbine with HRSG	AC1B
4	006	CT4B - Combustion Turbine with HRSG	AC1B

See individual Emissions Unit (EU) sections for more detailed descriptions.  
Multiple EU IDs indicated with an asterisk (\*). Regulated EU indicated with an "R".



**Purpose of Application and Category**

Check one (except as otherwise indicated):

**Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain:

- ] Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.
- ] Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

- ] Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: \_\_\_\_\_

- ] Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit to be renewed: \_\_\_\_\_

- ] Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: \_\_\_\_\_

\_\_\_\_\_

- ] Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit. Give reason for the revision e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

\_\_\_\_\_

**Category II: All Air Construction Permit Applications Subject to Processing Under Rule 62-210.300(2)(b), F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g.; to address one or more newly constructed or modified emissions units.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_  
\_\_\_\_\_

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units.**

This Application for Air Permit is submitted to obtain:

- Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: \_\_\_\_\_  
0850001-004-AV

- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Air construction permit for one or more existing, but unpermitted, emissions units.

**Application Processing Fee**

Check one:

Attached - Amount: \_\_\_\_\_

Not Applicable.

**Construction/Modification Information**

<p>1. Description of Proposed Project or Alterations:</p> <p><b>Installation of direct water spray inlet fogging systems. Since the facility holds a Title V permit pursuant to Chapter 62-213 F.A.C., a permit fee is not required. Refer to Part II for discussion.</b></p>
<p>2. Projected or Actual Date of Commencement of Construction :</p>
<p>3. Projected Date of Completion of Construction :</p>

**Professional Engineer Certification**

<p>1. Professional Engineer Name: <b>Kennard F. Kosky</b> Registration Number: <b>14996</b></p>
<p>2. Professional Engineer Mailing Address: Organization/Firm: <b>Golder Associates Inc.</b> Street Address: <b>6241 NW 23rd Street, Suite 500</b> City: <b>Gainesville</b> State: <b>FL</b> Zip Code: <b>32653-1500</b></p>
<p>3. Professional Engineer Telephone Numbers: Telephone: <b>(352) 336-5600</b> Fax: <b>(352) 336-6603</b></p>

4. Professional Engineer's Statement:

*I, the undersigned, hereby certify, except as particularly noted herein\*, that:*

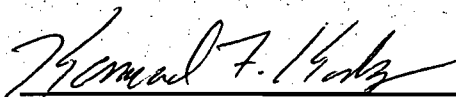
*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*



Signature

(seal) 149

3/3/99

Date

\* Attach any exception to certification statement.

**Application Contact**

1. Name and Title of Application Contact: <b>Mr. Richard G. Piper, Repowering Licensing Manager</b>
2. Application Contact Mailing Address:  Organization/Firm: <b>FPL Environmental Services Dep.</b> Street Address: <b>700 Universe Blvd.</b> City: <b>Juno Beach</b> State: <b>FL</b> Zip Code: <b>33408</b>
3. Application Contact Telephone Numbers:  Telephone: <b>(561) 691-7058</b> Fax: <b>(561) 691-7070</b>

**Application Comment**

**The existing combustion turbines (Units 3A,3B,4A & 4B) will be installed with direct water spray fogging systems that will reduce the turbine inlet air temperature. The temperature reduction will improve the heat rate and increase power due to the cooler-denser inlet air. The net emissions change from this project will not result in an increase of any regulated pollutant greater than the PSD significant emission rates. PSD review does not apply to proposed project. Discussed in Part II.**

## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Location and Type

1. Facility UTM Coordinates: Zone: <b>17</b> East (km): <b>543.2</b> North (km): <b>2993.0</b>			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): <b>27 / 3 / 29</b> Longitude: (DD/MM/SS): <b>80 / 33 / 54</b>			
3. Governmental Facility Code: <b>0</b>	4. Facility Status Code: <b>A</b>	5. Facility Major Group SIC Code: <b>49</b>	6. Facility SIC(s): <b>4911</b>
7. Facility Comment (limit to 500 characters):  <b>The existing Martin plant consists of 2 Fossil Fuel Fired Steam Generators (Units 1 and 2) and 2 Combined Cycle Units (Units 3 and 4). Each combined cycle unit consists of 2 combustion turbines and associated heat recovery steam generators (HRSGs). The primary fuel for the combustion turbines is natural gas with distillate oil as back-up. Refer to Part II for discussion</b>			

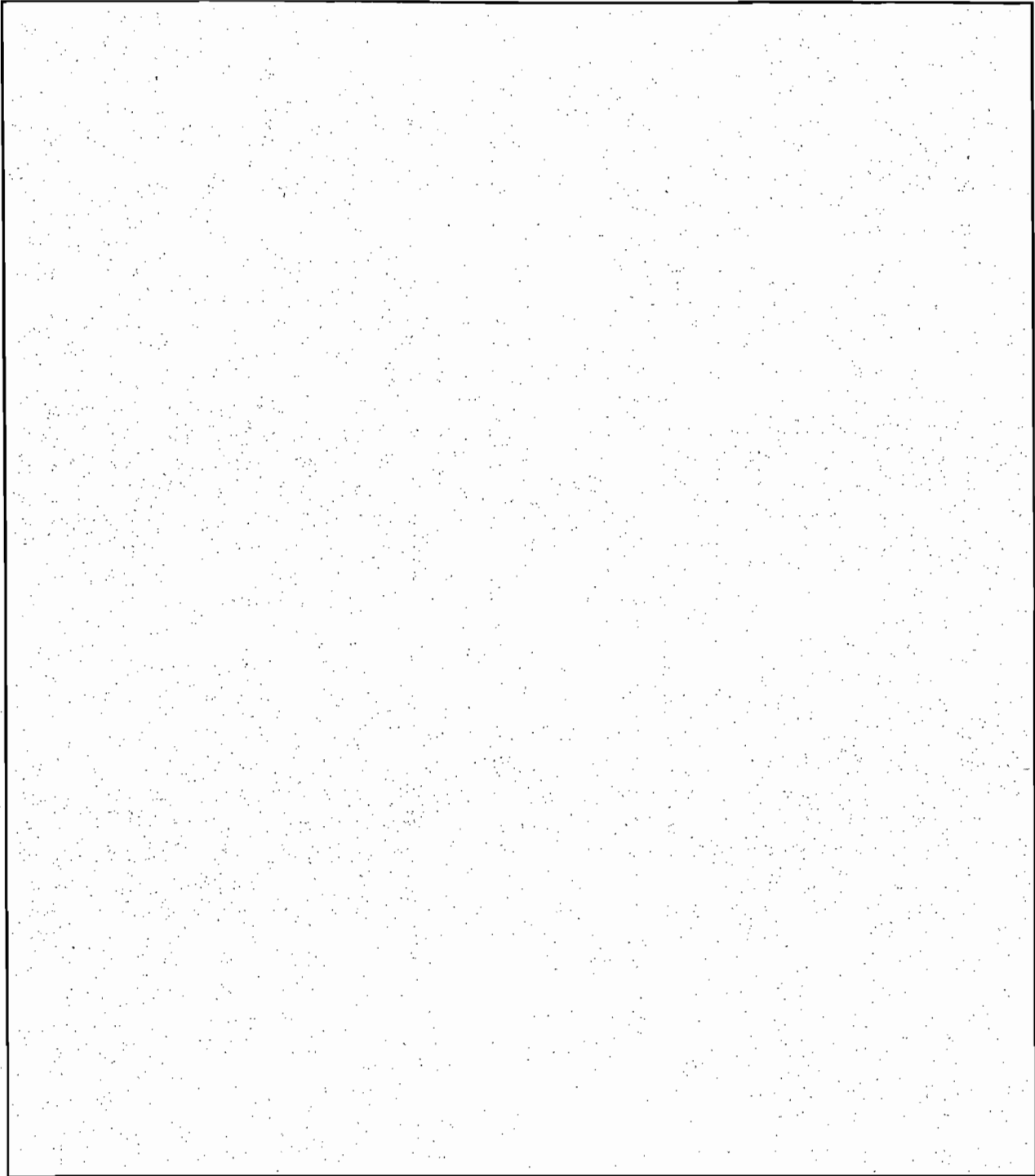
#### Facility Contact

1. Name and Title of Facility Contact: <b>Willie Welch, Environmental Specialist</b>			
2. Facility Contact Mailing Address: Organization/Firm: <b>FPL - Martin Plant</b> Street Address: <b>P.O. Box 176</b> City: <b>Indiantown</b> State: <b>FL</b> Zip Code: <b>34956-0176</b>			
3. Facility Contact Telephone Numbers: Telephone: <b>(561) 597-7106</b> Fax: <b>(561) 597-7416</b>			



## B. FACILITY REGULATIONS

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)





**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

**Facility emissions covered under existing Title V permit, no additional facility or emission unit applicable requirements as a result of the proposed change.**

## C. FACILITY POLLUTANTS

### Facility Pollutant Information

1. Pollutant Emitted	2. Pollutant Classification

## D. FACILITY POLLUTANT DETAIL INFORMATION

### Facility Pollutant Detail Information:

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

### Facility Pollutant Detail Information:

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

## E. FACILITY SUPPLEMENTAL INFORMATION

### Supplemental Requirements for All Applications

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input checked="" type="checkbox"/> Attached, Document ID(s): <u>Part II</u> _____ <input type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
5. Fugitive Emissions Identification: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
6. Supplemental Information for Construction Permit Application: <input checked="" type="checkbox"/> Attached, Document ID: <u>Part II</u> _____ <input type="checkbox"/> Not Applicable _____

### Additional Supplemental Requirements for Category I Applications Only

7. List of Proposed Exempt Activities: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____
8. List of Equipment/Activities Regulated under Title VI: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed <input type="checkbox"/> Not Applicable _____
9. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____
10. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____

11. Identification of Additional Applicable Requirements:

- Attached, Document ID: \_\_\_\_\_  
 Not Applicable

12. Compliance Assurance Monitoring Plan:

- Attached, Document ID: \_\_\_\_\_  
 Not Applicable

13. Risk Management Plan Verification:

- Plan Submitted to Implementing Agency - Verification Attached  
Document ID: \_\_\_\_\_  
 Plan to be Submitted to Implementing Agency by Required Date  
 Not Applicable

14. Compliance Report and Plan

- Attached, Document ID: \_\_\_\_\_  
 Not Applicable

15. Compliance Statement (Hard-copy Required)

- Attached, Document ID: \_\_\_\_\_  
 Not Applicable

**PART II**  
**SUPPORTING INFORMATION**

## Part II

### Application for Air Permit Installation of Direct Water Spray Fogging Systems Martin Plant

#### Introduction

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Martin Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decreases heat rate. The project is part of increasing capacity in a cost effective manner.

#### Description

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for West Palm Beach and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for West Palm Beach would be 11°F and would occur in August with a mid-afternoon temperature of 90°F and 64 percent relative humidity. During January, the mid-afternoon cooling would be about 9°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 55.5°F to 65.1°F with relative humidities ranging from 83 to 81 percent. The amount of adiabatic cooling would range from 3 to 4°F. The annual average temperature reduction used for gas firing was based on 24 hours operation would be about 5.5°F assuming 8°F for 12 hours during the day and 3°F for 12 hours during the night.

#### **Turbine Performance and Emission Estimates**

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the GE Model PG7221 (Frame 7FA) combustion turbines at the Martin plant, a 5.5°F average decrease in temperature for gas firing would result in a 2.1 percent increase in power and an associated 0.8 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Fort Myers turbines would be 4.7 mmBtu/hr/°F. The data were determined using GE supplied data (see Attachment A).



Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of degrees Fahrenheit-hours proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degrees Fahrenheit-hours for gas firing are calculated by multiplying 6,240 hours times 5.5°F or 34,320°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Martin turbines, a maximum of 34,320°F-hours of operation when firing natural gas and 4,000°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

### **Regulatory Applicability**

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Martin Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.

The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

Summary of Maximum Annual Emissions - All 4 Units

<u>Pollutant</u>	<u>Gas-Firing Tons/Year</u>	<u>Oil-firing Tons/Year</u>	<u>Total (Oil &amp; Gas)</u>
PM	2.95	1.23	4.19
NO <sub>x</sub>	29.04	9.39	38.43
SO <sub>2</sub>	15.01	18.74	33.75
CO	15.47	2.15	17.63
VOC	0.49	0.22	0.72
Degrees Fahrenheit-Hours for Each Fuel	34,320	4,000	
Additional Degrees Fahrenheit-Hours on Gas	11,095	0	
Total Gas Only Degrees Fahrenheit-Hours	45,415	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is NO<sub>x</sub>. Emissions of SO<sub>2</sub> are primarily associated with distillate fuel oil which is only used a backup to natural gas. For natural gas only, the maximum potential NO<sub>x</sub> emissions would be 34.4 tons/year at 45,415°F-hours per year per CT. This is equivalent to 2.77°F-hours of gas firing for each degree Fahrenheit-hour of oil firing (i.e., 11,095°F hours/4,000°F hours = 2.77°F-hours). The emissions of the other pollutants would be 3.9 tons/year for PM, 19.9 tons/year for SO<sub>2</sub>, 20.5 tons/year for CO and 0.65 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 181,661 hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 2.77°F hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected.

In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operated 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 181,661 degree F-hours for Units 3 and 4.

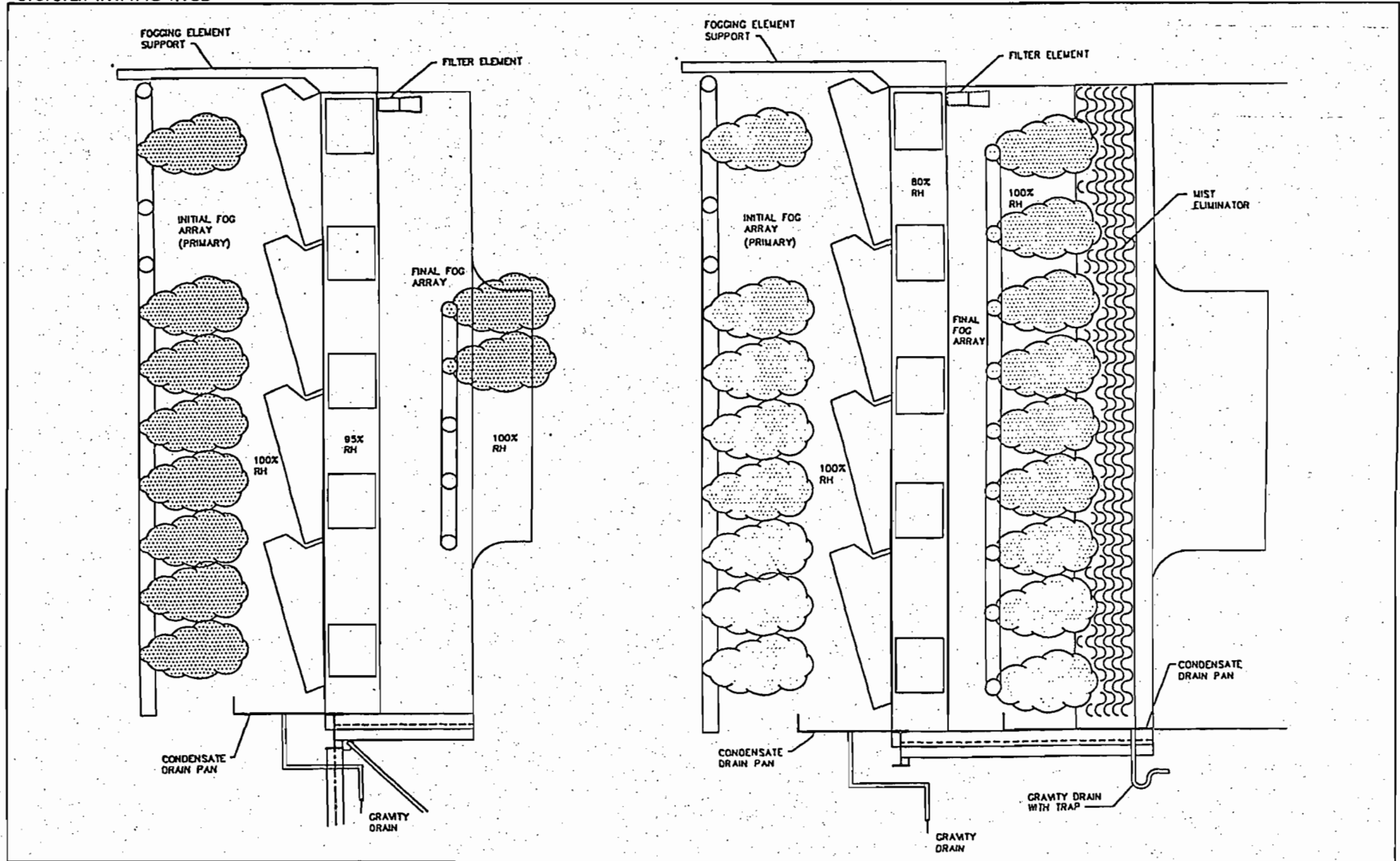


Figure 1. Illustrative Fogging System Schematic  
Florida Power & Light, Inc.

Source: Caldwell Energy and Environmental, Inc.



**Table 1** Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

Performance Basis			
Temperature Decrease	°F (1)	5.5	
Power Increase		2.09%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		1.44%	GE Curves
Heat Input Change	mmBtu/ °F	4.7	GE Curves
Hours/year		6,240 (2)	
Hours-°F/year		34,320	hours/year times temperature decrease
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu TPY	0.0092 0.74	Based on Title V Permit per machine
NO <sub>x</sub>	lb/MMBtu TPY	0.0900 7.26	Based on Title V Permit per machine
SO <sub>2</sub>	lb/MMBtu TPY	0.0465 3.75	Based on Title V Permit per machine
CO	lb/MMBtu TPY	0.0480 3.87	Based on Title V Permit per machine
VOC	lb/MMBtu TPY	0.0015 0.12	Based on Title V Permit per machine

Legend - TPY: tons per year

(1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger. Assumes 12 hours at 8 °F for daytime and 12 hours at 3 °F for nighttime.

(2) Hours of fogger operation based on estimate of 24 hours per day, 5 days/week and 52 weeks per year.

(3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.

<b>Table 2 Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (No. 2 Fuel Oil Combustion).</b>			
<b>Performance Basis</b>			
Temperature Decrease	°F (1)	8	
Power Increase		3.04%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		2.10%	GE Curves
Heat Input Change	mmBtu/ °F	4.7	GE Curves
Hours/year		500 (2)	
Hours-°F/year		4,000	hours/year times temperature decrease
<b>Pollutants</b>	<b>Units</b>	<b>Emissions (3)</b>	<b>Comments</b>
PM	lb/MMBtu	0.0328	Based on Title V Permit per machine
	TPY	0.31	
NO <sub>x</sub>	lb/MMBtu	0.2497	Based on Title V Permit per machine
	TPY	2.35	
SO <sub>2</sub>	lb/MMBtu	0.4984	Based on Title V Permit per machine
	TPY	4.68	
CO	lb/MMBtu	0.0573	Based on Title V Permit per machine
	TPY	0.54	
VOC	lb/MMBtu	0.0060	Based on Title V Permit per machine
	TPY	0.06	
<p>Legend - TPY: tons per year</p> <p>(1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.</p> <p>(2) Distillate oil firing limited to 2000 hours per year for all 4 combustion turbines combined.</p> <p>(3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.</p>			

**ATTACHMENT A**

**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective.

Plant Site: Martin Combined Cycle Units 3A, 3B, 4A and 4B  
Turbine Model: GE Model PG7221 (FA)

Turbine Inlet Temperature ( °F)	90	60
Difference ( °F)		30
Heat Input (mmBtu/hr)	1,550	1,690
Difference (mmBtu/hr)		140
Rate (mmBtu/hr/ °F) <sup>a</sup>		4.67

Note: <sup>a</sup> heat input difference divided by temperature difference.



**ATTACHMENT B**

**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



December 15, 1998

9737572A/1

Florida Power & Light Company  
700 Universe Blvd.  
P.O. Box 14000  
Juno Beach, Florida 33408

Attention: Mr. John Hampp, Environmental Specialist

RE: Putnam Inlet Fogging Emission Tests  
Analysis of Data

Dear John:

Golder Associates Inc. has evaluated the emissions data taken during August 25 and 26, 1998 to determine the potential effect of inlet fogging on emission rates of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). The data were obtained at the Putnam Plant using various inlet fogging conditions while operating the unit at nearly constant heat input. The heat input during testing on August 25, 1998 varied by less than 1.5 percent while heat input during testing on August 26, 1998 varied by about 2.5 percent. The data evaluated represented 178 individual 3 minute readings using continuous emission monitoring equipment. There were 72 data points when the inlet foggers were not operating (i.e., "off") while there were 106 data points where the various foggers were operating (i.e., "on").

The data were evaluated using the procedures in Appendix C to 40 CFR Part 60; Determination of Emission Rate Change. The data were also evaluated in terms of the potential effect of inlet fogging. Tables 1.1a and 1.1b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 25, 1998. Tables 1.2a and 1.2b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 26, 1998. Taken together, the analysis suggests that NO<sub>x</sub> concentrations may decrease slightly while CO may increase slightly with the operation of inlet foggers. However, the trend was not always consistent and the differences are small (i.e., up to a few ppm). Other factors also likely played a role in the variability of the data such as the response in continuous emission monitoring equipment, fuel input, ambient temperature and combustion turbine operation variability. Such changes, which cannot be completely accounted for in the data, would make it inappropriate to develop a specific relationships regarding emission rates at this time. Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

A handwritten signature in black ink, appearing to read 'Kennard F. Kosky'.

Kennard F. Kosky, P.E.  
Principal

KFK/arz

**Table 1.1a Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)**

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	87.8	0.98	1.782	0.485	88.3	87.4
1424-1521	on	20	19	86.5	1.33	1.729	0.514	87.0	85.9
1524	off	1	0	-	-	-	-	-	-
1527-1533	on	3	2	89.0	0.35	2.92	0.592	89.6	88.4
1536-1539	off	2	1	88.5	0.78	1.86	1.023	89.5	87.4

Legend: n= sample size, v = sample size -1, t=t distribution

**Table 1.1b Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)**

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	75.9	2.90	1.782	1.433	77.4	74.5
1424-1521	on	20	19	81.0	1.43	1.729	0.554	81.5	80.4
1524	off	1	0	-	-	-	-	-	-
1527-1533	on	3	2	78.0	2.00	2.92	3.372	81.4	74.6
1536-1539	off	2	1	79.5	2.12	1.86	2.790	82.3	76.7

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.2a Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98) NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	z	95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	89.1	0.7	1.701	-	0.236	89.4	88.9
1230-1430	on	41	-	90.5	1.3	-	1.645	0.334	90.8	90.2
1433-1539	off	23	-	96.8	1.3	1.717	-	0.466	97.3	96.4
1542-1745	on	42	-	92.4	2.2	-	1.645	0.561	93.0	91.9
1748-1800	off	5	4	97.7	0.4	2.132	-	0.429	98.1	97.3

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

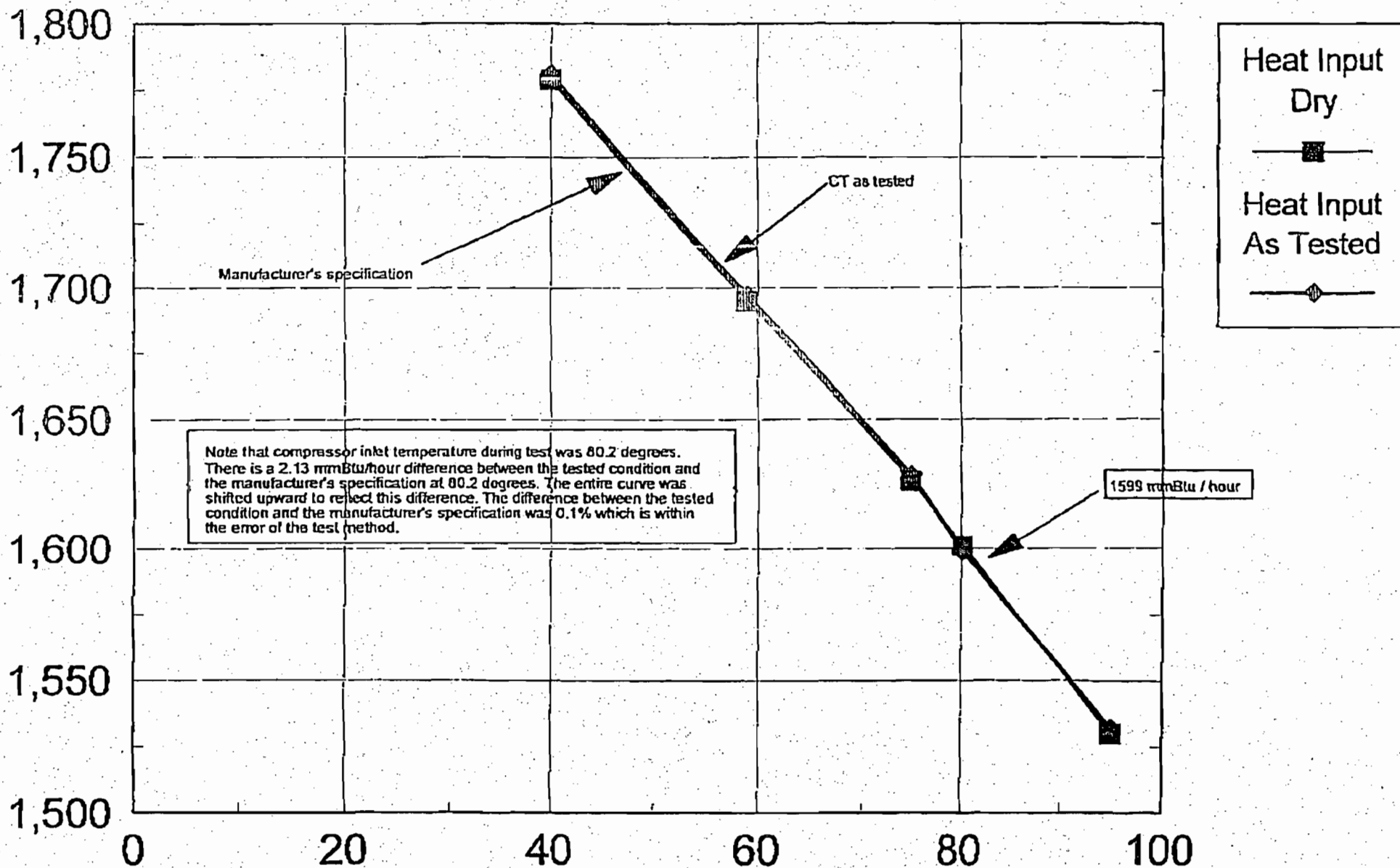
Table 1.2b Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98) CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	z	95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	72.6	2.3	1.701	-	0.728	73.3	71.9
1230-1430	on	41	-	70.9	1.9	-	1.645	0.494	71.4	70.4
1433-1539	off	23	-	67.2	1.9	1.717	-	0.688	67.9	66.5
1542-1745	on	42	-	69.5	3.3	-	1.645	0.828	70.4	68.7
1748-1800	off	5	4	63.4	0.9	2.132	-	0.853	64.3	62.5

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

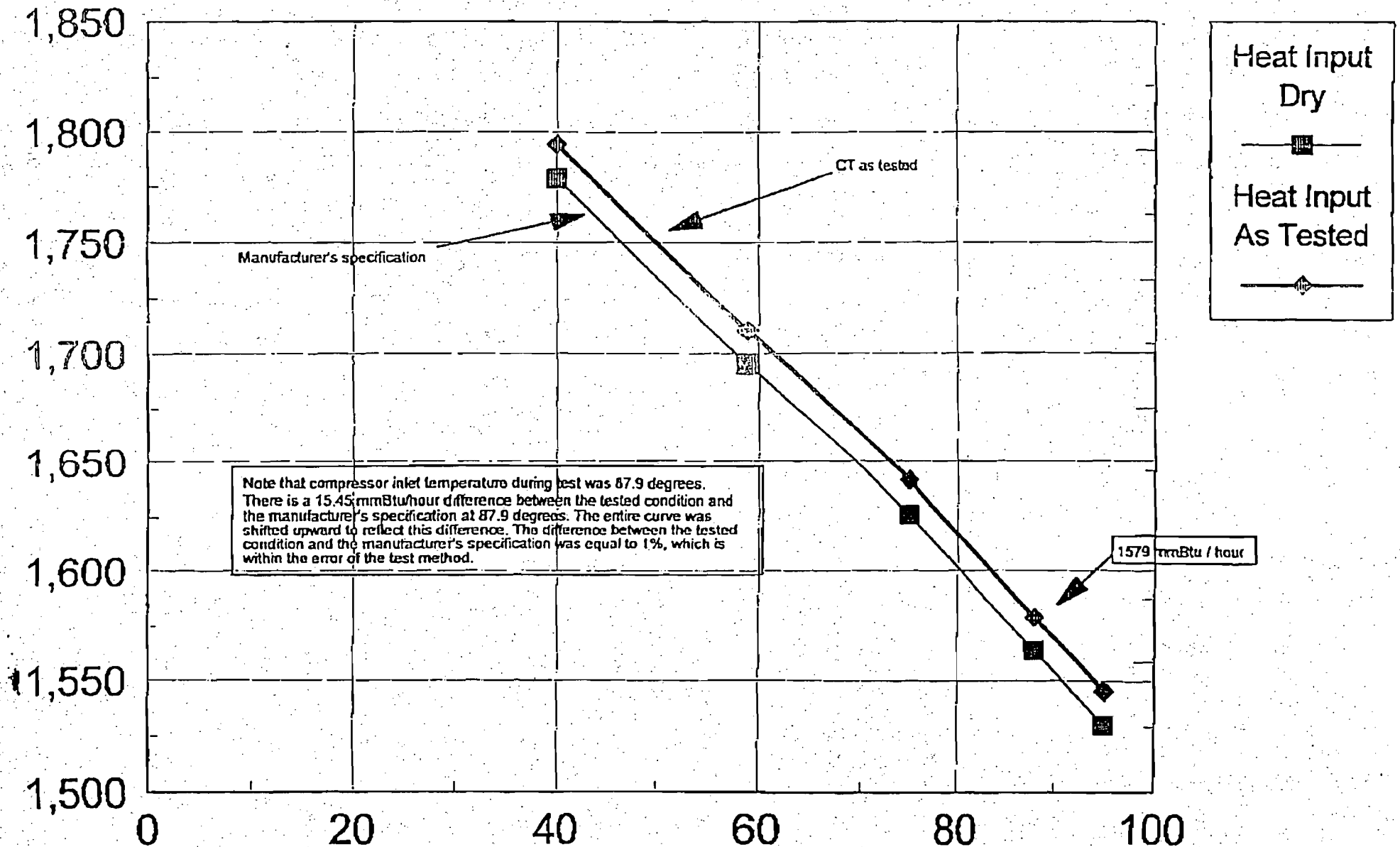
# Martin Unit 4B

## Heat Input vs. Ambient Temperature Curve

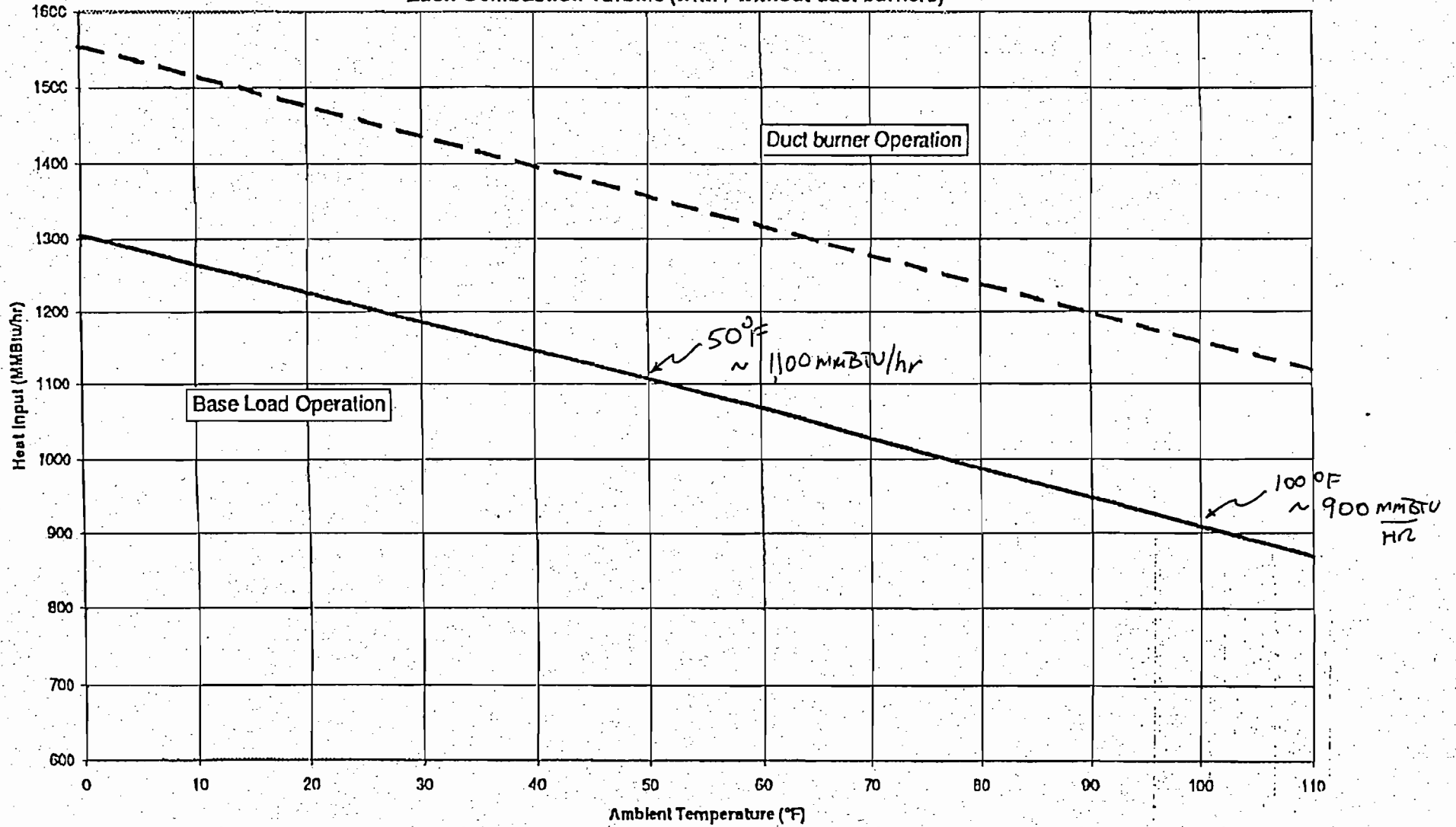


# Martin Unit 4A

## Heat Input vs. Ambient Temperature Curve

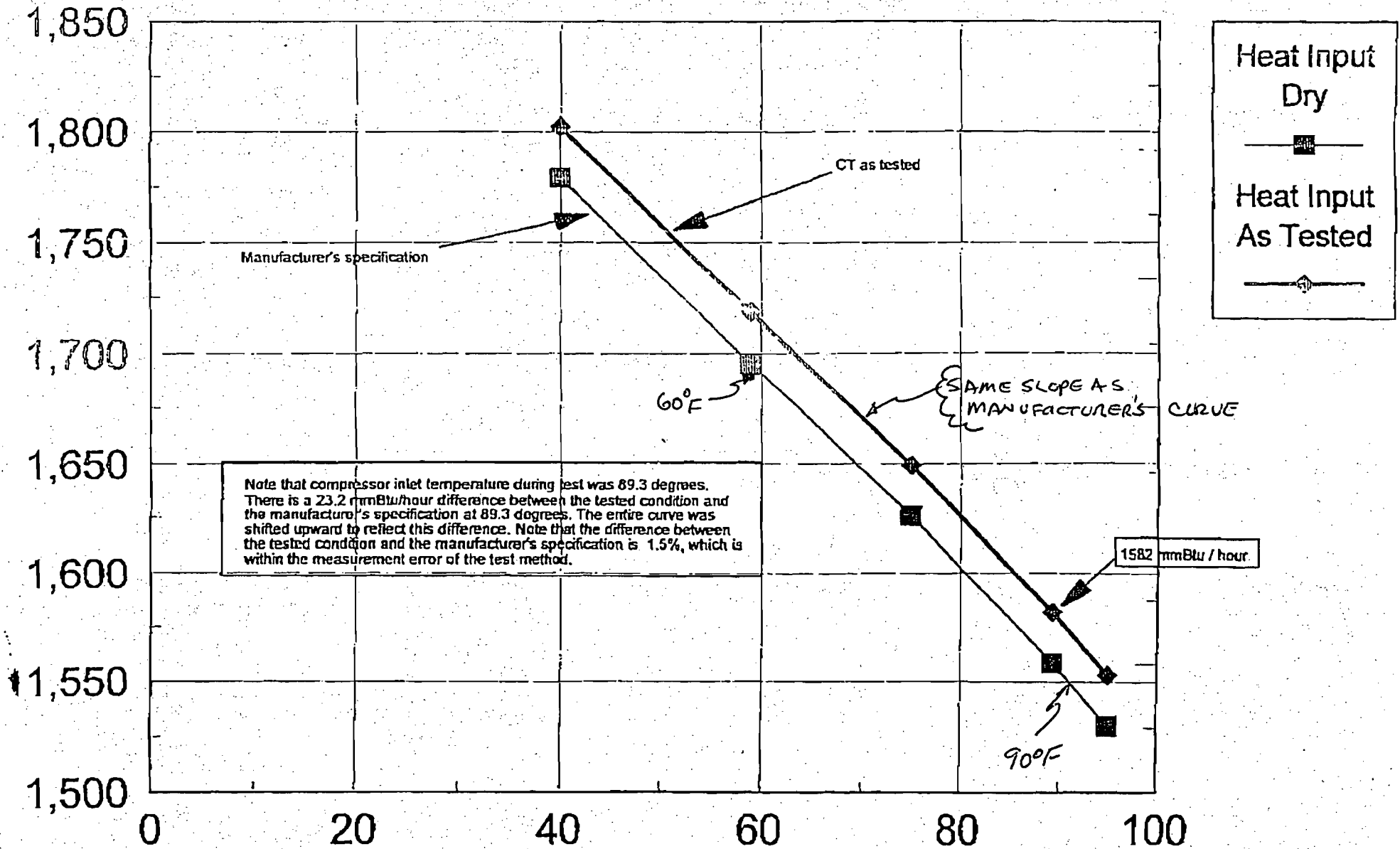


Pulnam Plant Unit 1 or 2  
Heat Input Variation With Ambient Temperature  
Each Combustion Turbine (with / without duct burners)



# Martin Unit 3A

## Heat Input vs. Ambient Temperature Curve







annual emissions will increase because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FPL proposes enforceable conditions to insure non-applicability. FPL asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. They are allowed to operate continuously (8760 hours of operation per unit). The maximum increase in annual emissions caused by project in tons per year is summarized below along with the PSD-significant levels.

Pollutants	Annual Emission Increase	PSD Significant Levels
PM/PM <sub>10</sub>	2	25/15
SO <sub>2</sub>	4	40
NO <sub>x</sub>	39	40
VOC	2	40
CO	9	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399 2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in the proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding, and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m. Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
 Bureau of Air Regulation  
 111 S. Magnolia Drive, Suite 4  
 Tallahassee, Florida, 32301  
 Telephone: 850/488-0114  
 Fax: 850/922-6979

Department of Environmental Protection  
 Northeast District Office  
 7825 Baymeadows Way, Suite 200B  
 Jacksonville, Florida 32256-7590  
 Telephone: 904/448-4300  
 Fax: 904/448-4363

The complete project file includes the application, technical evaluation, Draft Permit, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301 or call 850/488-0114, for additional information.

**PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT**

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DEP File No. 1070014-003-AC  
Florida Power & Light - Putnam Plant  
Emissions Units 003-006 Inlet Foggers Project  
Putnam County

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
1070014-003-AC  
Florida Power & Light - Putnam Plant  
Emissions Units 003-006 Inlet Foggers Project  
Putnam County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Florida Power & Light (FP&L). The permit is to install inlet foggers at the compressor inlets of four 70-megawatt natural gas and No. 2 fuel oil-fired Westinghouse Model 501B5A combined cycle combustion turbine-electrical generators at the Putnam Power Plant in Putnam County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, 392 US Highway 17 South, East Palatka, Florida 32131.

These units achieve their maximum rated output on cold days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is lower on hot days because of the lower compressor inlet air density. The foggers increase hot-day power output by approximately 4-6 MW through evaporative cooling compressor inlet air. The foggers provide no benefit on very humid or cold days and will not be used under those conditions. Maximum power production and emissions will continue to occur during cold days with the foggers turned off. The result is that maximum achievable power production and maximum achievable hourly emissions will not increase, although actual annual emissions will increase because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FPL proposes enforceable conditions to insure non-applicability. FPL asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. They are allowed to operate continuously (8760 hours of operation per unit). The maximum increase in annual emissions caused by project in tons per year is summarized below along with the PSD-significant levels.

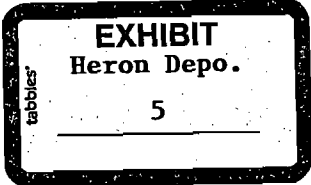
Pollutants	Annual Emission Increase	PSD Significant Levels
PM/PM <sub>10</sub>	2	25/15
SO <sub>2</sub>	4	40
NO <sub>x</sub>	39	40
VOC	2	40
CO	9	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399 2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Modification is not available in the proposed permit.



# NOTICE TO BE PUBLISHED IN THE NEWSPAPER

## PUBLIC NOTICE OF INTENT TO ISSUE PSD PERMIT MODIFICATION

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 0850001-005-AC (PSD-FL-146G)

Florida Power & Light Martin Plant  
Inlet Fogger Project  
Martin County

The Department of Environmental Protection (Department) gives notice of its intent to issue a PSD permit modification to Florida Power & Light (FP&L). The permit is to install foggers at the compressor inlets of four natural gas and No. 2 fuel oil-fired General Electric PG7221FA combined cycle combustion turbine-electrical generators at the Martin Plant in Martin County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, Post Office Box 176, Indiantown, Florida 34956.

The primary movers are the combustion turbines, which are typically nominally rated by General Electric at approximately 160 MW at 59 degrees when firing gas. The combustion turbines (exclusive of the steam cycle) normally achieve their maximum rated output of approximately 170 MW on cold (32 degrees) days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is only about 140 MW on hot (95 degrees) days because of the lower compressor inlet air density. The foggers can increase hot-day power output (under very dry conditions) by as much as 15 MW, thus almost restoring the units to their nominal rating. Under the design conditions for this Florida site, an improvement of about 8 MW can be expected.

The foggers provide no benefit under humid or cold (less than approximately 50 degrees) conditions and will not be used when they occur. The maximum output of approximately 170 MW will continue to occur at low ambient temperature. The result is that maximum hourly emissions will not increase although actual annual emissions will increase within their permitted limits because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FP&L proposes enforceable conditions to insure non-applicability. FP&L asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. The units are allowed to operate continuously and already have a very high availability factor. The maximum increase in annual emissions caused by the project in tons per year is summarized below along with the PSD-significant levels.

<u>Pollutants</u>	<u>Annual Emission Increase</u>	<u>PSD Significant Levels</u>
PM/PM <sub>10</sub>	4	25/15
SO <sub>2</sub>	34	40
NO <sub>x</sub>	38	40
VOC	1	40
CO	18	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit modification with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue a PSD Permit Modification." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public



## NOTICE TO BE PUBLISHED IN THE NEWSPAPER

inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida, 32301  
Telephone: 850/488-0114  
Fax: 850/922-6979

Department of Environmental Protection  
Southeast District Office  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
Telephone: 561/681-6600  
Fax: 561/681-6790

The complete project file includes the application, technical evaluation, Draft PSD Permit Modification, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 1. Applicant

Florida Power & Light  
Environmental Services Department  
700 Universe Blvd  
Juno Beach, FL 33408

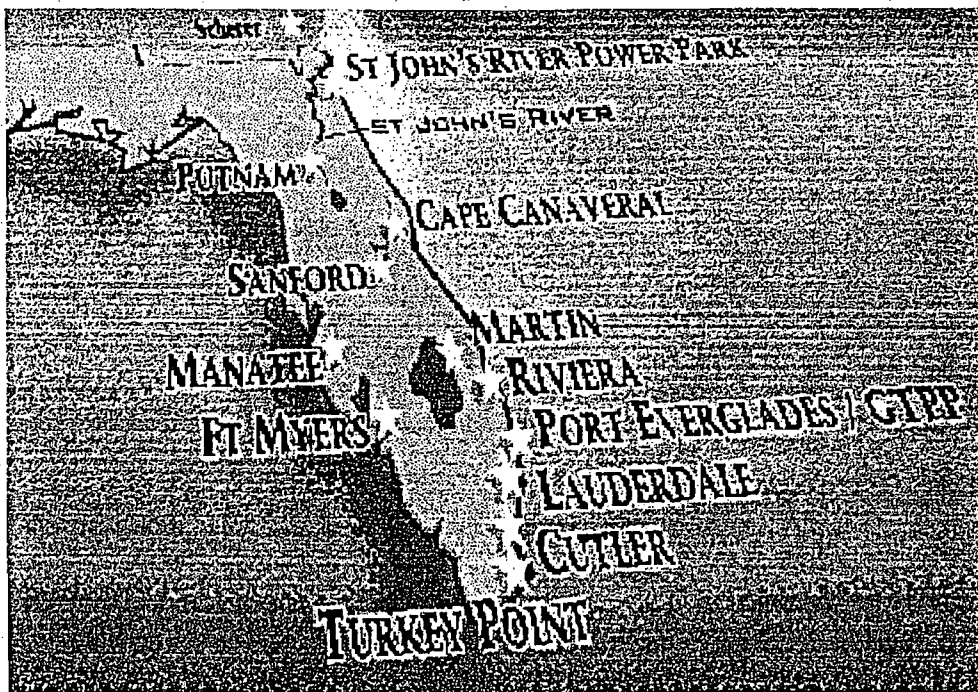
*Authorized Representative: John Lindsay, FP&L Martin Plant General Manager*

## 2. Source Name and Location

FP&L Martin Plant  
Post Office Box 176  
Indiantown, Florida 32956

UTM Coordinates: Zone 17, 543.2 km East and 2993.0 km North

The plant is located 7 miles North of Indiantown, Martin County. The location the Martin Plant within the FP&L system is shown below followed by a photograph of the site downloaded from the FP&L website:



## 3. Source Description

The Florida Power & Light (FP&L) Martin Plant consists of two oil and natural gas fired conventional steam generating stations, and two oil and natural gas fired combined cycle units. In addition, the facility includes one auxiliary boiler, and two diesel generators (one unregulated). Also included in this permit are two unregulated emissions units identified as facility-wide particulate matter emissions and facility-wide VOC emissions. Based on the Title V application, this facility is a major source of hazardous air pollutants (HAPs).

