

Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

May 9, 2001

CERTIFIED MAIL-RETURN RECEIPT REQUESTED


Mr. Scott Sumner, P.E.  
TRC  
21 Technology Drive  
Irvine, CA 92618

RE: DEP File No. 1110101-001-AC/PSD-FL-312  
CPV-Atlantic Power Generating Facility

Dear Mr. Sumner:

Due to a typographical error on page 1 of the May 3, 2001 Final Determination and page 2 of the Final Permit for the above referenced project, the stack height was incorrectly stated and should have read 200 feet instead of 150 feet. Please replace these pages with the enclosed corrected pages.

Sincerely,

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

CHF/ch

Enclosures



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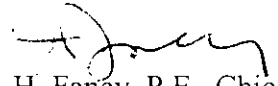
Ms. Frannie Hutchinson, Chair  
St. Lucie County Board of  
County Commissioners  
2300 Virginia Avenue  
Fort Pierce, Florida 34982

RE: DEP File No. 1110101-001-AC/PSD-FL-312  
CPV-Atlantic Power Generating Facility

Dear Ms. Hutchinson:

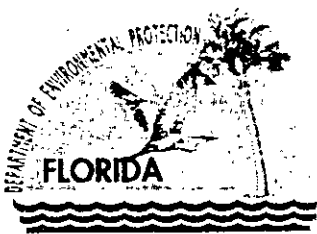
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CERTIFIED MAIL-RETURN RECEIPT REQUESTED


Mayor Robert E. Minsky  
City of Port St. Lucie  
121 Southwest Port St. Lucie Boulevard  
Port St. Lucie, Florida 34984-5099

RE: DEP File No. 1110101-001-AC/PSD-FL-312  
CPV-Atlantic Power Generating Facility

Dear Mayor Minsky:

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

CHF/ch

Enclosures

**FINAL DETERMINATION**  
**File No. 1110101-001-AC (PSD-FL-312)**  
**CPV – ATLANTIC POWER GENERATING FACILITY**  
**COMBINED CYCLE POWER PROJECT**

The Department distributed a Public Notice package on February 20, 2001 for the project to construct a natural gas and fuel oil-fired combined cycle unit to be known as the CPV – Atlantic Power Generating Facility near Port St. Lucie, St. Lucie County. The project consists of a nominal 170 MW General Electric 7FA combustion turbine-electrical generator, an unfired heat recovery steam generator, a steam-electrical generator; a 200-foot stack; a mechanical draft cooling tower; a 1.0 million gallon fuel oil storage tank, and other ancillary equipment. The Public Notice of Intent to Issue was published on March 3 in The Tribune, St. Lucie County.

Written comments were received during the 30-day public comment period from EPA Region IV and CPV Atlantic (submitted through Moyle Flanigan).

EPA's and CPV's comments are listed below (*italics*) followed by the Department's. Other comments from CPV regarding the Technical Evaluation and Preliminary Determination are noted and will become part of the facility's official files since there is no final TEPD document.

1. *In EPA's letter dated March 21, 2001(attached), EPA states "Condition 31, part d of the draft PSD permit indicates that certain data may be excluded because of startup and shutdown from the block average calculated to demonstrate compliance with the emission standards. Since periods of startup and shutdown are part of normal source operation, we recommend that the Florida Department of Environmental Protection (FDEP) also consider best available control technology (BACT) emission limits taking into account start up and shutdown emissions. Options for such limits include (but are not limited to) maximum NO<sub>x</sub> and CO mass emissions in a 24-hr period and future establishment of startup and shutdown emission limits for NO<sub>x</sub> and CO derived from monitoring results during the first few months of commercial operation. We further recommend that FDEP include definitions of what constitutes episodes of "startup and shutdown periods" as referenced in Condition 31."*

The Department does not allow extended operation at low loads, during which such emissions typically occur. The facility must also employ good operating practices during periods of excess emissions. This includes, for example, continued operation of the SCR system as long as the temperature conditions within the heat recovery steam generator allow.

At the same time, the Department is aware that emissions are less from the GE 7FA units at low loads (< 50 percent of full load) than previously believed. This is based on reports from new installations including JEA.

The Department will progressively implement EPA's comments for future projects as we get emissions data from facilities required to demonstrate compliance by CEMS. As drafted, the permit includes Specific Conditions (29, 30, and 31) related to excess emissions during startup, shutdown, and valid, documented malfunctions. See condition 31.d. of Section III of this permit for provisions that relate to excluding periods of CEM system data recorded for NO<sub>x</sub> and CO for episodes of startup, shutdown and malfunction. However, these periods are recorded and reported as excess emissions as stated in conditions 30 and 31.e.

# AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

## SECTION I - FACILITY INFORMATION

### FACILITY DESCRIPTION

The proposed CPV facility is a combined cycle power plant. Key components include:

- One nominal 170 megawatt (MW) gas-fired combustion turbine-electrical generator with an un-fired heat recovery steam generator (HRSG) and 200-foot stack;
- A selective catalytic reduction unit located within the HRSG;
- A 1-million gallon storage tank for backup No. 2 distillate fuel oil;
- A separate steam-electrical generator;
- A five-cell mechanical draft cooling tower; and
- Ancillary facilities including miscellaneous equipment buildings, ammonium storage, demineralized water storage, fire water storage, diesel-fired fire water pump, and a 500 kW emergency generator.

### EMISSION UNITS

This permit addresses the following emission units:

ARMS EMISSIONS UNIT NO.	SYSTEM	EMISSION UNIT DESCRIPTION
001	Power Generation	One 170-megawatt combustion turbine-electrical generator with unfired heat recovery steam generator
002	Water Cooling	One five-cell mechanical cooling tower
003	Fuel Storage	One 1-million gallon fuel oil storage tank

### REGULATORY CLASSIFICATION

Title V: This facility is classified as a Major or Title V Source of air pollution because emissions of at least one regulated air pollutant, such as particulate matter (PM/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

PSD: This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 TPY for at least one criteria pollutant, the facility is also a Major Facility with respect to Rule 62-212.400, Prevention of Significant Deterioration (PSD). With respect to Table 62-212.400-2, this facility modification results in emissions increases greater than 40 TPY of NO<sub>x</sub> and SO<sub>2</sub>, 25/15 TPY of PM/PM<sub>10</sub>, 100 TPY of CO, and 7 TPY of sulfuric acid mist. These pollutants require PSD review and determinations of Best Available Control Technology (BACT) pursuant to Rule 62-212.400, F.A.C.

Title III: This facility is not a major source of hazardous air pollutants (HAPs). This facility is not subject to MACT applicability.

**SENDER: COMPLETE THIS SECTION**

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## 1. Article Addressed to:

Mayor Robert E. Minsky  
City of Port St. Lucie  
121 SW Port St. Lucie Blvd.  
Port St. Lucie, FL 34984-5099

**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly)

B. Date of Delivery

5-7-10

C. Signature

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☐ Agent☐ Addressee

D. Is delivery address different from item 1?

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PS Form 3811, July 1999

Domestic Return Receipt

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Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	\$

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Recipient's Name (Please Print Clearly (to be completed by mailer))

Robert Minsky, Mayor

Street Apt. No. or PO Box No.

121 SW Port St. Lucie Blvd.

City State Zip

Port St. Lucie FL 34984-5099

PS Form 3800, February 2000

See Reverse for Instructions

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## 1. Article Addressed to:

Ms. Frannie Hutchinson, Chair  
St. Lucie County Board of  
County Commissioners  
2300 Virginia Ave.  
Fort Pierce, FL 34982

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5-14-01

C. Signature

x4 Bev Dunion

☐ Agent☐ Addressee

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4. Restricted Delivery? (Extra Fee)

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## 2. Article Number (Copy from service label)

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Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	\$

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Name (Please Print Clearly) (to be completed by mailer)

Frannie Hutchinson, Chair

Street, Apt., Rm., or P.O. Box No.

2300 Virginia Ave

City, State, ZIP+4

Fort Pierce FL 34982

PS Form 3800, July 1999

See Reverse for Instructions

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St. Lucie County Board of  
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2300 Virginia Avenue  
Fort Pierce, FL 34982

## 2. Article Number (Copy from service label)

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102595-99-M-1789

**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly)

B. Date of Delivery

5-7-01

C. Signature

x *W. Simon*

☐ Agent☐ Addressee

D. Is delivery address different from item 1?

☐ Yes

If YES, enter delivery address below:

☒ No

3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☐ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

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Postage

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Certified Fee

Return Receipt Fee  
(Endorsement Required)Restricted Delivery Fee  
(Endorsement Required)

Total Postage &amp; Fees

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Postmark  
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Recipient's Name (Please Print Clearly) (to be completed by mailer)

Frannie Hutchinson, Chair

Street, Apt. No., or P.O. Box No.

2300 Virginia Ave.

Fort Pierce, FL 34982

PS Form 3800, February 2000

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Port St. Lucie  
121 SW Port St. Lucie Blvd.  
Port St. Lucie, FL 34984-5099

2. Article Number (Copy from service label)

7000 0600 0026 4129 9402

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**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly)

J. JANSSEN

B. Date of Delivery

5-7-01

C. Signature

X

J. Janssen

☐ Agent☐ Addressee

D. Is delivery address different from item 1?

☐ Yes

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☐ No

3. Service Type

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Postage

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Certified Fee

Return Receipt Fee  
(Endorsement Required)Restricted Delivery Fee  
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Total Postage &amp; Fees

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Recipient's Name (Please Print Clearly) (to be completed by mailer)

Mayor Robert E. Minsky

Street: 121 SW Port St. Lucie Blvd.

City State Zip+4  
Port St. Lucie, FL 34984-5099

PS Form 3800, February 2000

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Mr. Scott Sumner, P.E.  
TRC  
21 Technology Dr.  
Irvine, CA 92618

## 2. Article Number (Copy from service label)

7099 3400 0000 1453 2054

**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly)

Dottie Spisak

B. Date of Delivery

5-22-01

C. Signature

Dottie Spisak

☐ Agent☐ Addressee

D. Is delivery address different from item 1?

☐ Yes

If YES, enter delivery address below:

☐ No

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Article Sent To:

Postage \$

Certified Fee

Return Receipt Fee  
(Endorsement Required)Restricted Delivery Fee  
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Total Postage &amp; Fees \$

Postmark  
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Name (Please Print Clearly) (to be completed by addressee)

Scott Sumner, P.E.

Street, Apt. No., or PO Box No.

21 Technology Dr.

City, State, ZIP+4

Irvine CA 92618

PS Form 3800, July 1999

See Reverse for Instructions

**FINAL DETERMINATION**  
**File No. 1110101-001-AC (PSD-FL-312)**  
**CPV – ATLANTIC POWER GENERATING FACILITY**  
**COMBINED CYCLE POWER PROJECT**

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At the same time, the Department is aware that emissions are less from the GE 7FA units at low loads (< 50 percent of full load) than previously believed. This is based on reports from new installations including JEA.

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2. *EPA states "since the PSD permit contains a separate CO emission limit (15 ppmvd) when the CT is operating in power augmentation mode, the PSD permit should also include a definition of power augmentation mode".*

The TEPD (page T-5) gives the following explanation regarding the power augmentation mode of operation: "power augmentation is accomplished by injecting some steam from the HRSG into the rotor (power) section of the combustion turbine. According to CPV, power augmentation will be employed in this project at temperatures above 59 °F to make additional electrical output that is lost due to increasing temperature".

3. *EPA states, "as previously discussed with FDEP staff, in lieu of PM/PM<sub>10</sub> emission limits in the PSD permit, compliance with the CO emission limits will serve as an indicator that good combustion practice are being maintained. Since Condition 16 (PM/PM<sub>10</sub> and Visible Emissions) does not include PM/PM<sub>10</sub> emission limits, Condition 16 should be modified to include language that clarifies the relationship between CO and PM/PM<sub>10</sub> emissions".*

The Department will add some wording (underlined) to the language already contained in the permit: ".....efficient combustion design, clean fuels and good operating practices" represent BACT controls for PM emissions". The CO CEMS limits and fuel specifications would serve as indicators of good combustion. Visible emissions limits would serve as work-practice standards for particulate matter.

4. *EPA's letter included various comments related to the CO oxidation catalyst, including: removal of costs of additional natural gas to compensate for pressure drop across catalyst; use of 8 instead of 7 percent interest rate; "double-counting" of catalyst recovery cost; and a high (20 percent) contingency fee.*

By letter dated April 20, 2001 (attached) CPV submitted revised cost-effectiveness calculations to control CO emissions by oxidation catalyst.

Based on the most conservative case (adoption of all EPA recommendations), the revised calculations result in an oxidation catalyst cost estimate of \$2,856 per ton of CO removed. The Department does not consider oxidation catalyst to be cost-effective based on this revised calculation.

CPV's cost effectiveness calculations are based on reduction of CO concentrations from the range of 9-20 ppmvd to the range of 2-4 ppmvd. Based on data available to the Department, actual emissions without oxidation catalyst are on the order of 1 ppmvd while firing gas or fuel oil. This is substantially less than even the objective by oxidation catalyst. The Department's conclusion is that the revised costs submitted by CPV are actually biased to the low side. However the Department has no data on CO emissions during power augmentation.

A maximum operating period of 2000 hours per year during power augmentation (believed to be the actual mode of highest CO emissions) is stated in Section III, Specific Condition 9. Power augmentation will not be limited if oxidation catalyst is installed. The 2000-hour limit may be revised in the future at the request of the applicant, based upon review of actual performance and control equipment cost-effectiveness following proper public notice.