FP&L Martin Plant  
0850001-005-AC (PSD-FL-146G)

Combustion Turbines 3A&B, 4A&B  
Emissions Units 003 through 006

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

Each conventional steam unit has the maximum capacity of 863.3 megawatts (MW) and consists of a boiler/steam generator which drives a single reheat turbine generator, and is equipped with low NO<sub>x</sub> dual fuel firing burners to reduce emissions of nitrogen oxides; and, multicyclones, with fly ash reinjection, to control particulate matter emissions. In addition, the units have a continuous emission monitoring system for measuring opacity, NO<sub>x</sub>, and sulfur dioxide. Unit 1 (ARMS Emission Unit 001) commenced commercial operation in December 1980. Unit 2 (ARMS Emission Unit 002) commenced commercial operation in June 1981.

Each combined cycle unit consists of two General Electric PG7221FA combustion turbine-electrical generator with unfired heat recovery steam generators. A single steam electrical turbine serves each combined cycle unit. Each combined cycle unit has a net hot weather capacity of roughly 400 MW. Nitrogen oxide emissions are controlled by dry low NO<sub>x</sub> (DLN-2) combustors for natural gas with steam injection for fuel oil firing. Based on information contained in the Title V Permit Application, only natural gas has been fired in the units to date. Units 3A and 3B (ARMS Emissions Units 003 and 004) commenced commercial operation in February 1994. Units 4A and 4B (ARMS Emissions Unit 005 and 006) commenced commercial operation in April 1994.

#### 4. Current Permit and Major Regulatory Program Status

Construction of the Martin Power Plant Units 1 and 2 was authorized by the Department under permits AC43-4037 and 4038. Units 3 and 4 were authorized under Site Certification PA89-27 and Permit.PSD-FL-146.

The facility operates under Title V Air Operation Permit No. 0850001-004-AV issued in June 1998. This facility is a major source of hazardous air pollutants (HAPs) based on information submitted in the Title V application.

The combustion turbines are subject to 40 CFR 60, Subpart GG, Standards of Performance for New Stationary Gas Turbines. The combined cycle units and the fossil fuel steam generators are regulated under the Title IV of the Clean Air Act, Acid Rain, Phase II.

#### 5. Permit Modification Request

On March 29, 1999 the Department received a request from FPL for modification of its permits to install direct water spray fogging systems in the inlet ducts of Combustion Turbines (CT) 3A/B and 4A/B (ARMS Emissions Units 003 through 006). The project is a performance enhancement that can improve both the turbine power output and the heat rate of the unit. The principle is based on evaporative cooling of the incoming, filtered, ambient air to lower its temperature and increase its density.

The individual combustion turbines are typically rated by General Electric at approximately 160 MW each at 59 degrees when firing gas. The combustion turbines (exclusive of the steam cycle) normally achieve their maximum rated output of approximately 170 MW on cold (32 degrees) days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is only about 140 MW on hot (95 degrees) days because of the lower compressor inlet air density. The foggers can increase hot-day power output (under dry conditions) by around 15 MW, thus almost restoring the units to their nominal rating. The foggers provide no benefit under humid or cold (less than approximately 50 degrees) conditions and will not be used when they occur. The maximum output of approximately 170 MW will continue to occur at low ambient temperature.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

Inlet foggers are routinely included in new combustion turbine projects and have not affected the Department's decisions regarding Best Available Control Technology.

## 6. Emissions Increases Due to Modification/Method of Operation

The foggers are physical pieces of equipment whose addition and use can increase emissions on hot or dry days. The use of the foggers can also be considered a change in method of operation of the inlet "air conditioning system" that is already used to filter incoming air.

Assuming a design condition for Florida of 95 degrees (°F) and 50 percent (%) relative humidity, evaporative cooling to the point of saturation of the incoming gas stream results in a temperature decrease of approximately 16 °F to 79 °F. This represents an increase of roughly 5% in power output or on the order of 7 MW per unit. Under average annually averaged conditions, the reduction typically possible is on the order of 5.5 °F, with an associated power increase of about 3 MW.

Refer to attached Heat Input versus Ambient Temperature Curve. FP&L estimated that that heat input to each combustion turbine will increase by approximately 4.7 mmBtu per hour per degree of temperature reduction (mmBtu/hr/°F) by evaporative cooling. If emissions rates are known in terms of pounds per mmBtu (lb/mmBtu), the increase on hourly emissions can be estimated.

FP&L assumed that each unit will be operated 6240 hours per year gas and 125 hours on oil with the fogger on and that the average temperature decrease will be 5.5 °F when the foggers are on. Annual emissions are estimated as detailed in the following table.

### TOTAL EMISSIONS INCREASES DUE TO USE OF INLET FOGGERS AT FOUR UNITS

Pollutant	Emission Rate <u>lb/mmBtu</u> (gas)	Emission Rate <u>lb/mmBtu</u> (oil)	Emission Increase <u>ton/yr</u> (gas)	Emission Increase <u>ton/yr</u> (oil)	Annual Increase <u>tons/yr</u> (Oil & Gas)	PSD Threshold <u>tons/yr</u>
NO <sub>x</sub>	0.0900	0.2497	29.04	9.39	38.43	40
PM/PM <sub>10</sub>	0.0092	0.0328	2.95	1.23	4.19	25/15
CO	0.0480	0.0573	15.47	2.15	17.63	100
VOC	0.0015	0.0060	0.491	0.22	0.72	40
SO <sub>2</sub>	0.0465	0.4984	15.01	18.74	33.75	40

Source: Application and additional information submitted on March 29 and May 7, 1999 respectively.

Limiting each unit to 6240 hours of operation on gas and 125 hours of operation on oil will not effectively insure that annual emissions increases will not exceed the values given above. This is because the hours of operation will be chosen with a bias toward the days when the possible temperature decrease is greater than 5.5.

To insure enforceability of a limit on annual emissions increases, FP&L proposes to limit the annual "degree-hours (°F-hr)" that the foggers operate. Degrees during a given hour can be calculated by measuring the temperature difference between the ambient and cooled air, while hours are easily documented. These values can be integrated over a year to calculate annual degree hours. Actual annual °F-hr can be directly multiplied by the lb/mmBtu of each pollutant and the 4.7 mmBtu/hr/°F factor and converted to tons to calculate actual annual emissions increases.



## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

The emissions increases calculated are the direct result from the physical change in or change in method of operation such as is the installation of the inlet foggers. These assume that the ability to achieve greater power output when the foggers are used does not result in emissions increases outside the turbines original power curve. The rationale is discussed below.

The emissions characteristics (GE performance curves) do not change as a result of the use of the foggers from what would normally occur throughout the entire range of temperatures and relative humidity. Rather, the foggers move the operating points along the same curve toward the power and emissions that normally occur at lower temperatures. The worst case emissions scenario will still occur during the winter months and will occur with the foggers off. According to GE (reference: Brooks, 1996), evaporative cooling is limited to ambient temperatures of 59 °F and above because of the potential for icing the compressor.

### 7. Evaluation of PSD Applicability

As a major source, a modification or change in method of operation of CTs 3A&B and 4A&B resulting in **significant net emissions increases** is subject to PSD review. Significant net emissions increase is defined in Rule 62-212.400, F.A.C as follows:

*Significant Net Emissions Increase – A significant net emissions increase of a pollutant regulated under the Act is a net emissions increase equal to or greater than the applicable significant emission rate listed in Table 212.400-2, Regulated Air Pollutants – Significant Emission Rates.*

The significant emission rates are included (see PSD Threshold) in the Table above. The meaning of a net emissions increase is given in Rule 62-212.400, F.A.C. as:

*Net Emissions Increase - A modification to a facility results in a net emissions increase when, for a pollutant regulated under the Act, the sum of all of the contemporaneous creditable increases and decreases in the actual emissions of the facility, including the increase in emissions of the modification itself and any increases and decreases in quantifiable fugitive emissions, is greater than zero.*

The definition of actual emissions is given in Rule 62-210.200, F.A.C. (definitions) as follows:

*Actual Emissions - The actual rate of emission of a pollutant from an emissions unit as determined in accordance with the following provisions:*

- (a) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during a two year period which precedes the particular date and which is representative of the normal operation of the emissions unit. The Department may allow the use of a different time period upon a determination that it is more representative of the normal operation of the emissions unit. Actual emissions shall be calculated using the emissions unit's actual operating hours, production rates and types of materials processed, stored, or combusted during the selected time period.*
- (b) The Department may presume that unit-specific allowable emissions for an emissions unit are equivalent to the actual emissions of the emissions unit provided that, for any regulated air pollutant, such unit-specific allowable emissions limits are federally enforceable.*

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

- (c) For any emissions unit (other than an electric utility steam-generating unit specified in subparagraph (d) of this definition) which has not begun normal operations on a particular date, actual emissions shall equal the potential emissions of the emissions unit on that date.
- (d) For an electric utility steam generating unit (other than a new unit or the replacement of an existing unit) actual emissions of the unit following a physical or operational change shall equal the representative actual annual emissions of the unit following the physical or operational change, provided the owner or operator submits to the Department on an annual basis, for a period of 5 years representative of normal post-change operations of the unit, within the period not longer than 10 years following the change, information demonstrating that the physical or operational change did not result in an emissions increase. The definition of "representative actual annual emissions" found in 40 CFR 52.21(b)(33) is adopted and incorporated by reference in Rule 62-204.800, F.A.C.

The term electric utility steam-generating unit is defined as:

Electric Utility Steam Generating Unit – Any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the unit.

Based on Department records, actual hours of operation since 1993 are as follows:

Unit/Year	Annual Operating Hours 1993 - 1998					
	1993	1994	1995	1996	1997	1998
3A (003)	786	7554	8334	7977	8121	8067
3B (004)	804	7789	8172	8281	8551	8301
4A (005)	91	5181	5974	8305	8243	8417
4B (006)	91	6780	8315	8310	8254	8345

As expected, there was a rapid increase in annual hours of operation after these very efficient units were installed in 1993. Their operation can presently be characterized as "baseload." The foggers will be allowed to operate continuously but will be limited in terms of "degree-hours." As previously mentioned, if the average temperature drop is in fact 5.5 °F, they can operate 6240 hours on gas and 125 hours on oil each.

The combustion turbines have clearly begun *normal operation*. As modern combined cycle units, they are very efficient in comparison with conventional boiler-based steam-electrical units. Each combustion turbine-electrical generator produces 160 MW (nominal) of electrical power excluding the power produced through the steam cycle. The steam cycle associated with each combustion turbine, including the unfired HRSG and steam turbine-electrical generator produces about 70 MW (well in excess of 25 MW) so that the units are clearly steam electrical units. Therefore, the correct approach to determine the magnitude of a net emissions increase is to compare actual emissions from preceding years with representative actual annual emissions as described for steam electrical units.

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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FP&L asserts and the Department accepts that use of the inlet foggers will not affect the hours of operation of the units. As mentioned previously, they are already baseload units and any downtime is more likely due to maintenance than to demand. Most likely the Martin combined cycle units will continue their normal baseload operation within the recent historical hours per year per unit. The emissions are directly related to the hours of operation.

The modification project can be isolated from the normal operation of the units and its effects can be directly predicted and measured without having to make annual comparisons of actual emissions from the combined cycle units before and after the change. The modification itself (i.e. installation and operation of the foggers), however, has not yet begun normal operation. The future actual emissions caused by the modification are equal to the potential-to-emit, which is based on the increases in heat input associated with the use of the fogging system.

The number of days during which the foggers can economically operate probably limits actual emissions increases to levels below significance for the purposes of PSD applicability. However, FP&L proposes to limit operation of the foggers to the equivalent of 6240 (gas) and 125 (oil) hours per combustion turbine per year on the basis of a 5.5 °F average compressor. This equates to 34,320 °F-hr on gas and 4000 °F-hr on oil per combustion turbine. If, for example, the average temperature drop is actually 11 °F, the foggers will only be allowed to operate half as many hours as the base case. Emissions will increase under these limitations (as previously tabulated) by levels less than the significant emissions rates. The Department concludes, therefore, that PSD does not apply to this project.

### 8. Proposed Addition of New Conditions to Power Plant Siting Certification No. PA 74-01 and PSD-FL-146

The combustion turbines were constructed under the authority of the Power Plant Siting Certification No. PA89-27 issued on 2/20/91. These conditions of certification PA 89-27 were been modified on 2/20/91, 9/28/94 and 9/06/96. The Department will amend PSD-FL-146 and the conditions of certification by adding a new condition authorizing installation and operation of the inlet foggers.

The new condition applicable to the inlet foggers proposed for CTs 3A&B and 4A&B (ARMS Units 003-006) are shown in the draft PSD permit modifications. It limits operation of each inlet fogger to 34,320 °F-hr on gas and 4000 °F-hr on oil. Monitoring and compliance procedures are included to insure the temperature drop and hours of operations are properly measured, documented and reported.

### 9. Conclusions

The project will not increase the maximum short-term emission rates as these are already achieved under natural conditions of low ambient temperatures without the use of the foggers.

The Department concludes that PSD is not applicable to this project since this project as presented will not result in significant net emissions increase to major facility. The changes will not cause a significant impact or cause or contribute to a violation of any ambient air quality standard or PSD increment.

The Department's conclusion does not set a precedent for projects implemented at any facilities other than combined cycle unit inlet fogger installations. It does not set precedents related to any physical changes within the compressors, combustors, rotors, or other key components at such units.

## **TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION**

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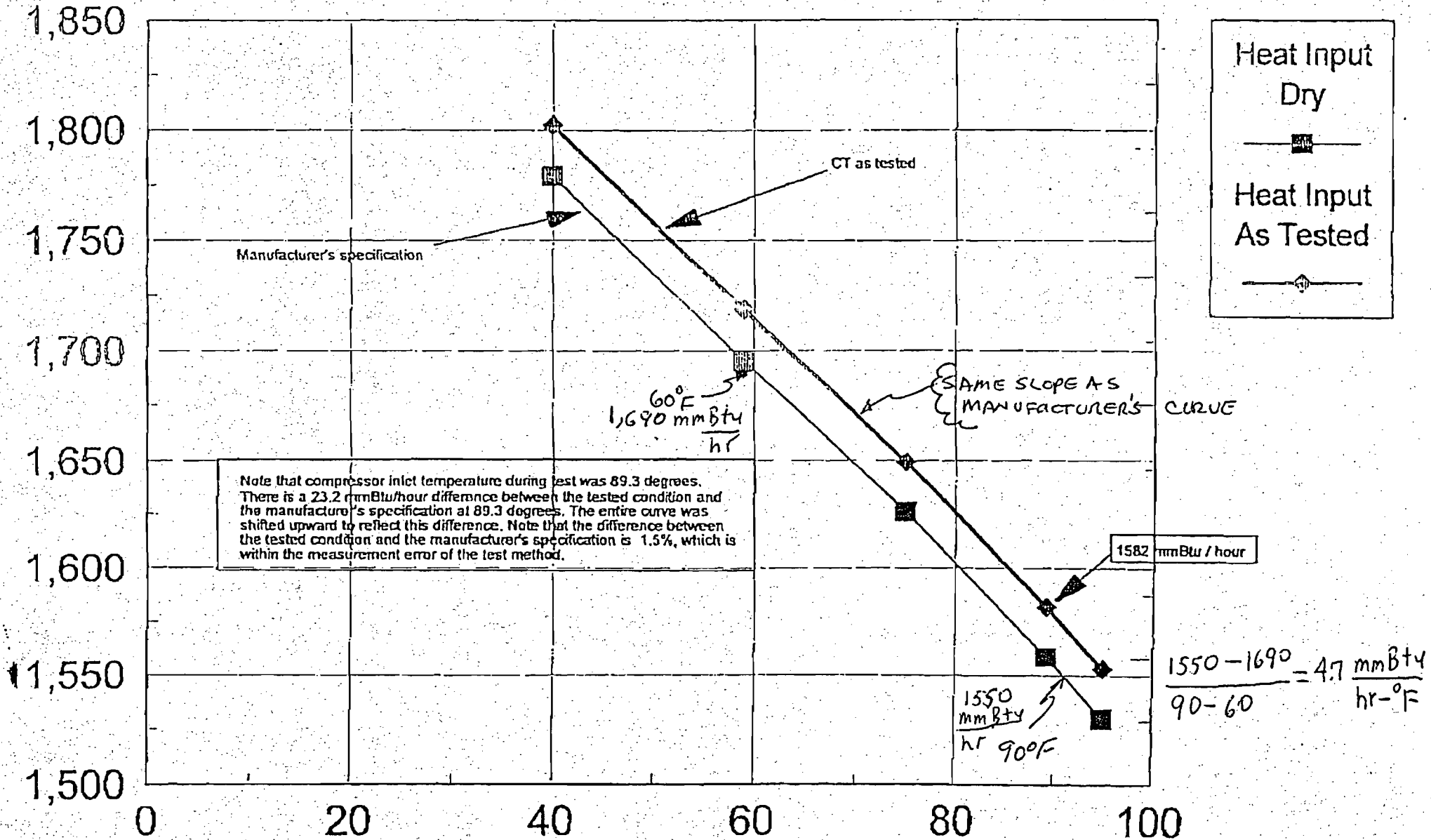
The application and determination of the Department's rules does not constitute an interpretation of the EPA rules under 40CFR52.21, Prevention of Significant Deterioration or 40CFR60, New Source Performance Standards.

For further details regarding this review, contact:

*A.A. Linero, P.E. Administrator  
Teresa Heron, Review Engineer  
New Source Review Section  
Bureau of Air Regulation  
850/488-0114*

# Martin Unit 3A

## Heat Input vs. Ambient Temperature Curve



# Memorandum

# Florida Department of Environmental Protection

TO: ~~C. H. Fancy~~

THRU: Al Linero *aal 6/15*

FROM: Teresa Heron *T.H.*

DATE: June 15, 1999

SUBJECT: FP&L Martin Plant  
DEP File No. 0850001-005-AC

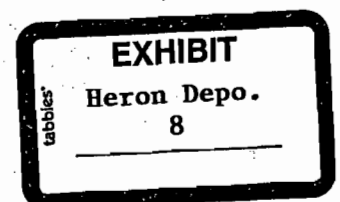
Attached is the draft public notice package including the Intent to Issue and the Technical Evaluation and Preliminary Determination for the compressor inlet fogger project at the FP&L Martin Plant. The application is to install inlet foggers ahead of the compressor inlets of four combined cycle combustion turbines. The foggers will operate on hot days and days of relatively low humidity. The evaporative cooling effected by the foggers will allow the units to operate closer to their rated capacity.

Both short-term and annual emissions will increase because the heat rate through the units will increase when the foggers. Maximum short-term emissions will still occur during cold days when use of the foggers is not feasible. The units already comply with 40 CFR 60, Subpart GG, so NSPS applicability is not an issue. FP&L proposes to limit operation of the coolers to 34,320 degrees F-hour on gas and 4000 degrees F-hour on oil to insure PSD is not triggered by their use.

I recommend your signature and approval of the cover letter and Intent to Issue.

AAL/th

Attachments



**PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT**

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 1070014-003-AC

Florida Power & Light - Putnam Plant  
Emissions Units 003-006 Inlet Foggers Project  
Putnam County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Florida Power & Light (FP&L). The permit is to install inlet foggers at the compressor inlets of four 70-megawatt natural gas and No. 2 fuel oil-fired Westinghouse Model 501B5A combined cycle combustion turbine-electrical generators at the Putnam Power Plant in Putnam County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, 392 US Highway 17 South, East Palatka, Florida 32131.

These units achieve their maximum rated output on cold days because the greater compressor inlet density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is lower on hot days because of the lower compressor inlet density. The foggers increase hot-day power output by approximately 4-6 MW through evaporative cooling of the compressor inlet air. The foggers provide no benefit on very humid or cold days and will not be used under those conditions. Maximum power production and emissions will continue to occur during cold conditions with the foggers turned off. The result is that maximum achievable power production and maximum achievable hourly emissions will not increase, although actual annual emissions will increase because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FPL proposes enforceable conditions to insure non-applicability. FPL asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. They are allowed to operate continuously (8760 hours of operation per unit). The maximum increase in annual emissions caused by project in tons per year is summarized below along with the PSD-significant levels.

<u>Pollutants</u>	<u>Annual Emission Increase</u>	<u>PSD Significant Levels</u>
PM/PM <sub>10</sub>	2	25/15
SO <sub>2</sub>	4	40
NO <sub>x</sub>	39	40
VOC	2	40
CO	9	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

EXHIBIT

Heron Depo.

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tabbles

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida, 32301  
Telephone: 850/488-0114  
Fax: 850/922-6979

Department of Environmental Protection  
Northeast District Office  
7825 Baymeadows Way, Suite 200B  
Jacksonville, Florida 32256-7590  
Telephone: 904/448-4300  
Fax: 904/448-4363

The complete project file includes the application, technical evaluation, Draft Permit, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.



Florida Department of  
Environmental Protection

Memorandum

TO: Howard L. Rhodes

THRU: C. H. Fancy <sup>ok</sup>  
Al Linero *aj* 7/15

FROM: Teresa Heron *T.H.*

DATE: July 15, 1999

SUBJECT: FP&L Putnam Spray Fogging Systems  
DEP File No. 1070014-003-AC

Attached is the final permit package for the compressor inlet fogger project at the FP&L Putnam Plant. The application is to install inlet foggers ahead of the compressor inlets of four combined cycle combustion turbines. The foggers will operate on hot days and days of relatively low humidity. The evaporative cooling effected by the foggers will allow the units to operate closer to their rated capacity.

Both short-term and annual emissions will increase because the heat rate through the units will increase when the foggers. However, maximum short-term emissions will still occur during cold days when use of the foggers is not feasible anyway. For this reason, we believe that 40CFR60, Subpart GG will not be triggered. FP&L proposes to limit operation of the coolers to 1,280 hours per unit per year while firing gas and 100 hours per unit per year while firing fuel oil to insure PSD is not triggered by their use. The issue of making a future potential to past actual annual emission increase calculation is extensively addressed in the Technical Evaluation.

We recommend your signature and approval.

AAL/aal

Attachments

COMPLETE MAY 7

INTENT JUNE 3 (DAY 27)

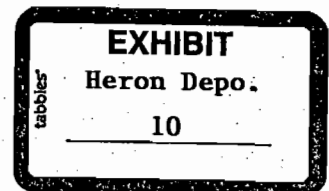
PROG. JULY 12

CLOCK STARTS JULY 26 (DAY 27)

TODAY JULY 15

DAY 00 SEPT 27

ACTUALLY SUBMITTED ON JUNE 10 - SINCE  
> 15 DAYS HAVE  
ELAPSED, WE CAN



# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 1. Applicant

Florida Power & Light Company  
Environmental Services Department  
700 Universe Blvd  
Juno Beach, Fl 33408

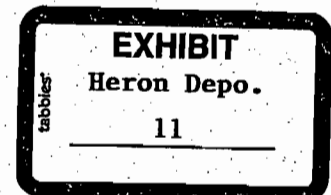
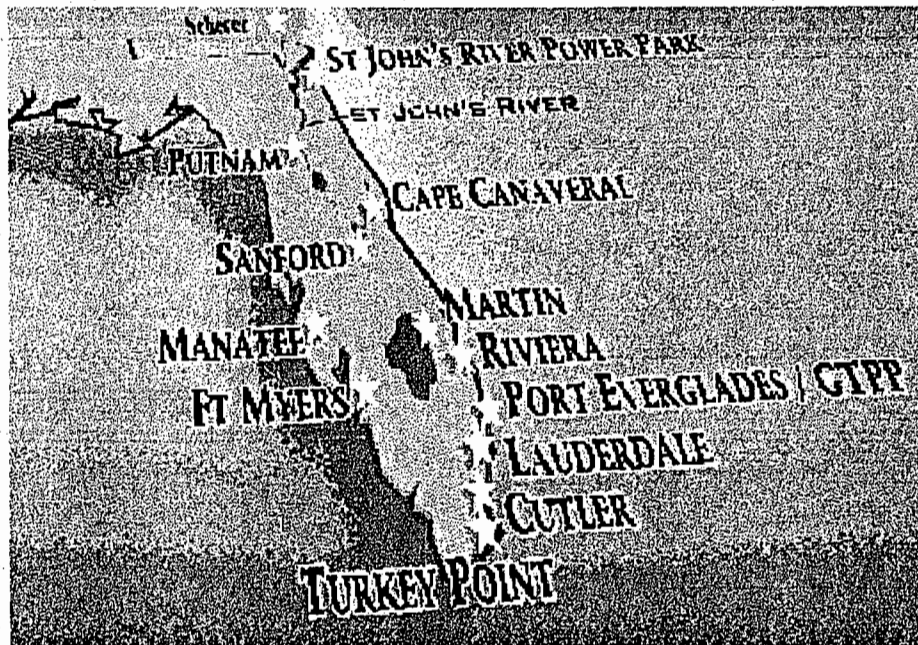
*Authorized Representative: Robert Bergstrom, FP&L Putnam Plant General Manager*

## 2. Source Name and Location

FP&L Putnam Power Plant  
392 US Highway 17 South  
East Palatka, Florida 32131

UTM Coordinates: Zone 17, 443.3 km East and 3277.80 km North

The location of the site within the FP&L grid is shown below:



## 3. Source Description

The Florida Power and Light (FP&L) Putnam Plant consists of four combustion turbines, each with an associated heat recovery steam generator equipped with a duct burner; an auxiliary boiler, and "unregulated or insignificant" emissions units. This facility emission units identification in the ARMS system includes the four combustion turbines, ARMS Emissions Units 003 to 006 and four Duct Burners for Combined Cycle Heat Recovery Steam Generators (HRSGs), ARMS Emissions Units 007 to 010 and an auxiliary boiler, ARMS Emission Unit 011.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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Each combustion turbine is a Westinghouse unit Model 501B5A rated at 70 MW generating capacity (at 85 degrees F ambient temperature), with a maximum heat input for natural gas and fuel oil of 968.3 mm Btu/hr and 910.6 mmBtu/hr, respectively. The duct burners for each HRSG are rated at a maximum heat input of 250 mmBtu/hr, and are fired with natural gas and No. 2. fuel oil. The auxiliary boiler is manufactured by VA-Power and has a maximum heat input for natural gas and number 2 fuel oil of 16.275 mmBtu/hr and 14.28 mmBtu/hr, respectively.

#### 4. Current Permit and Major Regulatory Program Status

Construction of the Putnam power plant facility was authorized by the Department's under the Power Plant Siting Certification No. PA74-01 ordered 10/16/74, and the modified conditions of PA 74-01 modified 5/20/80, 3/15/84, 7/16/91 and 5/28/92. The four combustion turbines & HRSGs along with an auxiliary boiler, identified in ARMS as Emissions Units 003 through 011, and other unregulated or "insignificant emissions units" are operated under Title V Air Operation Permit No. 1070014-001-AV issued in June 1998.

The HRSGs and the combustion turbines are regulated under Rule 62-210.300, F.A.C. Permits Required. Based on information submitted by the applicant in the Title V application, the combustion turbines are not subject to 40CFR 60, Subpart GG, Standards of Performance for New Stationary Gas Turbines. The HRSGs are subject to 40CFR 60, Subpart Db, Standard of Performance for Industrial-Commercial-Institutional Steam Generating Units. ARMS Emissions units 003, 004, 007 and 008 began commercial operations in 1978. ARMS Emissions Units 005, 006, 009 and 010 began commercial operations in 1977.

#### 5. Permit Modification Request

On March 29, 1999 the Department received a request from FPL for modification of its permits to install inlet foggers at the compressor inlets of Units 003 through 006. These units normally achieve their maximum rated output on cold days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is lower on hot days because of the lower compressor inlet density. The foggers increase hot-day power output by approximately 4-6 MW through evaporative cooling of the compressor inlet air although maximum output over all temperatures will remain 70 MW or below. The foggers provide little or no benefit on humid or cold days and will not be used under those conditions.

Inlet foggers are routinely included in new combustion turbine projects and have not affected the Department's decisions regarding Best Available Control Technology.

#### 6. Emissions Increases Due to Modification/Method of Operation

The foggers are physical pieces of equipment whose addition and use can increase emissions on hot or dry days. The use of the foggers can also be considered a change in method of operation of the inlet "air conditioning system" that is already used to filter incoming air.

The maximum short-term emissions increases were estimated by FPL using the heat input associated with a 16 degree F decrease in compressor inlet temperature. The maximum annual increases were estimated FP&L using the annual average inlet cooling of 8 degrees F. The increase in heat rate as a function of temperature was estimated by the applicant as 4 mmBtu per degree F when firing natural gas and 3.2 mmBtu per degree F when firing fuel oil. This was then used with the hours of operation to calculate the increases of each pollutant in tons per year. The results were estimated by FPL and are summarized below together with annual emission increase estimates. These are based on 1280

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

(gas) and 100 (oil) hours of operation per fogger per year [5120 hr/yr (gas) and 400 hr/yr (oil) for all 4 units].

## TOTAL EMISSIONS INCREASES DUE TO USE OF INLET FOGGERS AT FOUR UNITS

Pollutant	Emission Rate lb/mmBtu (gas)	Emission Rate lb/mmBtu (oil)	Emission Increase ton/yr (Oil)	Emission Increase Ton/yr (Gas)	Annual Increase tons/yr (Oil & Gas)	PSD Threshold tons/yr
NO <sub>x</sub>	0.44	0.698	3.60	36.0	39.6	40
PM/PM <sub>10</sub>	0.0168	0.0293	0.15	1.38	1.5	25/15
CO	0.11	0.048	0.25	9.01	9.3	100
VOC	0.024	0.017	0.09	1.97	2.1	40
SO <sub>2</sub>	0.00286	0.7	3.58	0.23	3.8	40

The emissions increases calculated are the direct result from the physical change in or change in method of operation, i.e. the installation and use of the inlet foggers. These assume that the ability to achieve greater power output when the foggers are used does not result in emissions increases outside the turbines original power curve. The rationale is discussed below.

The emissions characteristics (see Appendix W of attached draft permit) do not change as a result of the use of the foggers from what would normally occur throughout the entire range of temperatures and relative humidity. Rather, the foggers move the operating points along the same curve toward the power and emissions that normally occur at lower temperatures. The worst case emissions scenario will still occur during the winter months and will occur with the foggers off. This is because of the higher air density and massflow during cold weather allows higher heat input and power output. At low temperature, very little cooling can be attained because cold air cannot evaporate and hold much moisture. Under such conditions, icing can occur which is detrimental to the units.

### 7. Evaluation of PSD Applicability

As a major source, a modification or change in method of operation of Units 003-006 resulting in **significant net emissions increases** is subject to PSD review. Significant net emissions increase is defined in Rule 62-212.400, F.A.C as follows:

*Significant Net Emissions Increase – A significant net emissions increase of a pollutant regulated under the Act is a net emissions increase equal to or greater than the applicable significant emission rate listed in Table 212.400-2, Regulated Air Pollutants – Significant Emission Rates.*

The significant emission rates are included (see PSD Threshold) in the Table above. The meaning of a net emissions increase is given in Rule 62-212.400, F.A.C. as:

*Net Emissions Increase - A modification to a facility results in a net emissions increase when, for a pollutant regulated under the Act, the sum of all of the contemporaneous creditable increases and decreases in the actual emissions of the facility, including the increase in emissions of the modification itself and any increases and decreases in quantifiable fugitive emissions, is greater than zero.*

The definition of actual emissions is given in Rule 62-210.200, F.A.C. (definitions) as follows:

*Actual Emissions - The actual rate of emission of a pollutant from an emissions unit as determined in accordance with the following provisions:*

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

- (a) *In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during a two year period which precedes the particular date and which is representative of the normal operation of the emissions unit. The Department may allow the use of a different time period upon a determination that it is more representative of the normal operation of the emissions unit. Actual emissions shall be calculated using the emissions unit's actual operating hours, production rates and types of materials processed, stored, or combusted during the selected time period.*
- (b) *The Department may presume that unit-specific allowable emissions for an emissions unit are equivalent to the actual emissions of the emissions unit provided that, for any regulated air pollutant, such unit-specific allowable emissions limits are federally enforceable.*
- (c) *For any emissions unit (other than an electric utility steam-generating unit specified in subparagraph (d) of this definition) which has not begun normal operations on a particular date, actual emissions shall equal the potential emissions of the emissions unit on that date.*
- (d) *For an electric utility steam generating unit (other than a new unit or the replacement of an existing unit) actual emissions of the unit following a physical or operational change shall equal the representative actual annual emissions of the unit following the physical or operational change, provided the owner or operator submits to the Department on an annual basis, for a period of 5 years representative of normal post-change operations of the unit, within the period not longer than 10 years following the change, information demonstrating that the physical or operational change did not result in an emissions increase. The definition of "representative actual annual emissions" found in 40 CFR 52.21(b)(33) is adopted and incorporated by reference in Rule 62-204.800, F.A.C.*

The term electric utility steam-generating unit is defined as:

*Electric Utility Steam Generating Unit – Any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the unit.*

Based on Department records, actual hours of operation since 1993 for these units are as follows:

Unit/Year	Annual Operating Hours 1993 - 1998					
	1993	1994	1995	1996	1997	1998
003	7649	5585	7085	6528	6498	6410
004	7649	5585	7085	6528	6498	6410
005	7727	5963	6490	6607	6255	6601
006	7727	5963	6490	6607	6255	6601

Note: In 1998, the annual hours of operation of the duct burners are reported as 2414 (Unit 007), 2302 (Unit 008), 2579 (Unit 009), and 2579 (Unit 010). These were not recorded in ARMS during previous years.

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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These units have each operated approximately  $6500 \pm 1000$  hours per year since 1993. The duct burners within the HRSGs operate roughly 40 percent of the time when the combustion turbines operate. The foggers will operate no more than 1280 hours per year when the units burn gas and 100 hours when the units burn oil. This equates to roughly 20 percent of the time when the combustion turbines operate.

The combustion turbines have clearly begun *normal operation*. As combined cycle units, they are fairly efficient in comparison with conventional boiler-based steam-electrical units. They are not, however, baseload units. By comparison, the larger Westinghouse 501F and General Electric 7FA combined cycle units that were installed during the early 1990s in Fort Lauderdale and Martin County and are dispatched much like baseload units.

Each combustion turbine-electrical generator produces approximately 70 MW of electrical power excluding the power produced through the steam cycle. The steam cycle associated with each combustion turbine, including the supplementally-fired HRSG and steam turbine-electrical generator produces well in excess of 25 MW of power. Therefore the correct approach to determine the magnitude of a net emissions increase is to compare actual emissions from preceding years with representative actual annual emissions as described for steam electrical units.

FP&L asserts and the Department accepts that use of the inlet foggers will not affect the hours of operation of the units. Usage of the combustion turbines will depend on the system-wide growth in electrical demand and the impacts of major projects such as the planned 1500 and 2000 megawatt repowering projects at Fort Myers and Sanford. Most likely the Putnam units will continue their normal operation within the historical  $6500 \pm 1000$  hours per year per unit. The emissions are directly related to the hours of operation. Any increases from the fogger project would be dwarfed by the annual swings in usage of the units.

The modification project can, however, be isolated from the normal operation of the units and its effects can be directly predicted and measured without having to make annual comparisons of actual emissions from the combined cycle units before and after the change. The modification itself (i.e. installation and operation of the foggers), however, has not yet begun normal operation. Therefore the future actual emissions caused by the modification are equal to the potential-to-emit, which is based on the increases in heat input associated with the use of the fogging system.

The number of days during which the foggers can economically operate probably limits actual emissions increases to levels below significance for the purposes of PSD applicability. However, FPL proposes to limit operation of the foggers to 1,280 (gas) and 100 (oil) hours per unit per year. This value is approximately 20 % of the permitted hours of operation for each unit. It is also a clear indication that compressor air inlet cooling will not cause the units to operate all of the permitted hours during this mode. Emissions will increase under these limitations (as previously tabulated) by levels less than the significant emissions rates given in Table 212.400-2, F.A.C. The Department concludes, therefore, that PSD does not apply to this project.

### **8. Evaluation of NSPS Subpart GG Applicability**

As a major source, a physical change in or change in the method of operation resulting in an increase in the amount of any air pollutant (to which a standard applies) is subject to applicable requirements of 40 CFR 60, Standards of Performance for New Stationary Sources. Modification under 40 CFR 60.2 [Rule 62.204.800 F.A.C.] is defined as follows:

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

*Modification means any physical change in, or change in the method of operation of, an existing facility which increase the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emissions of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.*

The installation of the foggers do not change maximum short-term emissions rates as these are already achieved under natural conditions of low ambient temperatures without the use of the foggers. The inlet fogger installations only change the ambient conditions that occur during the normal operation of the turbines. Therefore, the inlet fogger installations do not make the combustion turbines subject to 40 CFR 60 Subpart GG because, the *physical* change in or change in the method of operation of, caused by the foggers installation do not increase the (maximum short-term) amount of any air pollutant. The Department will request EPA concurrence on this matter.

## 9. Proposed Addition of New Conditions to Power Plant Siting Certification No. PA 74-01 and Issuance of an Air Construction Permit.

These emissions units were constructed under the authority of the Power Plant Siting Certification No. PA74-01 ordered in 10/16/74, and the modified conditions of PA 74-01 modified 5/20/80, 3/15/84, 7/16/91 and 5/28/92. The Department will amend these conditions of certification by adding a new condition authorizing installation and operation of the inlet foggers and will issue a new air construction permit for these units.

The new conditions applicable to the inlet foggers proposed for Emissions Units 003 -006 are shown in the draft air construction permit. It limits operation of the inlet foggers to 1,280 (gas) and 100 (oil) hours per unit per year.

## 10. Conclusions

The project will not increase the maximum short-term emission rates as these are already achieved under natural conditions of low ambient temperatures without the use of the foggers. Therefore, the Department believes that the 40 CFR60 NSPS Subpart GG is not applicable to these units as a result of the installation of the foggers.

The Department concludes that PSD is not applicable to this project since this project as presented will not result in significant net emissions increases to a major facility. The changes will not cause a significant impact or cause or contribute to a violation of any ambient air quality standard or PSD increment.

The Department's conclusion does not set a precedent for projects implemented at any facilities other than combined cycle unit inlet fogger installations. It does not set precedents related to any physical changes within the compressors, combustors, rotors, heat recovery steam generators, or other key components at such units. The application and determination of the Department's rules does not constitute an interpretation of the EPA rules under 40CFR52.21, Prevention of Significant Deterioration or 40CFR60, Standards of Performance for New Stationary Sources.

For further details regarding this review, contact:

*A.A. Linero, P.E. Administrator  
Teresa Heron, Review Engineer  
New Source Review Section  
Bureau of Air Regulation  
850/488-0114*



**PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT**

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 1070014-003-AC

Florida Power & Light - Putnam Plant  
Emissions Units 003-006 Inlet Foggers Project  
Putnam County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Florida Power & Light (FP&L). The permit is to install inlet foggers at the compressor inlets of four 70-megawatt natural gas and No. 2 fuel oil-fired Westinghouse Model 501B5A combined cycle combustion turbine-electrical generators at the Putnam Power Plant in Putnam County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, 392 US Highway 17 South, East Palatka, Florida 32131.

These units achieve their maximum rated output on cold days because the greater compressor inlet density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is lower on hot days because of the lower compressor inlet density. The foggers increase hot-day power output by approximately 4-6 MW through evaporative cooling of the compressor inlet air. The foggers provide no benefit on very humid or cold days and will not be used under those conditions. Maximum power production and emissions will continue to occur during cold conditions with the foggers turned off. The result is that maximum achievable power production and maximum achievable hourly emissions will not increase, although actual annual emissions will increase because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FPL proposes enforceable conditions to insure non-applicability. FPL asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. They are allowed to operate continuously (8760 hours of operation per unit). The maximum increase in annual emissions caused by project in tons per year is summarized below along with the PSD-significant levels.

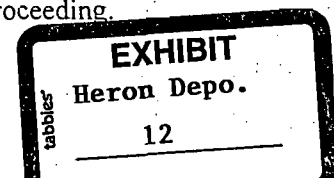
<u>Pollutants</u>	<u>Annual Emission Increase</u>	<u>PSD Significant Levels</u>
PM/PM <sub>10</sub>	2	25/15
SO <sub>2</sub>	4	40
NO <sub>x</sub>	39	40
VOC	2	40
CO	9	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

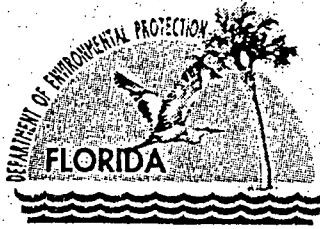
The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.







Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

June 2, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. R. Douglas Neeley, Chief  
Air, Radiation Technology Branch  
US EPA Region IV  
61 Forsyth Street  
Atlanta, Georgia 30303

Re: DEP File No. 1070014-003-AC  
Putnam Plant Units 3-6, Inlet Foggers  
Subpart GG Non-Applicability

Dear Mr. Neeley:

Enclosed is a copy of our Intent to Issue a permit to Florida Power and Light (FP&L) for the installation of inlet foggers for use during the summer season on the combined cycle units at the Putnam Plant. We request your concurrence with our preliminary determination or your own separate determination regarding the non-applicability of the 40CFR 60, NSPS Subpart GG for these units.

There are presently 4 Westinghouse 501B5A combustion turbines on the site. Each has a nominal simple cycle capacity of 70 megawatts. The units are permitted to operate continuously. These units normally achieve their maximum rated output on cold days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is lower on hot days because of the lower compressor inlet density. The foggers increase hot-day power output by approximately 2-4 MW through evaporative cooling of the compressor inlet air. The foggers provide little or no benefit on humid or cold days and will not be used under those conditions.

The foggers will not increase the maximum short-term emission rates for the units, as these are already achieved under natural conditions of low ambient temperatures without the use of the foggers. Therefore the Department believes that Subpart GG is not triggered by the project. The foggers are physical pieces of equipment whose addition and use can increase emissions on hot or dry days. The use of the foggers can also be considered a change in method of operation of the inlet "air conditioning system" that is already used to filter incoming air.

We would appreciate your early review and concurrence. If you have any questions on these matters please call Teresa Heron at 850/921-9529 or me at 850/921-9523.

Sincerely,

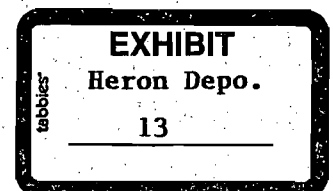
A. A. Linero, P.E., Administrator  
New Source Review Section

AAL/aal

Enclosures

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Printed on recycled paper.



# Memorandum

# Florida Department of Environmental Protection

TO: ~~C. H. Fancy~~ *aaf for CHF*  
THRU: Al Linero *cc L 6/2*  
FROM: Teresa Heron *T.H*  
DATE: June 2, 1999  
SUBJECT: FP&L Putnam Spray Fogging Systems  
DEP File No. 1070014-003-AC

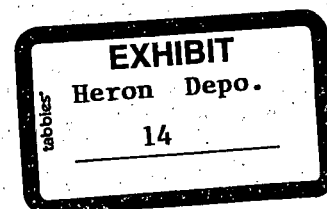
Attached is the draft public notice package including the Intent to Issue and the Technical Evaluation and Preliminary Determination for the compressor inlet fogger project at the FP&L Putnam Plant. The application is to install inlet foggers ahead of the compressor inlets of four combined cycle combustion turbines. The foggers will operate on hot days and days of relatively low humidity. The evaporative cooling effected by the foggers will allow the units to operate closer to their rated capacity.

Both short-term and annual emissions will increase because the heat rate through the units will increase when the foggers. However, maximum short-term emissions will still occur during cold days when use of the foggers is not feasible anyway. For this reason, we believe that 40CFR60, Subpart GG will not be triggered. FP&L proposes to limit operation of the coolers to 1,280 hours per unit per year while firing gas and 100 hours per unit per year while firing fuel oil to insure PSD is not triggered by their use. The issue of making a future potential to past actual annual emission increase calculation is extensively addressed in the Technical Evaluation.

We recommend your signature and approval of the cover letter and Intent to Issue.

AAL/aal

Attachments



**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



May 6, 1999

9737572-0100

Mr. C.H. Fancy, P.E., Chief  
Bureau of Air Regulation  
Florida Department of Environmental Protection  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

**RECEIVED**

MAY 07 1999

BUREAU OF  
AIR REGULATION

Attention: Ms. Teresa Heron

RE: Inlet Foggers – Putnam Plant Combustion Turbines DEP File 1070014-003-AC  
Inlet Foggers – Martin Plant Combustion Turbines DEP File 0850001-005-AC  
Florida Power & Light Company (FPL)

Dear Teresa:

This correspondence is submitted to address the Department's information request related to the installation of direct water spray fogging system to the inlet of the Putnam and Martin combustion turbines. The information requested is presented below and in the attachments to this correspondence.

1. Information Requested: Please submit additional data to support the statement that the emission rate does not change as a result of inlet fogging.

Information Submitted: As discussed in the application, the use of the direct water spray fogging systems will increase the relative humidity of the gas stream while concomitantly reducing the temperature due to adiabatic cooling of the inlet air. This effect is no different than when the turbine is operated under the same ambient conditions that occurs during the normal course of operation in any year. However, it allows the turbine to operate under such ambient conditions more frequently and thus can effect annual emissions. The influence on the emission rate of increasing the relative humidity and temperature is explained in EPA's Alternative Control Techniques Document – NO<sub>x</sub> Emissions from Stationary Gas Turbines (EPA-453/R-93-007, January 1993). In Section 4.2.1.3 the report provides information that indicates emissions of NO<sub>x</sub> decrease with increasing relative humidity. Also, the mass emission of NO<sub>x</sub> decreases per mass of fuel input. This is also the same as lower emissions per amount electric power generated (since power and fuel input are directly related). The lower NO<sub>x</sub> emissions with increasing relative humidity and lower temperature can be shown using the equation in Section 4.2.1.3; the adjustment equation in 40 C.F.R. Part 60 Subpart GG, Section 60.335(c)(1).

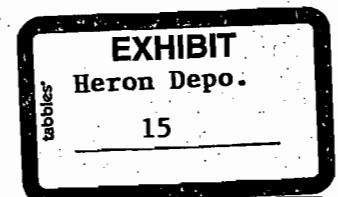


Table 1 presents calculation of relative NO<sub>x</sub> concentrations for various temperatures and relative humidity. As can be seen from the table the relative NO<sub>x</sub> concentration decreases with increasing humidity and decreasing temperature. The combined effect can be seen in the last column. Please find attached relevant pages from the EPA cited document. This EPA information is supported by the results of the testing performed at the Putnam Plant that indicated no change in emission rate (concentration) when the fogging system was used. These data also demonstrated no statistical change in CO concentrations as well.

The potential applicability of New Source Performance Standards (NSPS) Subpart GG to the Putnam turbines would be dependant on whether the installation of a fogging system is considered a modification under Section 60.14 of 40 C.F.R. 60. (Note: The NSPS already apply to the Martin turbines; these turbines meet lower emission levels as BACT.) The determination is based on whether a physical change resulted in an increase in the emission rate that is expressed in kilograms per hour. The emission rate can be determined using AP-42, materials balance, CEMs or manual/stack tests [see paragraphs (1) and (2) of Section 60.14]. The tests must be conducted under representative performance of the facility and that all operating which can effect emissions must be held constant to the maximum degree feasible. As described above, the inlet foggers only changes the ambient conditions that do occur during the normal operation of the turbine. Testing under the requirement to maintain all operating which may effect emissions (i.e., in this case temperature and relative humidity) constant would produce the same result. Thus, the short-term emission rates do not change. Nonetheless, the fogging system does increase the long-term emissions for which a limit on the operation of the fogging system has been requested to keep the increase below the PSD significant emission rate.

2. Information Requested: In reference to Table 1 and 2. (Part II of the Supporting Information), indicate the nominal values for power out, heat rate and heat input.

Information Submitted: The information presented in Table 1 presents the *rate of change* of power, heat rate and heat input for the turbine. The basis of the information is the attached performance curves. As noted from the curves the performance (fuel input and power) is a linear function of inlet temperature. The primary purpose of using the performance curves is to determine the increase in heat rate as a function of temperature. This was determined from the performance curves as 4 mmBtu per °F for Putnam and as 4.7 mmBtu per °F shown in Table 1. Note that the Putnam calculations have been updated to reflect as 4 mmBtu per °F rather than 3 mmBtu per °F in the original submittal. This was then used with the hours of operation to calculate the tons per year. An example for Putnam:  $4 \text{ mmBtu} / ^\circ\text{F} \times 0.44 \text{ lb/mmBtu} \times 8 \text{ }^\circ\text{F/hour} \times 1,280 \text{ hours} \times 1 \text{ ton}/2,000 \text{ lb} = 9.01 \text{ tons/year}$  for NO<sub>x</sub>. As noted in the application, AP-42 emission factors were used which for NO<sub>x</sub> are from 17 to 25 percent higher than the actual observed emissions. The 4 mmBtu / °F was determined from the performance curves as follows: At 50 °F the heat input is 1,100 mmBtu/hr based on high heating value (HHV). At 100 °F, the heat input is 900 mmBtu/hr (HHV). The difference is 200 mmBtu/hr (1,100 –

900) over 41 °F (100 – 59) or 4 mmBtu / °F. For oil firing the rate was determined to be 3.2 mmBtu / °F using the same procedure.

An example for Martin:  $4.7 \text{ mmBtu} / ^\circ\text{F} \times 0.09 \text{ lb/mmBtu} \times 5.5 \text{ }^\circ\text{F}/\text{hour} \times 6,240 \text{ hours} \times 1 \text{ ton}/2,000 \text{ lb} = 7.26 \text{ tons/year}$  for  $\text{NO}_x$ . The Martin emission rates, as noted in Tables 1 and 2, are based on maximum potential rate in the PSD permit. For  $\text{NO}_x$ , the maximum emission rate is 177 lb/hour at maximum heat input of 1,966 mmBtu/hr which is 0.09 mmBtu/hr (177/1,966). The 4.7 mmBtu / °F was determined from the heat rate curves as follows: At 60 °F the heat input is 1,550 mmBtu/hr based on high heating value (HHV). At 90 °F, the heat input is 1,690 mmBtu/hr (HHV). The difference is 140 mmBtu/hr (1,690 – 1,550) over 30 °F (90 – 60) or 4.66 mmBtu / °F; this value was rounded to 4.7 mmBtu / °F. This rate was used for both gas and oil firing.

3. Information Requested: Submit the heat input curves for these units.

Information Submitted: The heat input curves for the Martin Units are attached. The heat input curves for the Putnam Plant are attached.

4. Information Requested: Estimate actual emissions for each facility's turbines and worst case emission rate scenario.

Information Submitted: The actual emission for each facility is presented in the Annual Operating Report (these will be forwarded separately). As noted in the information supplied in Item 2 above, the emission estimates are based the maximum potential emission rate based on either AP-42 in the case of Putnam and the PSD permit in the case of Martin. Since the requested is based on an incremental increase in annual emissions using the maximum potential emission rates and a maximum amount of fogging ( °F-hours per year), the worst case emission estimate is presented in the application.

5. Information Requested: Submit hours of operation for each turbine.

Information Submitted: The AOR contain the hours of operation.

Your prompt review of the application is appreciated. If there are any further questions, please call.

Sincerely,

GOLDER ASSOCIATES INC.



Kennard F. Kosky, P.E.  
Principal  
Professional Engineer No. 14996

SEAL 

KFK/jkk

Enclosures

cc: Rich Piper, Repowering Licensing Manager  
Robert Bergstrom, Putnam Plant General Manager  
John Lindsay, Martin Plant General Manager  
Bob Burgess, FPL  
Jay Blum, FPL

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**Table 1a** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

**Performance Basis**

Temperature Decrease °F (1)	8	
Power Increase	3.28%	PPN Charts
Heat Rate Decrease	1.06%	Westinghouse
Heat Input Increase	2.22%	
Heat Input Change	mmBtu/ °F	4
Hours/year	1280 (2)	
Hours-°F/year	10,240	hours/year times temperature decrease

**Pollutants**

Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0168	AP-42 Section 3.1 per machine
	TPY	0.34	
NO <sub>x</sub>	lb/MMBtu	0.44	AP-42 Section 3.1 per machine
	TPY	9.01	
SO <sub>2</sub>	lb/MMBtu	0.00286	1 grain/100 cf natural gas per machine
	TPY	0.06	
CO	lb/MMBtu	0.11	AP-42 Section 3.1 per machine
	TPY	2.25	
VOC	lb/MMBtu	0.024	AP-42 Section 3.1 per machine
	TPY	0.49	

Legend - TPY: tons per year

- (1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.
- (2) Hours of fogger operation based on estimate of 8 hours per day and 160 days per year.
- (3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-0, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".

**Table 2a** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (No. 2 Fuel Oil Combustion).

**Performance Basis**

Temperature Decrease °F (1)	8	
Power Increase	3.28%	PPN Charts
Heat Rate Decrease	1.06%	Westinghouse
Heat Input Increase	2.22%	
Heat Input Change mmBtu/ °F	3.2	
Hours/year	100 (2)	
Hours-°F/year	800	hours/year times temperature decrease

Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0293	AP-42 Section 3.1 per machine
	TPY	0.04	
NO <sub>x</sub>	lb/MMBtu	0.698	AP-42 Section 3.1 per machine
	TPY	0.89	
SO <sub>2</sub>	lb/MMBtu	0.7	Based on Title V Permit per machine
	TPY	0.90	
CO	lb/MMBtu	0.048	AP-42 Section 3.1 per machine
	TPY	0.06	
VOC	lb/MMBtu	0.017	AP-42 Section 3.1 per machine
	TPY	0.02	

Legend - TPY: tons per year

(1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.

(2) Hours of fogger operation.

(3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-01, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".



## Part II

### Application for Air Permit Installation of Direct Water Spray Fogging Systems Putnam Plant

#### Introduction

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Putnam Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decreases heat rate. The project is part of increasing capacity in a cost effective manner.

#### Description

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for Jacksonville and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for Jacksonville would be 14°F and would occur in July with a mid-afternoon temperature of 91°F and 58 percent relative humidity. During January, the mid-afternoon cooling would be about 7°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 41.7°F to 55.7°F with relative humidities ranging from 83 to 88 percent. The amount of adiabatic cooling would range from 1 to 2°F. For the Putnam Plant, an 8°F average reduction was assumed in the calculations for primarily daytime operation.

#### **Turbine Performance and Emission Estimates**

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the Westinghouse Model 501B5A combustion turbines at the Putnam plant, an 8°F average decrease in temperature would result in a 3.3 percent increase in power and an associated 1.1 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Putnam turbines would be 4 mmBtu/hr/°F for gas firing and 3.2 mmBtu/hr/°F for oil firing. The data were determined using Westinghouse supplied data (see Attachment A).

Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of hours of proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degree F-hours for gas firing are calculated by multiplying 1,280 hours times 8°F or 10,240°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Putnam turbines, a maximum of 10,240°F-hours of operation when firing natural gas and 800°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

The use of AP-42 emission factors is appropriate for estimating maximum potential annual emissions since there are no emission limits for NO<sub>x</sub>. This is especially conservative for NO<sub>x</sub> since actual emissions are much lower. Over the last two years, quarterly emissions reported from CEM data ranged from 0.322 lb/mmBtu to 0.398 lb/mmBtu. The annual averages from CEM data ranged from 0.351 to 0.371 lb/mmBtu for 1997 and 0.354 to 0.375 lb/mmBtu for 1998. Using an emission factor of 0.44 lb/mmBtu to estimate maximum potential annual emissions, would overestimate annual emissions from 17 to 25 percent greater than that actual observed. Thus, the annual estimated emissions based on AP-42 emission factors are conservative.

**Regulatory Applicability**

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Putnam Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.

The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

**Summary of Maximum Annual Emissions - All Units**

<u>Pollutant</u>	<u>Gas</u> <u>Tons/Year</u>	<u>Oil</u> <u>Tons/Year</u>	<u>Oil &amp; Gas</u> <u>Total</u>
PM	1.38	0.15	1.53
NO <sub>x</sub>	36.04	3.57	39.62
SO <sub>2</sub>	0.23	3.58	3.82
CO	9.01	0.25	9.26
VOC	1.97	0.09	2.08
Degree Fahrenheit-Hours per year	10,240	800	
Additional Degree Fahrenheit-Hours on Gas	1,015	0	
Total Degree Fahrenheit-Hours Gas Only	11,255	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is  $\text{NO}_x$ . Emissions of  $\text{SO}_2$  are primarily associated with distillate fuel oil which is only used a backup to natural gas. For natural gas only, the maximum potential  $\text{NO}_x$  emissions would be 39.62 tons/year at 11,255°F-hours per year per CT. This is equivalent to 1.6°F-hours of gas firing for each hour of oil firing (i.e.,  $1,015^\circ\text{F-hours}/800^\circ\text{F-hours} = 1.27^\circ\text{F-hours}$ ). The emissions of the other pollutants would be 1.52 tons/year for PM, 0.25 tons/year for  $\text{SO}_2$ , 9.9 tons/year for CO and 2.16 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 45,020°F-hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 1.27°F-hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected. In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operate 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 45,020°F-hours for the facility.

**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective (gas firing shown).

Plant Site: Putnam Plant; GTs 11, 12, 21 and 22  
Turbine Model: Westinghouse 501B5A

Turbine Inlet Temperature ( °F)	100	50
Difference ( °F)		50
Heat Input (mmBtu/hr)	900	1,100
Difference (mmBtu/hr)		200
Rate (mmBtu/hr/ °F) <sup>a</sup>		4.00

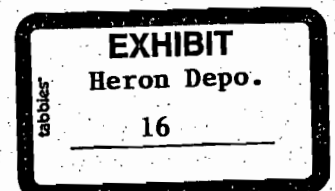
Note: <sup>a</sup> heat input difference divided by temperature difference.

**Alternative Control  
Techniques Document--  
NO<sub>x</sub> Emissions from Stationary  
Gas Turbines**

**Emission Standards Division**

**U. S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Air and Radiation  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711  
January 1993**

REPRODUCED BY  
U.S. DEPARTMENT OF COMMERCE  
NATIONAL TECHNICAL  
INFORMATION SERVICE  
SPRINGFIELD, VA 22161



substantially lower thermal NO<sub>x</sub> emissions than natural gas or DF-2.<sup>18</sup> For fuels containing FBN, the fuel NO<sub>x</sub> production increases with increasing levels of FBN.

4.2.1.3 Ambient Conditions. Ambient conditions that affect NO<sub>x</sub> formation are humidity, temperature, and pressure. Of these ambient conditions, humidity has the greatest effect on NO<sub>x</sub> formation.<sup>19</sup> The energy required to heat the airborne water vapor has a quenching effect on combustion temperatures, which reduces thermal NO<sub>x</sub> formation. At low humidity levels, NO<sub>x</sub> emissions increase with increases in ambient temperature. At high humidity levels, the effect of changes in ambient temperature on NO<sub>x</sub> formation varies. At high humidity levels and low ambient temperatures, NO<sub>x</sub> emissions increase with increasing temperature. Conversely, at high humidity levels and ambient temperatures above 10°C (50°F), NO<sub>x</sub> emissions decrease with increasing temperature. This effect of humidity and temperature on NO<sub>x</sub> formation is shown in Figure 4-4. A rise in ambient pressure results in higher pressure and temperature levels entering the combustor and so NO<sub>x</sub> production levels increase with increases in ambient pressure.<sup>19</sup>

The influence of ambient conditions on measured NO<sub>x</sub> emission levels can be corrected using the following equation:<sup>20</sup>

$$NO_x = (NO_{xO}) (P_r/P_o)^{0.5} e^{19(Ho-0.00633)} (288^\circ K/T_a)^{1.53}$$

where:

- NO<sub>x</sub> = emission rate of NO<sub>x</sub> at 15 percent O<sub>2</sub> and International Standards Organization (ISO) ambient conditions, volume percent;
- NO<sub>xO</sub> = observed NO<sub>x</sub> concentration, parts per million by volume (ppmv) referenced to 15 percent O<sub>2</sub>;
- P<sub>r</sub> = reference compressor inlet absolute pressure at 101.3 kilopascals ambient pressure, millimeters mercury (mm Hg);
- P<sub>o</sub> = observed compressor inlet absolute pressure at test, mm Hg;



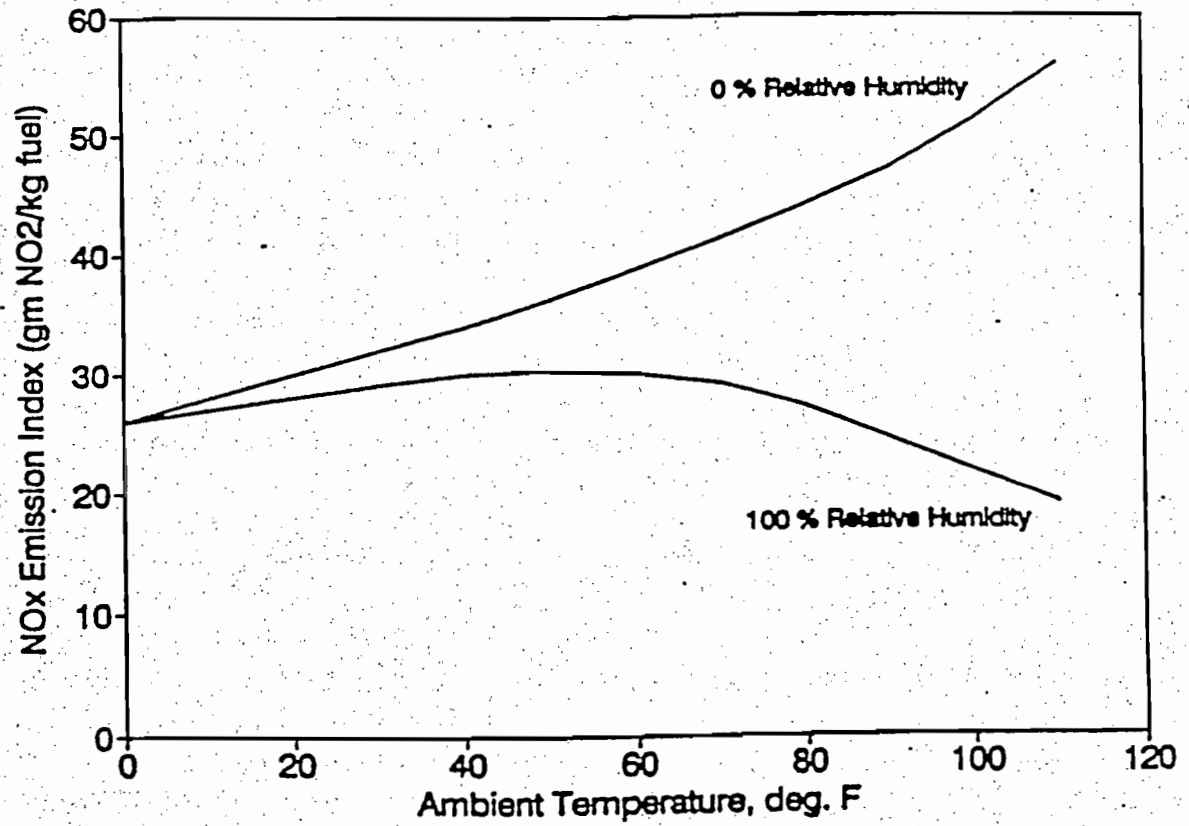


Figure 4-4. Influence of relative humidity and ambient temperature on NO<sub>x</sub> formation.<sup>19</sup>

$H_o$  = observed humidity of ambient air, g  $H_2O$ /g air;

$e$  = transcendental constant, 2.718; and

$T_a$  = ambient temperature, K.

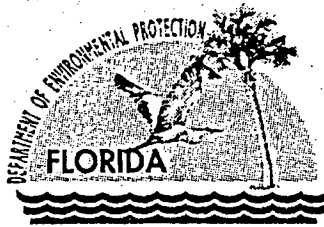
At least two manufacturers state that this equation does not accurately correct  $NO_x$  emissions for their turbine models.<sup>8,12</sup> It is expected that these turbine manufacturers could provide corrections to this equation that would more accurately correct  $NO_x$  emissions for the effects of ambient conditions based on test data for their turbine models.

4.2.1.4 Operating Cycles. Emissions from identical turbines used in simple and cogeneration cycles have similar  $NO_x$  emissions levels, provided no duct burner is used in heat recovery applications. The  $NO_x$  emissions are similar because, as stated in Section 4.2,  $NO_x$  is formed only in the turbine combustor and remains at this level regardless of downstream temperature reductions. A turbine operated in a regenerative cycle produces higher  $NO_x$  levels, however, due to increased combustor inlet temperatures present in regenerative cycle applications.<sup>21</sup>

4.2.1.5 Power Output Level. The power output level of a gas turbine is directly related to the firing temperature, which is directly related to flame temperature. Each gas turbine has a base-rated power level and corresponding  $NO_x$  level. At power outputs below this base-rated level, the flame temperature is lower, so  $NO_x$  emissions are lower. Conversely, at peak power outputs above the base rating,  $NO_x$  emissions are higher due to higher flame temperature. The  $NO_x$  emissions for a range of firing temperatures are shown in Figure 4-3 for one manufacturer's gas turbine.<sup>17</sup>

#### 4.2.2 $NO_x$ Emissions From Duct Burners

In some cogeneration and combined cycle applications, the exhaust heat from the gas turbine is not sufficient to produce the desired quantity of steam from the HRSG, and a supplemental burner, or duct burner, is placed in the exhaust duct between the



# Department of Environmental Protection

Jeb Bush  
Governor

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

April 26, 1999

## CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Richard Piper  
Repowering Licensing Manager  
Florida Power & Light Company  
Post Office Box 14000  
Juno Beach, Florida 33408

Re: Inlet Foggers – Putnan Plant Combustion Turbines DEP File 1070014-003- AC  
Inlet Foggers – Martin Plant Combustion Turbines DEP File 0850001-005- AC

Dear Mr. Piper:

The Department received your applications for the installation of the direct water spray fogging system at the FPL's Martin and Putnan Plants. Based on a technical review, the applications are incomplete. Pursuant to Rules 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, F.A.C., please submit the following information, including all relevant reference materials and calculations:

1. Please submit additional data to support the statement that the emission rate does not change as a result of inlet fogging.
2. In reference to Table 1 and 2. (Part II of the Supporting Information), indicate the nominal values for power output, heat rate and heat input increase.
3. Submit the heat input curves for these units.
4. Estimate actual emissions for each facility's turbines and worst case emission rate scenario.
5. Submit hours of operations for each turbine.

Please contact Teresa Heron at 850/921-9529 if you have any questions.

Sincerely,

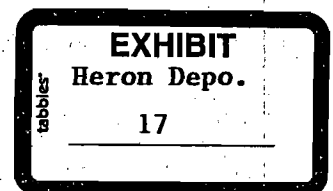
C. H. Fancy, P.E., Chief  
Bureau of Air Regulation

CHF/th

cc: Ken Kosky, P.E.  
Chris Kirts, NED  
Isidore Goldman, SED

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

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Inlet air Temperature

- Increase Power output
- Improve efficiency

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**CARLTON FIELDS, P.A.**  
ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S.E. SECOND STREET  
MIAMI, FLORIDA 33131-9101

MAILING ADDRESS  
P.O. BOX 019101, MIAMI FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

**FAX COVER SHEET**

Date:	February 19, 2003	Phone Number	Fax Number
To:	Teresa Heron	850-921-9529	850-922-6979
From:	Sean W. Firley	(305) 530-0050	(305) 530-0055

Client/Matter No.: 44087.98622

Employee No.: 648

Total Number of Pages Being Transmitted, Including Cover Sheet: 4

**Message:** Dear Ms. Heron: Per your conversation with my secretary earlier today, enclosed please find a copy of the Re-Notice of Deposition, rescheduling your deposition for Wednesday, February 26, 2003, at 9:30 a.m. Thank you.

Original to follow Via Regular Mail  Original will Not be Sent  Original will follow via Overnight Courier

\*\*\*\*\*  
The information contained in this facsimile message is attorney privileged and confidential information intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or copy of this communication is strictly prohibited. If you have received this communication in error, please immediately notify us by telephone (if long distance, please call collect) and return the original message to us at the above address via the U.S. Postal Service. Thank you.  
\*\*\*\*\*

IF THERE ARE ANY PROBLEMS OR COMPLICATIONS, PLEASE NOTIFY US IMMEDIATELY AT:  
(305) 530-0050

TELECOPIER OPERATOR: \_\_\_\_\_

CARLTON FIELDS, P.A.

TAMPA ORLANDO TALLAHASSEE WEST PALM BEACH ST. PETERSBURG MIAMI

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IN THE CIRCUIT COURT OF THE 15TH  
JUDICIAL CIRCUIT IN AND FOR  
PALM BEACH COUNTY, FLORIDA

CASE NO. CL 01-2415 AG

CALDWELL ENERGY & ENVIRONMENTAL,  
INC., a foreign corporation,

Plaintiff,

vs.

FLORIDA POWER & LIGHT COMPANY,  
a Florida corporation,

Defendant.

**RE-NOTICE OF TAKING TELEPHONIC DEPOSITION DUCES TECUM**  
**(Change in Date and Time)**

PLEASE TAKE NOTICE that the undersigned attorneys will take the deposition of:

<u>Name and Address</u>	<u>Date and Time</u>	<u>Location</u>
Ms. Teresa Heron State of Florida Dept. of Environmental Protection	February 26, 2002 9:30 a.m.	State of Florida. Dept. of Environmental Protection 111 South Magnolia Drive - #4 Tallahassee, FL 32399-2400

**[Directions:** 1 to 2 blocks North of US 27 on South Magnolia, in courtyard to the right of The Marketplace. There's a large parking lot and they are on the right side as you face the buildings. They are located on the bottom floor left hand side #4.

The deposition will be upon oral examination before Accurate Stenotype Reporters, or a Notary Public in and for the State of Florida at Large, or some other officer duly authorized by law to take depositions. The oral examination will continue from day to day until completed. The deposition is being taken for the purpose of discovery, for use at trial, or both of the foregoing, or for such other purposes as are permitted under the applicable and governing rules,

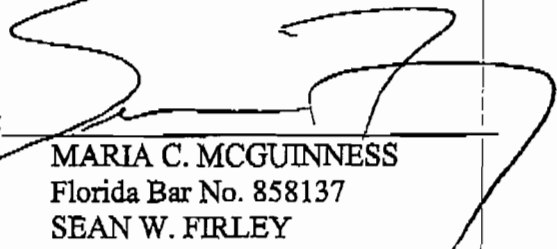
**BEST AVAILABLE COPY**

pursuant to Florida Rules of Civil Procedure. A list of the documents to be produced is attached hereto as Exhibit A.

**CERTIFICATE OF SERVICE**

I HEREBY CERTIFY that a true and correct copy of the foregoing was faxed and mailed on this 19<sup>th</sup> day of February, 2003, to: Spencer Sax, Esq. and Rachelle R. McBride, Esquire, Sachs, Sax & Klein, P.A., Post Office Box 810037, Boca Raton, Florida 33481-0037.

CARLTON FIELDS, P.A.  
Counsel for Caldwell Energy Environmental, Inc.  
Bank of America Tower at International Place  
100 Southeast Second Street, Suite 4000  
Miami, Florida 33131  
(305) 530-0050

By:   
MARIA C. MCGUINNESS  
Florida Bar No. 858137  
SEAN W. FIRLEY  
Florida Bar No. 0118567

Co-counsel for Plaintiff:

Robert M. Connolly, Esq.  
Stites & Harbison  
400 West Market Street  
Suite 1800  
Louisville, KY 40202-3352

Copy via Facsimile to:  
Accurate Stenotype Reporters (850) 878-2254 fax

**BEST AVAILABLE COPY****EXHIBIT A**

All documents pertaining to Defendant Florida Power & Light Company's ("FPL") permit application, permit, construction and operation of inlet fogging systems at FPL's Martin County, Florida and Putnam County, Florida power generating plants, including but not limited to any documents discussing FPL's anticipated and estimated use of the fogging systems in hours and/or on an annual basis, expectations for increases in megawatt output through the use of the inlet fogging systems at these power plants and the effect of the fogging systems on NOx emissions.

CARLTON FIELDS, P.A.

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050



# CARLTON FIELDS

ATTORNEYS AT LAW

4000 INTERNATIONAL PLACE  
100 S. E. SECOND STREET  
MIAMI, FLORIDA 33131

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FEB 17 2003

MAILING ADDRESS:  
P.O. BOX 019101, MIAMI, FL 33131-9101  
TEL (305) 530-0050 FAX (305) 530-0055

BUREAU OF AIR REGULATION

February 14, 2003

Ms. Teresa Heron  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

VIA U.S. MAIL

**Re: Caldwell Energy & Environmental, Inc. vs. Florida Power & Light Company  
Case No. CL 01-2415 AG, Palm Beach County Circuit Court  
Our File No. 44087-98622**

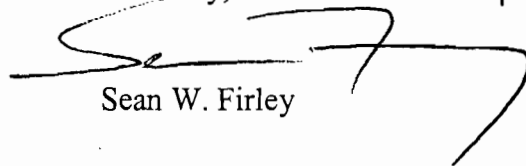
Dear Ms. Heron:

This letter will serve to confirm our telephone conversation today. Thank you for agreeing to begin your deposition on February 20, 2003 at 9:00 a.m., one hour earlier than originally scheduled.

As we discussed, it is very important that we receive copies of all documents you will be producing at the deposition well in advance of the deposition so that we can, in turn, furnish a copy to our opposing counsel who will also appear by telephone. I have enclosed a duplicate copy of the Subpoena which lists the documents requested for your reference.

Please call my secretary, Patty Watson, at the telephone number listed above to coordinate the delivery of the documents. She can supply you with our federal express account number for your use in overnighting the documents to us so that we can avoid the necessity of sending the documents via facsimile.

Sincerely,



Sean W. Firley

SWF:paw  
Enclosure

MIA#2234583.1

MIAMI ORLANDO ST. PETERSBURG TALLAHASSEE TAMPA WEST PALM BEACH

IN THE CIRCUIT COURT OF THE 15TH  
JUDICIAL CIRCUIT IN AND FOR  
PALM BEACH COUNTY, FLORIDA

CASE NO. CL 01-2415 AG

CALDWELL ENERGY & ENVIRONMENTAL,  
INC., a foreign corporation,

Plaintiff,

vs.

FLORIDA POWER & LIGHT COMPANY,  
a Florida corporation,

Defendant.

**COPY**

**SUBPOENA DUCES TECUM FOR PRODUCTION OF DOCUMENTS  
AND THINGS WITH TELEPHONIC DEPOSITION**

THE STATE OF FLORIDA:

TO: Ms. Teresa Heron (850-921-9529)  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

YOU ARE COMMANDED to appear at the offices of State of Florida, Department of  
Environmental Protection, 111 South Magnolia Drive - #4, Tallahassee, FL 32399-2400, on  
February 20, 2003 at 10:00 a.m., and to have with you at that time and place the following:

*9:00 A.M.*  
All documents pertaining to Defendant Florida Power & Light  
Company's ("FPL") permit application, permit, construction  
and operation of inlet fogging systems at FPL's Martin  
County, Florida and Putnam County, Florida power  
generating plants, including but not limited to any documents  
discussing FPL's anticipated, estimated and actual use of the  
fogging systems in hours and/or on an annual basis,  
expectations for increases in megawatt output through the use

MIA#2230344.1

CARLTON FIELDS, P. A .

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050

**of the inlet fogging systems at these power plants and the effect  
of the fogging systems on NOx emissions.**

These items will be inspected and may be copied at that time. You will not be required to surrender the original items. You may condition the preparation of the copies upon the payment in advance of the reasonable cost of preparation. You have the right to object to the production pursuant to this subpoena at any time before production by giving written notice to the attorney whose name appears on this subpoena.

If you fail to:

- (1) Appear as specified; or
- (2) Furnish the records instead of appearing as provided above; or
- (3) Object to this subpoena

You may be in contempt of Court. You are subpoenaed by the attorney whose name appears on this subpoena and unless excused from this subpoena by this attorney or the Court, you shall respond to this subpoena as directed.

DATED on January \_\_\_\_, 2003.

By: \_\_\_\_\_  
MARIA C. McGUINNESS, ESQ.  
Florida Bar No.: 858137  
COREY B. COLLINS, ESQ.  
Florida Bar No.: 0060704  
Attorney for Caldwell Energy &  
Environmental, Inc.  
CARLTON FIELDS, P.A.  
100 S.E. Second Street, Suite 4000  
Miami, FL 33131  
(305) 530-0050

Send Copies to:

MARIA C. McGUINNESS, ESQ.  
Carlton Fields, P.A.  
100 S.E. Second Street  
Suite 4000  
Miami, Florida 33131

CARLTON FIELDS, P. A.

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050

Department of Environmental Protection

Photocopy Charge Computation

Date: 2/18/03

Photocopies made for: Patty Watson @ Carlton Fields

Photocopies made by: Vickie Gibson

No. of Photocopies:	<u>164</u>	@ \$0.15 per copy	<u>\$24.60</u>
	<u>23</u>	@ \$0.20 double sided	<u>\$ 4.60</u>

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		Photocopy assignment:		Cost:
\$	x		=	\$ 6.00

Total Charge for Photocopies: \$ 35.20

\* Employee's monthly gross salary divided by 174 hours, then multiplied by 1.406 equals total hourly salary costs, including fringe benefits.

Please make check payable to:

The Department of Environmental Protection

Division of Air Resource Management  
Attn: Patty Adams, MS 5505 MC 5515  
2600 Blainstone Road  
Tallahassee, FL 32399- 2400

Check Sheet

Company Name: FPL Martin 0850001-005-AC  
Permit Number: 0850001-005-AC  
PSD Number: \_\_\_\_\_  
Permit Engineer: \_\_\_\_\_

**Application:**

- Initial Application
- Incompleteness Letters
- Responses
- Waiver of Department Action
- Department Response
- Other

**Cross References:**

- 
- 
- 

**Intent:**

- Intent to Issue
- Notice of Intent to Issue
- Technical Evaluation
- BACT Determination
- Unsigned Permit

Correspondence with:

- EPA
- Park Services
- Other

Proof of Publication

- Petitions - (Related to extensions, hearings, etc.)
- Waiver of Department Action
- Other

**Final Determination:**

- Final Determination
- Signed Permit
- BACT Determination
- Other

**Post Permit Correspondence:**

- Extensions/Amendments/Modifications
- Other

Check Sheet

Company Name: FPL Putman 1070014  
Permit Number: 1070014-003AC  
PSD Number: \_\_\_\_\_  
Permit Engineer: \_\_\_\_\_

**Application:**

- Initial Application
  - Incompleteness Letters
  - Responses
  - Waiver of Department Action
  - Department Response
  - Other

**Cross References:**

- 
- 
- 

**Intent:**

- Intent to Issue
- Notice of Intent to Issue
- Technical Evaluation
- BACT Determination
- Unsigned Permit
- Correspondence with:
  - EPA
  - Park Services
  - Other
- Proof of Publication
  - Petitions - (Related to extensions, hearings, etc.)
  - Waiver of Department Action
  - Other

**Final Determination:**

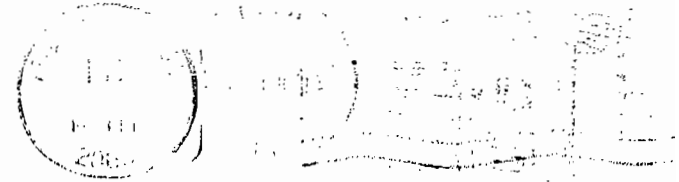
- Final Determination
- Signed Permit
- BACT Determination
- Other

**Post Permit Correspondence:**

- Extensions/Amendments/Modifications
- Other

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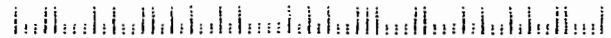
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**CARLTON FIELDS**  
POST OFFICE BOX 019101  
MIAMI, FLORIDA 33131-9101



Ms. Teresa Heron  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

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DROP OFF YOUR PACKAGE AND SAVE

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From (Your Name) Please Print Teresa Heron		Your Phone Number (Very Important) (850) 921-0529		
Company D.E.P. - Bureau of Air Regulation		To (Recipient's Name) Please Print Patty Watson		
Street Address 111 S. Magnolia Drive		Recipient's Phone Number (Very Important) (305) 530-0050		
City Tallahassee	State FL	Department/Floor No. for Sean W. Firley		
ZIP Required 32311		Company Carlton Fields, Attorneys at Law		
		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 4000 International Place		
		City Miami		
		State FL		
		ZIP Required 33131		
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)				
PAYMENT 1 <input type="checkbox"/> Bill Sender 2 <input checked="" type="checkbox"/> Bill Recipient's FedEx Acct. No. 3 <input type="checkbox"/> Bill 3rd Party FedEx Acct. No. 4 <input type="checkbox"/> Bill Credit Card		IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here		
5 <input type="checkbox"/> Cash/Check Acct./Credit Card No. 1345-2681-5 Exp. Date		Street Address		
City		State		
ZIP Required		ZIP Required		
<b>4 SERVICES (Check only one box)</b> Priority Overnight (Delivery by next business morning) 11 <input type="checkbox"/> OTHER PACKAGING 16 <input type="checkbox"/> FEDEX LETTER 12 <input checked="" type="checkbox"/> FEDEX PAK* 13 <input type="checkbox"/> FEDEX BOX 14 <input type="checkbox"/> FEDEX TUBE Standard Overnight (Delivery by next business afternoon No Saturday delivery) 51 <input type="checkbox"/> OTHER PACKAGING 56 <input type="checkbox"/> FEDEX LETTER* 52 <input type="checkbox"/> FEDEX PAK* 53 <input type="checkbox"/> FEDEX BOX 54 <input type="checkbox"/> FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 <input type="checkbox"/> ECONOMY* Government Overnight (Restricted for authorized users only) 46 <input type="checkbox"/> GOVT LETTER 41 <input type="checkbox"/> GOVT PACKAGE *Economy 1 error Rate not available Minimum charge: One pound Economy rate.		<b>5 DELIVERY AND SPECIAL HANDLING (Check services required)</b> Weekly Service 1 <input type="checkbox"/> HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 <input checked="" type="checkbox"/> DELIVER WEEKDAY Saturday Service 31 <input type="checkbox"/> HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 <input type="checkbox"/> DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 <input type="checkbox"/> SATURDAY PICK-UP (Extra charge) Special Handling 4 <input type="checkbox"/> DANGEROUS GOODS (Extra charge) 6 <input type="checkbox"/> DRY ICE (Dangerous Goods Shipper's Declaration not required) 12 <input type="checkbox"/> HOLIDAY DELIVERY (if allowed) (Extra charge)	<b>6 PACKAGES</b> WEIGHT In Pounds Only YOUR DECLARED VALUE (See right) Total Total Total DIM SHIPMENT (Changeable Volume) lbs.	<b>SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY</b> Use of this airbill constitutes your agreement to the service conditions in our current Service Guide, available upon request. See back of sender's copy of this airbill for information. Service conditions may vary for Government Overnight Service. See U.S. Government Service Guide for details. We will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, and document your actual loss for a timely claim. Limitations found in the current Federal Express Service Guide apply. Your right to recover from Federal Express for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the declared value specified to the left. Recovery cannot exceed actual documented loss. The maximum Declared Value for FedEx Letter and FedEx Pak packages is \$500. In the event of untimely delivery, Federal Express will at your request and with some limitations refund all transportation charges paid. See Service Guide for further information. Federal Express Use: Base Charges Declared Value Charge Other 1 Other 2 Total Charges REVISION DATE 12/92 PART # 137205 GBUE FORMAT # 158 158 PRINTED IN U.S.A.
<b>70 <input type="checkbox"/> OVERNIGHT FREIGHT**</b> (Continued restriction required) Delivery commitment may be later in some areas.		<b>80 <input type="checkbox"/> TWO-DAY FREIGHT**</b> *Declared Value Limit \$500. **Call for delivery schedule.		

Release Signature



IN THE CIRCUIT COURT OF THE 15TH  
JUDICIAL CIRCUIT IN AND FOR  
PALM BEACH COUNTY, FLORIDA

CASE NO. CL 01-2415 AG

CALDWELL ENERGY & ENVIRONMENTAL,  
INC., a foreign corporation,

Plaintiff,

vs.

FLORIDA POWER & LIGHT COMPANY,  
a Florida corporation,

Defendant.

RECEIVED

JAN 27 2003

BUREAU OF AIR REGULATION

**SUBPOENA DUCES TECUM FOR PRODUCTION OF DOCUMENTS  
AND THINGS WITH TELEPHONIC DEPOSITION**

THE STATE OF FLORIDA:

TO: Ms. Teresa Heron (850-921-9529)  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

~~J. Lee Vauss~~  
Certified Process Server ID#81  
Second Judicial Circuit  
Florida/County 250 AM  
Served 1/27/03 Time 1:14 PM

YOU ARE COMMANDED to appear at the offices of State of Florida, Department of Environmental Protection, 111 South Magnolia Drive - #4, Tallahassee, FL 32399-2400, on February 20, 2003 at 10:00 a.m., and to have with you at that time and place the following:

**All documents pertaining to Defendant Florida Power & Light Company's ("FPL") permit application, permit, construction and operation of inlet fogging systems at FPL's Martin County, Florida and Putnam County, Florida power generating plants, including but not limited to any documents discussing FPL's anticipated, estimated and actual use of the fogging systems in hours and/or on an annual basis, expectations for increases in megawatt output through the use**

CARLTON FIELDS, P. A.

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050

**of the inlet fogging systems at these power plants and the effect  
of the fogging systems on NOx emissions.**

These items will be inspected and may be copied at that time. You will not be required to surrender the original items. You may condition the preparation of the copies upon the payment in advance of the reasonable cost of preparation. You have the right to object to the production pursuant to this subpoena at any time before production by giving written notice to the attorney whose name appears on this subpoena.

If you fail to:

- (1) Appear as specified; or
- (2) Furnish the records instead of appearing as provided above; or
- (3) Object to this subpoena

You may be in contempt of Court. You are subpoenaed by the attorney whose name appears on this subpoena and unless excused from this subpoena by this attorney or the Court, you shall respond to this subpoena as directed.

DATED on January 22, 2003.

By: \_\_\_\_\_

MARIA C. MCGUINNESS, ESQ.

Florida Bar No.: 858137

COREY B. COLLINS, ESQ.

Florida Bar No.: 0060704

Attorney for Caldwell Energy &  
Environmental, Inc.

CARLTON FIELDS, P.A.

100 S.E. Second Street, Suite 4000

Miami, FL 33131

(305) 530-0050

Send Copies to:

MARIA C. MCGUINNESS, ESQ.

Carlton Fields, P.A.

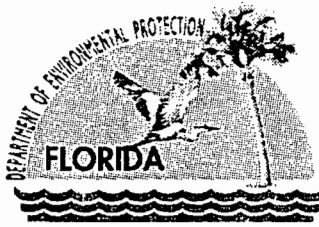
100 S.E. Second Street

Suite 4000

Miami, Florida 33131

CARLTON FIELDS, P. A .

Bank of America Tower at International Place - Suite 4000 - 100 Southeast Second Street - Miami - Florida 33131-9101 - (305) 530-0050



Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

July 15, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Lindsay  
Plant General Manager  
Florida Power & Light  
Post Office Box 176  
Indiantown, Florida 34946-0176

Re: DEP File No. PSD-FL-146(G) and 0850001-005AC  
Inlet Foggers Project - Martin Power Plant

Dear Mr. Lindsay:

The Department reviewed your request to modify the PSD Permit to authorize the installation of inlet foggers on the four General Electric PG7221 combustion turbine-electrical generators (Combustion Turbines 3A&B, 4A&B). The request is acceptable as detailed in the Department's Technical Evaluation and Preliminary Determination.

PSD-FL-146 permit is hereby modified as follows:

### Inlet Fogger Installation

Inlet foggers may be installed on Units CT3A, CT3B, CT4A and CT4B. Operation of the foggers on each unit may not exceed the following limits: 181,661 degree F-hours in aggregate firing natural gas fuel if no distillate fuel is fired. If distillate oil is fired in any of the CT's during a calendar year, the allowable degree F-hours for natural gas shall be decreased by 2.77 degree F-hours for every hour operated on distillate oil fuel. No CT may exceed 4,000 degree F-hours per year firing distillate oil fuel.