CPV (Gulfcoast Project) will install the first continuous CO monitor required for compliance at a combined cycle plant in Florida. CPV will install a CO monitor for the present project as well. The Department believes that long-term data will prove that oxidation catalyst is not cost effective for this project. The data will provide a basis for requiring future applicants to adhere to lower CO

limits that will clearly increase the theoretical cost of oxidation catalyst. CPV has agreed to install a CO continuous emission monitoring (CEM) system to provide reasonable assurance that the proposed emissions will not be exceeded.

The Department revised the BACT analysis to reflect the recent field data used to justify the position that CO catalyst is not cost effective for this project.

5. *EPA's letter includes various comments related to the SCONOX™ cost analysis including: "The SCONOX™ analysis was performed using a controlled emission level of 3.5 ppmvd. The cost SCONOX™ analysis should be redone using the lower emission level achievable by the SCONOX™ system". "The SCONOX™ vendor quote provided by Alston Power indicates a direct capital cost of \$14,000,000 for a SCONOX™ system. Table E-2 uses a direct capital cost of \$16,000,000 for a SCONOX™ system. The vendor quote should be used to determine the cost effectiveness value unless the need for a higher capital cost can be documented".*

CPV performed a revised cost analysis based on the lower emission level achievable by this technology or 2 ppmvd. CPV took into consideration the EPA's assumptions in calculating the cost-effectiveness for this project. Based on these assumptions, the revised cost per ton of NO<sub>x</sub> removed by SCONOX™ at 2 ppmvd is \$15,702 per ton. The originally calculated cost per ton of NO<sub>x</sub> removed by SCR at 3.5 ppmvd is \$2,835 per ton, making this technology clearly more cost-effective than the use of SCONOX™.

6. *In CPV's (Moyle Flanigan) letter of April 2, 2001, CPV states the following regarding ammonia use: "On page 9 of 19 of the draft Permit, Condition No.10, the permit condition states that there will be an anhydrous ammonia storage system for the project. However, CPV Atlantic is not going to use anhydrous ammonia or store it onsite. Instead, CPV Atlantic will use and store 19% aqueous ammonia. The draft permit accordingly should be revised to correct this condition."*

The Department revised this condition to reflect aqueous ammonia.

7. *Regarding hours of operation, CPV states: "On page 9 of 19 of the draft Permit, Condition No. 6, regarding Hours of Operation, states '[d]istillate oil firing shall not exceed 720 hours during any consecutive 12 months.' CPV Atlantic would like to have this revised, if possible, to state: 'distillate oil firing shall not exceed 720 hours per year,' which is consistent with the PSD permit issued for CPV Gulfcoast."*

This condition will not be changed. In several recent permits EPA has commented the following: "To limit the potential to emit, the operation limitations (hours of operation per year) should be expressed in terms of 12-consecutive months, rather than calendar year. This 12-month consecutive limit prevents that the enforcing agency from having to wait for long period of time to establish a continuing violation before initiating enforcement".

8. *Regarding CO emissions, CPV states: "On page 10 of 19 of the draft Permit, Condition No.13 a, dealing with Performance Tests, the CO emissions rate limit for natural gas firing should be 31 pounds per hour, based on the air permit application, instead of 26.0 lb/hr per hour, as stated in the first paragraph of Condition 13 a. of the draft permit. Also, based on the information submitted in the air permit application, the CO emissions rate limit for distillate oil firing in the third paragraph of Condition 13 a. should be 83.0 pounds per hour, rather than 70 pounds per hour, as stated in the draft Permit."*

The Department recognizes the variations on the lb/hr limit under different temperatures for combustion turbines (CT). All limits under the range of different temperatures are valid. To be consistent with the other conditions, the limit will be revised to include the 31 lb/hr (at 25° F and 100% load) as requested. The 70 lb/hr (at 25° F and 100% load) for oil firing will not be changed since this is the limit set in Appendix C of the application.

9. *On page 13 of 19 of the draft Permit, Condition No. 22 requires annual compliance tests for CO, NO<sub>x</sub>, ammonia slip, and visible emissions for gas and oil firing. However, Condition No. 20 states that CEM system data may be used to demonstrate compliance with all CO and NO<sub>x</sub> standards. In order to make clear that additional annual compliance testing is not required for CO and NO<sub>x</sub> in addition to the CEM system testing, CPV Atlantic requests that Condition No. 22 be clarified to include the sentence: "RATA data can substitute for annual compliance testing for CO and NO<sub>x</sub>".*

The Department will revise this condition adding the proposed language.

10. *On pages 17 and 18 of the draft Permit, Condition No. 31.g., concerning data availability, requires a 95% NO<sub>x</sub> and CO monitoring data availability per quarter. CPV Atlantic requests that this condition be revised to include the following sentence: "The NO<sub>x</sub> and CO monitor availability threshold shall not be less than 95% in any calendar quarter. The report required by this section shall be used to demonstrate monitor availability. In the event 95% availability is not achieved, the owner or operator shall provide the Department with a report identifying the problems in achieving 95% availability and a plan of corrective actions that will be taken to achieve 95% availability. The owner or operator shall implement the reported corrective actions within the next calendar quarter".*

The Department will revise this condition adding the proposed language.

11. *On page 1 of 4 of Appendix GG, 40 CFR60 NSPS Requirements for Gas Turbines, in paragraph numbered 11(a), the second line refers to the owner or operator being subject to the provisions of this subpart as provided "as specified in paragraph (b) section" and then there is no section number referenced, so that CPV Atlantic cannot determine the applicability regulations section to which it is subject. This provision should be modified to specify the applicable regulation section so that CPV can determine the regulations with which it must comply.*

This Appendix GG was corrected to read " paragraph (b) of this section".

12. *CPV provided information regarding the steam cycle in its application and in subsequent communication to the Department to support its position that the project is not subject to Sections 403.501-518, Florida Statutes, Florida Electrical Power Plant Siting Act. .*

The Department reviewed the information provided by CPV and determined that the project is not subject to the Act.

## CONCLUSION

The final action of the Department is to issue the permit with the changes noted above.

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF PERMIT

In the Matter of an  
Application for Permit by:


Mr. Gary Lambert, Executive Vice President  
CPV Atlantic, Ltd.  
45 Braintree Hill Office Park, Suite 107  
Braintree, MA 02184

DEP File No. 1110101-001-AC and PSD-FL-312  
Combined Cycle Facility  
St. Lucie County

Enclosed is the Final Permit Number 1110101-001-AC (PSD-FL-312) to construct a Combined Cycle Plant called the CPV Atlantic Power Generating Facility near Port St Lucie, St Lucie County. This permit is issued pursuant to Chapter 403, Florida Statutes.

Any party to this order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, F.S., by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Legal Office; 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 30 (thirty) days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

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

**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF FINAL PERMIT (including the FINAL permit) was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 5/3/01 to the person(s) listed:

Gary Lambert, CPV Atlantic, Ltd.\*  
Gregg Worley, EPA  
John Bunyak, NPS  
Isidore Goldman, DEP SED  
Danna Civetti, DEP St. Lucie Branch  
Chair, St. Lucie County BCC\*  
Mayor, Port St. Lucie\*  
Scott Sumner, P.E., TRC  
Cathy Sellers, Esq., Moyle Flanagan

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) 5/3/01 (Date)



Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

## PERMITTEE:

CPV Atlantic, Ltd.  
35 Braintree Hill Office Park, Suite 107  
Braintree, Massachusetts 02184

File No.	1110101-001-AC
Permit No.	PSD-FL-312
SIC No.	4911
Expires:	March 31, 2004

## Authorized Representative:

Gary Lambert, Executive Vice President

## PROJECT AND LOCATION:

Air construction permit pursuant to the requirements for the Prevention of Significant Deterioration of Air Quality (PSD) for the construction of a nominal gas-fired combined cycle electrical power plant. No. 2 distillate fuel oil will be used as back-up fuel. The plant will be known as the CPV Atlantic Power Generating Facility.

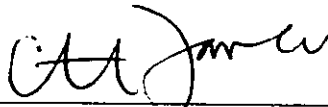
The project will be located Northwest of Glades Cut-off Road (SR 709) and East of I-95, near Port St. Lucie in St. Lucie County. UTM coordinates are Zone 17; 558.2 km E; 3,026.2 km N.

## STATEMENT OF BASIS:

This permit is issued under the provisions of Chapter 403 of the Florida Statutes, and Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297 of the Florida Administrative Code. The above named permittee is authorized to modify the facility in accordance with the conditions of this permit and as described in the application, approved drawings, plans, and other documents on file with the Department of Environmental Protection (Department).

The attached Appendices are made a part of this permit:

Appendix GC Construction Permit General Conditions  
Appendix BD BACT Determination  
Appendix GG NSPS Subpart GG Requirements

  
for Howard L. Rhodes, Director  
Division of Air Resources Management



# AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

## SECTION I - FACILITY INFORMATION

### FACILITY DESCRIPTION

The proposed CPV facility is a combined cycle power plant. Key components include:

- One nominal 170 megawatt (MW) gas-fired combustion turbine-electrical generator with an un-fired heat recovery steam generator (HRSG) and 200-foot stack;
- A selective catalytic reduction unit located within the HRSG;
- A 1-million gallon storage tank for backup No. 2 distillate fuel oil;
- A separate steam-electrical generator;
- A five-cell mechanical draft cooling tower; and
- Ancillary facilities including miscellaneous equipment buildings, ammonium storage, demineralized water storage, fire water storage, diesel-fired fire water pump, and a 500 kW emergency generator.

### EMISSION UNITS

This permit addresses the following emission units:

ARMS EMISSIONS UNIT NO.	SYSTEM	EMISSION UNIT DESCRIPTION
001	Power Generation	One 170-megawatt combustion turbine-electrical generator with unfired heat recovery steam generator
002	Water Cooling	One five-cell mechanical cooling tower
003	Fuel Storage	One 1-million gallon fuel oil storage tank

### REGULATORY CLASSIFICATION

Title V: This facility is classified as a Major or Title V Source of air pollution because emissions of at least one regulated air pollutant, such as particulate matter (PM/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

PSD: This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 TPY for at least one criteria pollutant, the facility is also a Major Facility with respect to Rule 62-212.400, Prevention of Significant Deterioration (PSD). With respect to Table 62-212.400-2, this facility modification results in emissions increases greater than 40 TPY of NO<sub>x</sub> and SO<sub>2</sub>, 25/15 TPY of PM/PM<sub>10</sub>, 100 TPY of CO, and 7 TPY of sulfuric acid mist. These pollutants require PSD review and determinations of Best Available Control Technology (BACT) pursuant to Rule 62-212.400, F.A.C.

Title III: This facility is not a major source of hazardous air pollutants (HAPs). This facility is not subject to MACT applicability.

## **AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)**

### **SECTION I - FACILITY INFORMATION**

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Title IV: The new combined cycle unit is subject to certain Acid Rain provisions of Title IV of the Clean Air Act.

NSPS: The new combined cycle gas turbine is subject to New Source Performance Standards 40 CFR 60, Subpart GG for Gas Turbines and the Storage Tank is subject to 40 CFR 60, Subpart Kb.

NESHAP: The permittee did not identify any emission unit as being subject to a National Emissions Standards for Hazardous Air Pollutants (NESHAP).

SITING: The project is not subject to Section 403.501-518, F.S., Florida Electrical Power Plant Siting Act, based on information regarding gross electrical power generated from the steam (Rankine) cycle submitted by the applicant and reviewed by the Department.

### **PERMIT SCHEDULE**

- 05/02/01 Air Construction Permit Issued
- 03/03/01 Notice of Intent to Issue published in The Tribune
- 02/19/01 Distributed Intent to Issue Permit
- 02/13/01 Application deemed complete
- 12/29/00 Received PSD Application

### **RELEVANT DOCUMENTS:**

The documents listed below are the basis of the permit. They are specifically related to this permitting action, but are not incorporated into this permit. These documents are on file with the Department.

- Application received on December 29, 2000
- Comments from the Fish and Wildlife Service dated January 23, 2001
- Department letter to CPV dated January 26, 2001
- CPV letter regarding CPV Gulfcoast Project CO cost calculations dated January 26, 2001
- CPV responses dated February 13, April 2 and April 20, 2001
- CPV communication dated April 26, 2001 regarding steam (Rankine) cycle
- Department's Intent to Issue and Public Notice Package dated February 21, 2001.
- Letter from EPA Region IV dated March 21, 2001
- Department's Final Determination and Best Available Control Technology Determination issued concurrently with this Final Permit.