The temperature drop across the inlet foggers shall be monitored whenever water is injected at the foggers and hourly average temperature drops shall be calculated and recorded automatically using computer system. The product of each hour of fogger operation and the average temperature depression for that hour shall be summed for each calendar year and shall be submitted to the DEP SE District Office with the Annual Operating Report. The temperature monitoring system shall be calibrated annually in accordance with Guidance Document No. DARM-EM-03 (attached).

A copy of this letter shall be filed with the referenced permit and shall become part of the permit. This permit modification is issued pursuant to Chapter 403, Florida Statutes. Any party to this order (permit modification) has the right to seek judicial review of it under Section 120.68, F.S., by the filing of a Notice of Appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department of Environmental Protection in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000,

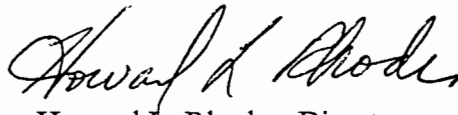
*"Protect, Conserve and Manage Florida's Environment and Natural Resources"*

Mr. John Lindsay  
July 15, 1999

and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within (thirty) days after this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

Sincerely,



Howard L. Rhodes, Director  
Division of Air Resources  
Management

HLR/aal

Enclosures

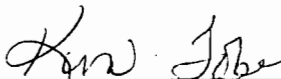
**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this PSD PERMIT MODIFICATION was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 7-20-99 to the person(s) listed:

John Lindsay, FP&L\*  
Richard G. Piper, FP&L  
Ken Kosky P.E., Golder Associates  
Isidore Goldman, SED  
John Bunyak, NPS  
Gregg Worley, EPA

Clerk Stamp

**FILING AND ACKNOWLEDGMENT**  
**FILED**, on this date, pursuant to §120.52,  
Florida Statutes, with the designated Department  
Clerk, receipt of which is hereby acknowledged.

  
\_\_\_\_\_  
(Clerk)

7-20-99  
(Date)

BEST AVAILABLE COPY

Z 333 618 111

US Postal Service  
**Receipt for Certified Mail**

No Insurance Coverage Provided.  
Do not use for International Mail (See reverse)

PS Form 3800, April 1995

Sent to	John Lindsay
Street & Number	FP & L
Post Office, State, & ZIP Code	Indian town, FL
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	Martin
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	7-20-99
	0850001-005-AC

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- Addressee's Address
  - Restricted Delivery
- Consult postmaster for fee.

3. Article Addressed to:

John Lindsay  
FP & L  
PO Box 176  
Indian town, FL  
34946-0176

5. Received By: (Print Name)  
Richard Tillis

6. Signature (Addressee or Agent)  
x Richard Tillis

4a. Article Number  
2 333 618 111

4b. Service Type  
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 Express Mail  Insured  
 Return Receipt for Merchandise  COD

7. Date of Delivery  
7-23-99

8. Addressee's Address (Only if requested and fee is paid)

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PS Form 3800, April 1995

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FedEx Tracking Number

811241472830

Form I.D. No.

0200

Sender's Copy

### 1 From (please print and press hard)

Date 7-20-99 Sender's FedEx Account Number \_\_\_\_\_

Sender's Name TERESA HERON Phone on 921-9533  
(850) 921-9529

Company FLORIDA DEP Air Div.

Address 2600 BLAIR STONE ROAD Dept./Floor/Suite/Room \_\_\_\_\_

City TALLAHASSEE State FL ZIP 32399-2400

### 2 Your Internal Billing Reference Information (Optional) (First 24 characters will appear on invoice)

### 3 To (please print and press hard)

Recipient's Name RICHARD PIPER Phone (561) 691-7058

Company FPL 0850001-005 AC Martin

Address 700 UNIVERSE BLVD Dept./Floor/Suite/Room \_\_\_\_\_  
(To "HOLD" at FedEx location, print FedEx address here) (We Cannot Deliver to P.O. Boxes or P.O. ZIP Codes)

City JUNO BEACH State FL ZIP 33408

#### For **HOLD** at FedEx Location check here

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Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only)  Next Sunday Delivery (Available for FedEx Priority Overnight only)

**Service Conditions, Declared Value, and Limit of Liability** - By using this Airbill, you agree to the service conditions in our current Service Guide or U.S. Government Service Guide. Both are available on request. SEE BACK OF SENDER'S COPY OF THIS AIRBILL FOR INFORMATION AND ADDITIONAL TERMS. We will not be responsible for any claim in excess of \$100 per package whether the result of loss, damage, or delay, non-delivery, misdelivery, or misrouting, unless you declare a higher value, pay an additional charge, and document your

actual loss in a timely manner. Your right to recover from us for any loss includes intrinsic value of the package, loss of sales, interest, profit, attorney's fees, costs, and other forms of damage, whether direct, incidental, consequential, or special, and is limited to the greater of \$100 or the declared value but cannot exceed actual documented loss. The maximum declared value for any FedEx Letter and FedEx Pak is \$500. Federal Express may, upon your request, and with some limitations, refund all transportation charges paid. See the current Service Guide for further details.

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Delivery commitment may be later in some areas.

FedEx Priority Overnight (Next business morning)  FedEx Standard Overnight (Next business afternoon)  
 FedEx First Overnight (Earliest next business morning delivery to select locations) (Higher rates apply)  
 FedEx 2Day (Second business day)  FedEx Express Saver (Third business day)  
FedEx Letter Rate not available. Minimum charge: One pound rate.

### 4b Express Freight Service Packages over 150 lbs.

Delivery commitment may be later in some areas.

FedEx Overnight Freight (Next business day)  FedEx 2Day Freight (Second business day)  FedEx Express Saver Freight (Up to 3 business days)  
(Call for delivery schedule. See back for detailed descriptions of freight services.)

### 5 Packaging

FedEx Letter  FedEx Pak (Declared value limit \$500)  FedEx Box  FedEx Tube  Other Pkg.

### 6 Special Handling

Does this shipment contain dangerous goods?  No  Yes (Shipper's Declaration not required)  Yes (Shipper's Declaration required)  
 Dry Ice (Dry Ice, 9, UN 1845) x \_\_\_\_\_ kg.  Cargo Aircraft Only  
\*Dangerous Goods cannot be shipped in FedEx packaging.

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Bill to:  Sender (Account No. in Section 1 will be billed)  Recipient (Enter FedEx Account No. or Credit Card No. below)  Third Party  Credit Card  Cash/Check

FedEx Account No. 1859-3028-7

Credit Card No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Total Packages \_\_\_\_\_ Total Weight \_\_\_\_\_ Total Declared Value\* \$ \_\_\_\_\_ Total Charges \$ \_\_\_\_\_

\*When declaring a value higher than \$100 per shipment, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE, AND LIMIT OF LIABILITY section for further information.

### 8 Release Signature Sign to authorize delivery without obtaining signature.

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.

322

Rev. Date 3/98 Part #153024 ©1994-98 FedEx PRINTED IN U.S.A. GFE 100

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## FINAL DETERMINATION

Florida Power and Light Company (FP&L)  
Martin Power Plant, Martin County  
Inlet Foggers Installation  
DEP File No: 0850001-005-AC (PSD-FL-146G)

An Intent to Issue an air construction permit modification, authorizing the installation of inlet foggers on the four General Electric PG7221 FA combustion turbine-electrical generators (E.U.No. 003-006) at the Martin Power Plant was distributed on June 15, 1999. This facility is located 7 miles North of Indiantown, Martin County, Florida.

The Public Notice of Intent to Issue Air Construction Permit was published in The Okeechobee News on June 19, 1999. Comments were received from FP&L.

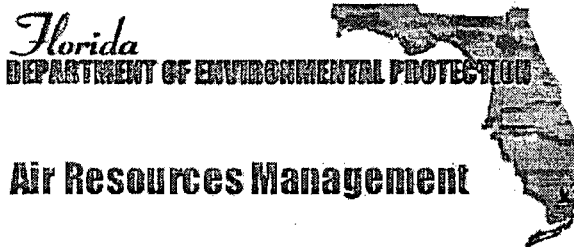
FP&L comments were related to the new Specific Condition for the foggers. FP&L requested to revise this condition to include an allowance for increasing fogger operating hours if distillate oil is not fired. The Department evaluated FP&L comments and agreed with their request. The new Specific Condition for the foggers is revised as follows:

### Inlet Fogger Installation:

Inlet foggers may be installed on Units CT3A, CT3B, CT4A and CT4B. Operation of the foggers on each unit may not exceed the following limits: 181,661 degree F-hours in aggregate firing natural gas fuel if no distillate fuel is fired. If distillate oil is fired in any of the CT's during a calendar year, the allowable degree F-hours for natural gas shall be decreased by 2.77 degree F-hours for every hour operated on distillate oil fuel. No CT may exceed 4,000 degree F-hours per year firing distillate oil fuel

The temperature drop across the inlet foggers shall be monitored whenever water is injected at the foggers and hourly average temperature drops shall be calculated and recorded automatically using computer system. The product of each hour of fogger operation and the average temperature depression for that hour shall be summed for each calendar year and shall be submitted to the DEP SE District Office with the Annual Operating Report. The temperature monitoring system shall be calibrated annually in accordance with Guidance Document No. DARM-EM-03 (attached).

The final action of the Department will be to issue the permit modification as noted above.



DESTINATION [dropdown arrow]

### Air Resources Management



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DARM-EM-03

TO: District Air Program Administrators Local Air Program Administrators Bureau of Air Regulation Engineers

FROM: Howard L. Rhodes, Director Division of Air Resources Management

DATE: October 10, 1994

SUBJECT: Guidance on Calibration of the Temperature Monitoring System for Soil Thermal Treatment Facilities

Rule 62-296.415(1)(c), F.A.C., requires the temperature of the flue gases leaving the high temperature zone of a soil thermal treatment facility to be monitored continuously. Rule 62-297.500(6), F.A.C., requires the temperature monitoring system to be calibrated at least annually from 10 percent below to 10 percent above its normal operation range by the procedures recommended by the manufacturer. The temperature monitoring system generally consists of a thermocouple, a temperature indicator, and a recorder. The purpose of the calibration is to provide reasonable assurance that the temperature being recorded by the monitoring system is the actual temperature of the flue gases.

If the manufacturer has provided recommended calibration procedures, those procedures should be followed. If the manufacturer has not provided recommended calibration procedures, the following general calibration procedures should be used:

**THERMOCOUPLE:** The calibration points should bracket the hot zone temperature range over which the thermocouple is to be used. The rule requires the



voltage output from the thermocouple to be measured at a minimum of three temperatures and over a range from 10% below to 10% above the designed flue gas hot zone temperature. The thermocouple should be calibrated against a NIST (National Institute of Standards and Technology) traceable reference thermocouple. The thermocouple may be calibrated using ASTM E 220, Method B. For these high temperature calibrations, electrical tube furnaces or dry fluidized baths can be used as stable heat sources. The incinerator duct may also be used for thermocouple calibration as discussed in guideline document GD-24, "Temperature Measurements and Calibration of Type K Thermocouples in High Temperature Stacks."

This document is available from the EPA Emission Measurement and Technical Information Center (EMTIC). The telephone number for the EPA bulletin board system is (919) 541-5742. Alternatively, the thermocouple can be replaced each year with a new thermocouple certified by the manufacturer to be accurate to within 0.9% of the flue gas temperatures being measured. A certificate of conformance from the manufacturer (certifying that the new thermocouple conforms to published specifications) will satisfy the annual calibration requirements of Rule 62-297.500(6), F.A.C.

**TEMPERATURE INDICATOR:** The instrument, which converts voltage output from the thermocouple to a temperature reading, can be calibrated by applying known voltages (mv), and reading the reported temperatures. The voltage values should correspond to the voltages generated by the thermocouple for temperatures over a range from 10% below to 10% above the designed flue gas hot zone temperature. The reference voltage supply should be accurate to within 0.1% of the reading.

**RECORDER:** The strip chart recorder or digital data acquisition system should be connected to the temperature indicator during its calibration and can be calibrated at the same time. The recorder should be adjusted to reproduce the readings of the temperature indicator.

The temperature monitoring system calibration error should not exceed 1% of the temperature reading

pursuant to Rule 62-297.500(6), F.A.C.

HLR/mh/hf

Last updated:  
May 17, 1999

Florida Department of  
Environmental Protection

Memorandum

TO: Howard L. Rhodes

THRU: Clair H. Fancy *CHF*  
Al Linero *AL* 7/15

FROM: Teresa Heron *T.H.*

DATE: July 15, 1999

SUBJECT: FP&L Martin Plant  
DEP File No. 0850001-005-AC (PSD-FL-146G)

Attached is the final PSD permit modification package for the compressor inlet fogger project at the FP&L Martin Plant. The application is to install inlet foggers ahead of the compressor inlets of four combined cycle combustion turbines. The foggers will operate on hot days and days of relatively low humidity. The evaporative cooling effected by the foggers will allow the units to operate closer to their rated capacity.

Both short-term and annual emissions will increase because the heat rate through the units will increase when the foggers. Maximum short-term emissions will still occur during cold days when use of the foggers is not feasible. The units already comply with 40 CFR 60, Subpart GG, so NSPS applicability is not an issue. FP&L proposes to limit operation of the coolers to 34,320 degrees F-hour on gas and 4000 degrees F-hour on oil to insure PSD is not triggered by their use.

I recommend your signature and approval of the cover letter and the final permit modification letter.

AAL/th

Attachments

COMPLETE MAY 7  
INTENT JUNE 7 (DAY 31)  
PROOF JULY 8  
RESTART JULY 22 (DAY 31)  
TODAY JULY 15  
DAY 90 SEPTEMBER 18

ACTUALLY PUBLISHED ON JUNE 19 - SINCE  
> 14 DAYS HAVE  
ELAPSED, WE CAN ISSUE.



Richard Piper

July 8, 1999

Teresa -

Per our conversation this morning, attached  
is the copies of the Public Notices for  
Putnam and Martin.

-RICH

May be

Duplicates of

Public Notices  
on both plants



**FPL**

June 24, 1999

**RECEIVED**

JUL 08 1999

BUREAU OF AIR REGULATION

Ms. Teresa Heron, P.E.  
New Source Review Section  
Bureau of Air Regulation  
Florida Department of Environmental Protection  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

**RE: FPL Martin Combustion Turbine Inlet Foggers  
PSD Permit PSD-FL-146G**

Dear Teresa:

Enclosed pursuant to Clair Fancy's correspondence of June 15, 1999, please find one copy of the Proof of Publication for the subject inlet foggers at the Martin facility. The Notice of Intent was published on June 19, 1999.

Teresa, should you have any questions, please do not hesitate to contact me at (561) 691-7058.

Very truly yours,

Richard Piper  
Repowering Licensing Manager  
Florida Power and Light Company

cc: file  
SED

The Okeechobee News
P.O. Box 639, Okeechobee, Florida 34973
(941) 763-3134
Published Daily

STATE OF FLORIDA
COUNTY OF OKEECHOBEE

Before the undersigned authority personally appeared
Judy Kasten, who on oath says she is Publisher of the Okeechobee
News, a DAILY Newspaper published at Okeechobee, in
Okeechobee County, Florida; that the attached copy of advertise-
ment, being a

Public Notice of Intent to
Issue PSD Permit
Modification

in the matter of

DER.

in the 19th Judicial District of the Circuit Court of Okeechobee
County, Florida, was published in said newspaper in the issues
of

June 19, 1999

Affiant further says that the said Okeechobee News is
a newspaper published at Okeechobee, in said Okeechobee
County, Florida, and that said newspaper has heretofore been
published continuously in said Okeechobee County, Florida
each week and has been entered as second class mail matter at
the post office in Okeechobee, in said Okeechobee County,
Florida, for a period of one year next preceding the first
publication of the attached copy of advertisement; and affiant
further says that she has neither paid nor promised any person,
firm or corporation any discount, rebate, commission or refund
for the purpose of securing this advertisement for publication in
the said newspaper.

Judy Kasten
Sworn to and subscribed before me this 21ST

day of June A.D. 19 99

Anna M. Hines
Notary Public, State of Florida at Large

Anna M Hines
My Commission CC715804
Expires March 31, 2002

PUBLIC NOTICE OF INTENT TO ISSUE PSD PER-
MIT MODIFICATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP File No. 0850001-005-AC (PSD-FL-146G)
Florida Power & Light Martin Plant
Inlet Fogger Project
Martin County

The Department of Environmental Protection (Department)
gives notice of its intent to issue a PSD permit modification
to Florida Power & Light (FP&L). The permit is to install
foggers at the compressor inlets of four natural gas and No.
2 fuel oil-fired General Electric PG7221FA combined cycle
combustion turbine-electrical generators at the Martin Plant
in Martin County. A Best Available Control Technology
(BACT) determination was not required pursuant to Rule 62-
212.400, F.A.C. The applicant's name and address are Flori-
da Power & Light, Post Office Box 176, Indiantown, Flori-
da 34956.

The primary movers are the combustion turbines, which are
typically nominally rated by General Electric at approxi-
mately 160 MW at 59 degrees when firing gas. The combustion
turbines (exclusive of the steam cycle) normally achieve
their maximum rated output of approximately 170 MW on
cold (32 degrees) days because the greater compressor inlet
air density allows greater throughout in the rotor or expansion
section of the combustion turbine. The maximum power
output is only about 140 MW on hot (95 degrees) days
because of the lower compressor inlet air density. The fog-
gers can increase hot-day power output (under very dry condi-
tions) by as much as 14 MW per combustion turbine, thus
almost restoring the units to their nominal rating. Under the
design conditions for this Florida site (95 degrees and 50
percent humidity), an improvement of about 7 MW per combus-
tion turbine can be expected.

The foggers provide no benefit under humid or cold (less
than approximately 50 degrees) conditions and will not be
used when they occur. The maximum output of approxi-
mately 170 MW will continue to occur at a low ambient tem-
perature. The result is that maximum hourly emissions will
not increase although actual annual emissions will increase
within their permitted limits because more fuel will be used
on hot, relatively dry days.

Although the number of days during which the foggers can
economically operate probably limits emissions increases to
levels below significance for the purposes of PSD applica-
bility, FP&L proposes enforceable conditions to insure non-
applicability. FP&L asserts and the Department accepts that
the modification will not cause any meaningful change in the
actual hours of operation of these combined cycle units. The
units are allowed to operate continuously and already have a
very high availability factor. The maximum increase in annual
emissions caused by the project in tons per year is summa-
rized below along with the PSD-significant levels.

Table with 4 columns: Pollutant, Annual Emission, Increase, PSD Significant Levels. Rows include PM/PM10, SO2, NOx, VOC, CO.

An air quality impact analysis was not required or conduct-
ed. No significant impacts are expected to occur as a result
of this project. It will not cause or contribute to a violation of
any ambient air quality standard or increment.

The Department will issue the FINAL permit modification
with the attached conditions unless a response received in
accordance with the following procedures results in a different
decision or significant change of terms or conditions.

The Department will accept written comments concerning
the proposed permit issuance action for a period of thirty
(30) days from the date of publication of "Public Notice of
Intent to Issue a PSD Permit Modification." Written com-
ments should be provided to the Department's Bureau of Air
Regulation at 2600 Blair Stone Road, Mail Station #5505,
Tallahassee, FL 32399-2400. Any written comments filed
shall be made available for public inspection. If written com-
ments received result in a significant change in the proposed
agency action, the Department shall revise the proposed per-
mit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached con-
ditions unless a timely petition for an administrative hearing
is filed pursuant to Sections 120.569 and 120.57 F.S., before

the deadline for filing a petition. The procedures for peti-
tioning for a hearing are set forth below. Mediation is not
available in this proceeding.

A person whose substantial interests are affected by the pro-
posed permitting decision may petition for an administrative
proceeding (hearing) under Sections 120.569 and 120.57 of
the Florida Statutes. The petition must contain the informa-
tion set forth below and must be filed (received) in the Office
of General Counsel of the Department at 3900 Common-
wealth Boulevard, Mail Station #35, Tallahassee, Florida,
32399-3000. Petitions filed by the permit applicant or any of
the parties listed below must be filed within fourteen (14)
days of receipt of this notice intent. Petitions filed by any
persons other than those entitled to written notice under Sec-
tion 120.60(3) of the Florida Statutes must be filed within
fourteen days of publication of the public notice of intent
whichever occurs first. Under Section 120.60(3), however, any person
who asked the Department for notice of agency action may
file a petition within fourteen (14) days of receipt of that
notice, regardless of the date of publication. A petitioner
shall mail a copy of the petition to the applicant at the
address indicated above at the time of filing. The failure of
any person to file a petition within the appropriate time per-
iod shall constitute a waiver of that person's right to request
an administrative hearing (hearing) under Sections

# FP&L Martin Plant

120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file of identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 29-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida, 32301  
Telephone: 850/488-0114  
Fax: 850/922-6979

Department of Environmental Protection  
Southeast District Office  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
Telephone: 561/681-6600  
Fax: 561/681-6790

The complete project file includes the application, technical evaluation, Draft PSD Permit Modification, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

**PUBLISH: 6/19/99**  
**Okeechobee News #228**



Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

June 15, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Lindsay, Plant General Manager  
FP&L Martin Plant  
Post Office Box 176  
Indiantown, Florida 34946-0176

Re: DEP File No. 0850001-005-AC (PSD-FL-146G)  
FPL Martin Plant  
Inlet Foggers Installation

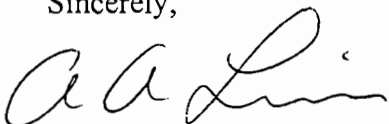
Dear Mr. Lindsay:

Enclosed is one copy of the Draft Permit and Technical Evaluation and Preliminary Determination, for the referenced project in Martin County. The Department's Intent to Issue PSD Permit Modification and the "PUBLIC NOTICE OF INTENT TO ISSUE PSD PERMIT MODIFICATION" are also included.

The "Public Notice of Intent to Issue PSD Permit Modification" must be published one time only, as soon as possible, the legal advertising section of a newspaper of general circulation in the area affected, pursuant to the requirements of Chapter 50, Florida Statutes. Proof of publication, i.e., newspaper affidavit, must be provided to the Department's Bureau of Air Regulation office within 7 (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 modification.

Please submit any written comments you wish to have considered concerning the Department's proposed action to A. A. Linero, P.E., Administrator, New Source Review Section at the above letterhead address. If you have any questions, please call Ms. Teresa Heron at 850/921-9529.

Sincerely,

 P.E. 6/15  
for C. H. Fancy, P.E., Chief,  
Bureau of Air Regulation

CHF/th

Enclosures



Z 333 618 163

US Postal Service  
**Receipt for Certified Mail**

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FP 4 L - Martins	
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Indiantown FL	
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Special Delivery Fee	
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Return Receipt Showing to Whom & Date Delivered	
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TOTAL Postage & Fees	\$
Postmark or Date	6-15-99

PS Form 3800, April 1995

4  
Your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- 1.  Addressee's Address
- 2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
Mr. John Lindsay, Plant Gen. Mgr.  
FP 4 L Martins Plant  
PO Box 176  
Indiantown, FL

4a. Article Number  
2333 618 163

4b. Service Type  
 Registered  
 Certified  
 Express Mail  
 Insured  
 Return Receipt for Merchandise  
 COD

7. Date of Delivery  
6-22-99

5. Received By: (Print Name)  
Bob Pilgrim

8. Addressee's Address (Only if requested and fee is paid)

6. Signature: (Addressee or Agent)

X Bob Pilgrim

PS Form 3811, December 1994

102595-97-8-0179

Domestic Return Receipt

Thank you for using Return Receipt Service.

In the Matter of an  
Application for Permit by:

Mr. John Lindsay  
Plant General Manager  
FP&L Martin Plant  
Post Office Box 176  
Indiantown, Florida 34956-0176

DEP File No. 0850001-005-AC (PSD-FL-146G)  
Combustion Turbines 003-006  
Inlet Foggers Installation  
Martin Power Plant  
Martin County

### INTENT TO ISSUE PSD PERMIT MODIFICATION

The Department of Environmental Protection (Department) gives notice of its intent to issue a PSD permit modification (copy of DRAFT PSD Permit Modification attached) for the proposed project, detailed in the application specified above and the attached Technical Evaluation and Preliminary Determination, for the reasons stated below.

The applicant, Florida Power & Light, Inc (FP&L), applied on March 29, 1999, to the Department to add inlet foggers to four combined cycle combustion turbine-electrical generators (Units 003 to 006) at the Martin Plant in Martin County.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.), Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, and 62-212, and 40 CFR 52.21. The above actions are not exempt from permitting procedures. The action is not a modification of the facility with respect to the rules for the Prevention of Significant Deterioration (PSD). However, the Department has determined that a modification of the existing PSD permit (PSD permit modification) is required to conduct the work.

The Department intends to issue this PSD permit modification based on the belief that reasonable assurances have been provided to indicate that operation of these emission units will not adversely impact air quality, and the emission units will comply with all appropriate provisions of Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297, F.A.C.

Pursuant to Section 403.815, F.S., and Rule 62-110.106(7)(a)1., F.A.C., you (the applicant) are required to publish at your own expense the enclosed "Public Notice of Intent to Issue PSD Permit Modification." The notice shall be published one time only in the legal advertisement section of a newspaper of general circulation in the area affected. For the purpose of these rules, "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. Where there is more than one newspaper of general circulation in the county, the newspaper used must be one with significant circulation in the area that may be affected by the permit. If you are uncertain that a newspaper meets these requirements, please contact the Department at the address or telephone number listed below. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400 (Telephone: 850/488-0114; Fax 850/ 922-6979). The Department suggests that you publish the notice within thirty days of receipt of this letter. You must provide proof of publication within seven days of publication, pursuant to Rule 62-110.106(5), F.A.C. No permitting action for which published notice is required shall be granted until proof of publication of notice is made by furnishing a uniform affidavit in substantially the form prescribed in section 50.051, F.S. to the office of the Department issuing the permit or other authorization. Failure to publish the notice and provide proof of publication may result in the denial of the permit pursuant to Rules 62-110.106(9) & (11), F.A.C.

The Department will issue the final PSD Permit Modification with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue PSD Permit Modification." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the PSD Permit Modification with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above. Mediation is not available in this proceeding.

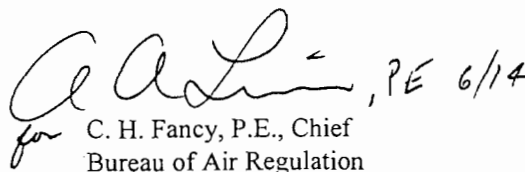
In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542 F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2) F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of the EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

Executed in Tallahassee, Florida.

 PE 6/14  
for C. H. Fancy, P.E., Chief  
Bureau of Air Regulation

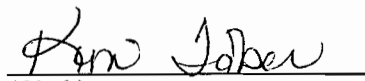
**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this INTENT TO ISSUE PSD PERMIT MODIFICATION (including the PUBLIC NOTICE, Technical Evaluation and Preliminary Determination, and the DRAFT PSD Permit Modification) was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 6-15-99 to the person(s) listed:

John Lindsay, FP&L\*  
Richard G. Piper, FP&L  
Ken Kosky P.E., Golder Associates  
Isidore Goldman, SED  
Gregg Worley, EPA

Clerk Stamp

**FILING AND ACKNOWLEDGMENT FILED**, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

 6-15-99  
(Clerk) (Date)

July XX, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Lindsay  
Plant General Manager  
Florida Power & Light  
Post Office Box 176  
Indiantown, Florida 34956-0176

Re: DEP File No. PSD-FL-146(G) and 0850001-005AC  
Inlet Foggers Project  
Martin Power Plant

Dear Mr. Lindsay:

The Department reviewed your request to modify the PSD Permit to authorize the installation of inlet foggers on the four General Electric PG7221 combustion turbine-electrical generators (Combustion Turbines 3A&B, 4A&B). The request is acceptable as detailed in the Department's Technical Evaluation and Preliminary Determination.

PSD-FL-146 permit is hereby modified as follows:

Inlet Fogger Installation

Inlet foggers may be installed on Units CT3A, CT3B, CT4A and CT4B. Operation of the foggers on each unit may not exceed 34,320 °F-hours for gas firing and 4,000 °F-hours for No. 2 fuel oil firing. The temperature drop across the inlet foggers shall be monitored whenever water is injected at the foggers and hourly average temperature drops shall be calculated and recorded automatically using computer system. The product of each hour of fogger operation and the average temperature depression for that hour shall be summed for each calendar year and shall be submitted to the DEP SE District Office with the Annual Operating Report. The temperature monitoring system shall be calibrated annually in accordance with Guidance Document No. DAMR-EM-03 (attached).

A copy of this letter shall be filed with the referenced permit and shall become part of the permit. This permit modification is issued pursuant to Chapter 403, Florida Statutes. Any party to this order (permit modification) has the right to seek judicial review of it under Section 120.68, F.S., by the filing of a Notice of Appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department of Environmental Protection in the Office

Mr. John Lindsay  
July XX, 1999

of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000, and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within (thirty) days after this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

Sincerely,

Howard L. Rhodes, Director  
Division of Air Resources  
Management

HLR/aal

Enclosures

**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this INTENT TO ISSUE PSD PERMIT MODIFICATION (including the PUBLIC NOTICE, Technical Evaluation and Preliminary Determination, and the DRAFT PSD Permit Modification) was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on \_\_\_\_\_ to the person(s) listed:

John Lindsay, FP&L\*  
Richard G. Piper, FP&L  
Ken Kosky P.E., Golder Associates  
Isidore Goldman, SED  
Gregg Worley, EPA

Clerk Stamp


**FILING AND ACKNOWLEDGMENT**  
**FILED**, on this date, pursuant to §120.52,  
Florida Statutes, with the designated  
Department Clerk, receipt of which is hereby  
acknowledged.

\_\_\_\_\_  
(Clerk)


\_\_\_\_\_  
(Date)


## Division of Air Resource Management

### **DARM** DARM-EM-03


 [Information](#)

TO: District Air Program Administrators Local Air  
Program Administrators Bureau of Air Regulation  
Engineers


 [Ozone Net](#)


 [Programs](#)

FROM: Howard L. Rhodes, Director Division of Air  
Resources Management


 [Regulations](#)


DATE: October 10, 1994

 [Forms](#)

 [Permitting](#)

SUBJECT: Guidance on Calibration of the Temperature  
Monitoring System for Soil Thermal Treatment Facilities

 [Outreach](#)

 [Downloads](#)

Rule 62-296.415(1)(c), F.A.C., requires the temperature of the flue gases leaving the high temperature zone of a soil thermal treatment facility to be monitored continuously. Rule 62-297.500(6), F.A.C., requires the temperature monitoring system to be calibrated at least annually from 10 percent below to 10 percent above its normal operation range by the procedures recommended by the manufacturer. The temperature monitoring system generally consists of a thermocouple, a temperature indicator, and a recorder. The purpose of the calibration is to provide reasonable assurance that the temperature being recorded by the monitoring system is the actual temperature of the flue gases.

If the manufacturer has provided recommended calibration procedures, those procedures should be followed. If the manufacturer has not provided recommended calibration procedures, the following general calibration procedures should be used:

**THERMOCOUPLE:** The calibration points should bracket the hot zone temperature range over which the thermocouple is to be used. The rule requires the voltage output from the thermocouple to be measured at a minimum of three temperatures and over a range from 10% below to 10% above the designed flue gas hot zone temperature. The thermocouple should be calibrated against a NIST (National Institute of Standards and Technology) traceable reference thermocouple. The

thermocouple may be calibrated using ASTM E 220, Method B. For these high temperature calibrations, electrical tube furnaces or dry fluidized baths can be used as stable heat sources. The incinerator duct may also be used for thermocouple calibration as discussed in guideline document GD-24, "Temperature Measurements and Calibration of Type K Thermocouples in High Temperature Stacks."

This document is available from the EPA Emission Measurement and Technical Information Center (EMTIC). The telephone number for the EPA bulletin board system is (919) 541-5742. Alternatively, the thermocouple can be replaced each year with a new thermocouple certified by the manufacturer to be accurate to within 0.9% of the flue gas temperatures being measured. A certificate of conformance from the manufacturer (certifying that the new thermocouple conforms to published specifications) will satisfy the annual calibration requirements of Rule 62-297.500(6), F.A.C.

**TEMPERATURE INDICATOR:** The instrument, which converts voltage output from the thermocouple to a temperature reading, can be calibrated by applying known voltages (mv), and reading the reported temperatures. The voltage values should correspond to the voltages generated by the thermocouple for temperatures over a range from 10% below to 10% above the designed flue gas hot zone temperature. The reference voltage supply should be accurate to within 0.1% of the reading.

**RECORDER:** The strip chart recorder or digital data acquisition system should be connected to the temperature indicator during its calibration and can be calibrated at the same time. The recorder should be adjusted to reproduce the readings of the temperature indicator.

The temperature monitoring system calibration error should not exceed 1% of the temperature reading pursuant to Rule 62-297.500(6), F.A.C.

HLR/mh/hf



# NOTICE TO BE PUBLISHED IN THE NEWSPAPER

## PUBLIC NOTICE OF INTENT TO ISSUE PSD PERMIT MODIFICATION

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 0850001-005-AC (PSD-FL-146G)

Florida Power & Light Martin Plant  
Inlet Fogger Project  
Martin County

The Department of Environmental Protection (Department) gives notice of its intent to issue a PSD permit modification to Florida Power & Light (FP&L). The permit is to install foggers at the compressor inlets of four natural gas and No. 2 fuel oil-fired General Electric PG7221FA combined cycle combustion turbine-electrical generators at the Martin Plant in Martin County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, Post Office Box 176, Indiantown, Florida 34956.

The primary movers are the combustion turbines, which are typically nominally rated by General Electric at approximately 160 MW at 59 degrees when firing gas. The combustion turbines (exclusive of the steam cycle) normally achieve their maximum rated output of approximately 170 MW on cold (32 degrees) days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is only about 140 MW on hot (95 degrees) days because of the lower compressor inlet air density. The foggers can increase hot-day power output (under very dry conditions) by as much as 15 MW, thus almost restoring the units to their nominal rating. Under the design conditions for this Florida site, an improvement of about 8 MW can be expected.

The foggers provide no benefit under humid or cold (less than approximately 50 degrees) conditions and will not be used when they occur. The maximum output of approximately 170 MW will continue to occur at low ambient temperature. The result is that maximum hourly emissions will not increase although actual annual emissions will increase within their permitted limits because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FP&L proposes enforceable conditions to insure non-applicability. FP&L asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. The units are allowed to operate continuously and already have a very high availability factor. The maximum increase in annual emissions caused by the project in tons per year is summarized below along with the PSD-significant levels.

<u>Pollutants</u>	<u>Annual Emission Increase</u>	<u>PSD Significant Levels</u>
PM/PM <sub>10</sub>	4	25/15
SO <sub>2</sub>	34	40
NO <sub>x</sub>	38	40
VOC	1	40
CO	18	100

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit modification with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue a PSD Permit Modification." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public

## **NOTICE TO BE PUBLISHED IN THE NEWSPAPER**

inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida, 32301  
Telephone: 850/488-0114  
Fax: 850/922-6979

Department of Environmental Protection  
Southeast District Office  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
Telephone: 561/681-6600  
Fax: 561/681-6790

The complete project file includes the application, technical evaluation, Draft PSD Permit Modification, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 1. Applicant

Florida Power & Light  
Environmental Services Department  
700 Universe Blvd  
Juno Beach, FL 33408

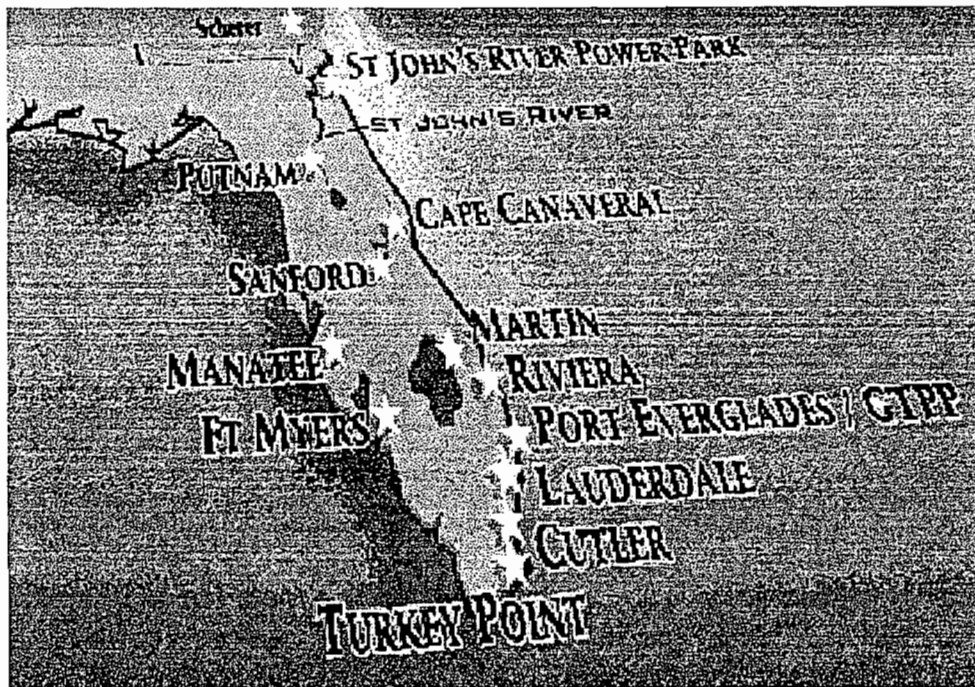
*Authorized Representative: John Lindsay, FP&L Martin Plant General Manager*

## 2. Source Name and Location

FP&L Martin Plant  
Post Office Box 176  
Indiantown, Florida 32956

UTM Coordinates: Zone 17, 543.2 km East and 2993.0 km North

The plant is located 7 miles North of Indiantown, Martin County. The location the Martin Plant within the FP&L system is shown below followed by a photograph of the site downloaded from the FP&L website:



## 3. Source Description

The Florida Power & Light (FP&L) Martin Plant consists of two oil and natural gas fired conventional steam generating stations, and two oil and natural gas fired combined cycle units. In addition, the facility includes one auxiliary boiler, and two diesel generators (one unregulated). Also included in this permit are two unregulated emissions units identified as facility-wide particulate matter emissions and facility-wide VOC emissions. Based on the Title V application, this facility is a major source of hazardous air pollutants (HAPs).

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

Each conventional steam unit has the maximum capacity of 863.3 megawatts (MW) and consists of a boiler/steam generator which drives a single reheat turbine generator, and is equipped with low NO<sub>x</sub> dual fuel firing burners to reduce emissions of nitrogen oxides; and, multicyclones, with fly ash reinjection, to control particulate matter emissions. In addition, the units have a continuous emission monitoring system for measuring opacity, NO<sub>x</sub>, and sulfur dioxide. Unit 1 (ARMS Emission Unit 001) commenced commercial operation in December 1980. Unit 2 (ARMS Emission Unit 002) commenced commercial operation in June 1981.

Each combined cycle unit consists of two General Electric PG7221FA combustion turbine-electrical generator with unfired heat recovery steam generators. A single steam electrical turbine serves each combined cycle unit. Each combined cycle unit has a net hot weather capacity of roughly 400 MW. Nitrogen oxide emissions are controlled by dry low NO<sub>x</sub> (DLN-2) combustors for natural gas with steam injection for fuel oil firing. Based on information contained in the Title V Permit Application, only natural gas has been fired in the units to date. Units 3A and 3B (ARMS Emissions Units 003 and 004) commenced commercial operation in February 1994. Units 4A and 4B (ARMS Emissions Unit 005 and 006) commenced commercial operation in April 1994.

#### **4. Current Permit and Major Regulatory Program Status**

Construction of the Martin Power Plant Units 1 and 2 was authorized by the Department under permits AC43-4037 and 4038. Units 3 and 4 were authorized under Site Certification PA89-27 and Permit.PSD-FL-146.

The facility operates under Title V Air Operation Permit No. 0850001-004-AV issued in June 1998. This facility is a major source of hazardous air pollutants (HAPs) based on information submitted in the Title V application.

The combustion turbines are subject to 40 CFR 60, Subpart GG, Standards of Performance for New Stationary Gas Turbines. The combined cycle units and the fossil fuel steam generators are regulated under the Title IV of the Clean Air Act, Acid Rain, Phase II.

#### **5. Permit Modification Request**

On March 29, 1999 the Department received a request from FPL for modification of its permits to install direct water spray fogging systems in the inlet ducts of Combustion Turbines (CT) 3A/B and 4A/B (ARMS Emissions Units 003 through 006). The project is a performance enhancement that can improve both the turbine power output and the heat rate of the unit. The principle is based on evaporative cooling of the incoming, filtered, ambient air to lower its temperature and increase its density.

The individual combustion turbines are typically rated by General Electric at approximately 160 MW each at 59 degrees when firing gas. The combustion turbines (exclusive of the steam cycle) normally achieve their maximum rated output of approximately 170 MW on cold (32 degrees) days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is only about 140 MW on hot (95 degrees) days because of the lower compressor inlet air density. The foggers can increase hot-day power output (under dry conditions) by around 15 MW, thus almost restoring the units to their nominal rating. The foggers provide no benefit under humid or cold (less than approximately 50 degrees) conditions and will not be used when they occur. The maximum output of approximately 170 MW will continue to occur at low ambient temperature.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

Inlet foggers are routinely included in new combustion turbine projects and have not affected the Department's decisions regarding Best Available Control Technology.

## 6. Emissions Increases Due to Modification/Method of Operation

The foggers are physical pieces of equipment whose addition and use can increase emissions on hot or dry days. The use of the foggers can also be considered a change in method of operation of the inlet "air conditioning system" that is already used to filter incoming air.

Assuming a design condition for Florida of 95 degrees (°F) and 50 percent (%) relative humidity, evaporative cooling to the point of saturation of the incoming gas stream results in a temperature decrease of approximately 16 °F to 79 °F. This represents an increase of roughly 5% in power output or on the order of 7 MW per unit. Under average annually averaged conditions, the reduction typically possible is on the order of 5.5 °F, with an associated power increase of about 3 MW.

Refer to attached Heat Input versus Ambient Temperature Curve. FP&L estimated that that heat input to each combustion turbine will increase by approximately 4.7 mmBtu per hour per degree of temperature reduction (mmBtu/hr/°F) by evaporative cooling. If emissions rates are known in terms of pounds per mmBtu (lb/mmBtu), the increase on hourly emissions can be estimated.

FP&L assumed that each unit will be operated 6240 hours per year gas and 125 hours on oil with the fogger on and that the average temperature decrease will be 5.5 °F when the foggers are on. Annual emissions are estimated as detailed in the following table.

### TOTAL EMISSIONS INCREASES DUE TO USE OF INLET FOGGERS AT FOUR UNITS

Pollutant	Emission Rate <u>lb/mmBtu</u> (gas)	Emission Rate <u>lb/mmBtu</u> (oil)	Emission Increase <u>ton/yr</u> (gas)	Emission Increase <u>ton/yr</u> (oil)	Annual Increase <u>tons/yr</u> (Oil & Gas)	PSD Threshold <u>tons/yr</u>
NO <sub>x</sub>	0.0900	0.2497	29.04	9.39	38.43	40
PM/PM <sub>10</sub>	0.0092	0.0328	2.95	1.23	4.19	25/15
CO	0.0480	0.0573	15.47	2.15	17.63	100
VOC	0.0015	0.0060	0.491	0.22	0.72	40
SO <sub>2</sub>	0.0465	0.4984	15.01	18.74	33.75	40

Source: Application and additional information submitted on March 29 and May 7, 1999 respectively.

Limiting each unit to 6240 hours of operation on gas and 125 hours of operation on oil will not effectively insure that annual emissions increases will not exceed the values given above. This is because the hours of operation will be chosen with a bias toward the days when the possible temperature decrease is greater than 5.5.

To insure enforceability of a limit on annual emissions increases, FP&L proposes to limit the annual "degree-hours (°F-hr)" that the foggers operate. Degrees during a given hour can be calculated by measuring the temperature difference between the ambient and cooled air, while hours are easily documented. These values can be integrated over a year to calculate annual degree hours. Actual annual °F-hr can be directly multiplied by the lb/mmBtu of each pollutant and the 4.7 mmBtu/hr/°F factor and converted to tons to calculate actual annual emissions increases.

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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The emissions increases calculated are the direct result from the physical change in or change in method of operation such as is the installation of the inlet foggers. These assume that the ability to achieve greater power output when the foggers are used does not result in emissions increases outside the turbines original power curve. The rationale is discussed below.

The emissions characteristics (GE performance curves) do not change as a result of the use of the foggers from what would normally occur throughout the entire range of temperatures and relative humidity. Rather, the foggers move the operating points along the same curve toward the power and emissions that normally occur at lower temperatures. The worst case emissions scenario will still occur during the winter months and will occur with the foggers off. According to GE (reference: Brooks, 1996), evaporative cooling is limited to ambient temperatures of 59 °F and above because of the potential for icing the compressor.

### 7. Evaluation of PSD Applicability

As a major source, a modification or change in method of operation of CTs 3A&B and 4A&B resulting in **significant net emissions increases** is subject to PSD review. Significant net emissions increase is defined in Rule 62-212.400, F.A.C as follows:

*Significant Net Emissions Increase – A significant net emissions increase of a pollutant regulated under the Act is a net emissions increase equal to or greater than the applicable significant emission rate listed in Table 212.400-2, Regulated Air Pollutants – Significant Emission Rates.*

The significant emission rates are included (see PSD Threshold) in the Table above. The meaning of a net emissions increase is given in Rule 62-212.400, F.A.C. as:

*Net Emissions Increase - A modification to a facility results in a net emissions increase when, for a pollutant regulated under the Act, the sum of all of the contemporaneous creditable increases and decreases in the actual emissions of the facility, including the increase in emissions of the modification itself and any increases and decreases in quantifiable fugitive emissions, is greater than zero.*

The definition of actual emissions is given in Rule 62-210.200, F.A.C. (definitions) as follows:

*Actual Emissions - The actual rate of emission of a pollutant from an emissions unit as determined in accordance with the following provisions:*

- (a) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during a two year period which precedes the particular date and which is representative of the normal operation of the emissions unit. The Department may allow the use of a different time period upon a determination that it is more representative of the normal operation of the emissions unit. Actual emissions shall be calculated using the emissions unit's actual operating hours, production rates and types of materials processed, stored, or combusted during the selected time period.*
- (b) The Department may presume that unit-specific allowable emissions for an emissions unit are equivalent to the actual emissions of the emissions unit provided that, for any regulated air pollutant, such unit-specific allowable emissions limits are federally enforceable.*

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

- (c) For any emissions unit (other than an electric utility steam-generating unit specified in subparagraph (d) of this definition) which has not begun **normal operations** on a particular date, actual emissions shall equal the **potential emissions** of the emissions unit on that date.
- (d) For an electric utility steam generating unit (other than a new unit or the replacement of an existing unit) actual emissions of the unit following a physical or operational change shall equal the representative actual annual emissions of the unit following the physical or operational change, provided the owner or operator submits to the Department on an annual basis, for a period of 5 years representative of normal post-change operations of the unit, within the period not longer than 10 years following the change, information demonstrating that the physical or operational change did not result in an emissions increase. The definition of "representative actual annual emissions" found in 40 CFR 52.21(b)(33) is adopted and incorporated by reference in Rule 62-204.800, F.A.C.

The term electric utility steam-generating unit is defined as:

*Electric Utility Steam Generating Unit* – Any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the unit.

Based on Department records, actual hours of operation since 1993 are as follows:

Unit/Year	Annual Operating Hours 1993 - 1998					
	1993	1994	1995	1996	1997	1998
3A (003)	786	7554	8334	7977	8121	8067
3B (004)	804	7789	8172	8281	8551	8301
4A (005)	91	5181	5974	8305	8243	8417
4B (006)	91	6780	8315	8310	8254	8345

As expected, there was a rapid increase in annual hours of operation after these very efficient units were installed in 1993. Their operation can presently be characterized as "baseload." The foggers will be allowed to operate continuously but will be limited in terms of "degree-hours." As previously mentioned, if the average temperature drop is in fact 5.5 °F, they can operate 6240 hours on gas and 125 hours on oil each.

The combustion turbines have clearly begun *normal operation*. As modern combined cycle units, they are very efficient in comparison with conventional boiler-based steam-electrical units. Each combustion turbine-electrical generator produces 160 MW (nominal) of electrical power excluding the power produced through the steam cycle. The steam cycle associated with each combustion turbine, including the unfired HRSG and steam turbine-electrical generator produces about 70 MW (well in excess of 25 MW) so that the units are clearly steam electrical units. Therefore, the correct approach to determine the magnitude of a net emissions increase is to compare actual emissions from preceding years with representative actual annual emissions as described for steam electrical units.

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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FP&L asserts and the Department accepts that use of the inlet foggers will not affect the hours of operation of the units. As mentioned previously, they are already baseload units and any downtime is more likely due to maintenance than to demand. Most likely the Martin combined cycle units will continue their normal baseload operation within the recent historical hours per year per unit. The emissions are directly related to the hours of operation.

The modification project can be isolated from the normal operation of the units and its effects can be directly predicted and measured without having to make annual comparisons of actual emissions from the combined cycle units before and after the change. The modification itself (i.e. installation and operation of the foggers), however, has not yet begun normal operation. The future actual emissions caused by the modification are equal to the potential-to-emit, which is based on the increases in heat input associated with the use of the fogging system.

The number of days during which the foggers can economically operate probably limits actual emissions increases to levels below significance for the purposes of PSD applicability. However, FP&L proposes to limit operation of the foggers to the equivalent of 6240 (gas) and 125 (oil) hours per combustion turbine per year on the basis of a 5.5 °F average compressor. This equates to 34,320 °F-hr on gas and 4000 °F-hr on oil per combustion turbine. If, for example, the average temperature drop is actually 11 °F, the foggers will only be allowed to operate half as many hours as the base case. Emissions will increase under these limitations (as previously tabulated) by levels less than the significant emissions rates. The Department concludes, therefore, that PSD does not apply to this project.

### 8. Proposed Addition of New Conditions to Power Plant Siting Certification No. PA 74-01 and PSD-FL-146

The combustion turbines were constructed under the authority of the Power Plant Siting Certification No. PA89-27 issued on 2/20/91. These conditions of certification PA 89-27 were been modified on 2/20/91, 9/28/94 and 9/06/96. The Department will amend PSD-FL-146 and the conditions of certification by adding a new condition authorizing installation and operation of the inlet foggers.

The new condition applicable to the inlet foggers proposed for CTs 3A&B and 4A&B (ARMS Units 003-006) are shown in the draft PSD permit modifications. It limits operation of each inlet fogger to 34,320 °F-hr on gas and 4000 °F-hr on oil. Monitoring and compliance procedures are included to insure the temperature drop and hours of operations are properly measured, documented and reported.

### 9. Conclusions

The project will not increase the maximum short-term emission rates as these are already achieved under natural conditions of low ambient temperatures without the use of the foggers.

The Department concludes that PSD is not applicable to this project since this project as presented will not result in significant net emissions increase to major facility. The changes will not cause a significant impact or cause or contribute to a violation of any ambient air quality standard or PSD increment.

The Department's conclusion does not set a precedent for projects implemented at any facilities other than combined cycle unit inlet fogger installations. It does not set precedents related to any physical changes within the compressors, combustors, rotors, or other key components at such units.



## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

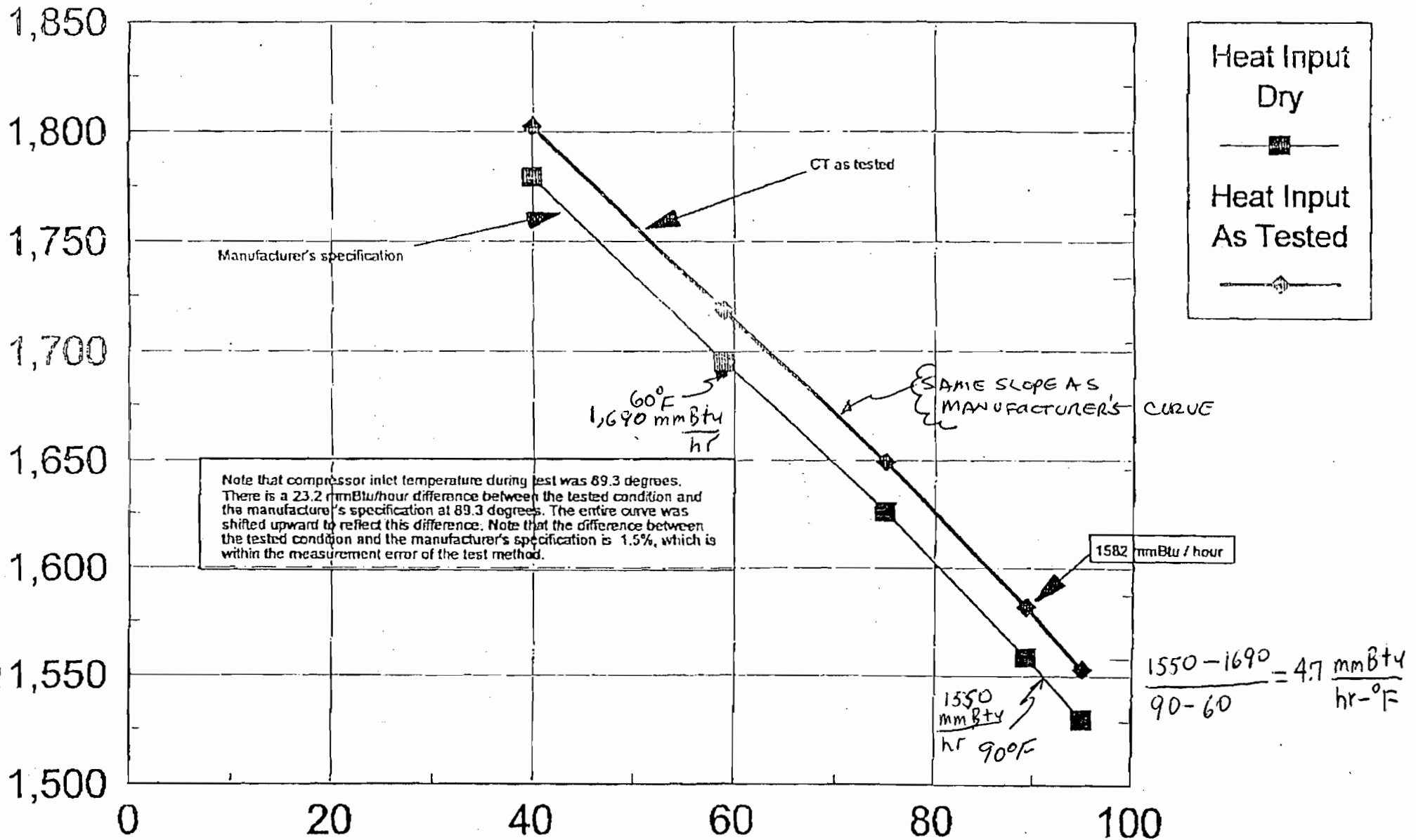
The application and determination of the Department's rules does not constitute an interpretation of the EPA rules under 40CFR52.21, Prevention of Significant Deterioration or 40CFR60, New Source Performance Standards.

For further details regarding this review, contact:

*A.A. Linero, P.E. Administrator*  
*Teresa Heron, Review Engineer*  
*New Source Review Section*  
*Bureau of Air Regulation*  
*850/488-0114*

# Martin Unit 3A

## Heat Input vs. Ambient Temperature Curve



Memorandum

Florida Department of  
Environmental Protection

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TO: ~~C. H. Fancy~~

THRU: Al Linero *aal 6/15*

FROM: Teresa Heron *T.H.*

DATE: June 15, 1999

SUBJECT: FP&L Martin Plant  
DEP File No. 0850001-005-AC

Attached is the draft public notice package including the Intent to Issue and the Technical Evaluation and Preliminary Determination for the compressor inlet fogger project at the FP&L Martin Plant. The application is to install inlet foggers ahead of the compressor inlets of four combined cycle combustion turbines. The foggers will operate on hot days and days of relatively low humidity. The evaporative cooling effected by the foggers will allow the units to operate closer to their rated capacity.

Both short-term and annual emissions will increase because the heat rate through the units will increase when the foggers. Maximum short-term emissions will still occur during cold days when use of the foggers is not feasible. The units already comply with 40 CFR 60, Subpart GG, so NSPS applicability is not an issue. FP&L proposes to limit operation of the coolers to 34,320 degrees F-hour on gas and 4000 degrees F-hour on oil to insure PSD is not triggered by their use.

I recommend your signature and approval of the cover letter and Intent to Issue.

AAL/th

Attachments

DAVID MCNEAL

404/562 9095

David - Attached are pages from GE paper  
"GE Heavy-Duty Gas Turbine Performance  
Characteristics" by F.J. Brooks, GE Power Systems,  
Schenectady NY. 1996.

It states evaporative cooling is limited to  
59°F and above. It is good to have a  
"literature source." I would stick to the 50°F  
that I cited earlier.

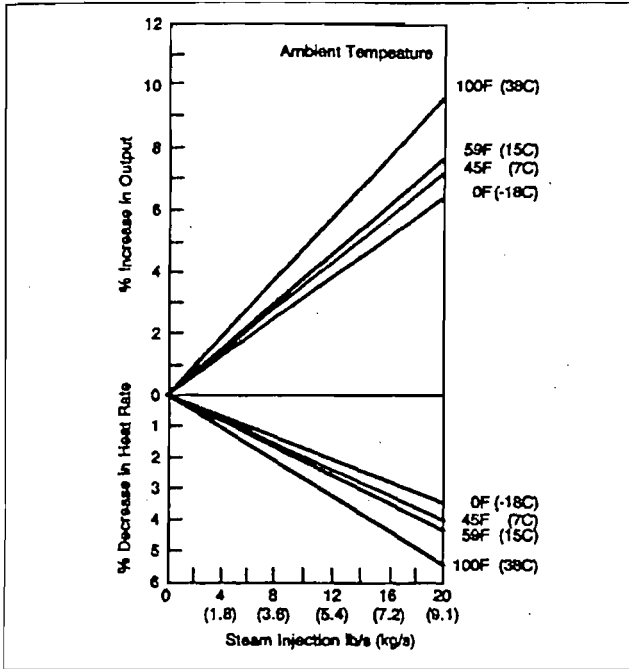
It is possible that for other applications  
(i.e. air conditioning in buildings) there may be  
a different practical limit. In any case  
I think I've now fully addressed this one.

Thanks



A. Linero 6/11

Post-it® Fax Note	7671	Date	6/11	# of pages	3
To	D. Mcneal	From	A. Linero		
Co./Dept.		Co.	DEP-Air		
Phone #		Phone #			
Fax #		Fax #			



GT22047C

Figure 13. Effect of steam injection on output and heat rate

than that obtained on natural gas. In the case of higher heating value fuels, such as refinery gases, output and efficiency may be equal to or lower than that obtained on natural gas.

### Diluent Injection

Since the early 1970s, GE has used water or steam injection for NO<sub>x</sub> control to meet applicable state and federal regulations. This is accomplished by admitting water or steam in the cap area or "head-end" of the combustion liner. Each machine and combustor configuration has limits on water or steam injection levels to protect the combustion system and turbine section. Depending on the amount of water or steam injection needed to achieve the desired NO<sub>x</sub> level, output will increase because of the additional mass flow. Figure 13 shows the effect of steam injection on output and heat rate for an MS7001EA. These curves assume that steam is free to the gas turbine cycle, therefore heat rate improves. Since it takes more fuel to raise water to combustor conditions than steam, water injection does not provide an improvement in heat rate.

### AIR EXTRACTION

In some gas turbine applications, it may be desirable to extract air from the compressor. Generally, up to 5% of the compressor airflow can be extracted from the compressor discharge

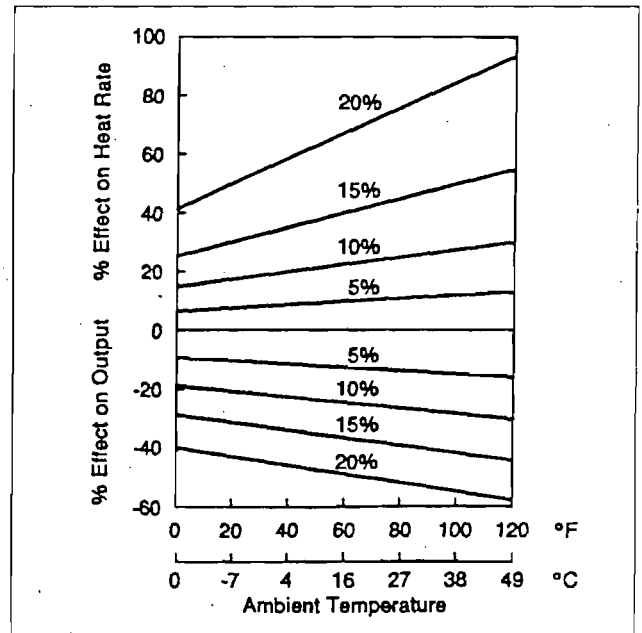
casings without modification to casings or on-base piping. Pressure and air temperature will depend on the type of machine and site conditions. Air extraction between 6% and 20% may be possible, depending on the machine and combustor configuration, with some modifications to the casings, piping and controls. Such applications need to be reviewed on a case-by-case basis. Air extractions above 20% will require extensive modification to the turbine casing and unit configuration. Figure 14 shows the effect of air extraction on output and heat rate. As a "rule of thumb," every 1% in air extraction results in a 2% loss in power.

## PERFORMANCE ENHANCEMENTS

Generally, controlling some of the factors that affect gas turbine performance is not possible. Most are determined by the planned site location and the plant configuration, i.e., simple- or combined-cycle. In the event additional output is needed, several possibilities to enhance performance may be considered.

### Inlet Cooling

The ambient effect curve (Figure 8) clearly shows that turbine output and heat rate are improved as compressor inlet temperature decreases. Lowering the compressor inlet temperature can be accomplished by installing an



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Figure 14. Effect of air extraction on output and heat rate

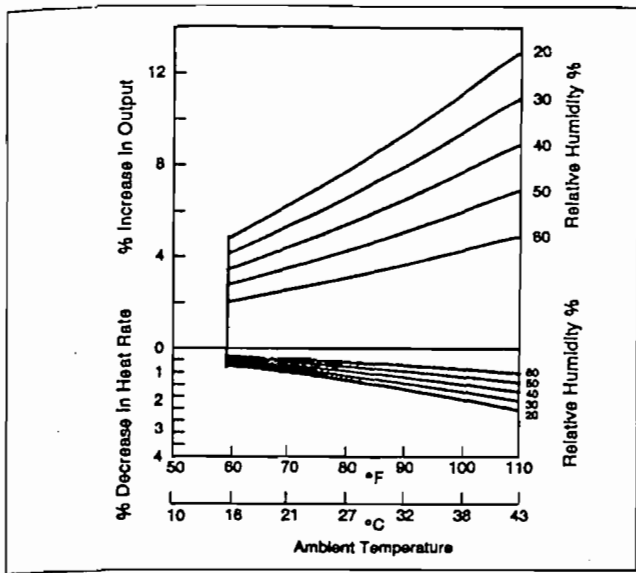


Figure 15. Effect of evaporative cooling on output and heat rate

GT22419-1C

evaporative cooler or inlet chiller in the inlet ducting downstream of the inlet filters. Careful application of these systems is necessary, as condensation or carryover of water can exacerbate compressor fouling and degrade performance. Generally, such systems are followed by moisture separators or coalescing pads to reduce the possibility of moisture carryover.

As Figure 15 shows, the biggest gains from evaporative cooling are realized in hot, low-humidity climates. It should be noted, from Figure 15, that evaporative cooling is limited to ambient temperatures of 59 F/15 C and above because of the potential for icing the compressor. Information contained in Figure 15 is based on an 85% effective evaporative cooler. Effectiveness is a measure of how close the cooler exit temperature approaches the ambient wet bulb temperature. For most applications, coolers having an effectiveness of 85% or 90% provide the most economic benefit.

Chillers, unlike evaporative coolers, are not limited by the ambient wet bulb temperature. The achievable temperature is limited only by the capacity of the chilling device to produce coolant and the ability of the coils to transfer heat. Cooling initially follows a line of constant specific humidity (Figure 16). As saturation is approached, water begins to condense from the air, and mist eliminators are used. Further heat transfer cools the condensate and air, and causes more condensation. Because of the relatively high heat of vaporization of water, most of the cooling energy in this regime goes to condensation and little to temperature reduction.

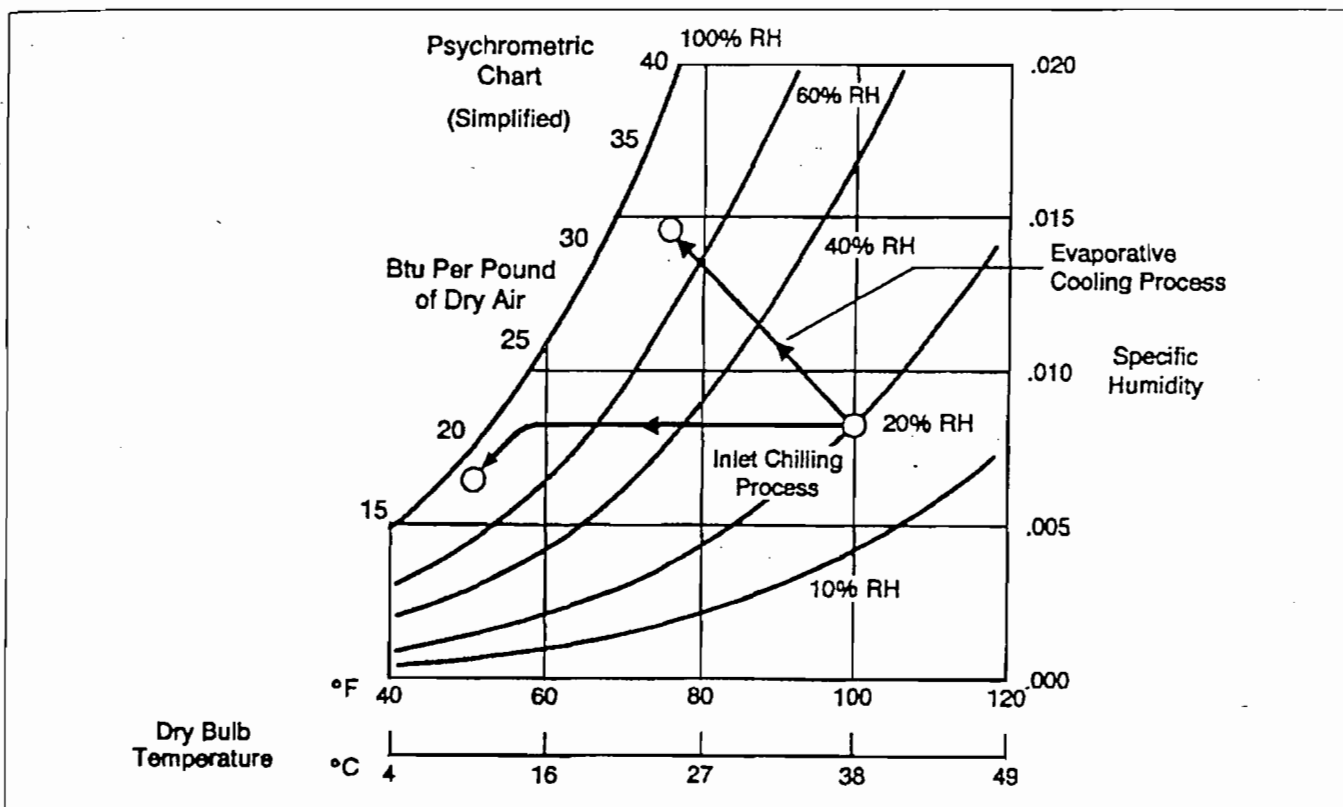


Figure 16. Inlet chilling process.

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BEST AVAILABLE COPY

4 pages  
DAVID MC NEAL

1/4

David - I can't find my good articles.  
I think I loaned them to Marty Costello  
and he is in training.

Here is a decent article from  
Caldwell who supply the systems. According  
to Don Shepherd of Caldwell, the combustion  
turbine manufacturers advise against operating  
coolers below about 50°F to avoid icing.

At very low temperatures, it might even  
be necessary to heat inlet air. So the  
heat input/temperature curve shouldn't change  
and emissions will still be at maximum  
under naturally-occurring low temp conditions.

Feel free to contact Shepherd at  
502/964-6450.

If I find something better, I'll send  
it to you. Otherwise I'll have to pull out  
the psychrometric charts and develop the  
information myself. Attached chart seems to  
show ranges for evaporative and indirect cooling.  
In summary, the obvious gains are  
from high temp / low humidity conditions.  
There is nothing to gain at low temperatures  
except to cause operating problems.

Thanks Al

2/4



# CALDWELL ENERGY & ENVIRONMENTAL, INC.

4020 Tower Rd • Louisville, KY 40232

(502) 964-6450 • Fax: (502) 964-7444 • [mail@caldwellenergy.com](mailto:mail@caldwellenergy.com)

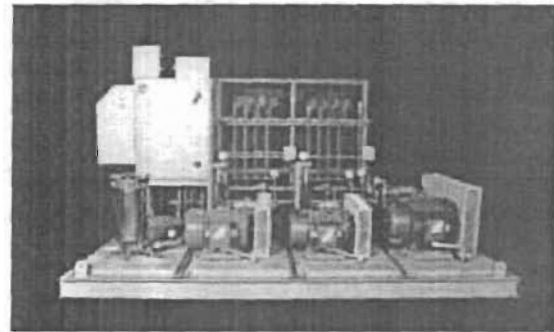
*I'll try to get something that talks about lower practical limit and will send it to you. Al*

Evaporative cooling has taken a revolutionary step...POWERFog. Traditional methods of cooling combustion turbine inlet air involved using uncontrolled amounts of water sprayed over wetted media. Now, injecting carefully regulated amounts of micron sized droplets into the inlet air of your combustion turbine(s) allows even more power to be generated. POWERFog systems can cool the air down to the saturation temperature of the ambient air without creating a power limiting pressure drop.

POWERFog systems cool atmospheric air from the dry bulb temperature all the way down to the wet bulb temperature. The drier the air, the more cooling can be achieved. You might think that these systems would not be effective in humid climates, but this is not true. While the dry bulb temperature increases as the sun moves higher in the sky, the wet bulb temperature stays relatively constant. This means that the greatest amount of cooling is achieved right when you need it most, during the hottest part of the day. At a design point of 95°F(35°C)/50% Relative Humidity (RH), a typical combustion turbine will realize about a six percent (6%) increase in power. In a dry hot climate, a 100°F(38°C)/20% RH condition will yield about an eleven percent (11%) increase. These systems are by far, the least expensive means to improve your plants performance. A typical simple payback is less than one year. Installation takes only a few days, and can frequently be done while your turbine is on-line.

## System Design

All systems should be sized based on historical weather data for your plant's location. CE&E maintains a database of five years of hourly weather data for 262 stations around the country. Our advanced modeling system optimizes each CTIAC system relative to your technical and economic requirements. For each system there is an optimal design point which will maximize your return on investment in the system.



## Performance Engineered Combustion Turbine Inlet Air Cooling

One of the most cost-effective ways to increase combustion turbine power output in high temperature ambient conditions is to reduce the air temperature by evaporating water into the turbine's inlet air. This denser air increases the mass flow to the turbine and since combustion turbines rely on this mass flow for power, output of the combustion turbine is significantly increased. On a 90°F day, with 20% relative humidity, inlet air temperature can be reduced to 63°F simply by evaporating water into the turbine's air stream. For the majority of combustion turbine types, this means a 9% increase in power output. The illustration above shows how a POWERFog system can improve your Combustion Turbine(s) performance.

Traditional methods of evaporating water into the inlet air use media blocks and de-misters that increase the pressure drop, and therefore reduce the power output capability of combustion turbines. These systems also require a significant amount of annual maintenance.

A more efficient way to evaporate water into the inlet air stream is to use a device that creates a "fog" of micron sized droplets of water. These droplets can be made so small that they can achieve more evaporative efficiency than traditional evaporative coolers. Inlet pressure drop across the system typically cannot even be measured by plant instrumentation. Caldwell Energy will engineer and guarantee the superior performance of a POWERFog system over media type evaporative coolers.



3/4

Caldwell Energy engineered the POWERFog HP system specifically for combustion turbine applications. This Combustion Turbine Inlet Air Cooling (CTIAC) system uses Caldwell Energy's proprietary high pressure nozzle design which maximizes evaporative efficiency and hence the power output of the combustion turbine. Custom engineered advanced control system logic, combined with multiple nozzle arrays, are all designed to optimize the system's performance. Special features provide for safe system operation.

The POWERFog HP nozzle creates a fog by spraying a high pressure water jet at an impaction pin directly in front of the ejected water stream. Water pressure can vary, typically between 1,000 and 3,500 pounds per square inch depending on the required droplet size. A drawing of the POWERFog HP nozzle is illustrated in Figure 2. Increased pressure reduces the size of the droplets. The key to determining the system design is the residence time of the water droplets in the inlet air, prior to the cooled air entering the compressor of the combustion turbine. This defines the required droplet size.

Fogging systems cool inlet air down to the wet bulb temperature of the ambient. This makes it highly effective in dry climates but also effective in more humid ones. Fogging systems in humid climates are still economical since the hottest periods of a day coincide with the periods of lowest relative humidity. Figure 3 illustrates the temperature and humidity distribution for a hot, sunny, and humid day. Note that the wet bulb temperature remains relatively constant.

In the case where the residence time of the fog prior to entry into compressor section of the combustion turbine is short, high pressure systems may not ensure complete evaporation. To address this condition, Caldwell Energy developed the POWERFog US system. This system produces smaller droplets, a fraction of the diameter of high pressure systems. These smaller droplets allow for faster evaporation.

Internally mounted POWERFog systems can be installed during a 2-4 day outage while you are doing your turbine inspection. Externally mounted POWERFog systems can normally be installed while the combustion turbine is running.

Caldwell Energy engineers, designs, manufactures, and installs all types of Combustion Turbine Inlet Air Cooling (CTIAC) systems, including fogging, chilling, refrigeration, and thermal energy storage systems. Let us give you the complete cooling picture today.



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Revised: February 6, 1999.

I'm sure this is impossible to  
real. I'll review ASHRAE  
book if I can find  
one.

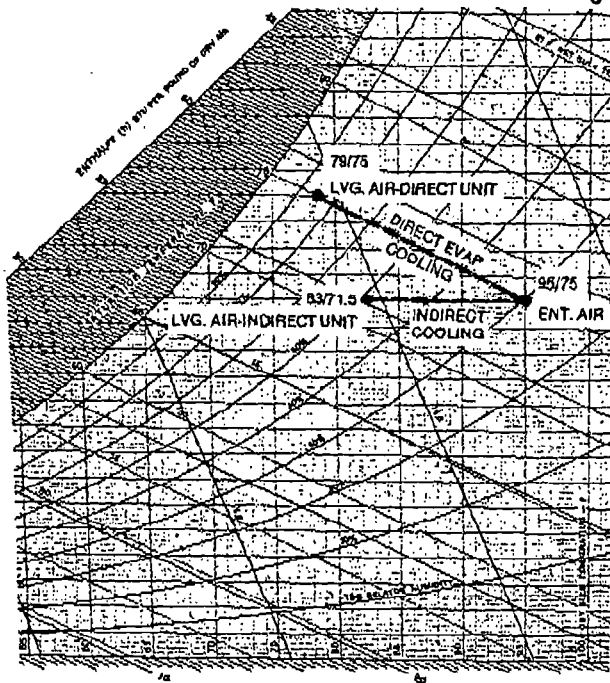


Fig. 1 Psychrometrics of Evaporative Cooling

The performance of an indirect evaporative cooling system can also be shown on a psychrometric chart. Many manufacturers of indirect evaporative cooling equipment use a similar definition of effectiveness as is used for a direct evaporative cooler. The term performance factor (PF) is also used. In indirect evaporative cooling, the cooling process in the primary airstream follows a line of constant moisture content (constant dew point). Performance factor (or effectiveness) is the dry-bulb depression in the primary airstream divided by the difference between the entering dry-bulb temperature of the primary airstream and the entering wet-bulb temperature of the secondary air. Depending on the heat exchanger design and relative air quantities of primary and secondary air, effectiveness ratings may be as high as 85%.

Continuing the example, assuming an effectiveness of 60%, and assuming both primary air and secondary air enter the apparatus at the outdoor condition of 95°F db and 75°F wb, the dry-bulb depression is 0.60 (95 - 75) = 12°F. The dry-bulb temperature leaving the indirect evaporative cooling process is 95 - 12 = 83°F. Because the process cools without adding moisture, the wet-bulb temperature is also reduced. Plotting on the psychrometric chart shows that the final wet-bulb temperature is 71.5°F. Because both the wet- and the dry-bulb temperatures in the indirect evaporative cooling process are reduced, indirect evaporative cooling can be used as a substitute for a portion of the refrigeration load in many applications.

### Humidification

Air can be humidified with an evaporative cooler by three methods: (1) using recirculated water without prior treatment of the air, (2) preheating the air and treating it with recirculated water, or (3) using heated water. In any evaporative cooler installation, the air should not enter with a wet-bulb temperature of less than 39°F; otherwise, the water may freeze.

### Recirculated Spray Water

Except for both the small amount of outside energy added by the recirculating pump in the form of shaft work and the small amount

of heat leakage into the apparatus from outside (including through the pump and its connecting piping), evaporative cooling is strictly adiabatic. Evaporation occurs from the recirculated liquid. Its temperature should adjust to the thermodynamic wet-bulb temperature of the entering air.

The whole airstream is not brought to complete saturation, but its state point should move along a line of constant thermodynamic wet-bulb temperature. The extent to which the leaving air temperature approaches the thermodynamic wet-bulb temperature of the entering air is expressed by a saturation effectiveness ratio, often called the humidifying effectiveness in humidifiers. The representative saturation, or humidifying effectiveness, of a spray-type air washer with various spray arrangements is listed in Table 1.

The degree of saturation depends on the extent of the contact between air and water. Other conditions being equal, a low-velocity airflow is conducive to higher humidifying effectiveness.

Table 1 Effectiveness of Spray Arrangements in a Spray-Type Air Washer

Bank	Arrangement	Length, ft	Effectiveness, %
1	Downstream	4	50 to 60
1	Downstream	6	60 to 75
1	Upstream	6	65 to 80
2	Downstream	8 to 10	80 to 90
2	Opposing	8 to 10	85 to 95
2	Upstream	8 to 10	90 to 98

### Preheating Air

Preheating the air increases both the dry- and wet-bulb temperatures and lowers the relative humidity, but it does not alter the humidity ratio (i.e., the mass ratio of water vapor to dry air). At a higher wet-bulb temperature, but with the same humidity ratio, more water can be absorbed per unit mass of dry air in passing through the evaporative cooler (if the humidifying effectiveness of the evaporative cooler is not adversely affected by operation at the higher wet-bulb temperature). The analysis of the process that occurs in the evaporative cooler is the same as that for recirculated water. The final preferred conditions are achieved by adjusting the amount of preheating to give the required wet-bulb temperature at the entrance to the evaporative cooler.

### Heated Recirculated Water

Even if heat is added to the recirculated water, the mixing in the evaporative cooler may still be regarded as adiabatic. The state point of the mixture should move toward the specific enthalpy of the heated water. By elevating the water temperature, it is possible to raise the air temperature (both dry and wet bulb) above the dry-bulb temperature of the entering air.

The relative humidity of the leaving air may be controlled by (1) bypassing some of the air around the evaporative cooler and remixing the two airstreams downstream or (2) automatically reducing the number of operating spray nozzles or sections of media wetted by operating valves in the different recycle header branches.

### Dehumidification and Cooling

Evaporative coolers are also used to cool and dehumidify air. Heat and moisture removed from the air raise the water temperature. If the entering water temperature is below the entering wet-bulb temperature, both the dry- and wet-bulb temperatures are lowered. Dehumidification results if the leaving water temperature is below the entering dew-point temperature. Moreover, the final water temperature is determined by the sensible and latent heat pickup and the amount of water circulated. However, this final temperature must not exceed the final required dew point, with one or two degrees below dew point being common.

4020 Tower Road  
Louisville, Kentucky  
Phone: 502-964-6450  
Fax: 502-964-7444

**CALDWELL ENERGY &  
ENVIRONMENTAL, INC.**

# Fax



Company: \_\_\_\_\_ From: Don Shepherd

Attn: Al Leare

Fax: 850-922-6979 Pages(Including Cover): 2

Phone: \_\_\_\_\_ Date: 6/10/97

Re: \_\_\_\_\_ CC: \_\_\_\_\_

EVAP-cooling

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6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



May 6, 1999

9737572-0100

Mr. C.H. Fancy, P.E., Chief  
Bureau of Air Regulation  
Florida department of Environmental Protection  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

**RECEIVED**

MAY 07 1999

BUREAU OF  
AIR REGULATION

Attention: Ms. Teresa Heron

RE: Inlet Foggers – Putnam Plant Combustion Turbines DEP File 1070014-003-AC  
Inlet Foggers – Martin Plant Combustion Turbines DEP File 0850001-005-AC  
Florida Power & Light Company (FPL)

Dear Teresa:

This correspondence is submitted to address the Department's information request related to the installation of direct water spray fogging system to the inlet of the Putnam and Martin combustion turbines. The information requested is presented below and in the attachments to this correspondence.

1. Information Requested: Please submit additional data to support the statement that the emission rate does not change as a result of inlet fogging.

Information Submitted: As discussed in the application, the use of the direct water spray fogging systems will increase the relative humidity of the gas stream while concomitantly reducing the temperature due to adiabatic cooling of the inlet air. This effect is no different than when the turbine is operated under the same ambient conditions that occurs during the normal course of operation in any year. However, it allows the turbine to operate under such ambient conditions more frequently and thus can effect annual emissions. The influence on the emission rate of increasing the relative humidity and temperature is explained in EPA's Alternative Control Techniques Document – NO<sub>x</sub> Emissions from Stationary Gas Turbines (EPA-453/R-93-007, January 1993). In Section 4.2.1.3 the report provides information that indicates emissions of NO<sub>x</sub> decrease with increasing relative humidity. Also, the mass emission of NO<sub>x</sub> decreases per mass of fuel input. This is also the same as lower emissions per amount electric power generated (since power and fuel input are directly related). The lower NO<sub>x</sub> emissions with increasing relative humidity and lower temperature can be shown using the equation in Section 4.2.1.3; the adjustment equation in 40 C.F.R. Part 60 Subpart GG, Section 60.335(c)(1).

Table 1 presents calculation of relative NO<sub>x</sub> concentrations for various temperatures and relative humidity. As can be seen from the table the relative NO<sub>x</sub> concentration decreases with increasing humidity and decreasing temperature. The combined effect can be seen in the last column. Please find attached relevant pages from the EPA cited document. This EPA information is supported by the results of the testing performed at the Putnam Plant that indicated no change in emission rate (concentration) when the fogging system was used. These data also demonstrated no statistical change in CO concentrations as well.

The potential applicability of New Source Performance Standards (NSPS) Subpart GG to the Putnam turbines would be dependant on whether the installation of a fogging system is considered a modification under Section 60.14 of 40 C.F.R. 60. (Note: The NSPS already apply to the Martin turbines; these turbines meet lower emission levels as BACT.) The determination is based on whether a physical change resulted in an increase in the emission rate that is expressed in kilograms per hour. The emission rate can be determined using AP-42, materials balance, CEMs or manual stack tests [see paragraphs (1) and (2) of Section 60.14]. The tests must conducted under representative performance of the facility and that all operating which can effect emissions must be held constant to the maximum degree feasible. As described above, the inlet foggers only changes the ambient conditions that do occur during the normal operation of the turbine. Testing under the requirement to maintain all operating which may effect emissions (i.e., in this case temperature and relative humidity) constant would produce the same result. Thus, the short-term emission rates do not change. Nonetheless, the fogging system does increase the long-term emissions for which a limit on the operation of the fogging system has been requested to keep the increase below the PSD significant emission rate.

2. Information Requested: In reference to Table 1 and 2. (Part II of the Supporting Information), indicate the nominal values for power out, heat rate and heat input.

Information Submitted: The information presented in Table 1 presents the *rate of change* of power, heat rate and heat input for the turbine. The basis of the information is the attached performance curves. As noted from the curves the performance (fuel input and power) is a linear function of inlet temperature. The primary purpose of using the performance curves is to determine the increase in heat rate as a function of temperature. This was determined from the performance curves as 4 mmBtu per °F for Putnam and as 4.7 mmBtu per °F shown in Table 1. Note that the Putnam calculations have been updated to reflect as 4 mmBtu per °F rather than 3 mmBtu per °F in the original submittal. This was then used with the hours of operation to calculate the tons per year. An example for Putnam: 4 mmBtu / °F x 0.44 lb/mmBtu x 8 °F/hour x 1,280 hours x 1 ton/2,000 lb = 9.01 tons/year for NO<sub>x</sub>. As noted in the application, AP-42 emission factors were used which for NO<sub>x</sub> are from 17 to 25 percent higher than the actual observed emissions. The 4 mmBtu / °F was determined from the performance curves as follows: At 50 °F the heat input is 1,100 mmBtu/hr based on high heating value (HHV). At 100 °F, the heat input is 900 mmBtu/hr (HHV). The difference is 200 mmBtu/hr (1,100 –

900) over 41 °F (100 – 59) or 4 mmBtu / °F. For oil firing the rate was determined to be 3.2 mmBtu / °F using the same procedure.

An example for Martin:  $4.7 \text{ mmBtu} / ^\circ\text{F} \times 0.09 \text{ lb/mmBtu} \times 5.5 \text{ } ^\circ\text{F}/\text{hour} \times 6,240 \text{ hours} \times 1 \text{ ton}/2,000 \text{ lb} = 7.26 \text{ tons/year}$  for  $\text{NO}_x$ . The Martin emission rates, as noted in Tables 1 and 2, are based on maximum potential rate in the PSD permit. For  $\text{NO}_x$ , the maximum emission rate is 177 lb/hour at maximum heat input of 1,966 mmBtu/hr which is 0.09 mmBtu/hr (177/1,966). The 4.7 mmBtu / °F was determined from the heat rate curves as follows: At 60 °F the heat input is 1,550 mmBtu/hr based on high heating value (HHV). At 90 °F, the heat input is 1,690 mmBtu/hr (HHV). The difference is 140 mmBtu/hr (1,690 – 1,550) over 30 °F (90 – 60) or 4.66 mmBtu / °F; this value was rounded to 4.7 mmBtu / °F. This rate was used for both gas and oil firing.

3. Information Requested: Submit the heat input curves for these units.

Information Submitted: The heat input curves for the Martin Units are attached. The heat input curves for the Putnam Plant are attached.

4. Information Requested: Estimate actual emissions for each facility's turbines and worst case emission rate scenario.

Information Submitted: The actual emission for each facility is presented in the Annual Operating Report (these will be forwarded separately). As noted in the information supplied in Item 2 above, the emission estimates are based the maximum potential emission rate based on either AP-42 in the case of Putnam and the PSD permit in the case of Martin. Since the requested is based on an incremental increase in annual emissions using the maximum potential emission rates and a maximum amount of fogging ( °F-hours per year), the worst case emission estimate is presented in the application.

5. Information Requested: Submit hours of operation for each turbine.

Information Submitted: The AOR contain the hours of operation.

Your prompt review of the application is appreciated. If there are any further questions, please call.

Sincerely,

GOLDER ASSOCIATES INC.



Kennard F. Kosky, P.E.  
Principal  
Professional Engineer No. 14996

SEAL 

KFK/jkk

Enclosures

cc: Rich Piper, Repowering Licensing Manager  
Robert Bergstrom, Putnam Plant General Manager  
John Lindsay, Martin Plant General Manager  
Bob Burgess, FPL  
Jay Blum, FPL

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**Table 1a** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

**Performance Basis**

Temperature Decrease °F (1)	8	
Power Increase	3.28%	PPN Charts
Heat Rate Decrease	1.06%	Westinghouse
Heat Input Increase	2.22%	
Heat Input Change mmBtu/ °F	4	
Hours/year	1280 (2)	
Hours-°F/year	10,240	hours/year times temperature decrease

**Pollutants Units Emissions (3) Comments**

PM	lb/MMBtu	0.0168	AP-42 Section 3.1 per machine
	TPY	0.34	
NO <sub>x</sub>	lb/MMBtu	0.44	AP-42 Section 3.1 per machine
	TPY	9.01	
SO <sub>2</sub>	lb/MMBtu	0.00286	1 grain/100 cf natural gas per machine
	TPY	0.06	
CO	lb/MMBtu	0.11	AP-42 Section 3.1 per machine
	TPY	2.25	
VOC	lb/MMBtu	0.024	AP-42 Section 3.1 per machine
	TPY	0.49	

Legend - TPY: tons per year

- (1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.
- (2) Hours of fogger operation based on estimate of 8 hours per day and 160 days per year.
- (3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-0, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".



**Table 2a** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (No. 2 Fuel Oil Combustion).

Performance Basis			
Temperature Decrease	°F (1)	8	
Power Increase		3.28%	PPN Charts
Heat Rate Decrease		1.06%	Westinghouse
Heat Input Increase		2.22%	
Heat Input Change	mmBtu/ °F	3.2	
Hours/year		100 (2)	
Hours-°F/year		800	hours/year times temperature decrease

Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0293	AP-42 Section 3.1 per machine
	TPY	0.04	
NO <sub>x</sub>	lb/MMBtu	0.698	AP-42 Section 3.1 per machine
	TPY	0.89	
SO <sub>2</sub>	lb/MMBtu	0.7	Based on Title V Permit per machine
	TPY	0.90	
CO	lb/MMBtu	0.048	AP-42 Section 3.1 per machine
	TPY	0.06	
VOC	lb/MMBtu	0.017	AP-42 Section 3.1 per machine
	TPY	0.02	

Legend - TPY: tons per year

- (1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.
- (2) Hours of fogger operation.
- (3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-01, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".