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION II. COMMON SPECIFIC CONDITIONS

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#### GENERAL AND ADMINISTRATIVE REQUIREMENTS

1. Permitting Authority: All documents related to applications for permits to construct, operate or modify an emissions unit should be submitted to the Bureau of Air Regulation (BAR), Florida Department of Environmental Protection (FDEP), at 2600 Blainstone Road, Tallahassee, Florida 32399-2400 and phone number (850)488-0114.
2. Compliance Authority: All documents related to reports, tests, and notifications should be submitted to the DEP Southeast District Office, 400 North Congress Avenue W, West Palm Beach, Florida, 33401 and phone number 561/681-6755, fax 561-681-6755. Copies shall be sent to the DEP Port St. Lucie Branch Office, 1801 S.E. Hillmoor Dr, C 204, Port St. Lucie, Florida 34952 and phone number 561/398-2806, fax 561/398-2815.
3. General Conditions: The owner and operator is subject to and shall operate under the attached General Permit Conditions G.1 through G.15 listed in Appendix GC of this permit. General Permit Conditions are binding and enforceable pursuant to Chapter 403 of the Florida Statutes. [Rule 62-4.160, F.A.C.]
4. Terminology: The terms used in this permit have specific meanings as defined in the corresponding chapters of the Florida Administrative Code.
5. Forms and Application Procedures: The permittee shall use the applicable forms listed in Rule 62-210.900, F.A.C. and follow the application procedures in Chapter 62-4, F.A.C. [Rule 62-210.900, F.A.C.]
6. Modifications: The permittee shall give written notification to the Department when there is any modification to this facility. This notice shall be submitted sufficiently in advance of any critical date involved to allow sufficient time for review, discussion, and revision of plans, if necessary. Such notice shall include, but not be limited to, information describing the precise nature of the change; modifications to any emission control system; production capacity of the facility before and after the change; and the anticipated completion date of the change. [Chapters 62-210 and 62-212, F.A.C.]
7. New or Additional Conditions: Pursuant to Rule 62-4.080, F.A.C., for good cause shown and after notice and an administrative hearing, if requested, the Department may require the permittee to conform to new or additional conditions. The Department shall allow the permittee a reasonable time to conform to the new or additional conditions, and on application of the permittee, the Department may grant additional time. [Rule 62-4.080, F.A.C.]
8. PSD Approval to Construct Expiration: Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, or if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The Department may extend the 18-month period upon a satisfactory showing that an extension is justified. [40 CFR 52.21(r)(2)]

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION II. COMMON SPECIFIC CONDITIONS

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9. Completion of Construction: The permit expiration date is March 31, 2004. Physical construction shall be complete by December 31, 2003. The additional time provides for testing, submittal of results, and submittal of the Title V permit to the Department.
10. Permit Expiration Date Extension: The permittee, for good cause, may request that this PSD permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (Rule 62-4.080, F.A.C.).
11. BACT Determination: In conjunction with extension of the 18 month periods to commence or continue construction, the extension of the March 31, 2004 permit expiration date, or any increases in MW generated by steam, heat input limits, hours of operation, oil firing, low or baseload operation, short-term or annual emission limits, annual fuel heat input limits or similar changes; the permittee may be required to demonstrate the adequacy of any previous determination of best available control technology for the source. [40 CFR 52.21(j)(4); 40CFR 51.166(j) and Rule 62-4.070 F.A.C.]
12. Application for Title IV Permit: An application for a Title IV Acid Rain Permit must be submitted to the U.S. Environmental Protection Agency Region IV office in Atlanta, Georgia and a copy to the DEP's Bureau of Air Regulation in Tallahassee at least 24 months before the date on which the new unit begins serving an electrical generator greater than 25 MW. [40 CFR 72]
13. Application for Title V Permit: An application for a Title V operating permit, pursuant to Chapter 62-213, F.A.C., must be submitted to the DEP's Bureau of Air Regulation, and a copy to the Department's Southeast District Office. [Chapter 62-213, F.A.C.]

### OPERATIONAL REQUIREMENTS

14. Plant Operation - Problems: If temporarily unable to comply with any of the conditions of the permit due to breakdown of equipment or destruction by fire, wind or other cause, the permittee shall notify each Compliance Authority as soon as possible, but at least within one working day, excluding weekends and holidays. The notification shall include: pertinent information as to the cause of the problem; steps being taken to correct the problem and prevent future recurrence; and, where applicable, the owner's intent toward reconstruction of destroyed facilities. Such notification does not release the permittee from any liability for failure to comply with the conditions of this permit or the regulations. [Rule 62-4.130, F.A.C.]
15. Operating Procedures: Operating procedures shall include good operating practices and proper training of all operators and supervisors. The good operating practices shall meet the guidelines and procedures as established by the equipment manufacturers. All operators (including supervisors) of air pollution control devices shall be properly trained in plant specific equipment. [Rule 62-4.070(3), F.A.C.]
16. Circumvention: The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without the applicable air control device operating properly. [Rule 62-210.650, F.A.C.]

**AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)**

**SECTION II. COMMON SPECIFIC CONDITIONS**

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17. Unconfined Particulate Matter Emissions: During the construction period, unconfined particulate matter emissions shall be minimized by dust suppressing techniques such as covering and/or application of water or chemicals to the affected areas, as necessary. [Rule 62-296.320(4)(c), F.A.C.]

**TESTING REQUIREMENTS**

18. Test Notification: The permittee shall notify each Compliance Authority in writing at least 30 days prior to any initial NSPS performance tests and at least 15 days prior to any other required tests. Notification shall include the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and conducting the test. [Rule 62-297.310(7)(a)9., F.A.C. and 40 CFR 60.7, 60.8]
19. Calculation of Emission Rate: For each emissions performance test, the indicated emission rate or concentration shall be the arithmetic average of the emission rate or concentration determined by each of the three separate test runs unless otherwise specified in a particular test method or applicable rule. [Rule 62-297.310(3), F.A.C.]
20. Applicable Test Procedures
- (a) *Required Sampling Time*. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes. The minimum observation period for a visible emissions compliance test shall be sixty (60) minutes. The observation period shall include the period during which the highest opacity can reasonably be expected to occur. [Rule 62-297.310(4)(a)1. and 2., F.A.C.]
  - (b) *Minimum Sample Volume*. Unless otherwise specified in the applicable rule or test method, the minimum sample volume per run shall be 25 dry standard cubic feet. [Rule 62-297.310(4)(b), F.A.C.]
  - (c) *Calibration of Sampling Equipment*. Calibration of the sampling train equipment shall be conducted in accordance with the schedule shown in Table 297.310-1, F.A.C. [Rule 62-297.310(4)(d), F.A.C.]
21. Determination of Process Variables
- (a) *Required Equipment*. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards. [Rule 62-297.310(5)(a), F.A.C.]
  - (b) *Accuracy of Equipment*. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value. [Rule 62-297.310(5)(b), F.A.C.]

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION II. COMMON SPECIFIC CONDITIONS

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22. Special Compliance Tests: When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it shall require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department. [Rule 62-297.310(7)(b), F.A.C.]
23. Stack Testing Facilities: Stack sampling facilities shall be installed in accordance with Rule 62-297.310(6), F.A.C.
24. Operating Rate During Testing: Testing of emissions shall be conducted with the emissions unit operating at permitted capacity. Permitted capacity is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impractical to test at permitted capacity, an emissions unit may be tested at less than the maximum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test rate until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity. [Rule 62-297.310(2)(b), F.A.C.]

#### RECORDS

25. Records Retention: All measurements, records, and other data required by this permit shall be documented in a permanent, legible format and retained for at least five (5) years following the date on which such measurements, records, or data are recorded. Records shall be made available to the Department upon request. [Rules 62-4.160(14) and 62-213.440(1)(b)2., F.A.C.]

#### REPORTS

26. Emissions Performance Test Results Reports: A report indicating the results of any required emissions performance test shall be submitted to each Compliance Authority no later than 45 days after completion of the last test run. The test report shall provide sufficient detail on the tested emission unit and the procedures used to allow the Department to determine if the test was properly conducted and if the test results were properly computed. At a minimum, the test report shall provide the applicable information listed in Rule 62-297.310(8)(c), F.A.C. [Rule 62-297.310(8), F.A.C.].
27. Annual Operating Reports: Pursuant to Rule 62-210.370(2), F.A.C., Annual Operation Reports, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. Annual operating reports shall be sent to the DEP's Southeast District Office by March 1st of each year.

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS

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#### APPLICABLE STANDARDS AND REGULATIONS

1. Regulations: Unless otherwise indicated in this permit, the construction and operation of the subject emission units shall be in accordance with the capacities and specifications stated in the application. The facility is subject to all applicable provisions of Chapter 403, F.S. and Florida Administrative Code Chapters 62-4, 62-17, 62-204, 62-210, 62-212, 62-213, 62-214, 62-296, and 62-297; and the applicable requirements of the Code of Federal Regulations Section 40, Parts 52, 60, 72, 73, and 75.
2. Applicable Requirements: Issuance of a permit does not relieve the owner or operator of an emissions unit from complying with any applicable requirements, any emission limiting standards or other requirements of the air pollution rules of the Department or any other such requirements under federal, state, or local law, notwithstanding that these applicable requirements are not explicitly stated in this permit. In cases where there is an ambiguity or conflict in the specific conditions of this permit with any of the above-mentioned regulations, the more stringent local, state, or federal requirement applies.  
[Rules 62-204.800 and Rules 62-210.300 and 62-4.070 (3) F.A.C.]
3. NSPS Requirements: The combined cycle gas turbine (Emissions Unit 001) shall comply with the applicable provisions of 40CFR60, Subpart GG, Standards of Performance for Stationary Gas Turbines, adopted by reference in Rule 62-204.800(7)(b), F.A.C. The distillate oil storage tank (Emissions Unit 002) shall comply with all applicable provisions of 40CFR60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels, adopted by reference in Rule 62-204.800, F.A.C. Emissions units subject to a specific NSPS subpart shall also comply with the applicable requirements of 40 CFR 60, Subpart A, General Provisions including:
  - 40CFR60.7, Notification and Recordkeeping
  - 40CFR60.8, Performance Tests
  - 40CFR60.11, Compliance with Standards and Maintenance Requirements
  - 40CFR60.12, Circumvention
  - 40CFR60.13, Monitoring Requirements
  - 40CFR60.19, General Notification and Reporting requirements

#### GENERAL OPERATION REQUIREMENTS

4. Authorized Fuels: The combined cycle gas turbine shall fire only pipeline-quality natural gas or No. 2 distillate oil (or a superior grade) containing no more than 0.05% sulfur by weight.  
[Rules 62-210.200 (Definitions - Potential Emissions) and 62-212.400, F.A.C.]
5. Combustion Turbine Capacity: The maximum heat input to the combined cycle gas turbine shall not exceed 1,700 million Btu per hour (mmBtu/hr) when firing natural gas nor 1,918 mmBtu/hr when firing distillate fuel oil. The heat input limits are based on the lower heating value (LHV) of each fuel, 100% load, and ambient conditions of 25°F temperature, 60% relative humidity, and 14.7 psi pressure.

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS

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These maximum heat input rates will vary depending upon ambient conditions and the combustion turbine characteristics. Manufacturer's curves corrected for site conditions or equations for correction to other ambient conditions shall be provided to the Department within 45 days of completing the initial compliance testing. [Design, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]

6. Hours of Operation: The combined cycle gas turbine may operate 8760 hours per year while firing natural gas. Distillate oil firing shall not exceed 720 hours during any consecutive 12 months. Power augmentation while firing gas is permitted 2000 hours per year and is not limited if oxidation catalyst is installed. The 2000 hour limit may be revised at the request of the applicant based upon review of actual performance and control equipment cost-effectiveness following proper public notice. [Applicant Request, Rule 62-210.200 (Definitions - Potential Emissions), F.A.C.]

#### CONTROL TECHNOLOGY

7. Automated Control System: The permittee shall install, calibrate, tune, operate, and maintain a Speedtronic<sup>TM</sup> Mark VI automated gas turbine control system for the combined cycle unit. The system shall be designed and operated to monitor and control the gas turbine combustion process and operating parameters including, but not limited to: air/fuel distribution and staging, turbine speed, load conditions, temperatures, heat input, and fully automated startup/shutdown. [Design; 62-212.400(BACT), F.A.C.]
8. DLN Combustion Technology: The permittee shall install, tune, operate and maintain the General Electric dry low-NO<sub>x</sub> combustion system (DLN 2.6 or better) to control NO<sub>x</sub> emissions from the combined cycle gas turbine. Prior to the initial emissions performance tests for the gas turbine, the dry low-NO<sub>x</sub> combustors and automated gas turbine control system shall be tuned to optimize the reduction of CO, NO<sub>x</sub>, and VOC emissions. Thereafter, the system shall be maintained and tuned in accordance with the manufacturer's recommendations to minimize these pollutant emissions. The permittee shall provide at least 5 days advance notice prior to any tuning session. The permittee shall provide manufacturer's emissions performance versus load diagrams for the DLN and wet injection systems upon installation and completion of testing.  
[Design; Rule 62-212.400(BACT), F.A.C.]
9. Wet Injection: A wet injection system shall be installed for use during distillate oil firing to reduce NO<sub>x</sub> emissions from the combustion turbine exhaust entering the HRSG. [Design, Rule 62-212.400, F.A.C.]
10. Selective Catalytic Reduction (SCR) System: The permittee shall install, tune, operate and maintain an SCR system to control NO<sub>x</sub> emissions from the combined cycle gas turbine. The SCR system consists of an ammonia injection grid, catalyst, aqueous ammonia storage, monitoring and control system, electrical, piping and other support equipment. The SCR system shall be designed to control NO<sub>x</sub> emissions to the permitted levels with an ammonia slip no greater than 5 ppmvd corrected to 15% oxygen. [Design, Rule 62-212.400, F.A.C.]



**AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)**

**SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS**

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11. Drift Eliminators: Drift eliminators shall be installed on the cooling tower to reduce PM/PM<sub>10</sub> emissions.

**EMISSION LIMITS AND STANDARDS**

12. Nitrogen Oxides (NO<sub>x</sub>) Emissions:

NO<sub>x</sub> emissions are defined as oxides of nitrogen measured as NO<sub>2</sub>.

**a. Performance Tests:**

When firing natural gas, NO<sub>x</sub> emissions from the combined cycle gas turbine shall not exceed 3.5 ppmvd corrected to 15% oxygen nor 24.1 pounds per hour, based on a 24-hour average.

When firing distillate oil, NO<sub>x</sub> emissions from the combined cycle gas turbine shall not exceed 10.0 ppmvd corrected to 15% oxygen nor 80.0 pounds per hour, based on a 24-hour average.

Compliance shall be determined in accordance with EPA Method 7E or Method 20 (40CFR60, Subpart GG).

**b. CEM System:**

When firing natural gas, NO<sub>x</sub> emissions from the combined cycle gas turbine shall not exceed 3.5 ppmvd corrected to 15% oxygen, based on a 24-hour block average.

When firing distillate oil, NO<sub>x</sub> emissions from the combined cycle gas turbine shall not exceed 10.0 ppmvd corrected to 15% oxygen, based on a 24-hour block average.

Compliance shall be determined by valid data from the required NO<sub>x</sub> CEM system.

[Rule 62-212.400, F.A.C., BACT Determination]

13. Carbon Monoxide (CO) Emissions:

**a. Performance Tests:**

When firing natural gas (excluding operation in the Power Augmentation Mode), CO emissions from the combined cycle gas turbine shall not exceed 9.0 ppmvd corrected to 15% oxygen nor 31.0 pounds per hour, based on a 24-hour average.

When firing natural gas and operating in the Power Augmentation Mode, CO emissions from the combined cycle gas turbine shall not exceed 15.0 ppmvd corrected to 15% oxygen nor 49.0 pounds per hour, based on a 24-hour average.

When firing distillate oil, CO emissions from the combined cycle gas turbine shall not exceed 20.0 ppmvd corrected to 15% oxygen nor 70.0 pounds per hour, based on a 24-hour average.

Compliance shall be determined in accordance with EPA Method 10.

**AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)**

**SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS**

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**b. CEM System:**

When firing natural gas, (excluding operation in the Power Augmentation Mode), CO emissions from the combined cycle gas turbine shall not exceed 9.0 ppmvd corrected to 15% oxygen, based on a 24-hour block average.

When firing natural gas and operating in the Power Augmentation Mode, CO emissions from the combined cycle gas turbine shall not exceed 15.0 ppmvd corrected to 15% oxygen, based on a 24-hour block average.

When firing distillate oil, CO emissions from the combined cycle gas turbine shall not exceed 20.0 ppmvd corrected to 15% oxygen<sub>2</sub> at 90-100 percent of full load, 22 ppmvd at 75-89 percent of full load nor 29 ppmvd @ 15% O<sub>2</sub> at 50-74 percent of full load based on a 24-hour block average.

Compliance shall be determined by valid data from the required CO CEM system.

[Rule 62-212.400, F.A.C, BACT Determination]

14. Volatile Organic Compounds (VOC) Emissions: The efficient combustion of clean fuels and good operating practices for the combined cycle gas turbine represent the Best Available Control Technology (BACT) requirements for VOC emissions.

{Permitting Note: VOC emissions are expected to be less than 3 pounds per hour (1.4 ppmvd corrected to 15% oxygen) when firing natural gas and less than 8 pounds per hour (3.6 ppmvd corrected to 15% oxygen) when firing distillate oil, as determined by EPA Method 25A measured and reported as methane.}

[Design; Rule 62-212.400(BACT), F.A.C.]

15. Sulfur Dioxide (SO<sub>2</sub>) and Sulfuric Acid Mist Emissions (SAM): The fuel specifications listed Condition No. 4 of this section effectively limit the potential emissions of SO<sub>2</sub> and SAM. Compliance with the fuel sulfur limits shall be demonstrated by the fuel sampling, analysis, record keeping and reporting requirements of Condition No. 28 of this section. [Rule 62-212.400, F.A.C.; 40 CFR 60.333]

16. PM/PM<sub>10</sub> and Visible Emissions (VE): When firing either natural gas or distillate oil, visible emissions shall not exceed 10% opacity, based on a 6-minute average as determined by EPA Method 9. The fuel specifications in Conditions No. 4 and 28 of this section combined with the efficient combustion design and good operating practices for the combined cycle gas turbine represent the Best Available Control Technology (BACT) requirements for particulate matter.

{Permitting Note: Particulate matter emissions are expected to be less than 11 pounds per hour when firing natural gas and less than 36 pounds per hour when firing distillate oil, as determined by EPA Method 5, front-half catch only.}

[Rule 62-212.400(BACT), F.A.C.]

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS

17. Ammonia Emissions: The concentration of ammonia in the stack exhaust gas shall not exceed 5 ppmvd corrected to 15% oxygen as determined by EPA Method CTM-027. [Rules 62-4.070 and 62-212.400(BACT), F.A.C.]

#### COMPLIANCE DETERMINATION

18. Test Methods: Required tests shall be performed in accordance with the following reference methods.

EPA Method	Description of Method and Comments
CTM-027	Procedure for Collection and Analysis of Ammonia in Stationary Source <ul style="list-style-type: none"><li>This is an EPA conditional test method.</li><li>The minimum detection limit shall be 1 ppm.</li></ul>
5	Determination of Particulate Matter Emissions from Stationary Sources <ul style="list-style-type: none"><li>For gas firing, the minimum sampling time shall be two hours per run and the minimum sampling volume shall be 60 dscf per run.</li><li>For oil firing, the minimum sampling time shall be one hour per run and the minimum sampling volume shall be 30 dscf per run.</li></ul>
7E	Determination of Nitrogen Oxide Emissions from Stationary Sources
9	Visual Determination of the Opacity of Emissions from Stationary Sources
10	Determination of Carbon Monoxide Emissions from Stationary Sources <ul style="list-style-type: none"><li>The method shall be based on a continuous sampling train.</li><li>The ascarite trap may be omitted or the interference trap of section 10.1 may be used in lieu of the silica gel and ascarite traps.</li></ul>
18	Measurement of Gaseous Organic Compound Emissions by Gas Chromatography <ul style="list-style-type: none"><li>EPA Method 18 may be used concurrently with EPA Method 25A to deduct emissions of methane and ethane from the measured VOC emissions.</li></ul>
20	Determination of Nitrogen Oxides, Sulfur Dioxide and Diluent Emissions from Stationary Gas Turbines
25A	Determination of Volatile Organic Concentrations

Except for Method CTM-027, the methods are described in 40 CFR 60, Appendix A, and adopted by reference in Rule 62-204.800, F.A.C. Method CT-027 is published on EPA's Technology Transfer Network Web Site at "<http://www.epa.gov/ttn/emc/ctm.html>". No other methods may be used for compliance testing unless prior written approval is received from the administrator of the Department's Emissions Monitoring Section in accordance with an alternate sampling procedure pursuant to 62-297.620, F.A.C. [Rules 62-204.800 and 62-297.100, F.A.C.; 40 CFR 60, Appendix A]

19. Testing Modes of Operation: The permittee shall conduct all required tests for each mode of operation defined below:
- Standard Operation**: Separate tests shall be conducted when firing the combustion turbine with natural gas as well as low sulfur distillate oil.
  - Alternate Mode of Operation**: Separate tests shall be conducted when firing the combustion turbine with natural gas and implementing the power augmentation mode with steam injection. Hourly rates of steam injection for power augmentation (pounds of steam)

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shall be restricted to the rates that demonstrated compliance during the test for this alternate mode of operation. The maximum steam injection rate (lb steam/hour) for power augmentation shall be established in the operation permit. Note: Alternate mode of operation is not allowed when firing low sulfur fuel oil. [Rule 62-4.070(3), F.A.C.]

20. Initial Compliance Tests: The combined cycle gas turbine shall be tested when firing each authorized fuel to demonstrate compliance with the emission standards for CO, NO<sub>x</sub>, visible emissions and ammonia slip. The tests must be conducted within 60 days after achieving at least 90% of the maximum permitted capacity, but not later than 180 days after initial operation of the combined cycle gas turbine.

Tests for CO and NO<sub>x</sub> shall be conducted concurrently. Certified CEM system data may be used to demonstrate compliance with all CO and NO<sub>x</sub> standards. [Rule 62-297.310(7)(a)1., F.A.C.; 40 CFR 60.335]

21. Initial and Quarterly Ammonia Stack Compliance Tests: An initial and quarterly stack emissions test shall be conducted when firing natural gas and fuel oil to demonstrate compliance with the limit on ammonia slip. The initial and annual (one of the quarters) NO<sub>x</sub> and ammonia tests shall be conducted at four points within the operating range of the gas turbine. The test results for ammonia slip shall also report the ammonia injection rates and average NO<sub>x</sub> emissions during each test run. [Rules 62-4.070 (3) and 62-212.400(BACT), F.A.C.]

22. Annual Compliance Tests: During each federal fiscal year (October 1<sup>st</sup> to September 30<sup>th</sup>), the combined cycle gas turbine shall be tested when firing natural gas to demonstrate compliance with the emission standards for CO, NO<sub>x</sub>, ammonia slip and visible emissions. If the combined cycle gas turbine fires more than 200 hours of distillate oil during the federal fiscal year, it shall also be tested for visible emissions and ammonia slip when firing oil. RATA data can substitute for annual compliance testing for CO and NO<sub>x</sub>.

23. Tests After Substantial Modifications: All performance tests required for initial start up shall also be required by the Department after any substantial modifications (and shake down period not to exceed 100 days after re-starting the gas turbine) of air pollution control equipment such as installation of an oxidation catalyst or change of combustors. [Rule 62-4.070 (3) F.A.C.]

24. Compliance with the CO/NO<sub>x</sub> Emissions Limits: Continuous compliance with the applicable CO and NO<sub>x</sub> emissions standards shall be demonstrated with valid data collected by the required CEM systems during the required annual RATA at permitted capacity. Refer to Specific Conditions 18 and 22.

[Rule 62-212.400(BACT) and 62-297.310(7)(a)4., F.A.C.]

25. Compliance with the VOC Emissions Limits: Compliance with the CO standards shall serve as surrogate standards for VOC emissions. [Rule 62-212.400 F.A.C. (BACT)]

26. Compliance with the Ammonia Emissions Limits: The permittee shall calculate and report the ppmvd ammonia slip @15% O<sub>2</sub> at the measured lb/hr emission rate as a means of compliance

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with the BACT standard. The compliance procedures are described in Specific Conditions 18 and 21. [Rule 62-212.400 F.A.C. (BACT)]

27. Compliance with the VE and PM/PM<sub>10</sub> Emissions Limits: Compliance with the VE limits shall be demonstrated by stack tests. Compliance with the fuel specifications, CO standards, and visible emissions standards of this section shall serve as surrogate standards for particulate matter. [Rule 62-212.400 F.A.C. (BACT)]
28. Compliance with the SO<sub>2</sub>/H<sub>2</sub>SO<sub>4</sub>- Fuel Sulfur Limits: The permittee shall demonstrate compliance with the fuel sulfur limits specified in this permit by maintaining the following records of the sulfur contents.
- Compliance with the fuel sulfur limit for *natural gas* shall be demonstrated by keeping reports obtained from the vendor indicating the sulfur content of the natural gas being supplied from the pipeline for each month of operation. Methods for determining the sulfur content of the natural gas shall be ASTM methods D4084-82, D3246-81 or more recent versions.
  - Compliance with the *fuel oil* sulfur limit shall be demonstrated by taking a sample, analyzing the sample for fuel sulfur, and reporting the results to each Compliance Authority before initial startup. Sampling the fuel oil sulfur content shall be conducted in accordance with ASTM D4057-88, Standard Practice for Manual Sampling of Petroleum and Petroleum Products, and one of the following test methods for sulfur in petroleum products: ASTM D129-91, ASTM D1552-90, ASTM D2622-94, or ASTM D4294-90. More recent versions of these methods may be used. For each subsequent fuel delivery, the permittee shall maintain a permanent file of the certified fuel sulfur analysis from the fuel vendor. At the request of a Compliance Authority, the permittee shall perform additional sampling and analysis for the fuel sulfur content.

The above methods shall be used to determine the fuel sulfur content in conjunction with the provisions of 40 CFR 75 Appendix D. [Rules 62-4.070(3) and 62-4.160(15), F.A.C.]

#### EXCESS EMISSIONS

29. Excess Emissions Prohibited: Excess emissions caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction are prohibited. These emissions shall be included in the 24-hour compliance averages for NO<sub>x</sub> and for CO emissions. [Rule 62-210.700(4), F.A.C.]
30. Excess Emissions Defined: During startup, shutdown, and documented unavoidable malfunction of the combined cycle gas turbine, the following permit conditions allow excess emissions or the exclusion of monitoring data for specifically defined periods of operation. These conditions apply only if operators employ the best operational practices to minimize the amount and duration of excess emissions during such incidents.

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- a. During startup and shutdown, visible emissions shall not exceed 10% opacity except for up to ten, 6-minute averaging periods during any calendar day, which shall not exceed 20% opacity. Data for each 6-minute averaging period shall be exclusive from other 6-minute averaging periods.
- b. Excluding startup and shutdown, operation below 50% base load is prohibited.
- c. In accordance with Condition No. 31 of this section, specific data collected by the CEM systems during startup, shutdown, malfunction, and tuning may be excluded from the CO and NO<sub>x</sub> compliance averaging periods.

If a CEM system reports emissions in excess of a 24-hour block emissions standard, the permittee shall notify the Compliance Authority within (1) working day with a preliminary report of: the nature, extent, and duration of the excess emissions; the cause of the excess emissions; and the actions taken to correct the problem. In addition, the Department may request a written summary report of the incident.

[G.E. Combined Cycle Startup Curves Data and Rule 62-210.700, F.A.C.]