## Part II

### Application for Air Permit Installation of Direct Water Spray Fogging Systems Putnam Plant

#### Introduction

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Putnam Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decreases heat rate. The project is part of increasing capacity in a cost effective manner.

#### Description

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for Jacksonville and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for Jacksonville would be 14°F and would occur in July with a mid-afternoon temperature of 91°F and 58 percent relative humidity. During January, the mid-afternoon cooling would be about 7°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 41.7°F to 55.7°F with relative humidities ranging from 83 to 88 percent. The amount of adiabatic cooling would range from 1 to 2°F. For the Putnam Plant, an 8°F average reduction was assumed in the calculations for primarily daytime operation.

#### **Turbine Performance and Emission Estimates**

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the Westinghouse Model 501B5A combustion turbines at the Putnam plant, an 8°F average decrease in temperature would result in a 3.3 percent increase in power and an associated 1.1 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Putnam turbines would be 4 mmBtu/hr/°F for gas firing and 3.2 mmBtu/hr/°F for oil firing. The data were determined using Westinghouse supplied data (see Attachment A).

Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of hours of proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degree F-hours for gas firing are calculated by multiplying 1,280 hours times 8°F or 10,240°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Putnam turbines, a maximum of 10,240°F-hours of operation when firing natural gas and 800°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

The use of AP-42 emission factors is appropriate for estimating maximum potential annual emissions since there are no emission limits for NO<sub>x</sub>. This is especially conservative for NO<sub>x</sub> since actual emissions are much lower. Over the last two years, quarterly emissions reported from CEM data ranged from 0.322 lb/mmBtu to 0.398 lb/mmBtu. The annual averages from CEM data ranged from 0.351 to 0.371 lb/mmBtu for 1997 and 0.354 to 0.375 lb/mmBtu for 1998. Using an emission factor of 0.44 lb/mmBtu to estimate maximum potential annual emissions, would overestimate annual emissions from 17 to 25 percent greater than that actual observed. Thus, the annual estimated emissions based on AP-42 emission factors are conservative.

### Regulatory Applicability

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Putnam Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.

The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

#### Summary of Maximum Annual Emissions - All Units

<u>Pollutant</u>	<u>Gas</u> <u>Tons/Year</u>	<u>Oil</u> <u>Tons/Year</u>	<u>Oil &amp; Gas</u> <u>Total</u>
PM	1.38	0.15	1.53
NO <sub>x</sub>	36.04	3.57	39.62
SO <sub>2</sub>	0.23	3.58	3.82
CO	9.01	0.25	9.26
VOC	1.97	0.09	2.08
Degree Fahrenheit-Hours per year	10,240	800	
Additional Degree Fahrenheit-Hours on Gas	1,015	0	
Total Degree Fahrenheit-Hours Gas Only	11,255	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is NO<sub>x</sub>. Emissions of SO<sub>2</sub> are primarily associated with distillate fuel oil which is only used a backup to natural gas. For natural gas only, the maximum potential NO<sub>x</sub> emissions would be 39.62 tons/year at 11,255°F-hours per year per CT. This is equivalent to 1.6°F-hours of gas firing for each hour of oil firing (i.e., 1,015°F-hours/800°F-hours = 1.27°F-hours). The emissions of the other pollutants would be 1.52 tons/year for PM, 0.25 tons/year for SO<sub>2</sub>, 9.9 tons/year for CO and 2.16 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 45,020°F-hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 1.27°F-hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected. In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operate 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 45,020°F-hours for the facility.

**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective (gas firing shown).

Plant Site: Putnam Plant; GTs 11, 12, 21 and 22  
Turbine Model: Westinghouse 501B5A

Turbine Inlet Temperature ( °F)	100	50
Difference ( °F)		50
Heat Input (mmBtu/hr)	900	1,100
Difference (mmBtu/hr)		200
Rate (mmBtu/hr/ °F) <sup>a</sup>		4.00

Note: <sup>a</sup> heat input difference divided by temperature difference.

**Alternative Control  
Techniques Document--  
NO<sub>x</sub> Emissions from Stationary  
Gas Turbines**

**Emission Standards Division**

**U. S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Air and Radiation  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711  
January 1993**

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NATIONAL TECHNICAL  
INFORMATION SERVICE  
SPRINGFIELD, VA 22161



substantially lower thermal NO<sub>x</sub> emissions than natural gas or DF-2.<sup>18</sup> For fuels containing FBN, the fuel NO<sub>x</sub> production increases with increasing levels of FBN.

4.2.1.3 Ambient Conditions. Ambient conditions that affect NO<sub>x</sub> formation are humidity, temperature, and pressure. Of these ambient conditions, humidity has the greatest effect on NO<sub>x</sub> formation.<sup>19</sup> The energy required to heat the airborne water vapor has a quenching effect on combustion temperatures, which reduces thermal NO<sub>x</sub> formation. At low humidity levels, NO<sub>x</sub> emissions increase with increases in ambient temperature. At high humidity levels, the effect of changes in ambient temperature on NO<sub>x</sub> formation varies. At high humidity levels and low ambient temperatures, NO<sub>x</sub> emissions increase with increasing temperature. Conversely, at high humidity levels and ambient temperatures above 10°C (50°F), NO<sub>x</sub> emissions decrease with increasing temperature. This effect of humidity and temperature on NO<sub>x</sub> formation is shown in Figure 4-4. A rise in ambient pressure results in higher pressure and temperature levels entering the combustor and so NO<sub>x</sub> production levels increase with increases in ambient pressure.<sup>19</sup>

The influence of ambient conditions on measured NO<sub>x</sub> emission levels can be corrected using the following equation:<sup>20</sup>

$$NO_x = (NO_{x0}) (P_r/P_o)^{0.5} e^{19(H_o - 0.00633)} (288^\circ K/T_a)^{1.53}$$

where:

NO<sub>x</sub> = emission rate of NO<sub>x</sub> at 15 percent O<sub>2</sub> and International Standards Organization (ISO) ambient conditions, volume percent;

NO<sub>x0</sub> = observed NO<sub>x</sub> concentration, parts per million by volume (ppmv) referenced to 15 percent O<sub>2</sub>;

P<sub>r</sub> = reference compressor inlet absolute pressure at 101.3 kilopascals ambient pressure, millimeters mercury (mm Hg);

P<sub>o</sub> = observed compressor inlet absolute pressure at test, mm Hg;

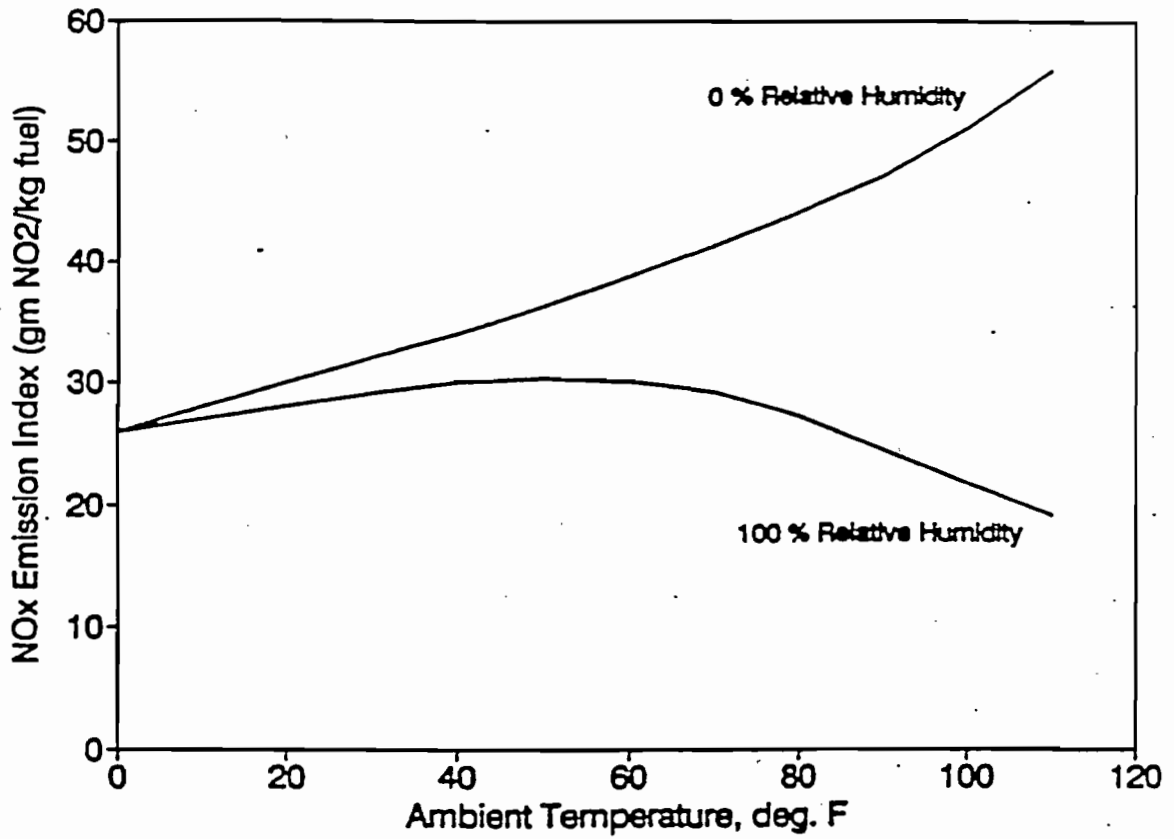


Figure 4-4. Influence of relative humidity and ambient temperature on NO<sub>x</sub> formation.<sup>19</sup>

$H_o$  = observed humidity of ambient air, g  $H_2O$ /g air;

$e$  = transcendental constant, 2.718; and

$T_a$  = ambient temperature, K.

At least two manufacturers state that this equation does not accurately correct  $NO_x$  emissions for their turbine models.<sup>8,12</sup> It is expected that these turbine manufacturers could provide corrections to this equation that would more accurately correct  $NO_x$  emissions for the effects of ambient conditions based on test data for their turbine models.

4.2.1.4 Operating Cycles. Emissions from identical turbines used in simple and cogeneration cycles have similar  $NO_x$  emissions levels, provided no duct burner is used in heat recovery applications. The  $NO_x$  emissions are similar because, as stated in Section 4.2,  $NO_x$  is formed only in the turbine combustor and remains at this level regardless of downstream temperature reductions. A turbine operated in a regenerative cycle produces higher  $NO_x$  levels, however, due to increased combustor inlet temperatures present in regenerative cycle applications.<sup>21</sup>

4.2.1.5 Power Output Level. The power output level of a gas turbine is directly related to the firing temperature, which is directly related to flame temperature. Each gas turbine has a base-rated power level and corresponding  $NO_x$  level. At power outputs below this base-rated level, the flame temperature is lower, so  $NO_x$  emissions are lower. Conversely, at peak power outputs above the base rating,  $NO_x$  emissions are higher due to higher flame temperature. The  $NO_x$  emissions for a range of firing temperatures are shown in Figure 4-3 for one manufacturer's gas turbine.<sup>17</sup>

#### 4.2.2 $NO_x$ Emissions From Duct Burners

In some cogeneration and combined cycle applications, the exhaust heat from the gas turbine is not sufficient to produce the desired quantity of steam from the HRSG, and a supplemental burner, or duct burner, is placed in the exhaust duct between the



Florida Power & Light Company, Environmental Services Dept., P.O. Box 14000, Juno Beach, FL 33408

September 18, 1997

Mr. Scott M. Sheplak, P.E.  
State of Florida  
Department of Environmental Protection  
Division of Air Resources Management  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Re: Draft Permit No. 1070014-001-AV  
FPL Putnam Plant Initial Title V Permit

Dear Mr. Sheplak:

Enclosed for your use please find a copy of the heat input vs. ambient temperature graph for the subject facility.

If you have any questions, please do not hesitate to contact me at (561) 691-7058.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Richard Piper", is written over the typed name.

Richard Piper  
Senior Environmental Specialist  
Florida Power & Light Company

**RECEIVED**

SEP 22 1997

BUREAU OF  
AIR REGULATION

cc: Pat Wilson

PPN / PPN

BEST AVAILABLE COPY



Florida Power & Light Company, Environmental Services Dept., P.O. Box 14000, Juno Beach, FL 33408

November 10, 1997

Mr. Scott M. Sheplak, P.E.  
State of Florida  
Department of Environmental Protection  
Division of Air Resources Management  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Re: Draft Permit No. 1070014-001-AV  
Heat Input Information for Oil Firing  
FPL Putnam Plant Initial Title V Permit

Dear Mr. Sheplak:

Attached for your use please find a graph of the ambient temperature vs. heat input data for the Putnam plant combustion turbine units for distillate oil firing.

If you have any questions, please do not hesitate to contact me at (561) 691-7058.

Very truly yours,

A handwritten signature in cursive script that reads "Rich Piper".

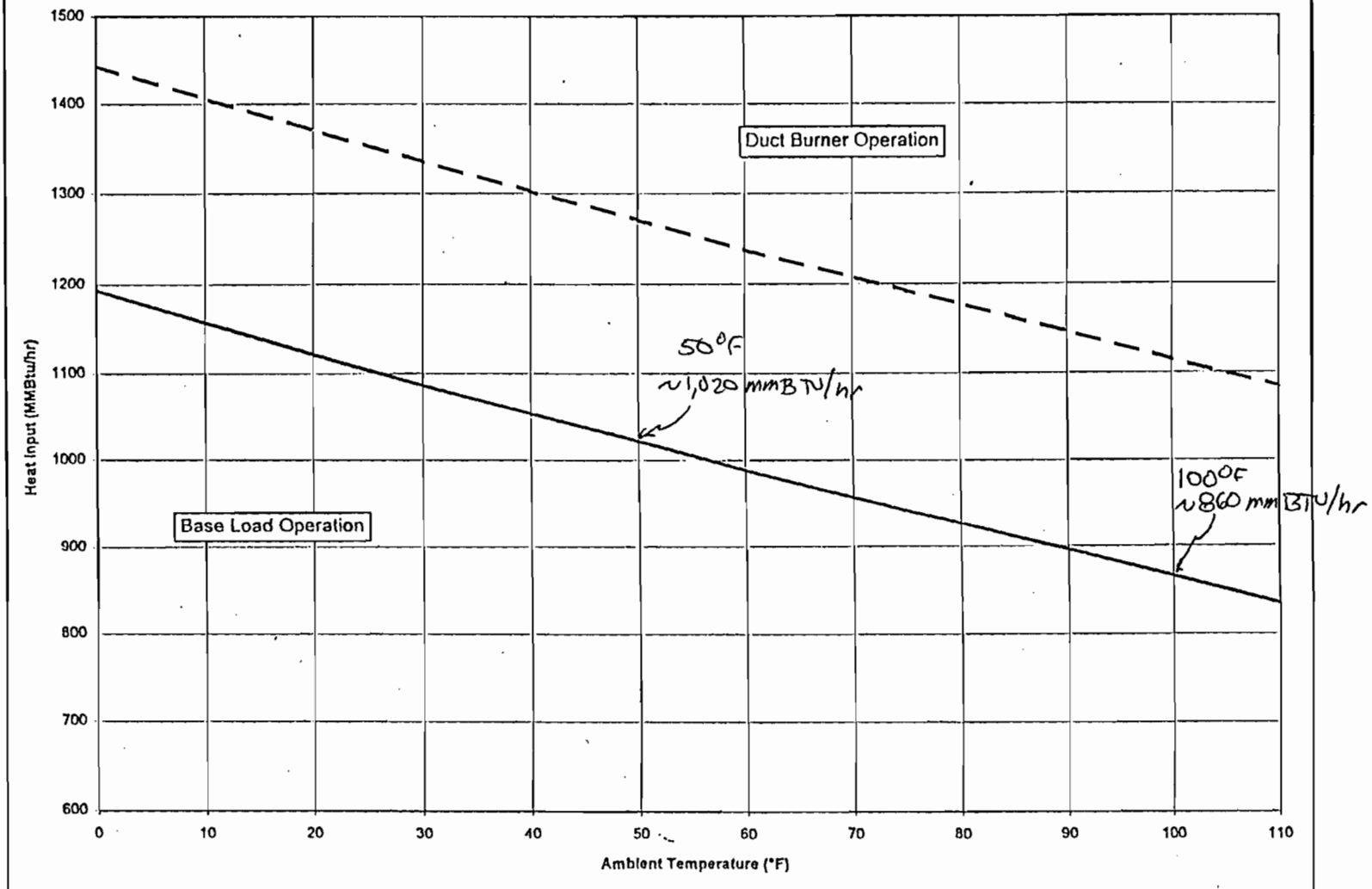
Rich Piper  
Senior Environmental Specialist  
Florida Power & Light Company

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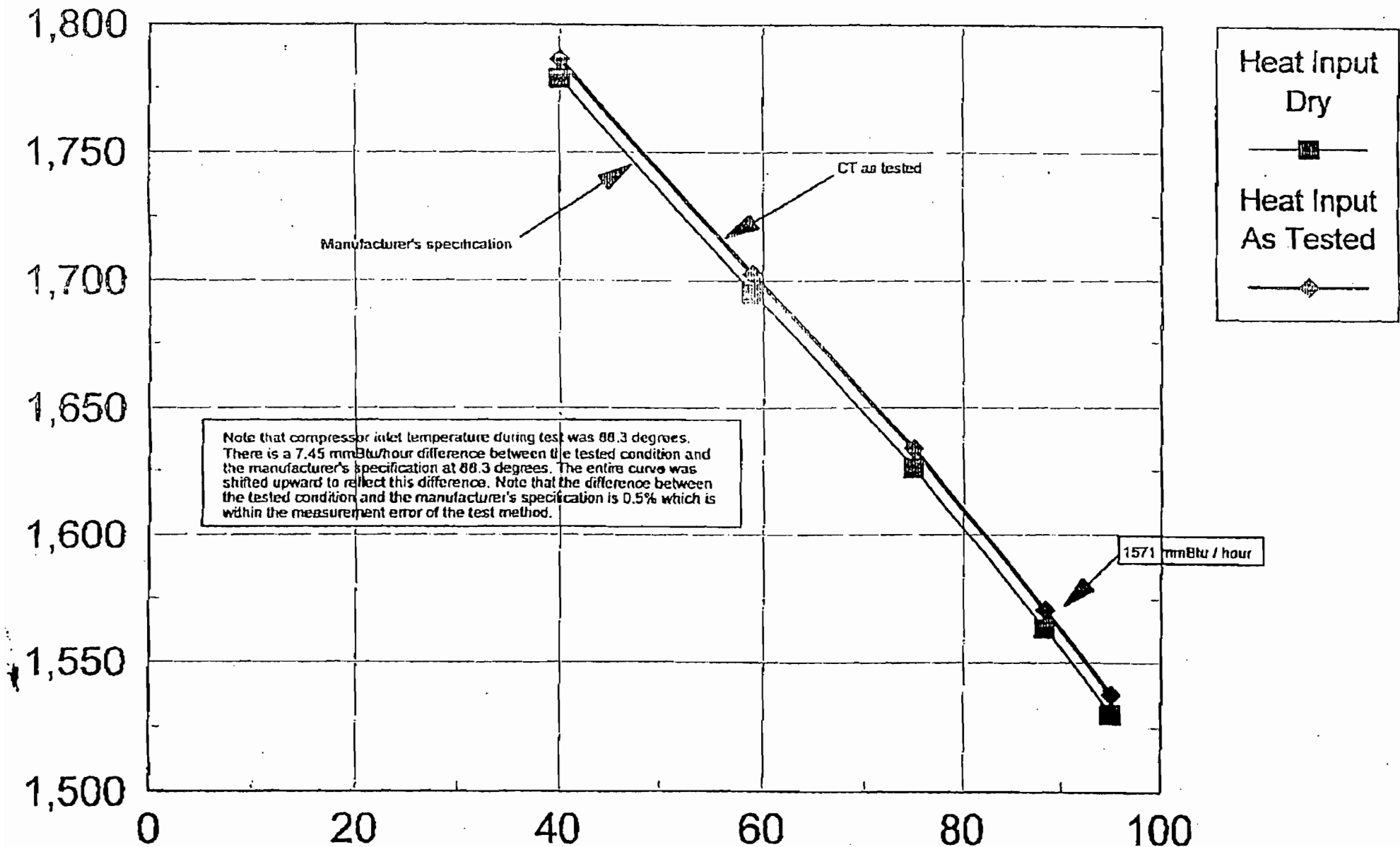
BUREAU OF  
AIR REGULATION

Putnam Plant Unit 1 or 2  
Heat Input Variation With Ambient Temperature (Oil)  
Each Combustion Turbine (with / without duct burners)



# Martin Unit 3B

## Heat Input vs. Ambient Temperature Curve





Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

April 26, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Richard Piper  
Repowering Licensing Manager  
Florida Power & Light Company  
Post Office Box 14000  
Juno Beach, Florida 33408

Re: Inlet Foggers – Putnan Plant Combustion Turbines DEP File 1070014-003- AC  
Inlet Foggers – Martin Plant Combustion Turbines DEP File 0850001-005- AC

Dear Mr. Piper:

The Department received your applications for the installation of the direct water spray fogging system at the FPL's Martin and Putnan Plants. Based on a technical review, the applications are incomplete. Pursuant to Rules 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, F.A.C., please submit the following information, including all relevant reference materials and calculations:

1. Please submit additional data to support the statement that the emission rate does not change as a result of inlet fogging.
2. In reference to Table 1 and 2. (Part II of the Supporting Information), indicate the nominal values for power output, heat rate and heat input increase.
3. Submit the heat input curves for these units.
4. Estimate actual emissions for each facility's turbines and worst case emission rate scenario.
5. Submit hours of operations for each turbine.

Please contact Teresa Heron at 850/921-9529 if you have any questions.

Sincerely,

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

CHF/th

cc: Ken Kosky, P.E  
Chris Kirts, NED  
Isidore Goldman, SED

*"Protect, Conserve and Manage Florida's Environment and Natural Resources"*



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Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	4-27-99
Postmark - 1070014-003-AC	
Marking - 0850001-05-AC	

PS Form 3800, April 1995

Fold at line over top of envelope to

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Richard Piper  
FP + L  
PO Box 14000  
Juno Beach, FL

33488

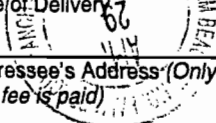
4a. Article Number

2 333 618 104

4b. Service Type

- Registered
- Express Mail
- Return Receipt for Merchandise
- Certified
- Insured
- COD

7. Date of Delivery



5. Received By: (Print Name)

R. Piper

6. Signature: (Addressee or Agent)

X

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.

**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603

**RECEIVED**

**MAR 29 1999**

**BUREAU OF  
AIR REGULATION**



Project No. 9737572

March 26, 1999

Mr. Clair H. Fancy, P.E., Chief  
Bureau of Air regulation  
Florida Department of Environmental Regulation  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

Attention: Mr. A. A. Linero, P.E. Administrator; New Source Review Section

RE: Florida Power & Light Company Putnam - 1070014-003-AC  
Spray Fogging Systems-Martin and Putnam Plants

Dear Al:

0850001-005-AC - Martin

On behalf of FPL, I am submitting air construction permit applications for the installation of direct fogging systems for the FPL Martin Plant, Units 3 and 4 and the Putnam Plant. As you will note from the discussion in Part II of the applications, the request will not trigger review under the Department's Prevention of Significant Deterioration Rules in Chapter 62-212 Florida administrative Code.

The proposed method for assuring the Department that the PSD review is not required and to monitor operation is to record the degree Fahrenheit-hours that actually occur. The degree F-hours will be recorded from temperature probes determining the turbine air inlet temperatures before and after the fogging systems. This will record data on the actual temperature decrease for the facility.

Please call me or Rich Piper of FPL (561-691-7058), if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

A handwritten signature in cursive script, appearing to read 'Ken'.

Kennard F. Kosky, P.E.  
Principal

KFK/jkk

Enclosures

cc: Rich Piper, FPL

9737572A/01.ltr

**RECEIVED**

MAR 29 1999

BUREAU OF  
AIR REGULATION

APPLICATION FOR AIR PERMIT  
INSTALLATION OF DIRECT WATER  
SPRAY FOGGING SYSTEMS  
MARTIN PLANT

Prepared For:

Florida Power & Light, Inc.  
700 Universe Blvd.  
Juno Beach, Florida 33408

Prepared By:

Golder Associates Inc.  
6241 NW 23rd Street, Suite 500  
Gainesville, Florida 32653

March 1999  
9737572Y/F3

*SE District*

DISTRIBUTION:

6 Copies - Florida Power & Light, Inc. (4 signatures, 2 photocopy signatures)  
2 Copies - Golder Associates Inc.

PART I  
APPLICATION FOR AIR PERMIT  
LONG FORM

# Department of Environmental Protection

## DIVISION OF AIR RESOURCES MANAGEMENT

### APPLICATION FOR AIR PERMIT - LONG FORM

See Instructions for Form No. 62-210.900(1)

#### I. APPLICATION INFORMATION

This section of the Application for Air Permit form identifies the facility and provides general information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

#### Identification of Facility Addressed in This Application

Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

1. Facility Owner/Company Name: <b>Florida Power &amp; Light Company</b>	
2. Site Name: <b>Martin Plant</b>	
3. Facility Identification Number: <b>0850001</b> [ ] Unknown	
4. Facility Location Information: Street Address or Other Locator: <b>7m N of Indiantown on SR 710</b> City: <b>Indiantown</b> County: <b>Martin</b> Zip Code: <b>34956</b>	
5. Relocatable Facility? [ ] Yes [X] No	6. Existing Permitted Facility? [X] Yes [ ] No

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<i>March 29, 1999</i>
2. Permit Number:	<i>0850001-005-AC</i>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official:

**John Lindsay, Plant General Manager**

2. Owner/Authorized Representative or Responsible Official Mailing Address:

Organization/Firm: **FPL - Martin Plant**

Street Address: **P.O. Box 176**

City: **Indiantown**

State: **FL** Zip Code: **34956-0176**

3. Owner/Authorized Representative or Responsible Official Telephone Numbers:

Telephone: **(561) 597-7106**

Fax: **(561) 597-7416**

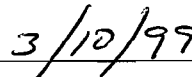
4. Owner/Authorized Representative or Responsible Official Statement:

*I, the undersigned, am the owner or authorized representative\* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*

Signature



Date



\* Attach letter of authorization if not currently on file.

**Scope of Application**

This Application for Air Permit addresses the following emissions unit(s) at the facility. An Emissions Unit Information Section (a Section III of the form) must be included for each emissions unit listed.

**Emissions Unit ID**                      **Description of Emissions Unit**                      **Permit Type**

Unit #	Unit ID		
1	003	CT3A - Combustion Turbine with HRSG	AC1B
2	004	CT3B - Combustion Turbine with HRSG	AC1B
3	005	CT4A - Combustion Turbine with HRSG	AC1B
4	006	CT4B - Combustion Turbine with HRSG	AC1B

**See individual Emissions Unit (EU) sections for more detailed descriptions.  
Multiple EU IDs indicated with an asterisk (\*). Regulated EU indicated with an "R".**

**Purpose of Application and Category**

Check one (except as otherwise indicated):

**Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain:

Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.

Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: \_\_\_\_\_

\_\_\_\_\_

Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit. Give reason for the revision e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

\_\_\_\_\_



**Category II: All Air Construction Permit Applications Subject to Processing Under Rule 62-210.300(2)(b),F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g., to address one or more newly constructed or modified emissions units.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_  
\_\_\_\_\_

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units.**

This Application for Air Permit is submitted to obtain:

- Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: \_\_\_\_\_  
**0850001-004-AV**

- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Air construction permit for one or more existing, but unpermitted, emissions units.

**Application Processing Fee**

Check one:

Attached - Amount: \_\_\_\_\_

Not Applicable.

**Construction/Modification Information**

1. Description of Proposed Project or Alterations:  <b>Installation of direct water spray inlet fogging systems. Since the facility holds a Title V permit pursuant to Chapter 62-213 F.A.C., a permit fee is not required. Refer to Part II for discussion.</b>
2. Projected or Actual Date of Commencement of Construction :
3. Projected Date of Completion of Construction :

**Professional Engineer Certification**

1. Professional Engineer Name: <b>Kennard F. Kosky</b> Registration Number: <b>14996</b>
2. Professional Engineer Mailing Address: Organization/Firm: <b>Golder Associates Inc.</b> Street Address: <b>6241 NW 23rd Street, Suite 500</b> City: <b>Gainesville</b> State: <b>FL</b> Zip Code: <b>32653-1500</b>
3. Professional Engineer Telephone Numbers: Telephone: <b>(352) 336-5600</b> Fax: <b>(352) 336-6603</b>

4. Professional Engineer's Statement:

*I, the undersigned, hereby certify, except as particularly noted herein\*, that:*

*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*

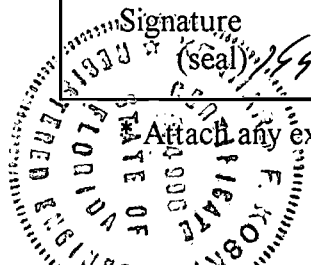
*Howard F. Kozak*

*3/3/99*

Signature  
(seal)

Date

Attach any exception to certification statement.



**Application Contact**

1. Name and Title of Application Contact: <b>Mr. Richard G. Piper, Repowering Licensing Manager</b>
2. Application Contact Mailing Address:  Organization/Firm: <b>FPL Environmental Services Dep.</b> Street Address: <b>700 Universe Blvd.</b> City: <b>Juno Beach</b> State: <b>FL</b> Zip Code: <b>33408</b>
3. Application Contact Telephone Numbers:  Telephone: <b>(561) 691-7058</b> Fax: <b>(561) 691-7070</b>

**Application Comment**

<p><b>The existing combustion turbines (Units 3A,3B,4A &amp; 4B) will be installed with direct water spray fogging systems that will reduce the turbine inlet air temperature. The temperature reduction will improve the heat rate and increase power due to the cooler-denser inlet air. The net emissions change from this project will not result in an increase of any regulated pollutant greater than the PSD significant emission rates. PSD review does not apply to proposed project. Discussed in Part II.</b></p>
---

## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Location and Type

1. Facility UTM Coordinates: Zone: 17                      East (km): 543.2                      North (km): 2993.0			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): 27 / 3 / 29                      Longitude: (DD/MM/SS): 80 / 33 / 54			
3. Governmental Facility Code: <b>0</b>	4. Facility Status Code: <b>A</b>	5. Facility Major Group SIC Code: <b>49</b>	6. Facility SIC(s): <b>4911</b>
7. Facility Comment (limit to 500 characters):  The existing Martin plant consists of 2 Fossil Fuel Fired Steam Generators (Units 1 and 2) and 2 Combined Cycle Units (Units 3 and 4). Each combined cycle unit consists of 2 combustion turbines and associated heat recovery steam generators (HRSGs). The primary fuel for the combustion turbines is natural gas with distillate oil as back-up. Refer to Part II for discussion			

#### Facility Contact

1. Name and Title of Facility Contact: <b>Willie Welch, Environmental Specialist</b>			
2. Facility Contact Mailing Address: Organization/Firm: <b>FPL - Martin Plant</b> Street Address: <b>P.O. Box 176</b> City: <b>Indiantown</b> State: <b>FL</b> Zip Code: <b>34956-0176</b>			
3. Facility Contact Telephone Numbers: Telephone: <b>(561) 597-7106</b> Fax: <b>(561) 597-7416</b>			



**B. FACILITY REGULATIONS**

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

[Empty box for Rule Applicability Analysis]

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

Facility emissions covered under existing Title V permit, no additional facility or emission unit applicable requirements as a result of the proposed change.



**C. FACILITY POLLUTANTS**

**Facility Pollutant Information**

1. Pollutant Emitted	2. Pollutant Classification

**D. FACILITY POLLUTANT DETAIL INFORMATION**

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

## E. FACILITY SUPPLEMENTAL INFORMATION

### Supplemental Requirements for All Applications

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input checked="" type="checkbox"/> Attached, Document ID(s): <u>Part II</u> _____ <input type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
5. Fugitive Emissions Identification: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
6. Supplemental Information for Construction Permit Application: <input checked="" type="checkbox"/> Attached, Document ID: <u>Part II</u> _____ <input type="checkbox"/> Not Applicable

### Additional Supplemental Requirements for Category I Applications Only

7. List of Proposed Exempt Activities: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
8. List of Equipment/Activities Regulated under Title VI: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed <input type="checkbox"/> Not Applicable
9. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
10. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable

<p>11. Identification of Additional Applicable Requirements:</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>12. Compliance Assurance Monitoring Plan:</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>13. Risk Management Plan Verification:</p> <p><input type="checkbox"/> Plan Submitted to Implementing Agency - Verification Attached Document ID: _____</p> <p><input type="checkbox"/> Plan to be Submitted to Implementing Agency by Required Date</p> <p><input type="checkbox"/> Not Applicable</p>
<p>14. Compliance Report and Plan</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>15. Compliance Statement (Hard-copy Required)</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>

PART II  
SUPPORTING INFORMATION

## Part II

### Application for Air Permit Installation of Direct Water Spray Fogging Systems Martin Plant

#### Introduction

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Martin Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decrease heat rate. The project is part of increasing capacity in a cost effective manner.

#### Description

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for West Palm Beach and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for West Palm Beach would be 11°F and would occur in August with a mid-afternoon temperature of 90°F and 64 percent relative humidity. During January, the mid-afternoon cooling would be about 9°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 55.5°F to 65.1°F with relative humidities ranging from 83 to 81 percent. The amount of adiabatic cooling would range from 3 to 4°F. The annual average temperature reduction used for gas firing was based on 24 hours operation would be about 5.5°F assuming 8°F for 12 hours during the day and 3°F for 12 hours during the night.

#### **Turbine Performance and Emission Estimates**

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the GE Model PG7221 (Frame 7FA) combustion turbines at the Martin plant, a 5.5°F average decrease in temperature for gas firing would result in a 2.1 percent increase in power and an associated 0.8 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Fort Myers turbines would be 4.7 mmBtu/hr/°F. The data were determined using GE supplied data (see Attachment A).

Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of degrees Fahrenheit-hours proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degrees Fahrenheit-hours for gas firing are calculated by multiplying 6,240 hours times 5.5°F or 34,320°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Martin turbines, a maximum of 34,320°F-hours of operation when firing natural gas and 4,000°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

### **Regulatory Applicability**

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Martin Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.



The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

Summary of Maximum Annual Emissions - All 4 Units

<u>Pollutant</u>	<u>Gas-Firing Tons/Year</u>	<u>Oil-firing Tons/Year</u>	<u>Total (Oil &amp; Gas)</u>
PM	2.95	1.23	4.19
NO <sub>x</sub>	29.04	9.39	38.43
SO <sub>2</sub>	15.01	18.74	33.75
CO	15.47	2.15	17.63
VOC	0.49	0.22	0.72
Degrees Fahrenheit-Hours for Each Fuel	34,320	4,000	
Additional Degrees Fahrenheit-Hours on Gas	11,095	0	
Total Gas Only Degrees Fahrenheit-Hours	45,415	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is NO<sub>x</sub>. Emissions of SO<sub>2</sub> are primarily associated with distillate fuel oil which is only used a backup to natural gas. For natural gas only, the maximum potential NO<sub>x</sub> emissions would be 34.4 tons/year at 45,415°F-hours per year per CT. This is equivalent to 2.77°F-hours of gas firing for each degree Fahrenheit-hour of oil firing (i.e., 11,095°F hours/4,000°F hours = 2.77°F-hours). The emissions of the other pollutants would be 3.9 tons/year for PM, 19.9 tons/year for SO<sub>2</sub>, 20.5 tons/year for CO and 0.65 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 181,661 hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 2.77°F hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected.

In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operated 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 181,661 degree F-hours for Units 3 and 4.

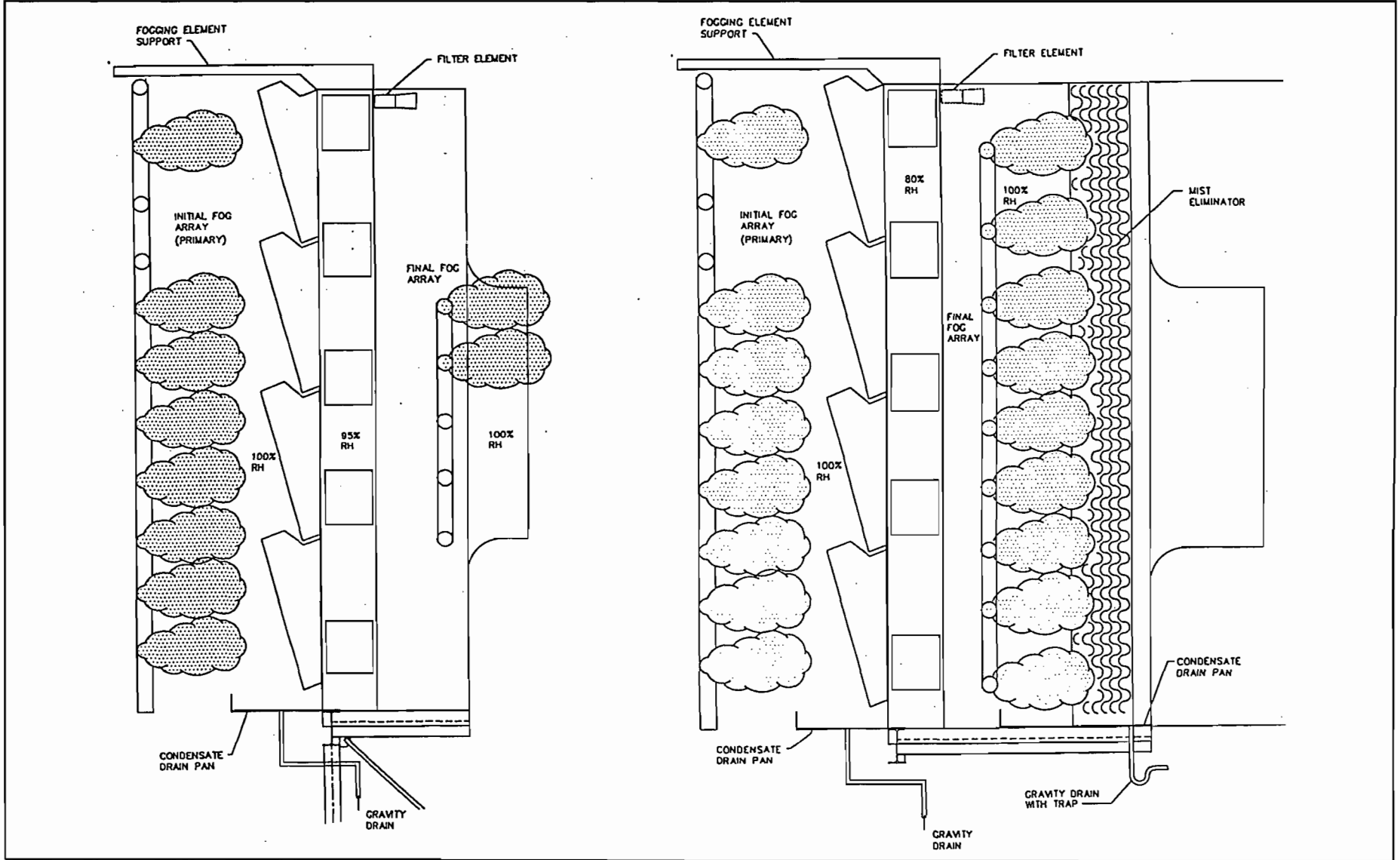


Figure 1. Illustrative Fogging System Schematic  
Florida Power & Light, Inc.

Source: Caldwell Energy and Environmental, Inc.



**Table 1** Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

Performance Basis			
Temperature Decrease	°F (1)	5.5	
Power Increase		2.09%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		1.44%	GE Curves
Heat Input Change	mmBtu/ °F	4.7	GE Curves
Hours/year		6,240 (2)	
Hours-°F/year		34,320	hours/year times temperature decrease
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu TPY	0.0092	Based on Title V Permit per machine
		0.74	
NO <sub>x</sub>	lb/MMBtu TPY	0.0900	Based on Title V Permit per machine
		7.26	
SO <sub>2</sub>	lb/MMBtu TPY	0.0465	Based on Title V Permit per machine
		3.75	
CO	lb/MMBtu TPY	0.0480	Based on Title V Permit per machine
		3.87	
VOC	lb/MMBtu TPY	0.0015	Based on Title V Permit per machine
		0.12	

Legend - TPY: tons per year

(1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger. Assumes 12 hours at 8 °F for daytime and 12 hours at 3 °F for nighttime.

(2) Hours of fogger operation based on estimate of 24 hours per day, 5 days/week and 52 weeks per year.

(3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.

**Table 2** Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (No. 2 Fuel Oil Combustion).

Performance Basis			
Temperature Decrease	°F (1)	8	
Power Increase		3.04%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		2.10%	GE Curves
Heat Input Change	mmBtu/ °F	4.7	GE Curves
Hours/year		500 (2)	
Hours-°F/year		4,000	hours/year times temperature decrease
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu TPY	0.0328	Based on Title V Permit per machine
		0.31	
NO <sub>x</sub>	lb/MMBtu TPY	0.2497	Based on Title V Permit per machine
		2.35	
SO <sub>2</sub>	lb/MMBtu TPY	0.4984	Based on Title V Permit per machine
		4.68	
CO	lb/MMBtu TPY	0.0573	Based on Title V Permit per machine
		0.54	
VOC	lb/MMBtu TPY	0.0060	Based on Title V Permit per machine
		0.06	

Legend - TPY: tons per year

(1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.

(2) Distillate oil firing limited to 2000 hours per year for all 4 combustion turbines combined.

(3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.

ATTACHMENT A

**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective.

Plant Site: Martin Combined Cycle Units 3A, 3B, 4A and 4B  
Turbine Model: GE Model PG7221 (FA)

Turbine Inlet Temperature ( °F)	90	60
Difference ( °F)		30
Heat Input (mmBtu/hr)	1,550	1,690
Difference (mmBtu/hr)		140
Rate (mmBtu/hr/ °F) <sup>a</sup>		4.67

Note: <sup>a</sup> heat input difference divided by temperature difference.

ATTACHMENT B



**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



December 15, 1998

9737572A/1

Florida Power & Light Company  
700 Universe Blvd.  
P.O. Box 14000  
Juno Beach, Florida 33408

Attention: Mr. John Hampp, Environmental Specialist

RE: Putnam Inlet Fogging Emission Tests  
Analysis of Data

Dear John:

Golder Associates Inc. has evaluated the emissions data taken during August 25 and 26, 1998 to determine the potential effect of inlet fogging on emission rates of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). The data were obtained at the Putnam Plant using various inlet fogging conditions while operating the unit at nearly constant heat input. The heat input during testing on August 25, 1998 varied by less than 1.5 percent while heat input during testing on August 26, 1998 varied by about 2.5 percent. The data evaluated represented 178 individual 3 minute readings using continuous emission monitoring equipment. There were 72 data points when the inlet foggers were not operating (i.e., "off") while there were 106 data points where the various foggers were operating (i.e., "on").

The data were evaluated using the procedures in Appendix C to 40 CFR Part 60; Determination of Emission Rate Change. The data were also evaluated in terms of the potential effect of inlet fogging. Tables 1.1a and 1.1b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 25, 1998. Tables 1.2a and 1.2b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 26, 1998. Taken together, the analysis suggests that NO<sub>x</sub> concentrations may decrease slightly while CO may increase slightly with the operation of inlet foggers. However, the trend was not always consistent and the differences are small (i.e., up to a few ppm). Other factors also likely played a role in the variability of the data such as the response in continuous emission monitoring equipment, fuel input, ambient temperature and combustion turbine operation variability. Such changes, which cannot be completely accounted for in the data, would make it inappropriate to develop a specific relationships regarding emission rates at this time. Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

A handwritten signature in black ink, appearing to read 'Kennard F. Kosky'.

Kennard F. Kosky, P.E.  
Principal

KFK/arz

Table 1.1a Florida Power And Light (FP&L) Test data for the Combustion Turbine  
 Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98)  
 NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	87.8	0.98	1.782	0.485	88.3	87.4
1424-1521	on	20	19	86.5	1.33	1.729	0.514	87.0	85.9
1524	off	1	0	-	-	-	-	-	-
1527-1533	on	3	2	89.0	0.35	2.92	0.592	89.6	88.4
1536-1539	off	2	1	88.5	0.78	1.86	1.023	89.5	87.4

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.1b Florida Power And Light (FP&L) Test data for the Combustion Turbine  
 Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98)  
 CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	75.9	2.90	1.782	1.433	77.4	74.5
1424-1521	on	20	19	81.0	1.43	1.729	0.554	81.5	80.4
1524	off	1	0	-	-	-	-	-	-
1527-1533	on	3	2	78.0	2.00	2.92	3.372	81.4	74.6
1536-1539	off	2	1	79.5	2.12	1.86	2.790	82.3	76.7

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.2a Florida Power And Light (FP&L) Test data for the Combustion Turbine  
 Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
 NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	z	95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	89.1	0.7	1.701	-	0.236	89.4	88.9
1230-1430	on	41	-	90.5	1.3	-	1.645	0.334	90.8	90.2
1433-1539	off	23		96.8	1.3	1.717		0.466	97.3	96.4
1542-1745	on	42		92.4	2.2		1.645	0.561	93.0	91.9
1748-1800	off	5	4	97.7	0.4	2.132	-	0.429	98.1	97.3

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

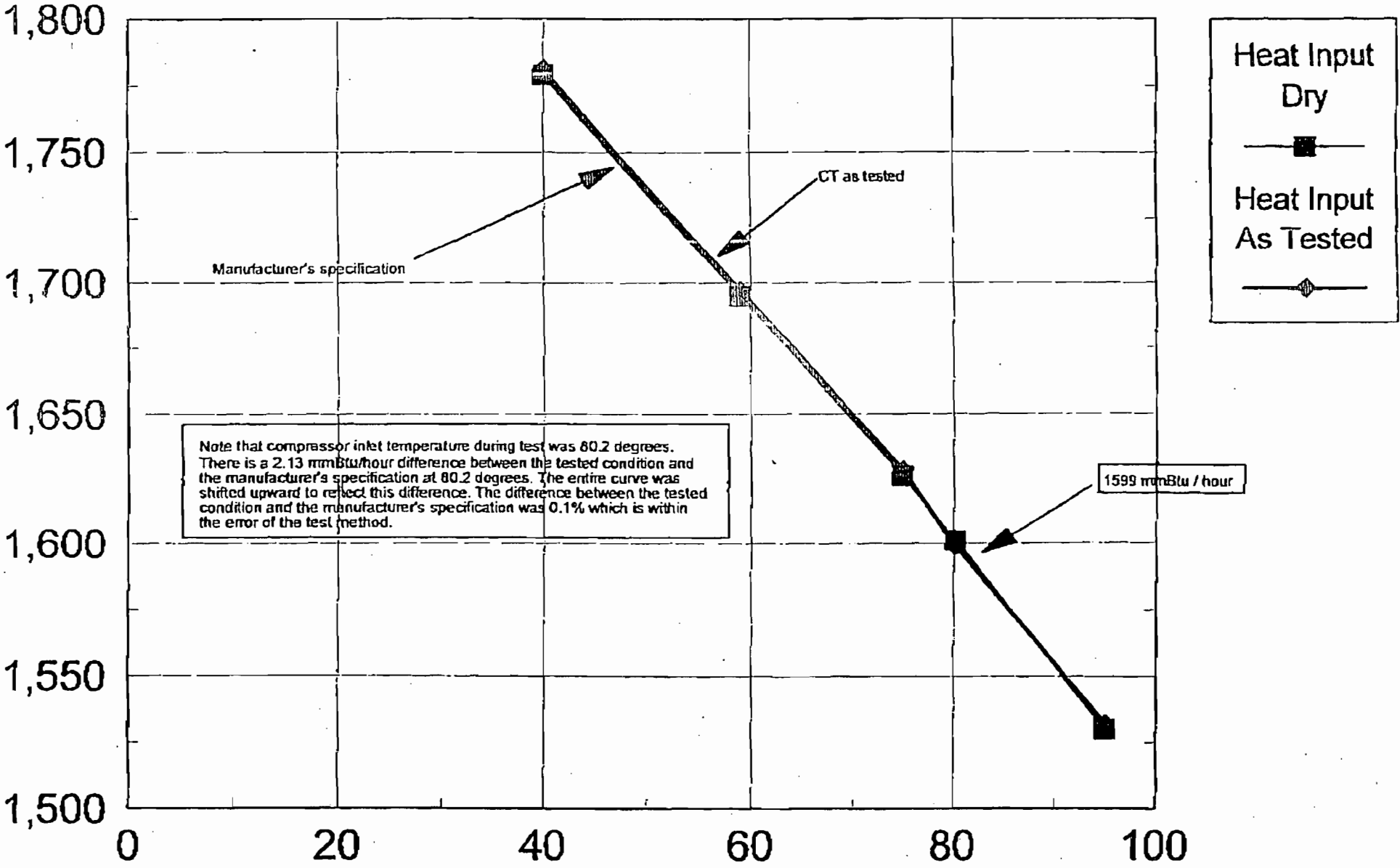
Table 1.2b Florida Power And Light (FP&L) Test data for the Combustion Turbine  
 Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
 CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t		95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	72.6	2.3	1.701	-	0.728	73.3	71.9
1230-1430	on	41	-	70.9	1.9	-	1.645	0.494	71.4	70.4
1433-1539	off	23		67.2	1.9	1.717		0.688	67.9	66.5
1542-1745	on	42		69.5	3.3		1.645	0.828	70.4	68.7
1748-1800	off	5	4	63.4	0.9	2.132	-	0.853	64.3	62.5

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

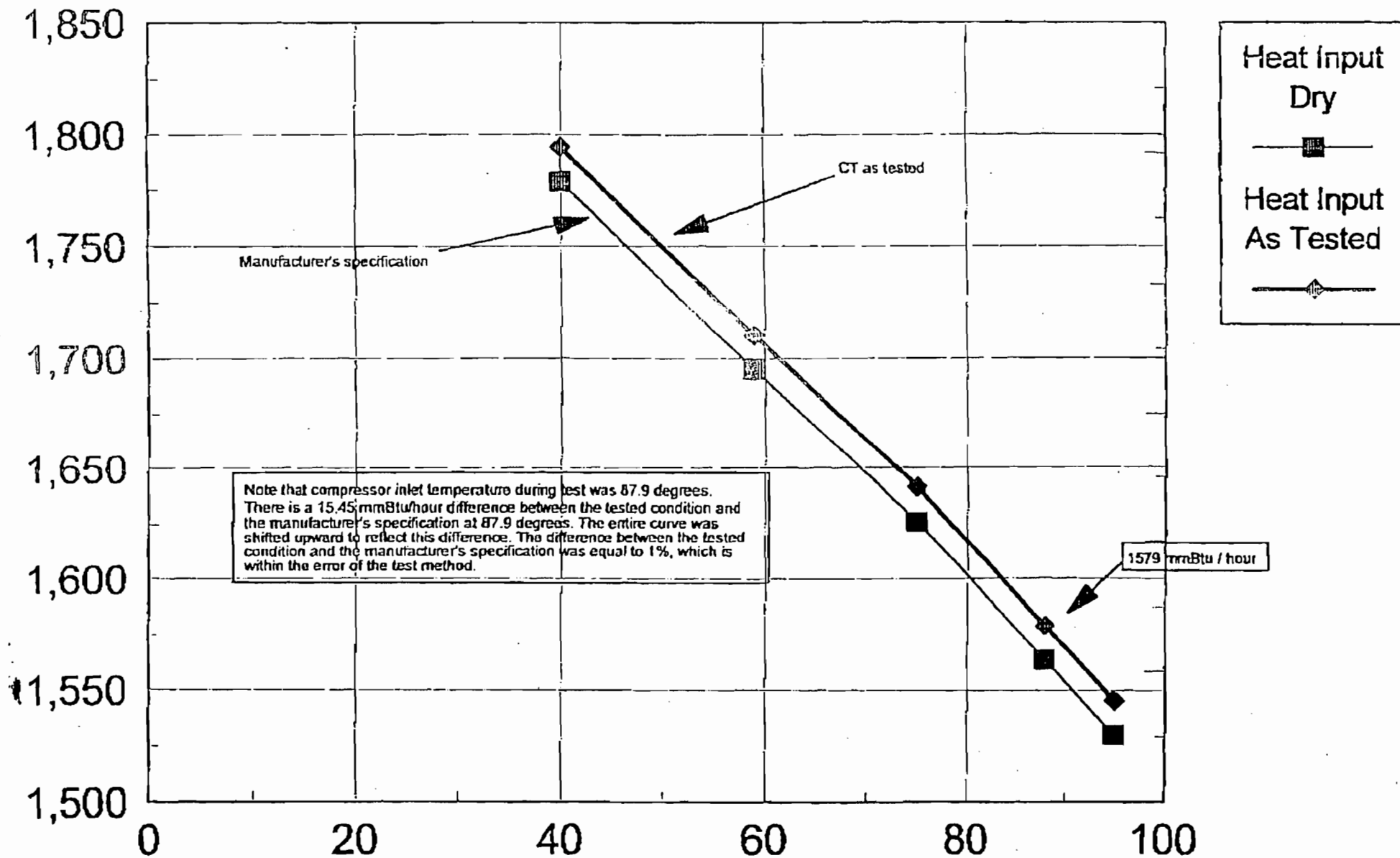
# Martin Unit 4B

## Heat Input vs. Ambient Temperature Curve

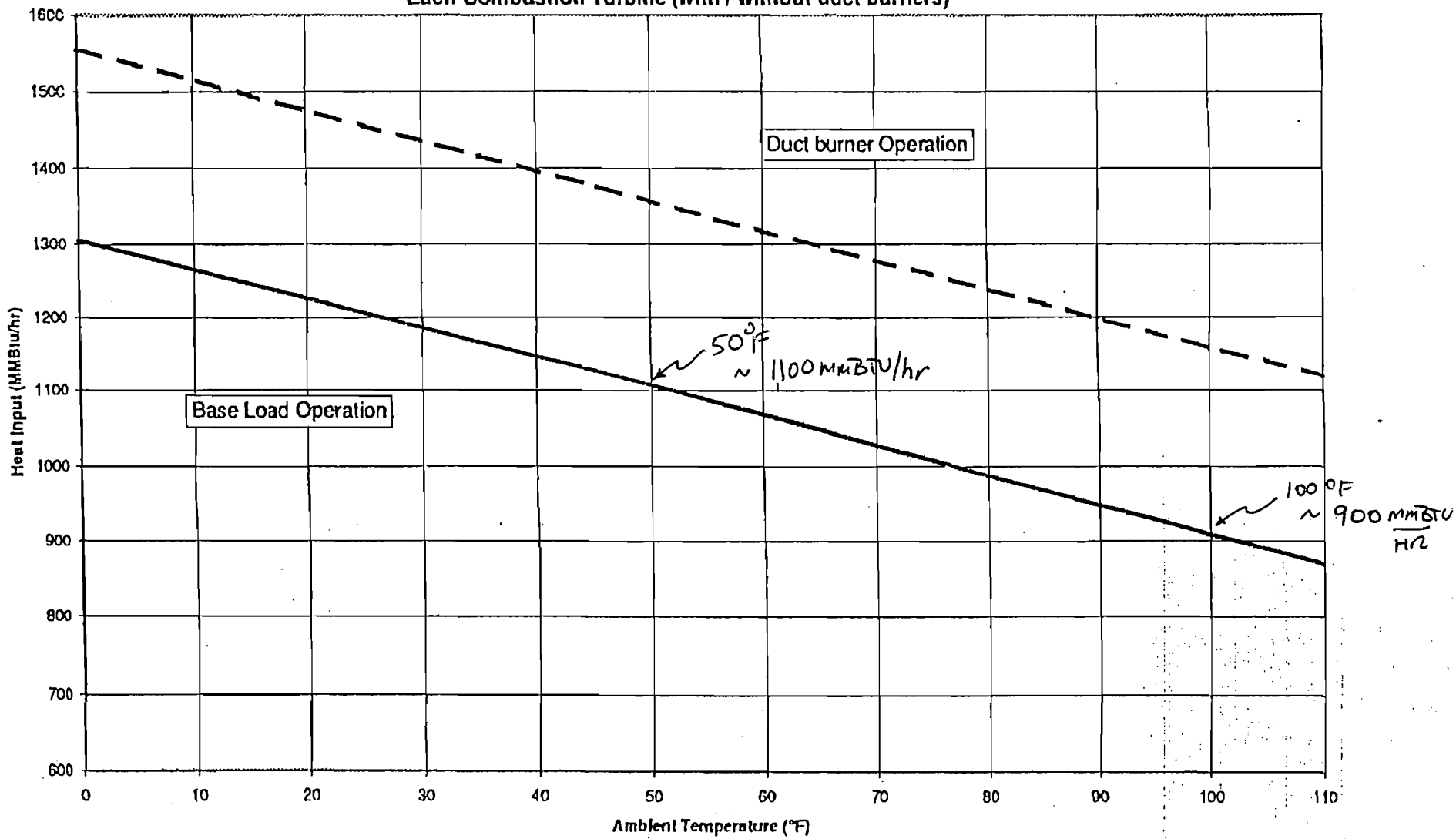


# Martin Unit 4A

## Heat Input vs. Ambient Temperature Curve

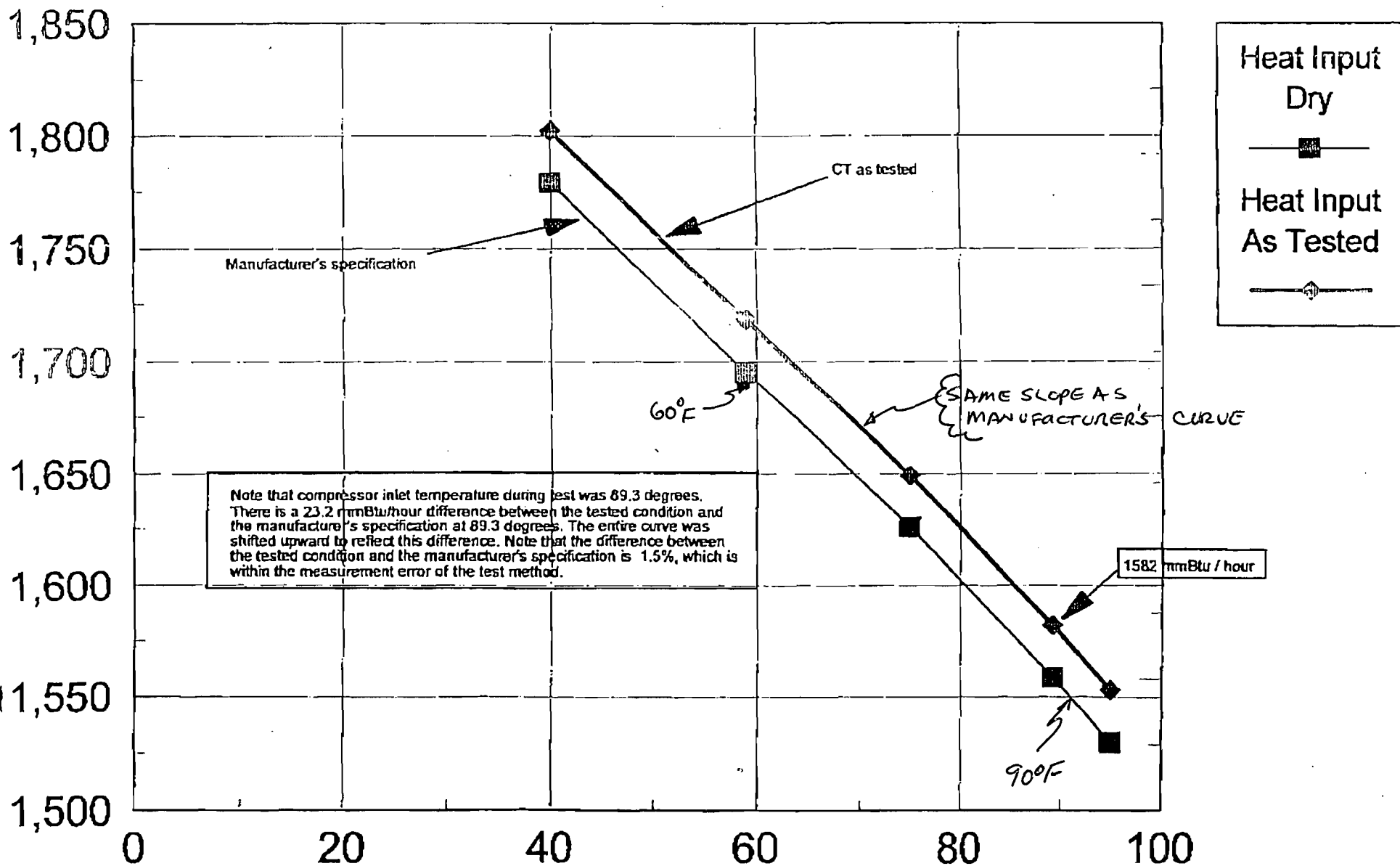


Pulnam Plant Unit 1 or 2  
Heat Input Variation With Ambient Temperature  
Each Combustion Turbine (with / without duct burners)



# Martin Unit 3A

## Heat Input vs. Ambient Temperature Curve



**RECEIVED**

MAR 29 1999

BUREAU OF  
AIR REGULATION

APPLICATION FOR AIR PERMIT  
INSTALLATION OF DIRECT WATER  
SPRAY FOGGING SYSTEMS  
PUTNAM PLANT

Prepared For:

Florida Power & Light, Inc.  
700 Universe Blvd.  
Juno Beach, Florida 33408

Prepared By:

Golder Associates Inc.  
6241 NW 23rd Street, Suite 500  
Gainesville, Florida 32653

March 1999  
9737572Y/F2

*NE District*

DISTRIBUTION:

6 Copies - Florida Power & Light, Inc. (4 signatures, 2 photocopy signatures)  
2 Copies - Golder Associates Inc.



PART I  
APPLICATION FOR AIR PERMIT  
LONG FORM

# Department of Environmental Protection

## DIVISION OF AIR RESOURCES MANAGEMENT

### APPLICATION FOR AIR PERMIT - LONG FORM

See Instructions for Form No. 62-210.900(1)

#### I. APPLICATION INFORMATION

This section of the Application for Air Permit form identifies the facility and provides general information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

#### Identification of Facility Addressed in This Application

Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

1. Facility Owner/Company Name: <b>Florida Power &amp; Light Company</b>	
2. Site Name: <b>Putnam Plant</b>	
3. Facility Identification Number: <b>1070014</b> [ ] Unknown	
4. Facility Location Information: Street Address or Other Locator: <b>392 US Highway 17 South</b> City: <b>East Palatka</b> County: <b>Putnam</b> Zip Code: <b>32131</b>	
5. Relocatable Facility? [ ] Yes [x] No	6. Existing Permitted Facility? [x] Yes [ ] No

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<b>March 29, 1999</b>
2. Permit Number:	<b>1070014-003-AC</b>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official:

**Robert Bergstrom, Plant General Manager**

2. Owner/Authorized Representative or Responsible Official Mailing Address:

Organization/Firm: **FPL - Putnam Plant**

Street Address: **392 US Hwy 17 South**

City: **East Palatka**

State: **FL**

Zip Code: **32131**

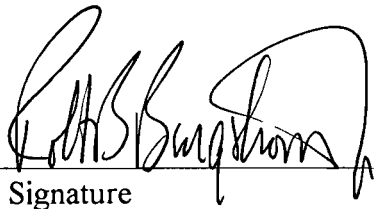
3. Owner/Authorized Representative or Responsible Official Telephone Numbers:

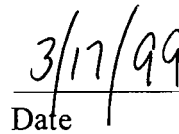
Telephone: **(941) 325-1206**

Fax: **(904) 329-4699**

4. Owner/Authorized Representative or Responsible Official Statement:

*I, the undersigned, am the owner or authorized representative\* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*

  
Signature

  
Date

\* Attach letter of authorization if not currently on file.

**Scope of Application**

This Application for Air Permit addresses the following emissions unit(s) at the facility. An Emissions Unit Information Section (a Section III of the form) must be included for each emissions unit listed.

Emissions Unit ID		Description of Emissions Unit	Permit Type
Unit #	Unit ID		
1	003	Gas Turbine 1GT Unit 1	AC1B
2	004	Gas Turbine 2GT Unit 1	AC1B
3	005	Gas Turbine 1GT Unit 2	AC1B
4	006	Gas Turbine 2GT Unit 2	AC1B

See individual Emissions Unit (EU) sections for more detailed descriptions.  
Multiple EU IDs indicated with an asterisk (\*). Regulated EU indicated with an "R".

**Purpose of Application and Category**

Check one (except as otherwise indicated):

**Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain:

Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.

Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: \_\_\_\_\_

\_\_\_\_\_

Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit. Give reason for the revision e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

\_\_\_\_\_

**Category II: All Air Construction Permit Applications Subject to Processing Under Rule 62-210.300(2)(b), F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g.; to address one or more newly constructed or modified emissions units.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_  
\_\_\_\_\_

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units.**

This Application for Air Permit is submitted to obtain:

- Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: \_\_\_\_\_  
1070014-001-AV

- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Air construction permit for one or more existing, but unpermitted, emissions units.

**Application Processing Fee**

Check one:

Attached - Amount: \_\_\_\_\_

Not Applicable.

**Construction/Modification Information**

1. Description of Proposed Project or Alterations:  Installation of direct water spray inlet fogging systems. Since the facility holds a Title V permit pursuant to Chapter 62-213 F.A.C., a permit fee is not required. Refer to Part II for discussion.
2. Projected or Actual Date of Commencement of Construction :
3. Projected Date of Completion of Construction :

**Professional Engineer Certification**

1. Professional Engineer Name: <b>Kennard F. Kosky</b> Registration Number: <b>14996</b>
2. Professional Engineer Mailing Address: Organization/Firm: <b>Golder Associates Inc.</b> Street Address: <b>6241 NW 23rd Street, Suite 500</b> City: <b>Gainesville</b> State: <b>FL</b> Zip Code: <b>32653-1500</b>
3. Professional Engineer Telephone Numbers: Telephone: <b>(352) 336-5600</b> Fax: <b>(352) 336-6603</b>

4. Professional Engineer's Statement:

*I, the undersigned, hereby certify, except as particularly noted herein\*, that:*

*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*

*Thomas F. Kelly*

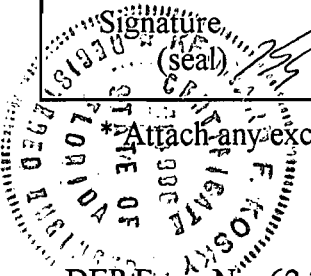
*3/3/99*

Signature

Date

(seal)

Attach any exception to certification statement.





**Application Contact**

1. Name and Title of Application Contact: <b>Mr. Richard G. Piper, Repowering Licensing Manager</b>
2. Application Contact Mailing Address:  Organization/Firm: <b>FPL Environmental Services Dep.</b> Street Address: <b>700 Universe Blvd.</b> City: <b>Juno Beach</b> State: <b>FL</b> Zip Code: <b>33408</b>
3. Application Contact Telephone Numbers:  Telephone: <b>(561) 691-7058</b> Fax: <b>(561) 691-7070</b>

**Application Comment**

The existing 4 combustion turbines (GT 11,12,21 and 22) will be installed with direct water spray fogging systems that will reduce the turbine inlet air temperature. The temperature reduction will improve the heat rate and increase power due to the cooler-denser inlet air. The net emissions change from this project will not result in an increase of any regulated pollutant greater than the PSD significant emission rates. PSD review does not apply to proposed project. Discussion in Part II.

## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Location and Type

1. Facility UTM Coordinates: Zone: 17                      East (km): 443.3                      North (km): 3277.80			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): 29 / 37 / 44                      Longitude: (DD/MM/SS): 81 / 35 / 6			
3. Governmental Facility Code: 0	4. Facility Status Code: A	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4911
7. Facility Comment (limit to 500 characters):  The existing Putnam Plant consists of 2 combined cycle units. Each unit consists of 2 combustion turbines and associated heat recovery steam generators (HRSG). The HRSGs have duct burners. The primary fuel for the turbines and duct burners is natural gas. Distillate oil is used as back-up in the combustion turbines. Refer to Part II fo discussion.			

#### Facility Contact

1. Name and Title of Facility Contact: Pat Wilson, Environmental Specialist
2. Facility Contact Mailing Address: Organization/Firm: FPL - Putnam Plant Street Address: 392 US Hwy 17 South City: East Paltka                      State: FL                      Zip Code: 32131
3. Facility Contact Telephone Numbers: Telephone: (904) 329-4609                      Fax: (904) 329-4699



**B. FACILITY REGULATIONS**

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

A large, empty rectangular box with a black border, intended for the user to provide a Rule Applicability Analysis. The box is currently blank.

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

**Facility emissions covered under existing Title V permit, no additional facility or emission unit applicable requirements as a result of the proposed change.**

**C. FACILITY POLLUTANTS**

**Facility Pollutant Information**

1. Pollutant Emitted	2. Pollutant Classification

**D. FACILITY POLLUTANT DETAIL INFORMATION**

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

**E. FACILITY SUPPLEMENTAL INFORMATION**

**Supplemental Requirements for All Applications**

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input checked="" type="checkbox"/> Attached, Document ID(s): <u>Part II</u> _____ <input type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
5. Fugitive Emissions Identification: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
6. Supplemental Information for Construction Permit Application: <input checked="" type="checkbox"/> Attached, Document ID: <u>Part II</u> _____ <input type="checkbox"/> Not Applicable

**Additional Supplemental Requirements for Category I Applications Only**

7. List of Proposed Exempt Activities: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
8. List of Equipment/Activities Regulated under Title VI: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed <input type="checkbox"/> Not Applicable
9. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
10. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable



11. Identification of Additional Applicable Requirements: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
12. Compliance Assurance Monitoring Plan: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
13. Risk Management Plan Verification:  <input type="checkbox"/> Plan Submitted to Implementing Agency - Verification Attached Document ID: _____  <input type="checkbox"/> Plan to be Submitted to Implementing Agency by Required Date  <input type="checkbox"/> Not Applicable
14. Compliance Report and Plan <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
15. Compliance Statement (Hard-copy Required) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable

PART II  
SUPPORTING INFORMATION

**Part II**  
**Application for Air Permit**  
**Installation of Direct Water Spray Fogging Systems**  
**Putnam Plant**

**Introduction**

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Putnam Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decreases heat rate. The project is part of increasing capacity in a cost effective manner.

**Description**

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for Jacksonville and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for Jacksonville would be 14°F and would occur in July with a mid-afternoon temperature of 91°F and 58 percent relative humidity. During January, the mid-afternoon cooling would be about 7°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 41.7°F to 55.7°F with relative humidities ranging from 83 to 88 percent. The amount of adiabatic cooling would range from 1 to 2°F. For the Putnam Plant, an 8°F average reduction was assumed in the calculations for primarily daytime operation.

#### **Turbine Performance and Emission Estimates**

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the Westinghouse Model 501B5A combustion turbines at the Putnam plant, an 8°F average decrease in temperature would result in a 3.3 percent increase in power and an associated 1.1 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Putnam turbines would be 3 mmBtu/hr/°F. The data were determined using Westinghouse supplied data (see Attachment A).

Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of hours of proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degree F-hours for gas firing are calculated by multiplying 1,440 hours times 8°F or 11,520°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Putnam turbines, a maximum of 11,520°F-hours of operation when firing natural gas and 1,920°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

The use of AP-42 emission factors is appropriate for estimating maximum potential annual emissions since there are no emission limits for NO<sub>x</sub>. This is especially conservative for NO<sub>x</sub> since actual emissions are much lower. Over the last two years, quarterly emissions reported from CEM data ranged from 0.322 lb/mmBtu to 0.398 lb/mmBtu. The annual averages from CEM data ranged from 0.351 to 0.371 lb/mmBtu for 1997 and 0.354 to 0.375 lb/mmBtu for 1998. Using an emission factor of 0.44 lb/mmBtu to estimate maximum potential annual emissions, would overestimate annual emissions from 17 to 25 percent greater than that actual observed. Thus, the annual estimated emissions based on AP-42 emission factors are conservative.

**Regulatory Applicability**

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Putnam Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.

The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

Summary of Maximum Annual Emissions - All Units

<u>Pollutant</u>	<u>Tons/Year</u>	<u>Tons/Year</u>	<u>Total (Oil &amp; Gas)</u>
PM	1.16	0.34	1.50
NO <sub>x</sub>	30.41	8.04	38.45
SO <sub>2</sub>	0.20	8.06	8.26
CO	7.60	0.55	8.16
VOC	1.66	0.20	1.85
Degree Fahrenheit-Hours per year	11,520	1,920	
Additional Degree Fahrenheit-Hours on Gas	3,046	0	
Total Degree Fahrenheit-Hours Gas Only	14,566	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is NO<sub>x</sub>. Emissions of SO<sub>2</sub> are primarily associated with distillate fuel oil which is only used as a backup to natural gas. For natural gas only, the maximum potential NO<sub>x</sub> emissions would be 38.45 tons/year at 14,566°F-hours per year per CT. This is equivalent to 1.6°F-hours of gas firing for each hour of oil firing (i.e., 3,046°F-hours/1,920°F-hours = 1.6°F-hours). The emissions of the other pollutants would be 1.47 tons/year for PM, 0.25 tons/year for SO<sub>2</sub>, 9.61 tons/year for CO and 2.10 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 58,264°F-hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 1.6°F-hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected. In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operate 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 58,264°F-hours for the facility.

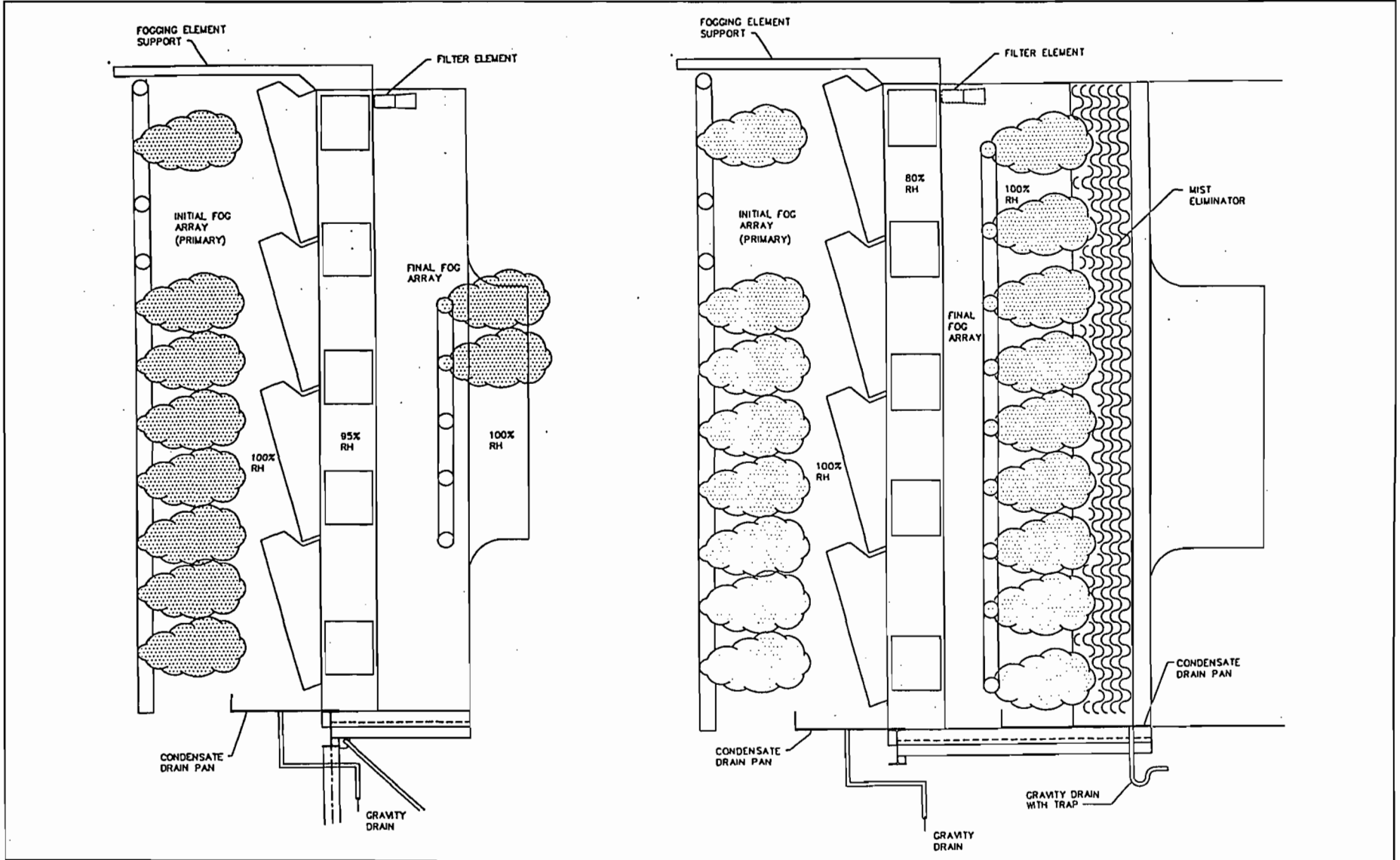


Figure 1. Illustrative Fogging System Schematic  
Florida Power & Light, Inc.

Source: Caldwell Energy and Environmental, Inc.





**Table 1** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

Performance Basis			
Temperature Decrease	°F (1)	8	PPN Charts Westinghouse  @ 85 °F  hours/year times temperature decrease
Power Increase		3.28%	
Heat Rate Decrease		1.06%	
Heat Input Increase		2.22%	
Heat Input Change	mmBtu/ °F	3	
Hours/year		1,440 (2)	
°F-hours/year		11,520	
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0168	AP-42 Section 3.1 per machine
	TPY	0.29	
NOx	lb/MMBtu	0.44	AP-42 Section 3.1 per machine
	TPY	7.60	
SO <sub>2</sub>	lb/MMBtu	0.00286	1 grain/100 cf natural gas per machine
	TPY	0.05	
CO	lb/MMBtu	0.11	AP-42 Section 3.1 per machine
	TPY	1.90	
VOC	lb/MMBtu	0.024	AP-42 Section 3.1 per machine
	TPY	0.41	

Legend - TPY: tons per year

(1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.

(2) Hours of fogger operation based on estimate of 8 hours per day and 180 days per year.

(3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-0, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".

**Table 2** Emission Estimates of the Putnam Facility Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging ( No. 2 Fuel Oil Combustion).

Performance Basis			
Temperature Decrease	°F (1)	8	PPN Charts Westinghouse  hours/year times temperature decrease
Power Increase		3.28%	
Heat Rate Decrease		1.06%	
Heat Input Increase		2.22%	
Heat Input Change	mmBtu/ °F	3	
Hours/year		240 (2)	
°F-hours/year		1,920	
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0293	AP-42 Section 3.1 per machine
	TPY	0.08	
NOx	lb/MMBtu	0.698	AP-42 Section 3.1 per machine
	TPY	2.01	
SO <sub>2</sub>	lb/MMBtu	0.7	Based on Title V Permit per machine
	TPY	2.02	
CO	lb/MMBtu	0.048	AP-42 Section 3.1 per machine
	TPY	0.14	
VOC	lb/MMBtu	0.017	AP-42 Section 3.1 per machine
	TPY	0.05	

Legend - TPY: tons per year

(1) Temperature decrease is annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.

(2) Hours of fogger operation.

(3) Emission factor references - Title V Permit No. 1070014-001-AV, PPSC PA 74-01, EPA AP-42 Emission Factors Section 3.1 "Stationary Gas Turbines".

ATTACHMENT A

**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective.

Plant Site: Putnam Plant; GTs 11, 12, 21 and 22  
Turbine Model: Westinghouse 501B5A

Turbine Inlet Temperature ( °F)	100	59
Difference ( °F)		41
Heat Input (mmBtu/hr)	877	1,005
Difference (mmBtu/hr)		127.65
Rate (mmBtu/hr/ °F) <sup>a</sup>		3.11

Note: <sup>a</sup> heat input difference divided by temperature difference.

ATTACHMENT B

**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



December 15, 1998

9737572A/1

Florida Power & Light Company  
700 Universe Blvd.  
P.O. Box 14000  
Juno Beach, Florida 33408

Attention: Mr. John Hampp, Environmental Specialist

RE: Putnam Inlet Fogging Emission Tests  
Analysis of Data

Dear John:

Golder Associates Inc. has evaluated the emissions data taken during August 25 and 26, 1998 to determine the potential effect of inlet fogging on emission rates of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). The data were obtained at the Putnam Plant using various inlet fogging conditions while operating the unit at nearly constant heat input. The heat input during testing on August 25, 1998 varied by less than 1.5 percent while heat input during testing on August 26, 1998 varied by about 2.5 percent. The data evaluated represented 178 individual 3 minute readings using continuous emission monitoring equipment. There were 72 data points when the inlet foggers were not operating (i.e., "off") while there were 106 data points where the various foggers were operating (i.e., "on").

The data were evaluated using the procedures in Appendix C to 40 CFR Part 60; Determination of Emission Rate Change. The data were also evaluated in terms of the potential effect of inlet fogging. Tables 1.1a and 1.1b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 25, 1998. Tables 1.2a and 1.2b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 26, 1998. Taken together, the analysis suggests that NO<sub>x</sub> concentrations may decrease slightly while CO may increase slightly with the operation of inlet foggers. However, the trend was not always consistent and the differences are small (i.e., up to a few ppm). Other factors also likely played a role in the variability of the data such as the response in continuous emission monitoring equipment, fuel input, ambient temperature and combustion turbine operation variability. Such changes, which cannot be completely accounted for in the data, would make it inappropriate to develop a specific relationships regarding emission rates at this time. Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

A handwritten signature in black ink, appearing to read 'Kennard F. Kosky'.

Kennard F. Kosky, P.E.  
Principal

KFK/arz

Table 1.1a Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	87.8	0.98	1.782	0.485	88.3	87.4
1424-1521	on	20	19	86.5	1.33	1.729	0.514	87.0	85.9
1524	off	1	0	-	-	-	-		
1527-1533	on	3	2	89.0	0.35	2.92	0.592	89.6	88.4
1536-1539	off	2	1	88.5	0.78	1.86	1.023	89.5	87.4

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.1b Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, Fl.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	75.9	2.90	1.782	1.433	77.4	74.5
1424-1521	on	20	19	81.0	1.43	1.729	0.554	81.5	80.4
1524	off	1	0	-	-	-	-		
1527-1533	on	3	2	78.0	2.00	2.92	3.372	81.4	74.6
1536-1539	off	2	1	79.5	2.12	1.86	2.790	82.3	76.7

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.2a Florida Power And Light (FP&L) Test data for the Combustion Turbine  
Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	z	95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	89.1	0.7	1.701	-	0.236	89.4	88.9
1230-1430	on	41	-	90.5	1.3	-	1.645	0.334	90.8	90.2
1433-1539	off	23		96.8	1.3	1.717		0.466	97.3	96.4
1542-1745	on	42		92.4	2.2		1.645	0.561	93.0	91.9
1748-1800	off	5	4	97.7	0.4	2.132	-	0.429	98.1	97.3

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

Table 1.2b Florida Power And Light (FP&L) Test data for the Combustion Turbine  
Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t		95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	72.6	2.3	1.701	-	0.728	73.3	71.9
1230-1430	on	41	-	70.9	1.9	-	1.645	0.494	71.4	70.4
1433-1539	off	23		67.2	1.9	1.717		0.688	67.9	66.5
1542-1745	on	42		69.5	3.3		1.645	0.828	70.4	68.7
1748-1800	off	5	4	63.4	0.9	2.132	-	0.853	64.3	62.5

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)





**FPL**

Florida Power & Light Company, Environmental Services Dept., P.O. Box 14000, Juno Beach, FL 33408

June 24, 1999

Ms. Teresa Heron, P.E.  
New Source Review Section  
Bureau of Air Regulation  
Florida Department of Environmental Protection  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

**RECEIVED**

**JUL 14 1999**

**BUREAU OF AIR REGULATION**

**RE: FPL Martin Combustion Turbine Inlet Foggers**  
**PSD Permit PSD-FL-146G**

Dear Teresa:

Enclosed pursuant to Clair Fancy's correspondence of June 15, 1999, please find one copy of the Proof of Publication for the subject inlet foggers at the Martin facility. The Notice of Intent was published on June 19, 1999.

Teresa, should you have any questions, please do not hesitate to contact me at (561) 691-7058.

Very truly yours,

Richard Piper  
Repowering Licensing Manager  
Florida Power and Light Company

The Okeechobee News
P.O. Box 639, Okeechobee, Florida 34973
(941) 763-3134
Published Daily

STATE OF FLORIDA
COUNTY OF OKEECHOBEE

Before the undersigned authority personally appeared Judy Kasten, who on oath says she is Publisher of the Okeechobee News, a DAILY Newspaper published at Okeechobee, in Okeechobee County, Florida; that the attached copy of advertisement, being a

Public Notice of Intent to Issue PSD Permit Modification

in the matter of

DER.

in the 19th Judicial District of the Circuit Court of Okeechobee County, Florida, was published in said newspaper in the issues of

June 19, 1999

Affiant further says that the said Okeechobee News is a newspaper published at Okeechobee, in said Okeechobee County, Florida, and that said newspaper has heretofore been published continuously in said Okeechobee County, Florida each week and has been entered as second class mail matter at the post office in Okeechobee, in said Okeechobee County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Judy Kasten

Sworn to and subscribed before me this 21ST

day of June A.D. 19 99

Anna M. Hines

Notary Public, State of Florida at Large

Anna M Hines
My Commission CC715804
Expires March 31, 2002

PUBLIC NOTICE OF INTENT TO ISSUE PSD PER-

MIT MODIFICATION
STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEP File No. 0850001-005-AC (PSD-FL-146G)
Florida Power & Light Martin Plant
Inlet Fogger Project
Martin County

The Department of Environmental Protection (Department) gives notice of its intent to issue a PSD permit modification to Florida Power & Light (FP&L). The permit is to install foggers at the compressor inlets of four natural gas and No. 2 fuel oil-fired General Electric PG7221FA combined cycle combustion turbine-electrical generators at the Martin Plant in Martin County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Florida Power & Light, Post Office Box 176, Indiantown, Florida 34956.

The primary movers are the combustion turbines, which are typically nominally rated by General Electric at approximately 160 MW at 59 degrees when firing gas. The combustion turbines (exclusive of the steam cycle) normally achieve their maximum rated output of approximately 170 MW on cold (32 degrees) days because the greater compressor inlet air density allows greater throughput in the rotor or expansion section of the combustion turbine. The maximum power output is only about 140 MW on hot (95 degrees) days because of the lower compressor inlet air density. The foggers can increase hot-day power output (under very dry conditions) by as much as 14 MW per combustion turbine, thus almost restoring the units to their nominal rating. Under the design conditions for this Florida site (95 degrees and 50 percent humidity), an improvement of about 7 MW per combustion turbine can be expected.

The foggers provide no benefit under humid or cold (less than approximately 50 degrees) conditions and will not be used when they occur. The maximum output of approximately 170 MW will continue to occur at a low ambient temperature. The result is that maximum hourly emissions will not increase although actual annual emissions will increase within their permitted limits because more fuel will be used on hot, relatively dry days.

Although the number of days during which the foggers can economically operate probably limits emissions increases to levels below significance for the purposes of PSD applicability, FP&L proposes enforceable conditions to insure non-applicability. FP&L asserts and the Department accepts that the modification will not cause any meaningful change in the actual hours of operation of these combined cycle units. The units are allowed to operate continuously and already have a very high availability factor. The maximum increase in annual emissions caused by the project in tons per year is summarized below along with the PSD-significant levels.

Table with 3 columns: Pollutant, Annual Emission Increase, PSD Significant Levels. Rows include PM10, SO2, NOx, VOC, CO.

An air quality impact analysis was not required or conducted. No significant impacts are expected to occur as a result of this project. It will not cause or contribute to a violation of any ambient air quality standard or increment.