#### MONITORING REQUIREMENTS

31. Continuous Emission Monitoring System: The owner or operator shall install, calibrate, maintain, and operate a continuous emission monitoring (CEM) system in the exhaust stack of each emissions unit to measure and record the emissions of NO<sub>x</sub> and CO from these emissions units in a manner sufficient to demonstrate compliance with the CEM emission standards of this permit. The oxygen content or the carbon dioxide (CO<sub>2</sub>) content of the flue gas shall also be monitored at the location where NO<sub>x</sub> and CO are monitored to correct the measured CO and NO<sub>x</sub> emissions rates to 15% oxygen. If a CO<sub>2</sub> monitor is installed, the oxygen content of the flue gas shall be calculated by the CEM system using F-factors that are appropriate for the fuel fired. The CEM system shall be used to demonstrate compliance with the CEM emission standards for NO<sub>x</sub> and CO specified in this permit.

- a. *Data Collection*. Compliance with the CEM emission standards for NO<sub>x</sub> and CO shall be based on a 24-hour block average starting at midnight of each operating day. The 24-hour block average shall be calculated from 24 consecutive hourly average emission rate values. If a unit operates less than 24 hours during the block, the 24-hour block average shall be the average of available valid hourly average emission rate values for the 24-hour block. Each hourly value shall be computed using at least one data point in each fifteen minute quadrant of an hour, where the unit combusted fuel during that quadrant of an hour. Notwithstanding this requirement, an hourly value shall be computed from at least two data points separated by a minimum of 15 minutes (where the unit operates for more than one quadrant of an hour). The owner or operator shall use all valid measurements or data points collected during an hour to calculate the hourly averages. All data points collected during an hour shall be, to the extent practicable, evenly spaced over the hour. If the CEM system measures concentration on a wet basis, the CEM system shall include provisions to determine the moisture content of the exhaust gas and an algorithm to enable correction of the monitoring results to a dry basis (0% moisture). Alternatively, the owner or operator

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may develop through manual stack test measurements a curve of moisture contents in the exhaust gas versus load for each allowable fuel, and use these typical values in an algorithm to enable correction of the monitoring results to a dry basis (0% moisture). Final results of the CEM system shall be expressed as ppmvd, corrected to 15% oxygen.

- b. *NOx Certification.* The NOx monitor shall be certified and operated in accordance with the following requirements. The NOx monitor shall be certified pursuant to 40 CFR Part 75 and shall be operated and maintained in accordance with the applicable requirements of 40 CFR Part 75, Subparts B and C. For purposes of determining compliance with the CEM emission standards of this permit, missing data shall not be substituted. Instead the block average shall be determined using the remaining hourly data in the 24-hour block. Record keeping and reporting shall be conducted pursuant to 40 CFR Part 75, Subparts F and G. The RATA tests required for the NOx monitor shall be performed using EPA Method 20 or 7E, of Appendix A of 40 CFR 60. The NOx monitor shall be a dual range monitor. The span for the lower range shall not be greater than 10 ppm, and the span for the upper range shall not be greater than 30 ppm, as corrected to 15% O<sub>2</sub>.
- c. *CO, CO<sub>2</sub>, and Oxygen Certification.* The CO monitor and CO<sub>2</sub> monitor shall be certified and operated in accordance with the following requirements. The CO monitor shall be certified pursuant to 40 CFR 60, Appendix B, Performance Specification 4. The CO<sub>2</sub> monitor shall be certified pursuant to 40 CFR 60, Appendix B, Performance Specification 3. The oxygen monitor shall be certified pursuant to 40 CFR 60, Appendix B, Performance Specification 3. Quality assurance procedures shall conform to the requirements of 40 CFR 60, Appendix F, and the Data Assessment Report of section 7 shall be made each calendar quarter, and reported semi-annually to each Compliance Authority. The RATA tests required for the CO monitor shall be performed using EPA Method 10, of Appendix A of 40 CFR 60. The Method 10 analysis shall be based on a continuous sampling train, and the ascarite trap may be omitted or the interference trap of section 10.1 may be used in lieu of the silica gel and ascarite traps. The CO monitor shall be a dual range monitor. The span for the lower range shall not be greater than 20 ppm, and the span for the upper range shall not be greater than 60 ppm, as corrected to 15% oxygen. The RATA tests required for the CO<sub>2</sub> monitor shall be performed using EPA Method 3B, of Appendix A of 40 CFR 60. The RATA tests required for the oxygen monitor shall be performed using EPA Method 3B, of Appendix A of 40 CFR 60.
- d. *Data Exclusion.* Emissions data for NOx, CO and CO<sub>2</sub> (or oxygen content) shall be recorded by the CEM system during episodes of startup, shutdown and malfunction. NOx and CO emissions data recorded during these episodes may be excluded from the block average calculated to demonstrate compliance with the CEM emission standards as provided in this paragraph.

## AIR CONSTRUCTION PERMIT 1110101-001-AC (PSD-FL-312)

### SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS

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- (1) Periods of data excluded for a cold startup shall not exceed four hours in any block 24-hour period. A "*cold startup*" is defined as a startup to combined cycle operation following a complete shutdown lasting at least 48 hours.
- (2) Periods of data excluded for a warm startup shall not exceed two hours in any block 24-hour period. A "*warm startup*" is defined as a startup to combined cycle operation following a complete shutdown lasting 8 hours or more, but less than 48 hours.
- (3) Periods of data excluded for a hot startup shall not exceed one hour in any block 24-hour period. A "*hot startup*" is defined as a startup to combined cycle operation following a complete shutdown lasting less than 8 hours.
- (4) Periods of data excluded for a shutdown shall not exceed three hours in any block 24-hour period. A "*shutdown*" is the process of bringing a gas turbine off line and ending fuel combustion.
- (5) Periods of data excluded for a documented unavoidable malfunction shall not exceed two hours in any 24-hour block period. A "*documented unavoidable malfunction*" is a malfunction beyond the control of the operator that is documented within 24 hours of occurrence by contacting each Compliance Authority by telephone or facsimile transmittal.
- (6) If the permittee provides at least five days advance notice prior to a *tuning session*, data may be excluded from the block average calculated to demonstrate compliance with the CEM emission standards. Periods of data excluded for such episodes shall not exceed a total of three hours in any 24-hour block period. Tuning sessions must be performed in accordance with the manufacturer's recommendations. No more than two tuning sessions are expected during any year.

All periods of data excluded for any startup, shutdown or malfunction episode shall be consecutive for each episode. The permittee shall minimize the duration of data excluded for startup, shutdown and malfunctions, to the extent practicable. Data recorded during startup, shutdown or malfunction events shall not be excluded if the startup, shutdown or malfunction episode was caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure, which may reasonably be prevented.

Best operational practices shall be used to minimize hourly emissions that occur during episodes of startup, shutdown and malfunction. Emissions of any quantity or duration that occur entirely or in part from poor maintenance, poor operation, or any other equipment or process failure, which may reasonably be prevented, shall be prohibited.

- e. *Data Exclusion Reports.* A summary report of duration of data excluded from the block average calculation, and all instances of missing data from monitor downtime, shall be reported semi-annually to each Compliance Authority. This report shall be consolidated with the report required pursuant to 40 CFR 60.7. For purposes of reporting "excess emissions" pursuant to the requirements of 40 CFR 60.7, excess emissions shall be defined as the hourly emissions which are recorded by the CEM system during periods of data



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### SECTION III - EMISSIONS UNITS SPECIFIC CONDITIONS

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excluded for episodes of startup, shutdown and malfunction, as allowed above. The duration of excess emissions shall be the duration of the periods of data excluded for such episodes. Reports required by this paragraph and by 40 CFR 60.7 shall be submitted no less than semi-annually, including semi-annual periods in which no data is excluded or no instances of missing data occur.

- f. *Data Conversion.* Upon request from the Department, the CEM systems emission rates shall be corrected to ISO conditions to demonstrate compliance with the applicable standards of 40 CFR 60.332.
- g. *Availability.* The NO<sub>x</sub> and CO monitor availability threshold shall not be less than 95% in any calendar quarter. The report required by this section shall be used to demonstrate monitor availability. In the event 95% availability is not achieved, the owner or operator shall provide the Department with a report identifying the problems in achieving 95% availability and a plan of corrective actions that will be taken to achieve 95% availability. The owner or operator shall implement the reported corrective actions within the next calendar quarter.

{Permitting Note 1: As required by EPA's March 12, 1993 determination, the NO<sub>x</sub> monitor shall meet the applicable requirements of 40 CFR 60.13, Appendix B and Appendix F for certifying, maintaining, operating and assuring the quality of the system; shall be capable of calculating NO<sub>x</sub> emissions concentrations corrected to 15% oxygen; shall have no less than 95% monitor availability in any given calendar quarter; and shall provide a minimum of four data points for each hour and calculate an hourly average. The requirements for the CEMS specified by the specific conditions of this permit satisfy these requirements.}

{Permitting Note 2: Compliance with these requirements will ensure compliance with the other applicable CEM system requirements such as: NSPS Subpart GG; Rule 62-297.520, F.A.C.; 40 CFR 60.7(a)(5) and 40 CFR 60.13; 40 CFR Part 51, Appendix P; 40 CFR 60, Appendix B - Performance Specifications; and 40 CFR 60, Appendix F - Quality Assurance Procedures.}

[Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]

- 32. Ammonia Monitoring Requirements: In accordance with the manufacturer's specifications, the permittee shall install, calibrate, maintain and operate, an ammonia flow meter to measure and record the ammonia injection rate to the SCR system. The permittee shall document the general range of ammonia flow rates required to meet emissions limitations over the range of combustion turbine load conditions allowed by this permit by comparing NO<sub>x</sub> emissions recorded by the NO<sub>x</sub> monitor with ammonia flow rates recorded using the ammonia flow meter. During NO<sub>x</sub> monitor downtimes or malfunctions, the permittee shall operate at the ammonia flow rate that is consistent with the documented flow rate for the combustion turbine load. [Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]
- 33. SCR Operational Requirements: The SCR shall operate at all times that the turbine is operating, except during turbine start-up and shutdown periods, as dictated by the manufacturer's guidelines and in accordance with this permit. During turbine start-up, permittee shall begin use of SCR (i.e., commence ammonia injection) as soon as possible and

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within two (2) hours of the initial turbine firing or when the temperature of the catalyst bed reaches a suitable predetermined temperature level, whichever occurs first. During turbine shutdown, permittee shall discontinue use of the SCR (i.e., discontinue ammonia injection) when the catalyst bed temperature drops below the predetermined temperature levels, but no more than one hour prior to the time at which the fuel feed to the turbine is discontinued.

Suitable temperature for activation and deactivation of the SCR shall be established during performance testing. The permittee shall, whenever possible, operate the facility in a manner so as to optimize the effectiveness of the SCR unit while minimizing ammonia slip to below the emission limit. Design, Rule 62-212.400, F.A.C.]

34. Fuel Consumption Monitoring of Operations: To demonstrate compliance with the fuel consumption limits, the permittee shall monitor and record the rates of consumption of each allowable fuel in accordance with the provisions of 40 CFR 75 Appendix D. To demonstrate compliance with the turbine capacity requirements, the permittee shall monitor and record the operating rate of the combined cycle gas turbine on a daily average basis, considering the number of hours of operation during each day (including the times of startup, shutdown and malfunction).

Such monitoring shall be made using a monitoring component of the CEM system required above, or by monitoring daily rates of consumption and heat content of each allowable fuel in accordance with the provisions of 40 CFR 75 Appendix D. [Rules 62-4.070(3) and 62-212.400(BACT), F.A.C.]

35. Fuel Consumption Rates Monthly Monitoring: By the fifth calendar day of each month, the permittee shall record the monthly fuel consumption and hours of operation for the gas turbine. The information shall be recorded in a written (or electronic log) and shall summarize the previous month of operation and the previous 12 months of operation. Information recorded and stored as an electronic file shall be available for inspection and printing within at least three days of a request by the Department. [Rule 62-4.070(3), F.A.C.]

#### NOTIFICATION, REPORTING, AND RECORDKEEPING

36. Records: All measurements, records, and other data required to be maintained by CPV shall be recorded in a permanent form and retained for at least five (5) years following the date on which such measurements, records, or data are recorded. These records shall be made available to DEP representatives upon request. [Rules 62-4.160 and 62-213.440, F.A.C.]
37. NSPS Notifications: All notifications and reports required by the 40CFR 60, Subpart A applicable requirements shall be submitted to Compliance Authority.
38. Semi-Annual Reports: Semi-annual excess emission reports, in accordance with 40 CFR 60.7 (a)(7)(c) (2000 version), shall be submitted to each Compliance Authority.

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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**CPV Atlantic Power Generating Facility**  
**PSD-FL-312 and 1110101-001-AC**  
**St. Lucie County, Florida**

**BACKGROUND**

The applicant, CPV Atlantic, Ltd, proposes to install a construct a combined cycle power plant at a new facility near Port St. Lucie, St. Lucie County. The proposed project will result in "significant increases" with respect to Table 62-212.400-2, Florida Administrative Code (F.A.C.) of emissions of particulate matter (PM and PM<sub>10</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (SAM), and nitrogen oxides (NO<sub>x</sub>). The project is therefore subject to review for the Prevention of Significant Deterioration (PSD) and a determination of Best Available Control Technology (BACT) in accordance with Rules 62-212.400, F.A.C.