The Department will issue the FINAL permit modification with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue a PSD Permit Modification." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before

the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the 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 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice of intent whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to petition.



shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 29-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that 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 such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Drive, Suite 4  
Tallahassee, Florida, 32301  
Telephone: 850/488-0114  
Fax: 850/922-6979

Department of Environmental Protection  
Southeast District Office  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
Telephone: 561/681-6600  
Fax: 561/681-6790

The complete project file includes the application, technical evaluation, Draft PSD Permit Modification, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

PUBLISH: 6/19/99  
Okeechobee News #228



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.  
 USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.  
 QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL  
 PACKAGE  
 TRACKING NUMBER

1495342940

5505/5515

1495342940

**SENDER'S COPY**

**SENDER'S COPY  
 DROP OFF YOUR PACKAGE AND SAVE**

SENDER'S FEDERAL EXPRESS ACCOUNT NUMBER <b>1345-2681-5</b>		Date <b>2/18/03</b>
From (Your Name) Please Print <b>Teresa Heron</b>		Recipient's Phone Number (Very Important) <b>(305) 530-0050</b>
Your Phone Number (Very Important) <b>(850) 921-9529</b>		To (Recipient's Name) Please Print <b>Patty Watson</b>
Company <b>D.E.P. - Bureau of Air Regulation</b>		Company <b>for Sean W. Firley</b>
Department/Floor No. <b>111 S. Magnolia Drive</b>		Department/Floor No. <b>Carlton Fields, Attorneys at Law</b>
Street Address <b>111 S. Magnolia Drive</b>		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) <b>4000 International Place</b>
City <b>Tallahassee</b>		City <b>Miami</b>
State <b>FL</b>	ZIP Required <b>32311</b>	State <b>FL</b>
ZIP Required <b>32311</b>		ZIP Required <b>33131</b>
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)		
IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address		
PAYMENT 1 <input type="checkbox"/> Bill Sender 2 <input checked="" type="checkbox"/> Bill Recipient's FedEx Acct. No. 3 <input type="checkbox"/> Bill 3rd Party FedEx Acct. No. 4 <input type="checkbox"/> Bill Credit Card 5 <input type="checkbox"/> Cash/Check Acct./Credit Card No. <b>1345-2681-5</b> Exp. Date		City State ZIP Required

<b>SERVICES</b> (Check only one box)		<b>DELIVERY AND SPECIAL HANDLING</b> (Check services required)		<b>PACKAGES</b> WEIGHT in Pounds Only		<b>YOUR DECLARED VALUE</b> (See right)		<b>SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY</b>		<b>Federal Express Use</b>			
<b>Priority Overnight</b> (Delivery by next business morning) 11 <input type="checkbox"/> OTHER PACKAGING 16 <input type="checkbox"/> FEDEX LETTER* 12 <input checked="" type="checkbox"/> FEDEX PAK** 13 <input type="checkbox"/> FEDEX BOX 14 <input type="checkbox"/> FEDEX TUBE		<b>Standard Overnight</b> (Delivery by next business afternoon. No Saturday delivery) 51 <input type="checkbox"/> OTHER PACKAGING 56 <input type="checkbox"/> FEDEX LETTER* 52 <input type="checkbox"/> FEDEX PAK** 53 <input type="checkbox"/> FEDEX BDX 54 <input type="checkbox"/> FEDEX TUBE		<b>Weekday Service</b> 1 <input type="checkbox"/> HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 <input checked="" type="checkbox"/> DELIVER WEEKDAY <b>Saturday Service</b> 31 <input type="checkbox"/> HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 <input type="checkbox"/> DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 <input type="checkbox"/> SATURDAY PICK-UP (Extra charge)		<b>Special Handling</b> 4 <input type="checkbox"/> DANGEROUS GOODS (Extra charge) 6 <input type="checkbox"/> DRY ICE Dangerous Goods Shipper's Declaration not required		<b>DIM SHIPMENT</b> (Chargeable Weight) lbs.		Use of this airbill constitutes your agreement to the service conditions in our current Service Guide, available upon request. See back of sender's copy of this airbill for information. Service conditions may vary for Government Overnight Service. See U.S. Government Service Guide for details. We will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, and document your actual loss for a timely claim. Limitations found in the current Federal Express Service Guide apply. Your right to recover from Federal Express for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the declared value specified to the left. Recovery cannot exceed actual documented loss. The maximum Declared Value for FedEx Letter and FedEx PAK packages is \$500. In the event of untimely delivery, Federal Express will at your request and with some limitations refund all transportation charges paid. See Service Guide for further information.		Base Charges Declared Value Charge Other 1 Other 2 Total Charges	
<b>Economy Two-Day</b> (Delivery by second business day 1) 30 <input type="checkbox"/> ECONOMY* *Economy Letter Rate not available. Minimum charge. One pound Economy rate.		<b>Government Overnight</b> (Restricted for authorized users only) 46 <input type="checkbox"/> GOVT LETTER 41 <input type="checkbox"/> GOVT PACKAGE		Total Total Total		Received At 1 <input type="checkbox"/> Regular Stop 3 <input type="checkbox"/> Drop Box 2 <input type="checkbox"/> On-Call Stop 5 <input type="checkbox"/> Station		Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.		REVISION DATE 12/92 PART #137205 GBFE FORMAT #158 <b>158</b> © 1992-93 FEDEX PRINTED IN U.S.A.			
<b>Freight Service</b> (for packages over 150 lbs.) 70 <input type="checkbox"/> OVERNIGHT FREIGHT** (Confirmed reservation required) † Delivery commitment may be later in some areas		80 <input type="checkbox"/> TWO-DAY FREIGHT** **Declared Value Limit \$500. **Call for delivery schedule		Day kg. 9 UN 1845 X kg. 904 III DESCRIPTION 12 <input type="checkbox"/> HOLIDAY DELIVERY (if offered) (Extra charge)		Signature:							

## **TERMS AND CONDITIONS**

### **DEFINITIONS**

On this Airbill, we, our and us refer to Federal Express Corporation, its employees and agents. You and your refer to the sender, its employees and agents.

### **AGREEMENT TO TERMS**

By giving us your package to deliver, you agree to all the terms of this Airbill and in our current Service Guide, which is available upon request. If there is a conflict between the current Service Guide and this Airbill, the Service Guide will control. No one is authorized to alter or modify the terms of our Agreement.

### **RESPONSIBILITY FOR PACKAGING AND COMPLETING AIRBILL**

You are responsible for adequately packaging your goods and for properly filling out this Airbill. Omission of the number of packages and weight per package from this Airbill will result in a billing based on our best estimate of the number of packages received from you and an estimated "default" weight per package, as determined and periodically adjusted by us.

### **AIR TRANSPORTATION TAX INCLUDED**

Our basic rate includes a federal tax required by Internal Revenue Code Section 4271 on the air transportation portion of this service.

### **LIMITATIONS ON OUR LIABILITY AND LIABILITIES NOT ASSUMED**

Our liability for loss or damage to your package is limited to your actual damages or \$100, whichever is less, unless you pay for and declare a higher authorized value. We do not provide cargo liability insurance, but you may pay an additional charge for each additional \$100 of declared value. If you declare a higher value and pay the additional charge, our liability will be the lesser of your declared value or the actual value of your package.

In any event we will not be liable for any damages, whether direct, incidental, special or consequential in excess of the declared value of a shipment, whether or not Federal Express had knowledge that such damages might be incurred including, but not limited to, loss of income or profits.

We won't be liable for your acts or omissions, including but not limited to improper or insufficient packing, securing, marking or addressing, or for the acts or omissions of the recipient or anyone else with an interest in the package. Also, we won't be liable, if you or the recipient violates any of the terms of our Agreement. We won't be liable for loss of or damage to shipments of prohibited items.

We won't be liable for loss, damage or delay caused by events we cannot control, including but not limited to acts of God, perils of the air, weather conditions, acts of public enemies, war, strikes, civil commotions, or acts or omissions of public authorities (including customs and quarantine officials) with actual or apparent authority.

### **DECLARED VALUE LIMITS**

The highest declared value we allow for FedEx Letter and FedEx Pak shipments is \$500. For other shipments, the highest declared value we allow is \$25,000 unless your package contains items of "extraordinary value," in which case the highest declared value we allow is \$500. Items of "extraordinary value" include artwork, jewelry, furs, precious metals, negotiable instruments, and other items listed in our current Service Guide.

If you send more than one package on this Airbill, you may fill in the total declared value for all packages, not to exceed the \$100, \$500 or \$25,000 per package limit described above. (Example: 5 packages can have a total declared value of up to \$125,000.)

If more than one package is shipped on this Airbill, our liability for loss or damage will be limited to the actual value of the package(s) lost or damaged (not to exceed the lesser of the total declared value or the per package limits described above). You have the responsibility of proving the actual loss or damage.

### **FILING A CLAIM**

ALL CLAIMS MUST BE MADE BY YOU IN WRITING. You must notify us of your claim within strict time limits. See current Service Guide.

We'll consider your claim filed if you call and notify our Customer Service Department at 800-238-5355 and notify us in writing as soon as possible.

Within 90 days after you notify us of your claim, you must send us all relevant information about it. We are not obligated to act on any claim until you have paid all transportation charges, and you may not deduct the amount of your claim from those charges.

If the recipient accepts your package without noting any damage on the delivery record, we will assume that the package was delivered in good condition. In order for us to process your claim, you must, to the extent possible, make the original shipping cartons and packing available for inspection.

### **RIGHT TO INSPECT**

We may, at our option, open and inspect your packages prior to or after you give them to us to deliver.

### **NO C.O.D. SERVICES**

NO C.O.D. SERVICES ON THIS AIRBILL. If C.O.D. Service is required, please use a Federal Express C.O.D. airbill for this purpose.

### **RESPONSIBILITY FOR PAYMENT**

Even if you give us different payment instructions, you will always be primarily responsible for all delivery costs, as well as any cost we may incur in either returning your package to you or warehousing it pending disposition.

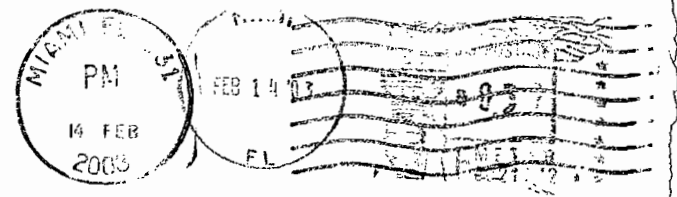
### **RIGHT OF REJECTION**

We reserve the right to reject a shipment at any time, when such shipment would be likely to cause damage or delay to other shipments, equipment or personnel, or if the transportation of which is prohibited by law or is in violation of any rules contained in this Airbill or our current Service Guide.

### **MONEY-BACK GUARANTEE**

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund or credit all transportation charges. See current Service Guide for further information.

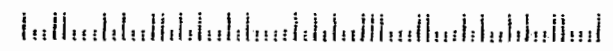
187 08622 (256)  
**CARLTON FIELDS**  
POST OFFICE BOX 019101  
MIAMI, FLORIDA 33131-9101



Ms. Teresa Heron  
State of Florida  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

A

32399+2400 01



7 333 618 104

US Postal Service  
**Receipt for Certified Mail**  
No Insurance Coverage Provided.  
Do not use for International Mail (See reverse)

Sent to <b>Richard Piper</b>	
Street & Number <b>FP + L</b>	
Post Office, State, & ZIP Code <b>Juno Beach FL</b>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <b>Dunham - 1070014-003-AC</b> <b>Martin - 0850001-05-AC</b>	

PS Form 3800, April 1995

Fold at line over top of envelope to

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

**Richard Piper**  
**FP + L**  
**PO Box 14000**  
**Juno Beach, FL**

4a. Article Number

**2333 618 104**

4b. Service Type

- Registered
- Express Mail
- Return Receipt for Merchandise
- Certified
- Insured
- COD

7. Date of Delivery



5. Received By: (Print Name)

**R. Piper**  
**3348**

8. Addressee's Address (Only if requested and fee is paid)

6. Signature: (Addressee or Agent)

**X**

Thank you for using Return Receipt Service.



FPL

Richard Piper

July 8, 1999

Teresa -

Per our conversation this morning, attached  
is the copies of the Public Notices for  
Putnam and Martin.

-RICH

May be

Duplicates of

Public Notices  
on both plants



7 333 618 163

US Postal Service  
**Receipt for Certified Mail**  
No Insurance Coverage Provided.  
Do not use for International Mail (See reverse)

Sent to	
John Lindsay	
Street & Number	
FP & L - Martins	
Post Office, State, & ZIP Code	
Indiantown FL	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	6-15-99

PS Form 3800 April 1995

your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. John Lindsay, Plant Gen. Mgr.  
FP & L Martins Plant  
PO Box 176  
Indiantown, FL

349 46-0176

5. Received By: (Print Name)

Bob P. [Signature]

6. Signature: (Addressee or Agent)

X Bob P. [Signature]

4a. Article Number

7 333 618 163

4b. Service Type

- Registered
- Certified
- Express Mail
- Insured
- Return Receipt for Merchandise
- COD

7. Date of Delivery

6-22-99

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.

Z 333 618 111

US Postal Service  
**Receipt for Certified Mail**

No Insurance Coverage Provided.  
Do not use for International Mail (See reverse)

PS Form 3800, April 1995

Sent to	John Lindsay
Street & Number	FP + L
Post Office, State, & ZIP Code	Indian town, FL
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	Martin
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	7-20-99
	0850001-005-AC

Is your RETURN ADDRESS completed on the reverse

- Complete this form and attach to the mailpiece.
- Print your name and address on the card to you.
- Attach this form to the front of the mailpiece, and return it back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

- Addressee's Address
  - Restricted Delivery
- Consult postmaster for fee.

3. Article Addressed to:  
John Lindsay  
FP + L  
PO Box 176  
Indian town, FL  
34946-0176

5. Received By: (Print Name)  
Richard Tillis

6. Signature, Addressee or Agent  
x Richard Tillis

4a. Article Number  
2 333 618 111

4b. Service Type  
 Registered  Certified  
 Express Mail  Insured  
 Return Receipt for Merchandise  COD

7. Date of Delivery  
7-23-99

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.

# FedEx USA Airbill

FedEx Tracking Number

811241472830

Form I.D. No.

0200

Sender's Copy

**1 From** (please print and press hard)

Date 7-20-99 Sender's FedEx Account Number \_\_\_\_\_

Sender's Name TERESA HERON Phone on 921-9533  
(850) 921-9529

Company FLORIDA DEP Air Div.

Address 2600 BLAIR STONE ROAD

Dept./Floor/Suite/Room

City TALLAHASSEE State FL ZIP 32399-2400

**2 Your Internal Billing Reference Information**  
(Optional) (First 24 characters will appear on invoice)

**3 To** (please print and press hard)

Recipient's Name RICHARD PIPER Phone (561) 691-7058

Company FPL 0850001-005 AC Martin

Address 700 UNIVERSE BLVD

(To "HOLD" at FedEx location, print FedEx address here)

(We Cannot Deliver to P.O. Boxes or P.O. ZIP Codes)

Dept./Floor/Suite/Room

City JUNO BEACH State FL ZIP 33408

**For HOLD at FedEx Location check here**

Hold Weekday (Not available with FedEx First Overnight)  
 Hold Saturday (Not available at all locations and FedEx 2Day only)

**For WEEKEND Delivery check here** (Extra Charge. Not available to all locations)

Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only)  
 NEW Sunday Delivery (Available for FedEx Priority Overnight only)

**Service Conditions, Declared Value, and Limit of Liability** - By using this Airbill, you agree to the service conditions in our current Service Guide or U.S. Government Service Guide. Both are available on request. SEE BACK OF SENDER'S COPY OF THIS AIRBILL FOR INFORMATION AND ADDITIONAL TERMS. We will not be responsible for any claim in excess of \$100 per package whether the result of loss, damage, or delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, and document your

actual loss in a timely manner. Your right to recover from us for any loss includes intrinsic value of the package, loss of sales, interest, profit, attorney's fees, costs, and other forms of damage, whether direct, incidental, consequential, or special, and is limited to the greater of \$100 or the declared value but cannot exceed actual documented loss. The maximum declared value for any FedEx Letter and FedEx Pak is \$500. Federal Express may, upon your request, and with some limitations, refund all transportation charges paid. See the FedEx Service Guide for further details.

**Questions?**

Call 1-800-Go-FedEx® (800)463-3339

The World On Time®

**4a Express Package Service** Packages under 150 lbs. Delivery commitment may be later in some areas.

FedEx Priority Overnight (Next business morning)  FedEx Standard Overnight (Next business afternoon)  
 FedEx First Overnight (Earliest next business morning delivery to select locations) (Higher rates apply)  
 FedEx 2Day (Second business day)  FedEx Express Saver (Third business day)  
FedEx Letter Rate not available. Minimum charge: One pound rate.

**4b Express Freight Service** Packages over 150 lbs. Delivery commitment may be later in some areas.

FedEx Overnight Freight (Next business day)  FedEx 2Day Freight (Second business day)  FedEx Express Saver Freight (Up to 3 business days)  
(Call for delivery schedule. See back for detailed descriptions of freight services.)

**5 Packaging**  FedEx Letter  FedEx Pak  FedEx Box  FedEx Tube  Other Pkg.  
Declared value limit \$500.

**6 Special Handling** (One box must be checked)

Does this shipment contain dangerous goods?  No  Yes (As per attached Shipper's Declaration)  Yes (Shipper's Declaration not required)  
 Dry Ice (Dry Ice, 9, UN 1845) x \_\_\_\_\_ kg.  Cargo Aircraft Only  
\*Dangerous Goods cannot be shipped in FedEx packaging.

**7 Payment**

Bill to:  Sender (Account No. in Section 1 will be billed)  Recipient (Enter FedEx Account No. or Credit Card No. below)  Third Party  Credit Card  Cash/Check

FedEx Account No. 1859-3028-7

Credit Card No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Total Packages	Total Weight	Total Declared Value*	Total Charges
		\$ .00	\$

\*When declaring a value higher than \$100 per shipment, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE, AND LIMIT OF LIABILITY section for further information.

**8 Release Signature** Sign to authorize delivery without obtaining signature.

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.

322

Rev. Date 3/98  
Part #153024  
©1994-98 FedEx  
PRINTED IN U.S.A.  
GBFE 1/99

RETAIN THIS COPY FOR YOUR RECORDS

RECEIVED

MAR 29 1999

BUREAU OF  
AIR REGULATION

Scanned

APPLICATION FOR AIR PERMIT  
INSTALLATION OF DIRECT WATER  
SPRAY FOGGING SYSTEMS  
MARTIN PLANT

Prepared For:

Florida Power & Light, Inc.  
700 Universe Blvd.  
Juno Beach, Florida 33408

Prepared By:

Golder Associates Inc.  
6241 NW 23rd Street, Suite 500  
Gainesville, Florida 32653

March 1999  
9737572Y/F3

DISTRIBUTION:

6 Copies - Florida Power & Light, Inc. (4 signatures, 2 photocopy signatures)  
2 Copies - Golder Associates Inc.



PART I  
APPLICATION FOR AIR PERMIT  
LONG FORM

# Department of Environmental Protection

## DIVISION OF AIR RESOURCES MANAGEMENT

### APPLICATION FOR AIR PERMIT - LONG FORM

See Instructions for Form No. 62-210.900(1)

#### I. APPLICATION INFORMATION

This section of the Application for Air Permit form identifies the facility and provides general information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

#### Identification of Facility Addressed in This Application

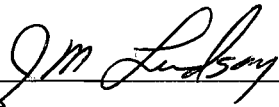
Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

1. Facility Owner/Company Name: <b>Florida Power &amp; Light Company</b>	
2. Site Name: <b>Martin Plant</b>	
3. Facility Identification Number: <b>0850001</b> [ ] Unknown	
4. Facility Location Information: Street Address or Other Locator: <b>7m N of Indiantown on SR 710</b> City: <b>Indiantown</b> County: <b>Martin</b> Zip Code: <b>34956</b>	
5. Relocatable Facility? [ ] Yes [ <input checked="" type="checkbox"/> ] No	6. Existing Permitted Facility? [ <input checked="" type="checkbox"/> ] Yes [ ] No

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<i>March 29, 1999</i>
2. Permit Number:	<i>0850001-005-AC</i>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official: <b>John Lindsay, Plant General Manager</b>
2. Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: <b>FPL - Martin Plant</b> Street Address: <b>P.O. Box 176</b> City: <b>Indiantown</b> State: <b>FL</b> Zip Code: <b>34956-0176</b>
3. Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: <b>(561) 597-7106</b> Fax: <b>(561) 597-7416</b>
4. Owner/Authorized Representative or Responsible Official Statement:  <i>I, the undersigned, am the owner or authorized representative* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.</i>  Signature <u></u> Date <u>3/10/99</u>

\* Attach letter of authorization if not currently on file.

**Scope of Application**

This Application for Air Permit addresses the following emissions unit(s) at the facility. An Emissions Unit Information Section (a Section III of the form) must be included for each emissions unit listed.

**Emissions Unit ID**                      **Description of Emissions Unit**                      **Permit Type**

Unit #	Unit ID		
1	003	CT3A - Combustion Turbine with HRSG	AC1B
2	004	CT3B - Combustion Turbine with HRSG	AC1B
3	005	CT4A - Combustion Turbine with HRSG	AC1B
4	006	CT4B - Combustion Turbine with HRSG	AC1B

See individual Emissions Unit (EU) sections for more detailed descriptions.  
Multiple EU IDs indicated with an asterisk (\*). Regulated EU indicated with an "R".



**Purpose of Application and Category**

Check one (except as otherwise indicated):

**Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain:

Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.

Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit to be renewed: \_\_\_\_\_

Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: \_\_\_\_\_

Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit. Give reason for the revision e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

**Category II: All Air Construction Permit Applications Subject to Processing Under Rule 62-210.300(2)(b),F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g.; to address one or more newly constructed or modified emissions units.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_  
\_\_\_\_\_

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units.**

This Application for Air Permit is submitted to obtain:

- Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: \_\_\_\_\_  
**0850001-004-AV**

- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s): \_\_\_\_\_  
\_\_\_\_\_

- Air construction permit for one or more existing, but unpermitted, emissions units.

**Application Processing Fee**

Check one:

Attached - Amount: \_\_\_\_\_

Not Applicable.

**Construction/Modification Information**

1. Description of Proposed Project or Alterations:  Installation of direct water spray inlet fogging systems. Since the facility holds a Title V permit pursuant to Chapter 62-213 F.A.C., a permit fee is not required. Refer to Part II for discussion.
2. Projected or Actual Date of Commencement of Construction :
3. Projected Date of Completion of Construction :

**Professional Engineer Certification**

1. Professional Engineer Name: <b>Kennard F. Kosky</b> Registration Number: <b>14996</b>
2. Professional Engineer Mailing Address: Organization/Firm: <b>Golder Associates Inc.</b> Street Address: <b>6241 NW 23rd Street, Suite 500</b> City: <b>Gainesville</b> State: <b>FL</b> Zip Code: <b>32653-1500</b>
3. Professional Engineer Telephone Numbers: Telephone: <b>(352) 336-5600</b> Fax: <b>(352) 336-6603</b>

4. Professional Engineer's Statement:

*I, the undersigned, hereby certify, except as particularly noted herein\*, that:*

*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [ X ] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*

*Thomas F. Katz*

*3/3/99*

Date

Signature

(seal)

Attach any exception to certification statement.

**Application Contact**

1. Name and Title of Application Contact: <b>Mr. Richard G. Piper, Repowering Licensing Manager</b>
2. Application Contact Mailing Address:  Organization/Firm: <b>FPL Environmental Services Dep.</b> Street Address: <b>700 Universe Blvd.</b> City: <b>Juno Beach</b> State: <b>FL</b> Zip Code: <b>33408</b>
3. Application Contact Telephone Numbers:  Telephone: <b>(561) 691-7058</b> Fax: <b>(561) 691-7070</b>

**Application Comment**

The existing combustion turbines (Units 3A,3B,4A & 4B) will be installed with direct water spray fogging systems that will reduce the turbine inlet air temperature. The temperature reduction will improve the heat rate and increase power due to the cooler-denser inlet air. The net emissions change from this project will not result in an increase of any regulated pollutant greater than the PSD significant emission rates. PSD review does not apply to proposed project. Discussed in Part II.

## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Location and Type

1. Facility UTM Coordinates: Zone: 17                      East (km): 543.2                      North (km): 2993.0			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): 27 / 3 / 29                      Longitude: (DD/MM/SS): 80 / 33 / 54			
3. Governmental Facility Code: 0	4. Facility Status Code: A	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4911
7. Facility Comment (limit to 500 characters):  The existing Martin plant consists of 2 Fossil Fuel Fired Steam Generators (Units 1 and 2) and 2 Combined Cycle Units (Units 3 and 4). Each combined cycle unit consists of 2 combustion turbines and associated heat recovery steam generators (HRSGs). The primary fuel for the combustion turbines is natural gas with distillate oil as back-up. Refer to Part II for discussion			

#### Facility Contact

1. Name and Title of Facility Contact: Willie Welch, Environmental Specialist			
2. Facility Contact Mailing Address: Organization/Firm: FPL - Martin Plant Street Address: P.O. Box 176 City: Indiantown                      State: FL                      Zip Code: 34956-0176			
3. Facility Contact Telephone Numbers: Telephone: (561) 597-7106                      Fax: (561) 597-7416			



**B. FACILITY REGULATIONS**

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

A large, empty rectangular box with a black border, intended for the user to provide a Rule Applicability Analysis. The box is currently blank.



**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

Facility emissions covered under existing Title V permit, no additional facility or emission unit applicable requirements as a result of the proposed change.

**C. FACILITY POLLUTANTS**

**Facility Pollutant Information**

1. Pollutant Emitted	2. Pollutant Classification

**D. FACILITY POLLUTANT DETAIL INFORMATION**

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hr)	(tons/yr)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

E. FACILITY SUPPLEMENTAL INFORMATION

**Supplemental Requirements for All Applications**

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input checked="" type="checkbox"/> Attached, Document ID(s): <b>Part II</b> _____ <input type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
5. Fugitive Emissions Identification: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable _____ <input type="checkbox"/> Waiver Requested
6. Supplemental Information for Construction Permit Application: <input checked="" type="checkbox"/> Attached, Document ID: <b>Part II</b> _____ <input type="checkbox"/> Not Applicable _____

**Additional Supplemental Requirements for Category I Applications Only**

7. List of Proposed Exempt Activities: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____
8. List of Equipment/Activities Regulated under Title VI: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed <input type="checkbox"/> Not Applicable _____
9. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____
10. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable _____

<p>11. Identification of Additional Applicable Requirements:</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>12. Compliance Assurance Monitoring Plan:</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>13. Risk Management Plan Verification:</p> <p><input type="checkbox"/> Plan Submitted to Implementing Agency - Verification Attached Document ID: _____</p> <p><input type="checkbox"/> Plan to be Submitted to Implementing Agency by Required Date</p> <p><input type="checkbox"/> Not Applicable</p>
<p>14. Compliance Report and Plan</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>
<p>15. Compliance Statement (Hard-copy Required)</p> <p><input type="checkbox"/> Attached, Document ID: _____</p> <p><input type="checkbox"/> Not Applicable</p>

PART II  
SUPPORTING INFORMATION

## Part II

### Application for Air Permit Installation of Direct Water Spray Fogging Systems Martin Plant

#### Introduction

Florida Power & Light Company is proposing to install direct water spray fogging systems in the inlet ducts of the existing 4 combustion turbines in combined cycle configuration at the Martin Plant. The purpose of the inlet foggers to provide adiabatic inlet air cooling which increase turbine output and decreases heat rate. The project is part of increasing capacity in a cost effective manner.

#### Description

The direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog is produced by injection grids placed in the turbine inlet duct that use nozzles that produce a fine spray. The small fog particles (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 Btu/lb of water. The result of the fogging is a cooler more moisture laden air stream. Figure 1 presents a schematic of a typical fogging system.

The amount of heat removed is highly dependent upon the ambient air conditions. The two most important parameters are the dry bulb temperature and relative humidity. As moisture is added to the inlet air by the fogging, the vaporization of the fog droplets cools the air toward the wet-bulb temperature. For the proposed project, the design condition is 95°F and 50 percent relative humidity. The resultant wet bulb temperature, based on psychrometric charts is 79°F. At 100 percent saturation the inlet cooling system would result in a 16°F decrease of the turbine inlet air.

While adiabatic cooling is most efficient for dry climates, adiabatic cooling in Florida can be an effective means of inlet air cooling during the late morning to evening hours. This period is typically 8 to 10 hours per day from about 10 am to 8 pm. In the early morning hours and

evening hours, the typical relative humidity in Florida is 70 to 90 percent depending on the climatic conditions. Because of the highly variable nature of ambient air conditions, the annual average inlet cooling was assumed to be 8°F. This average was reviewed against a 30 year record of meteorological data for West Palm Beach and found to be representative of the range in conditions that occur over an annual period. This includes cooling associated with the typical mid-afternoon summer days and early morning/evening periods that occur year-round. The typical mid-afternoon cooling for West Palm Beach would be 11°F and would occur in August with a mid-afternoon temperature of 90°F and 64 percent relative humidity. During January, the mid-afternoon cooling would be about 9°F. The typical cooling that would occur in the early morning hours of evening hours with temperatures of about 80°F and a relative humidity of 80 percent would be 5°F. This cooling also assumes that the gas stream can be 100 percent saturated. The ambient air conditions that are modified by the fogging system occur naturally but are more frequent with the fogging system. For example, the average minimum temperatures for the months of November through April range from 55.5°F to 65.1°F with relative humidities ranging from 83 to 81 percent. The amount of adiabatic cooling would range from 3 to 4°F. The annual average temperature reduction used for gas firing was based on 24 hours operation would be about 5.5°F assuming 8°F for 12 hours during the day and 3°F for 12 hours during the night.

#### Turbine Performance and Emission Estimates

The effect of decreasing the turbine inlet air through the use of fogging will be to increase the mass flow of air that can go through the turbine which allows higher heat input and power output. The combustion turbine is also more efficient since the heat rate decreases with decreasing temperature. For the GE Model PG7221 (Frame 7FA) combustion turbines at the Martin plant, a 5.5°F average decrease in temperature for gas firing would result in a 2.1 percent increase in power and an associated 0.8 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated. The increase in heat rate as a function of temperature decrease is a linear function and for the Fort Myers turbines would be 4.7 mmBtu/hr/°F. The data were determined using GE supplied data (see Attachment A).



Because the turbine is operating on its original power curve, the emission characteristics do not change from what would normally occur at that temperature and relative humidity. An evaluation of emissions from the fogging tests conducted at the FPL Putnam plant did not result in any statistically significant differences in emission rates (see Attachment B). The increase in emissions of criteria pollutants associated with fogging were determined using emission limits contained in the Title V Permit for the facility. This provides the maximum potential allowed and would conservatively estimate emission rates. Table 1 and 2 presents a summary of the operating conditions and emission increases resulting from fogging firing natural gas and distillate fuel oil, respectively. The annual emissions were determined by multiplying the heat input increase per degree Fahrenheit times the emissions rate in lb/mmBtu for the number of degrees Fahrenheit-hours proposed for the turbines. The degree F-hours/year is the total amount of annual temperature reduction proposed for fogging and was calculated by using the average temperature reduction multiplied by the hours of year assumed. For example, the degrees Fahrenheit-hours for gas firing are calculated by multiplying 6,240 hours times 5.5°F or 34,320°F-hours. Each turbine inlet fogging system will be equipped with temperature probes to determine the amount of inlet cooling. This reduction will be recorded for each hour of fogger operation. For the Martin turbines, a maximum of 34,320°F-hours of operation when firing natural gas and 4,000°F-hours of operation when firing distillate fuel oil was used as the basis for annual emission estimates for each turbine.

### **Regulatory Applicability**

A modification is defined in Rule 62-210.200 Florida Administrative Code (F.A.C.) as any physical change in, or a change in the method of operation of, or addition to a facility which would result in an increase in the actual emissions of any air pollutant subject to regulation under the Clean Air Act. A modification to a major source of air pollution, such as the Martin Plant, may be subject to review under the Department's Prevention of Significant Deterioration (PSD) rules codified in Rule 62-212.400 F.A.C.

$$9.3 \frac{\text{lb}}{\text{hr}} \times 6240 \frac{\text{hr}}{\text{yr}} \times \frac{\text{---}}{2000 \text{ lb}} = 29.16$$

1/10/18

The proposed installation of direct water spray fogging systems is a modification according to Rule 62-212.200 (188) F.A.C., since annual emissions will potentially increase as a result of the increased power and heat input. This has been confirmed by the Department in its December 31, 1998 correspondence to FPL.

Based on the available data, it is concluded that the emission rate does not change as a result of inlet fogging. Therefore, increase in annual potential emissions can be conservatively determined through the use of increases in heat input associated with the use of the fogging systems. For the 4 combustion turbines (CTs) the maximum potential annual increase in emissions is estimated as follows:

Summary of Maximum Annual Emissions - All 4 Units

Pollutant	Gas-Firing Tons/Year	Oil-firing Tons/Year	Total (Oil & Gas)
PM	2.95	1.23	4.19
NO <sub>x</sub>	29.04	9.39	38.43
SO <sub>2</sub>	15.01	18.74	33.75
CO	15.47	2.15	17.63
VOC	0.49	0.22	0.72
Degrees Fahrenheit-Hours for Each Fuel	34,320	4,000	
Additional Degrees Fahrenheit-Hours on Gas	11,095	0	
Total Gas Only Degrees Fahrenheit-Hours	45,415	0	

These maximum potential emission rates are less than the significant emission rates in Table 62-212.400-2 in Rule 62-212.400 F.A.C. and therefore PSD would not apply. The pollutant closest to the PSD significant emission rates when firing natural gas is NO<sub>x</sub>. Emissions of SO<sub>2</sub> are primarily associated with distillate fuel oil which is only used a backup to natural gas. For natural gas only, the maximum potential NO<sub>x</sub> emissions would be 34.4 tons/year at 45,415°F-hours per year per CT. This is equivalent to 2.77°F-hours of gas firing for each degree Fahrenheit-hour of oil firing (i.e., 11,095°F hours/4,000°F hours = 2.77°F-hours). The emissions of the other pollutants would be 3.9 tons/year for PM, 19.9 tons/year for SO<sub>2</sub>, 20.5 tons/year for CO and 0.65 tons/year for VOC.

FPL proposes that the amount of fogging allowed by the Department be based on a cumulative amount of operating hours for the 4 combustion turbines. This would amount to 181,661 hours of operation when firing only natural gas. If only natural gas is fired, the proposed amount of hours would be decreased by 2.77°F hours for each °F-hour when fuel oil was fired during an annual period. As described previously, the emission rates would not be affected.

In addition, during periods when the fogging system is not used, the operation of the CTs will not be affected by this request and will be operated according to the Department's previous approvals (e.g., authorized to operated 8,760 hours/year/CT).

As described previously, the inlet fogging systems will have temperature monitoring equipment which will record the actual temperature reduction for each hour of operation. These data will be summarized monthly and reported to the Department with the Annual Operating Reports demonstrating that the annual period does not exceed 181,661 degree F-hours for Units 3 and 4.

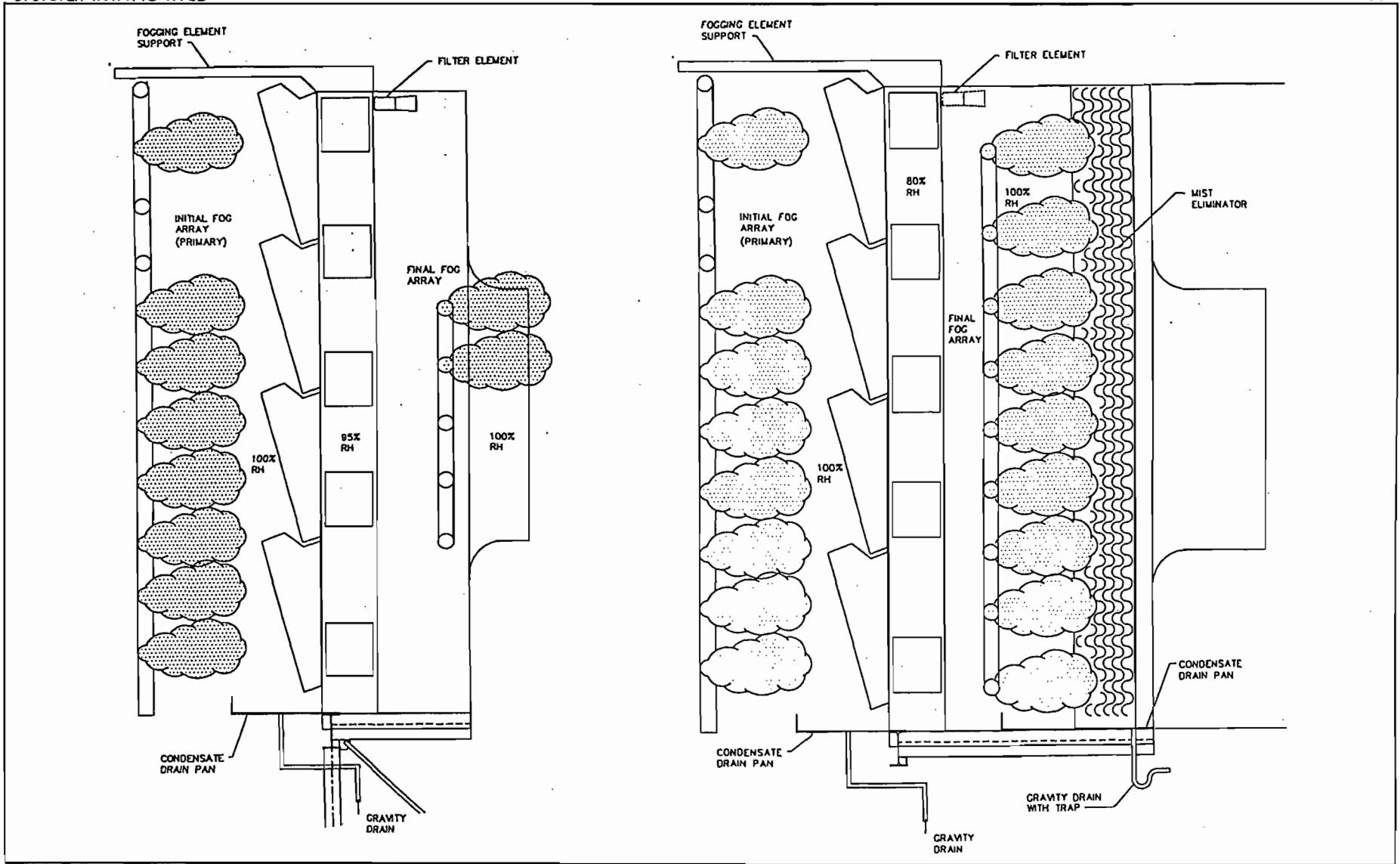


Figure 1. Illustrative Fogging System Schematic  
Florida Power & Light, Inc.

Source: Caldwell Energy and Environmental, Inc.



**Table 1** Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (Natural Gas Combustion).

Performance Basis			
Temperature Decrease	°F (1)	5.5	
Power Increase		2.09%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		1.44%	GE Curves
Heat Input Change	mmBtu/°F	4.7	GE Curves
Hours/year		<del>1560</del> 6,240 (2)	
Hours-°F/year		34,320	hours/year times temperature decrease
<i>1560 percent</i>			
Pollutants	Units	Emissions (3)	Comments
PM	Ib/MMBtu	0.0092	Based on Title V Permit per machine
	TPY	0.74	
NO <sub>x</sub>	Ib/MMBtu	0.0900	Based on Title V Permit per machine
	TPY	7.26	
SO <sub>2</sub>	Ib/MMBtu	0.0465	Based on Title V Permit per machine
	TPY	3.75	
CO	Ib/MMBtu	0.0480	Based on Title V Permit per machine
	TPY	3.87	
VOC	Ib/MMBtu	0.0015	Based on Title V Permit per machine
	TPY	0.12	

Legend - TPY: tons per year

- (1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger. Assumes 12 hours at 8 °F for daytime and 12 hours at 3 °F for nighttime.
- (2) Hours of fogger operation based on estimate of 24 hours per day, 5 days/week and 52 weeks per year.
- (3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.



**Table 2** Emission Estimates of the Martin Combined Cycle Combustion Turbines with Inlet Air Cooling System with Direct Water Spray Inlet Fogging (No. 2 Fuel Oil Combustion).

Performance Basis			
Temperature Decrease	°F (1)	8	
Power Increase		3.04%	GE Curves
Heat Rate Decrease		1.22%	GE Curves
Heat Input Increase		2.10%	GE Curves
Heat Input Change	mmBtu/°F	4.7	GE Curves
Hours/year		125 500 (2)	
Hours-°F/year		4,000	hours/year times temperature decrease
Pollutants	Units	Emissions (3)	Comments
PM	lb/MMBtu	0.0328	Based on Title V Permit per machine
	TPY	0.31	
NO <sub>x</sub>	lb/MMBtu	0.2497	Based on Title V Permit per machine
	TPY	2.35	
SO <sub>2</sub>	lb/MMBtu	0.4984	Based on Title V Permit per machine
	TPY	4.68	
CO	lb/MMBtu	0.0573	Based on Title V Permit per machine
	TPY	0.54	
VOC	lb/MMBtu	0.0060	Based on Title V Permit per machine
	TPY	0.06	

*100 x 4*  
*2000*  
*125 per unit*

Legend - TPY: tons per year

- (1) Temperature decrease is the annual average temperature differential of ambient temperature to compressor inlet temperature utilizing inlet fogger.
- (2) Distillate oil firing limited to 2000 hours per year for all 4 combustion turbines combined.
- (3) Emission factor references - PSD-FL-146, Site Certification PA-89-27 and Title V Permit No. 0850001-004-AV.

ATTACHMENT A



**Attachment A**

The following data were obtained from performance curves in the range that fogging would be most effective.

Plant Site: Martin Combined Cycle Units 3A, 3B, 4A and 4B  
Turbine Model: GE Model PG7221 (FA)

Turbine Inlet Temperature ( °F)	90	60
Difference ( °F)		30
Heat Input (mmBtu/hr)	1,550	1,690
Difference (mmBtu/hr)		140
Rate (mmBtu/hr/ °F) <sup>a</sup>		4.67

Note: <sup>a</sup> heat input difference divided by temperature difference.

ATTACHMENT B

**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500  
Gainesville, FL 32653-1500  
Telephone (352) 336-5600  
Fax (352) 336-6603



December 15, 1998

9737572A/1

Florida Power & Light Company  
700 Universe Blvd.  
P.O. Box 14000  
Juno Beach, Florida 33408

Attention: Mr. John Hampp, Environmental Specialist

RE: Putnam Inlet Fogging Emission Tests  
Analysis of Data

Dear John:

Golder Associates Inc. has evaluated the emissions data taken during August 25 and 26, 1998 to determine the potential effect of inlet fogging on emission rates of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). The data were obtained at the Putnam Plant using various inlet fogging conditions while operating the unit at nearly constant heat input. The heat input during testing on August 25, 1998 varied by less than 1.5 percent while heat input during testing on August 26, 1998 varied by about 2.5 percent. The data evaluated represented 178 individual 3 minute readings using continuous emission monitoring equipment. There were 72 data points when the inlet foggers were not operating (i.e., "off") while there were 106 data points where the various foggers were operating (i.e., "on").

The data were evaluated using the procedures in Appendix C to 40 CFR Part 60; Determination of Emission Rate Change. The data were also evaluated in terms of the potential effect of inlet fogging. Tables 1.1a and 1.1b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 25, 1998. Tables 1.2a and 1.2b present the results of Appendix C evaluation for NO<sub>x</sub> and CO, respectively for the data recorded on August 26, 1998. Taken together, the analysis suggests that NO<sub>x</sub> concentrations may decrease slightly while CO may increase slightly with the operation of inlet foggers. However, the trend was not always consistent and the differences are small (i.e., up to a few ppm). Other factors also likely played a role in the variability of the data such as the response in continuous emission monitoring equipment, fuel input, ambient temperature and combustion turbine operation variability. Such changes, which cannot be completely accounted for in the data, would make it inappropriate to develop a specific relationships regarding emission rates at this time. Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

A handwritten signature in black ink, appearing to read "Kennard F. Kosky". The signature is written in a cursive, slightly slanted style.

Kennard F. Kosky, P.E.  
Principal

KFK/arz

Table 1.1a Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	87.8	0.98	1.782	0.485	88.3	87.4
1424-1521	on	20	19	86.5	1.33	1.729	0.514	87.0	85.9
1524	off	1	0	-	-	-	-		
1527-1533	on	3	2	89.0	0.35	2.92	0.592	89.6	88.4
1536-1539	off	2	1	88.5	0.78	1.86	1.023	89.5	87.4

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.1b Florida Power And Light (FP&L) Test data for the Combustion Turbine Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/25/98) CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	95% C.I.	Upper C.I.	Lower C.I.
1345-1421	off (baseline)	13	12	75.9	2.90	1.782	1.433	77.4	74.5
1424-1521	on	20	19	81.0	1.43	1.729	0.554	81.5	80.4
1524	off	1	0	-	-	-	-		
1527-1533	on	3	2	78.0	2.00	2.92	3.372	81.4	74.6
1536-1539	off	2	1	79.5	2.12	1.86	2.790	82.3	76.7

Legend: n= sample size, v = sample size -1, t=t distribution

Table 1.2a Florida Power And Light (FP&L) Test data for the Combustion Turbine  
Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
NO<sub>x</sub> Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t	z	95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	89.1	0.7	1.701	-	0.236	89.4	88.9
1230-1430	on	41	-	90.5	1.3	-	1.645	0.334	90.8	90.2
1433-1539	off	23		96.8	1.3	1.717		0.466	97.3	96.4
1542-1745	on	42		92.4	2.2		1.645	0.561	93.0	91.9
1748-1800	off	5	4	97.7	0.4	2.132	-	0.429	98.1	97.3

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)

Table 1.2b Florida Power And Light (FP&L) Test data for the Combustion Turbine  
Inlet Air Cooling System with Direct Water Spray Inlet Fogging (8/26/98)  
CO Statistical Analysis (Unit 1GT2 - Putnam Plant, Palatka, FL.)

Hour Range	Fogger on/off	n	v (n-1)	Mean	Std Dev	t		95% C.I.	Upper C.I.	Lower C.I.
1103-1227	off (baseline)	29	28	72.6	2.3	1.701	-	0.728	73.3	71.9
1230-1430	on	41	-	70.9	1.9	-	1.645	0.494	71.4	70.4
1433-1539	off	23		67.2	1.9	1.717		0.688	67.9	66.5
1542-1745	on	42		69.5	3.3		1.645	0.828	70.4	68.7
1748-1800	off	5	4	63.4	0.9	2.132	-	0.853	64.3	62.5

Legend: n= sample size, v = sample size -1, t=t distribution, z = z distribution (used when sample size is >30)