The primary unit to be installed is a nominal 170 MW, General Electric 7FA combustion turbine-electrical generator, fired primarily with pipeline natural gas. The project includes an unfired heat recovery steam generator (HRSG) connected to a separate steam turbine-electrical generator. The project also includes a 1 million gallon storage tank for backup No. 2 fuel oil, cooling tower, a 200-foot stack, and a mechanical draft cooling tower and other ancillary equipment. Descriptions of the process, project, air quality effects, and rule applicability are given in the Technical Evaluation and Preliminary Determination dated February 19, 2001, accompanying the Department's Intent to Issue.

**BACT APPLICATION:**

The application was received on December 29, 2000 and included a proposed BACT proposal prepared by the applicant's consultant, TRC.

**REVIEW GROUP MEMBERS:**

Teresa Heron, Permit Engineer and A. A. Linero, P.E.

**BACT REQUESTED BY THE APPLICANT:**

POLLUTANT	CONTROL TECHNOLOGY	PROPOSED BACT LIMIT
Nitrogen Oxides	Selective Catalytic Reduction	3.5 ppmvd @15% O <sub>2</sub> (gas) 10 ppmvd@15% O <sub>2</sub> (oil)
Carbon Monoxide	Combustion Controls	9 ppmvd (gas) 20 ppmvd (oil)
Particulate Matter	Inherently Clean Fuels Combustion Controls	20 lb/hr (gas) 53 lb/hr (oil)
Sulfur Dioxide/Sulfuric Acid Mist	Low Sulfur Fuels	0.0065% sulfur (gas) 0.05% sulfur (oil)

## **APPENDIX BD**

### **BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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#### **BACT DETERMINATION PROCEDURE:**

In accordance with Chapter 62-212, F.A.C., this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department of Environmental Protection (Department), on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that, in making the BACT determination, the Department shall give consideration to:

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

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

#### **STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES:**

The minimum basis for a BACT determination is 40 CFR 60, Subpart GG, Standards of Performance for Stationary Gas Turbines (NSPS). The Department adopted subpart GG by reference in Rule 62-204.800, F.A.C. The key emission limits required by Subpart GG are 75 ppmvd NO<sub>x</sub> @ 15% O<sub>2</sub> (assuming 25 percent efficiency) and 150 ppmvd SO<sub>2</sub> @ 15% O<sub>2</sub> (or <0.8% sulfur in fuel). The BACT proposed by the CPV is consistent with the NSPS, which allows NO<sub>x</sub> emissions in the range of 110 ppmvd for the high efficiency unit to be purchased by CPV. No National Emission Standard for Hazardous Air Pollutants exists for stationary gas turbines.

There is a National Emission Standard for Hazardous Air Pollutants (NESHAP) under development by EPA, but it is not applicable to this project. Because emissions of HAP are less than 10 tons per year, there is no requirement to conduct a case-by-case maximum achievable control technology determination.

#### **DETERMINATIONS BY STATES:**

The following table is a sample of information on some recent applications, proposals, and determinations in the Southeast for combined cycle projects. The CPV Atlantic Project is included for reference.

# APPENDIX BD

## BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

### TABLE 1

RECENT NO<sub>x</sub> EMISSION LIMIT PROPOSALS AND DETERMINATIONS FOR "F-CLASS"  
COMBINED CYCLE PROJECTS IN THE SOUTHEAST

Project Location	Capacity Megawatts	NO <sub>x</sub> Limit ppmvd @ 15% O <sub>2</sub> and Fuel	Technology	Comments
CPV Atlantic, FL	245	3.5 – NG 10 – FO	SCR	170 MW GE 7FA CT Under Review
CPV Gulfcoast, FL	245	3.5 – NG 10 – FO	SCR	170 MW GE 7FA CT Issued 2/2001
TECO Bayside, FL	1750	3.5 – NG 12 – FO	SCR	7x170 MW GE 7FA CTs Repowering Draft Issued 2/2001
FPC Hines II, FL	530	3.5 – NG 12 – FO	SCR	2x170 MW WH501F
Calpine Osprey, FL	527	3.5 – NG	SCR	2x170 MW WH501F Draft 5/00
Calpine Blue Heron, FL	1080	3.5 – NG	SCR	4x170 MW WH501F Draft 2/00
Santee Cooper, SC	~500	9 – NG	DLN	2x170 MW GE 7FA CTs ~ 4/00
Mobile Energy, AL	~250	~3.5 – NG ~11 – FO	SCR	178 MW GE 7FA CT 1/99
Alabama Power Barry	800	3.5 – NG	SCR	3x170 MW GE 7FA CTs 11/98
Alabama Power Theo	210	3.5 – NG	SCR	4x170 MW GE 7FA CTs 11/98
KUA Cane Island 3, FL	250	3.5 – NG (12 – simple cycle) 15 – FO	SCR	170 MW GE 7FA. 11/99 DLN on simple cycle
Lake Worth LLC, FL	250	9 or 3.5 – NG 9.4 or 3.5 – NG (CT&DB) 42 or 16.4 – FO	DLN or SCR DLN or SCR WI or SCR	170 MW GE 7FA. 11/99 Increase allowed for DB under DLN.
Miss Power Daniel	1000	3.5 – NG	SCR	4x170 MW GE 7FA CTs 11/98

DB = Duct Burner

NG = Natural Gas

FO = Fuel Oil

DLN = Dry Low NO<sub>x</sub> Combustion

SCR = Selective Catalytic Reduction

WI = Water or Steam Injection

GE = General Electric

WH = Westinghouse

CT = Combustion Turbine

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

TABLE 2

RECENT CO, VOC, AND PM NO<sub>x</sub> EMISSION LIMIT PROPOSALS AND  
DETERMINATIONS FOR "F-CLASS" COMBINED CYCLE PROJECTS

Project Location	CO - ppmvd (or lb/mmBtu)	VOC - ppmv (or lb/mmBtu)	PM - lb/mmBtu (or gr/dscf or lb/hr)	Technology and Comments
CPV Atlantic, FL	9 - NG (50 - 100% load) 15 - NG (PA) 20 - FO	1.4 - NG 3.5 FO	11 lb/hr - NG (front) 36 lb/hr - FO (front) 5 ppmvd Ammonia Slip	Clean Fuels Good Combustion
CPV Gulfcoast, FL	9 - NG (50 - 100% load) 15 - NG (PA) 20 - FO	1.4 - NG 3.5 FO	11 lb/hr - NG (front) 36 lb/hr - FO (front) 5 ppmvd Ammonia Slip	Clean Fuels Good Combustion
TECO Bayside, FL	9 - NG (24-hr CEMS) 20 - FO (24-hr CEMS)	1.3 - NG 3 - FO	12 lb/hr - NG 30 lb/hr - FO	Clean Fuels Good Combustion
FPC Hines II, FL	16 - NG (24-hr CEMS) 30 - FO (24-hr CEMS)	2 - NG 10 - FO	10% Opacity - NG 5/9 ammonia - NG/FO	Clean Fuels Good Combustion
Calpine Osprey, FL	10 - NG 17 - NG (DB&PA)	2.3 - NG 4.6 - NG (DB&PA)	24 lb/hr - NG (DB&PA) 10 percent Opacity 9 ppmvd Ammonia Slip	Clean Fuels Good Combustion
Calpine Blue Heron, FL	10 - NG (24-hr CEMS) 17 - NG (DB&PA)	1.2 - NG 6.6 - NG (DB&PA)	31.9 lb/hr - NG (DB&PA) 10 percent Opacity 5 ppmvd Ammonia Slip	Clean Fuels Good Combustion
Mobile Energy, AL	~18 - NG ~26 - FO	~5 - NG ~6 - FO	10% Opacity	Clean Fuels Good Combustion
Alabama Power Barry	~15 - NG(CT) ~25 - NG(DB & CT)	~8 - NG(CT) ~12 - NG(CT & DB)	0.010 lb/mmBtu - (CT) 0.011 lb/mmBtu -(CT/DB) 10% Opacity	Clean Fuels Good Combustion
Alabama Power Theo	~36 - CT & DB	~12.5 CT & DB		Clean Fuels Good Combustion
KUA Cane Island	10 - NG (CT) 20 - NG (CT&DB) 30 - FO	1.4 - NG (CT) 4 - NG (CT&DB) 10 - FO	10% Opacity	Clean Fuels Good Combustion
Lake Worth LLC, FL	9 - NG (CT) 15 - NG (CT & DB) 20 - F.O. (3-hr)	1.4 - NG (CT) 1.8 - NG (CT & DB) 3.5 - F.O.	10% Opacity	Clean Fuels Good Combustion
Miss Power Daniel	~15 - NG(CT) ~25 - NG(DB & CT)	~8 - NG(CT) ~12 - NG(CT & DB)	0.010 lb/mmBtu - (CT) 0.011 lb/mmBtu -(CT/DB) 10% Opacity	Clean Fuels Good Combustion

All of the projects listed above control SO<sub>2</sub> and sulfuric acid mist by limiting the sulfur content of the fuel. In every case, pipeline quality natural gas is used and has a sulfur content less than 2 grains per 100 cubic feet. In some cases, the limits are even lower or are expressed in different terms. However all ultimately rely on a fairly uniform gas distribution network and have very little flexibility in actually controlling sulfur content. Similarly, emissions of these two pollutants are controlled by using 0.05 percent sulfur distillate fuel oil.

Some of the projects listed above include front and back half catch for PM limits. Therefore comparison is not simple.

## APPENDIX BD

### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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#### **OTHER INFORMATION AVAILABLE TO THE DEPARTMENT:**

Besides the initial information submitted by the applicant, the summary above, and the references at the end of this document, key information reviewed by the Department includes:

- Comments from the National Park Service dated January 23, 2001
- Comments from from EPA Region IV (on CPV Gulfcoast) dated December 27, 2000
- Alternative Control Techniques Document - NO<sub>x</sub> Emissions from Stationary Gas Turbines
- General Electric 39th Turbine State-of-the-Art Technology Seminar Proceedings
- GE Power Generation - Speedtronic™ Mark V Gas Turbine Control System
- GE Combined Cycle Startup Curves

#### **REVIEW OF NITROGEN OXIDES CONTROL TECHNOLOGIES:**

Some of the discussion in this section is based on a 1993 EPA document on Alternative Control Techniques for NO<sub>x</sub> Emissions from Stationary Gas Turbines. Project-specific information is included where applicable.

##### **Nitrogen Oxides Formation**

Nitrogen oxides form in the gas turbine combustion process as a result of the dissociation of molecular nitrogen and oxygen to their atomic forms and subsequent recombination into seven different oxides of nitrogen. *Thermal NO<sub>x</sub>* forms in the high temperature area of the gas turbine combustor. Thermal NO<sub>x</sub> increases exponentially with increases in flame temperature and linearly with increases in residence time. Flame temperature is dependent upon the ratio of fuel burned in a flame to the amount of fuel that consumes all of the available oxygen.

By maintaining a low fuel ratio (lean combustion), the flame temperature will be lower, thus reducing the potential for NO<sub>x</sub> formation. *Prompt NO<sub>x</sub>* is formed in the proximity of the flame front as intermediate combustion products. The contribution of Prompt to overall NO<sub>x</sub> is relatively small in near-stoichiometric combustors and increases for leaner fuel mixtures. This provides a practical limit for NO<sub>x</sub> control by lean combustion.

In all but the most recent gas turbine combustor designs, the high temperature combustion gases are cooled to an acceptable temperature with dilution air prior to entering the turbine (expansion) section. The sooner this cooling occurs, the lower the thermal NO<sub>x</sub> formation. Cooling is also required to protect the first stage nozzle. When this is accomplished by air-cooling, the air is injected into the component and is ejected into the combustion gas stream, causing a further drop in combustion gas temperature. This, in turn, lowers achievable thermal efficiency for the unit.

The relationship between flame temperature, firing temperature, unit efficiency, and NO<sub>x</sub> formation can be appreciated from Figure 1 which is from a General Electric discussion on these principles.

*Fuel NO<sub>x</sub>* is formed when fuels containing bound nitrogen are burned. This phenomenon is not important when combusting natural gas. Also, low sulfur fuel oil (which has more fuel-bound nitrogen than natural gas) is limited to no more than 30 days or 720 hours per year.

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### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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Uncontrolled emissions range from about 100 to over 600 parts per million by volume, dry, corrected to 15 percent oxygen (ppmvd @15% O<sub>2</sub>). The Department estimates uncontrolled emissions at approximately 200 ppmvd @15% O<sub>2</sub> for the turbine of the CPV Atlantic Project. The proposed NO<sub>x</sub> controls will significantly reduce these emissions.

#### NO<sub>x</sub> Control Techniques

##### Wet Injection

Injection of either water or steam directly into the combustor lowers the flame temperature and thereby reduces thermal NO<sub>x</sub> formation. Typical emissions achieved by wet injection are in the range of 15–25 ppmvd when firing gas and 42 ppmvd when firing fuel oil in large combustion turbines. These values often form the basis, particularly in combined cycle turbines, for further reduction to BACT limits by other techniques. Carbon monoxide (CO) and hydrocarbon (HC) emissions are relatively low for most gas turbines. However steam and (more so) water injection may increase emissions of both of these pollutants.

##### Combustion Controls: Dry Low NO<sub>x</sub> (DLN)

The excess air in lean combustion cools the flame and reduces the rate of thermal NO<sub>x</sub> formation. Lean premixing of fuel and air prior to combustion can further reduce NO<sub>x</sub> emissions. This is accomplished by minimizing localized fuel-rich pockets (and high temperatures) that can occur when trying to achieve lean mixing within the combustion zones.

The above principle is incorporated into the General Electric DLN-2.6 can-annular combustor shown in Figure 2. Each combustor includes six nozzles within which fuel and air have been fully pre-mixed. There are 16 small fuel passages around the circumference of each combustor can known as quarternary fuel pegs. The six nozzles are sequentially ignited as load increases in a manner that maintains lean pre-mixed combustion and flame stability.

Design emission characteristics of the DLN-2.6 combustor while firing natural gas are given in Figure 3 for a unit tuned to meet a 15 ppmvd NO<sub>x</sub> limit (by volume, dry corrected to at 15 percent oxygen) at JEA's Kennedy Station. The combustor can be tuned differently to achieve emissions as low as 9 ppmvd of NO<sub>x</sub>.

The combustor emits NO<sub>x</sub> at concentrations of 15 ppmvd at loads between 50 and 100 percent of capacity, but concentrations as high as 100 ppmvd may occur at less than 50 percent of capacity. Note that VOC comprises a very small amount of the "unburned hydrocarbons" which in turn is mostly non-VOC methane.

Following are the results of the new and clean tests conducted on a dual-fuel GE PG7241FA combustion turbine operating in combined cycle mode and burning natural gas at the City of Tallahassee Purdom Station Unit 8.<sup>1</sup> The DLN 2-6 combustors for this project were guaranteed to achieve 9 ppmvd of NO<sub>x</sub> while burning natural gas although the permit limit is 12 ppmvd. The results are all superior to the emission characteristics given in Figure 3.



## ***Gas Turbine - Hot Gas Path Parts***

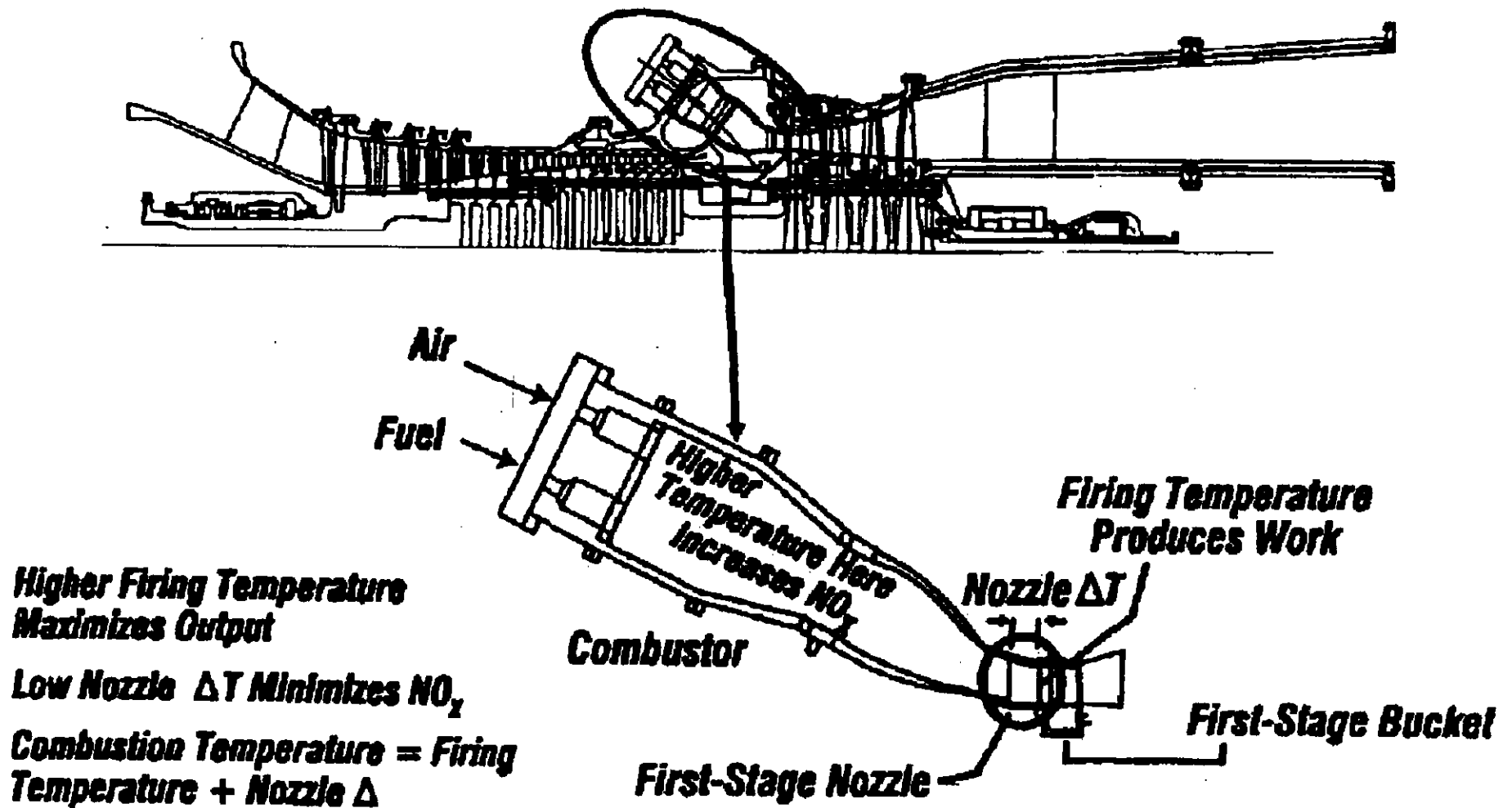
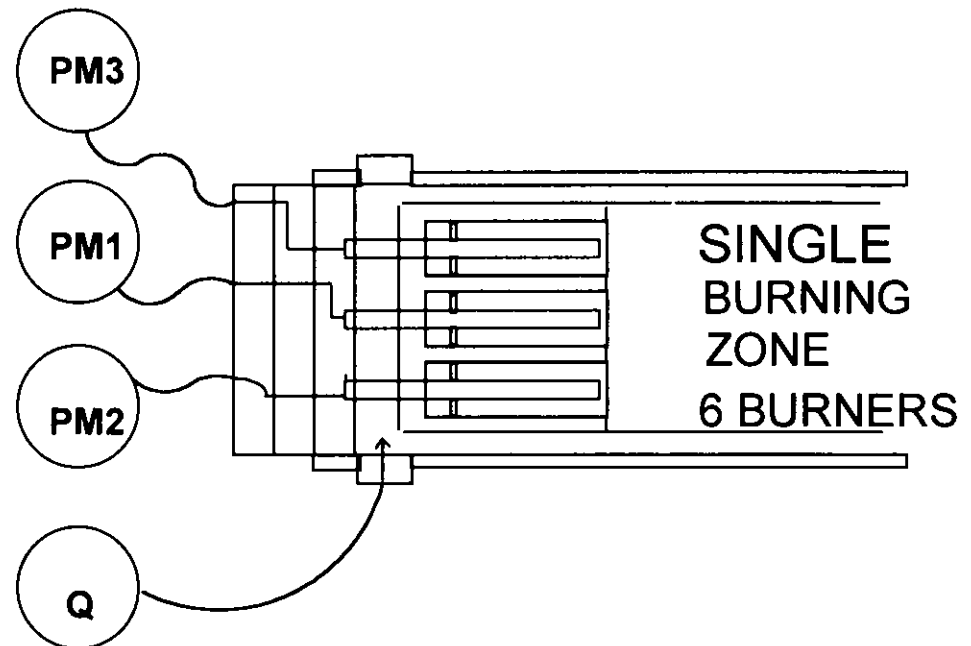
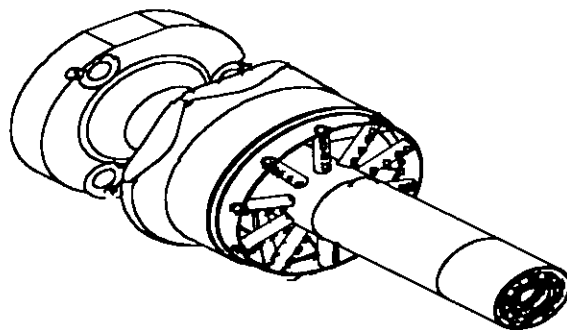
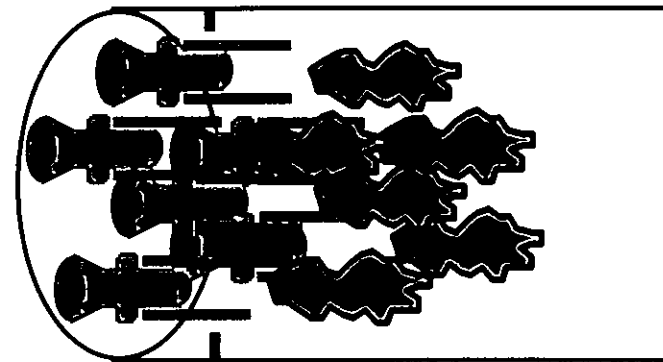
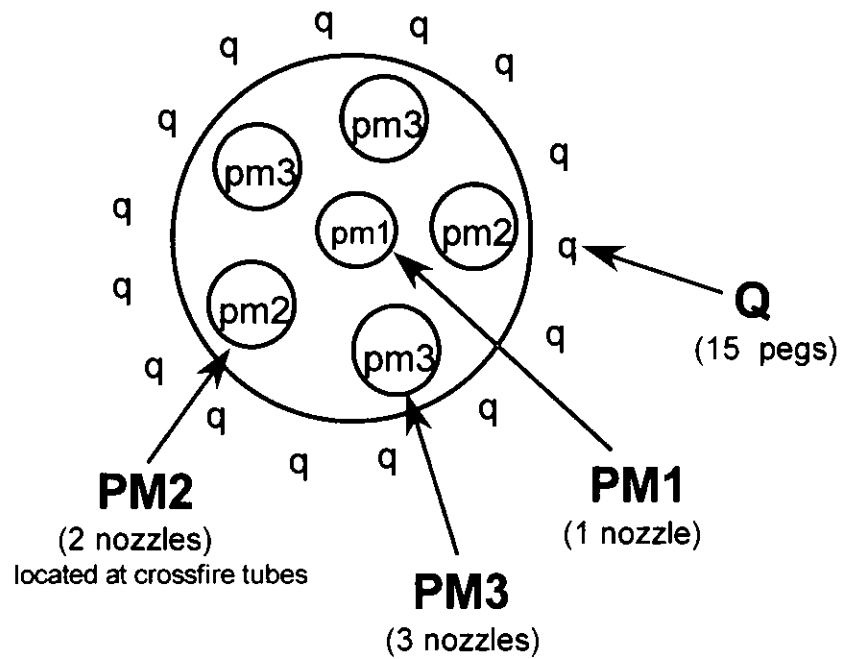


Figure 1 – Relation Between Flame Temperature and Firing Temperature



**Figure 2 - DLN2.6 Fuel Nozzle Arrangement**

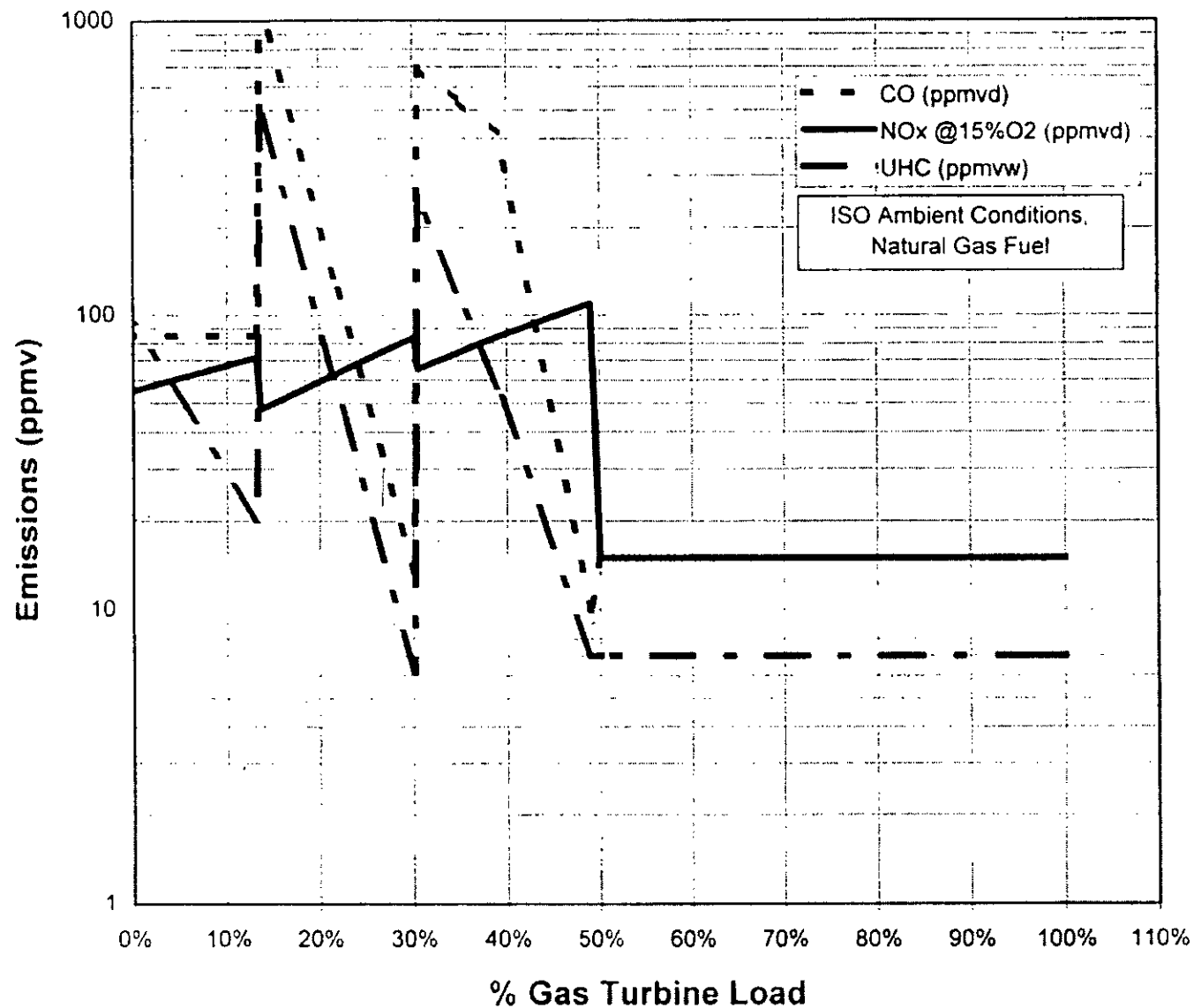


Figure 3 – Emissions Performance Curves for GE DLN-2.6 Combustor  
Firing Natural Gas in a Dual Fuel GE 7FA Combustion Turbine  
(Simple Cycle Intermittent Duty – If Tuned to 15 ppmvd NO<sub>x</sub>)

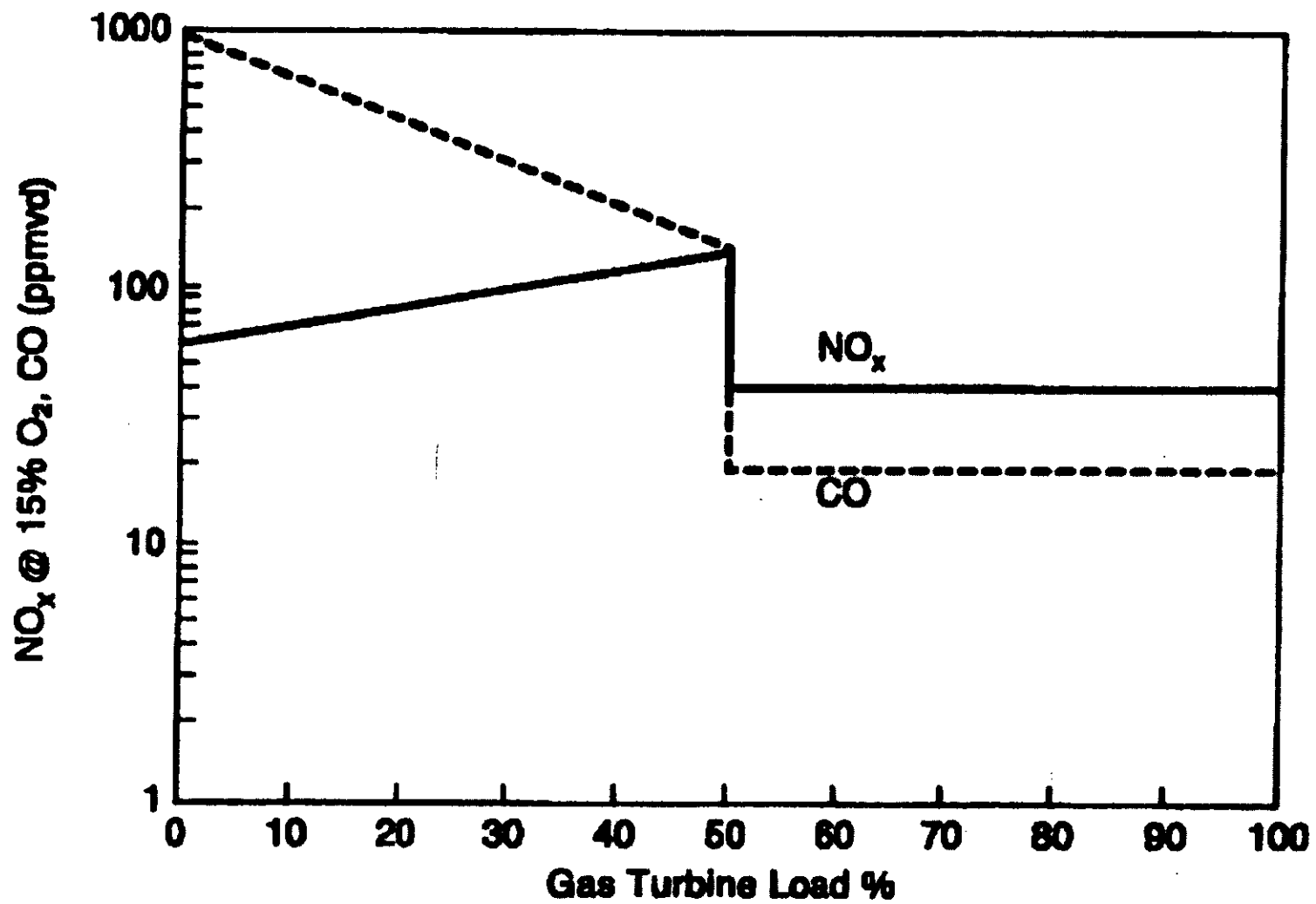


Figure 4 – Emissions Performance for DLN-2 Combustors  
Firing Fuel Oil in Dual Fuel GE 7FA Turbine

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Percent of Full Load	NO <sub>x</sub> (ppmvd @15% O <sub>2</sub> )	CO (ppmvd)
70	7.2	
80	6.1	
90	6.6	
100	8.7	0.85
Limit	12	25

Following are the results of the new and clean tests conducted on a dual-fuel GE PG7241FA combustion turbine operating in simple cycle mode and burning natural gas at the Tampa Electric Polk Power Station.<sup>2</sup> The DLN 2-6 combustors for this project were guaranteed to achieve 9 ppmvd of NO<sub>x</sub> while burning natural gas although the permit limit is 10.5 ppmvd. Again, the results are all superior to the emission characteristics given in Figure 3.

Percent of Full Load	NO <sub>x</sub> (ppmvd @15% O <sub>2</sub> )	CO (ppmvd)	VOC (ppmvd)
50	5.3	1.6	0.5
70	6.3	0.5	0.4
85	6.2	0.4	0.2
100	7.6	0.3	0.1
Limit	10.5	15	7

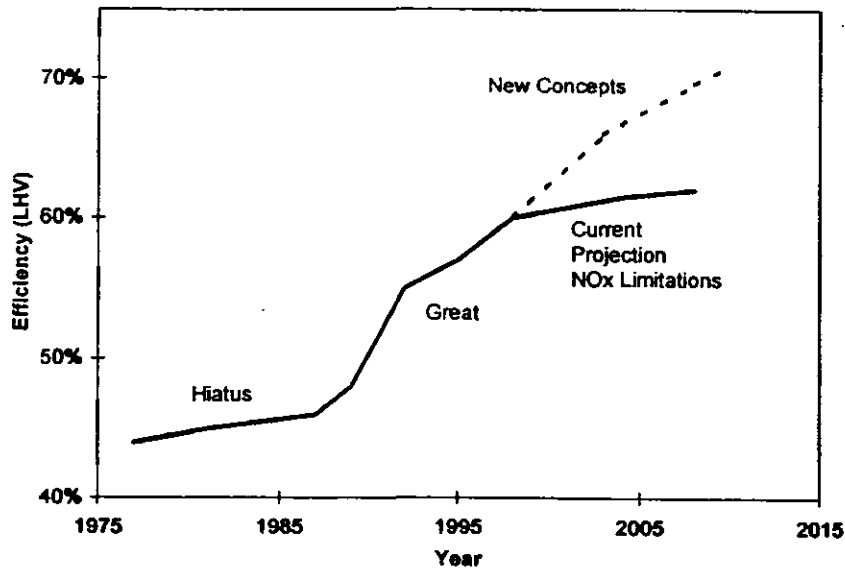
Recent conversations with other operators indicate that the Low NO<sub>x</sub> characteristics extend to operations less than 50 percent of full load, though such operation is not (yet) guaranteed by GE.<sup>3</sup>

Emissions characteristics by wet injection NO<sub>x</sub> control while firing oil are shown in Figure 4 for the DLN-2.0, a predecessor of the DLN2-6. Operation on fuel oil is not in the premixed mode. Specialized premixed DLN burners for fuel oil operation were installed in a project in Israel<sup>4</sup> where water is scarce, but the Department has no information on the results.

Mitsubishi (who also make a 501F) is also developing a dual-fuel premixed DLN. Optimization of premix fuel-air nozzle and performance was verified in high-pressure combustion tests. Commissioning tests on gas and oil burning were completed at an undesignated site.<sup>5</sup> The details are not available in English.

An important consideration is that power and efficiency are sacrificed in the effort to achieve low NO<sub>x</sub> by combustion technology. This limitation is seen in Figure 5 from an EPRI report.<sup>6</sup> Basically developments such as single crystal blading, aircraft compressor design, high technology blade cooling have helped to greatly increase efficiency and lower capital costs. Further improvements are more difficult in large part because of the competing demands for air to support lean premix combustion and to provide blade cooling. New concepts are under development by GE and the other turbine manufacturers to meet the challenges implicit in Figure 5.

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**Figure 5 – Efficiency Increases in Combustion Turbines**

Further  $\text{NO}_x$  reductions related to flame temperature control are possible such as closed loop steam cooling. This feature is available only in larger units (Westinghouse G or General Electric H Class technology) than the units planned by CPV. The fluid is circulated through the internal portion of the nozzle component or around the transition piece between the combustor and the nozzle and does not enter the exhaust stream. Instead it is normally sent back to a steam generator. The difference between flame temperature and firing temperature into the first stage is minimized and higher efficiency is attained.

Another important result of steam cooling is that a higher firing temperature can be attained with no increase in flame temperature. Flame temperatures and  $\text{NO}_x$  emissions can therefore be maintained at comparatively low levels even at high firing temperatures (refer back to figure 1). At the same time, thermal efficiency should be greater when employing steam cooling. A similar analysis applies to steam cooling around the transition piece between the combustor and first stage nozzle.

Catalytic Combustion: XONON™

Catalytic combustion involves using a catalytic bed to oxidize a lean air and fuel mixture within a combustor instead of burning with a flame as described in the DLN technology above. In a catalytic combustor the air and fuel mixture oxidizes at lower temperatures, producing less  $\text{NO}_x$ .<sup>7</sup> In the past, the technology was not reliable because the catalyst would not last long enough to make the combustor economical.

There has been increased interest in catalytic combustion as a result of technological improvements and incentives to reduce  $\text{NO}_x$  emissions without the use of add-on control equipment and reagents. Westinghouse is working to replace the central pilot in its DLN technology with a catalytic pilot in a project with Precision Combustion Inc.

Catalytica has developed a system know as XONON™, which works by partially burning fuel in a low temperature pre-combustor and completing the combustion in a catalytic combustor. The overall result is low temperature partial combustion (and thus lower  $\text{NO}_x$  combustion) followed by flameless catalytic combustion to further attenuate  $\text{NO}_x$  formation.

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In 1998, Catalytica announced the startup of a 1.5 MW Kawasaki gas turbine equipped with XONON™.<sup>8</sup> The turbine is owned by Catalytica and is located at the Gianera Generating Station of Silicon Valley Power, a municipally owned utility serving the City of Santa Clara, California. Previously, this turbine and XONON™ system had successfully completed over 1,200 hours of extensive full-scale tests at a project development facility in Oklahoma, which documented XONON's ability to limit emissions of NO<sub>x</sub> to less than 3 ppmvd.

Recently, Catalytica and GE announced that the XONON™ combustion system has been specified as the *preferred* emissions control system with GE 7FA turbines that have been ordered for Enron's proposed 750 MW Pastoria Energy Facility.<sup>9</sup> The project will enter commercial operation by the summer of 2001. However actual installation of XONON on the Pastoria project is doubtful.

In principle, XONON™ will work on a combined cycle project. However, the Department does not have information regarding the status of the technology for fuel oil firing, cycling operations, or reasonable assurance that the technology is technically and economically feasible for a GE 7FA unit in an attainment area.

#### Selective Catalytic Reduction (SCR)

Selective catalytic reduction (SCR) is an add-on NO<sub>x</sub> control technology that is employed in the exhaust stream following the gas turbine. SCR reduces NO<sub>x</sub> emissions by injecting ammonia into the flue gas in the presence of a catalyst. Ammonia reacts with NO<sub>x</sub> in the presence of a catalyst and excess oxygen yielding molecular nitrogen and water. The catalysts used in combined cycle, low temperature applications (conventional SCR), are usually vanadium or titanium oxide and account for almost all installations. For high temperature applications (Hot SCR up to 1100 °F), such as simple cycle turbines, zeolite catalysts are available but used in few applications to-date. SCR units are typically used in combination with wet injection or DLN combustion controls.

In the past, sulfur was found to poison the catalyst material. Sulfur-resistant catalyst materials are now becoming more available. Catalyst formulation improvements have proven effective in resisting sulfur-induced performance degradation with fuel oil in Europe and Japan, where conventional SCR catalyst life in excess of 4 to 6 years has been achieved, while 8 to 10 years catalyst life has been reported with natural gas.

As of early 1992, over 100 gas turbine installations already used SCR in the United States. Only one combustion turbine project in Florida (FPC Hines Power Block 1) employs SCR. The equipment was installed on a temporary basis because Westinghouse had not yet demonstrated emissions as low as 12 ppmvd by DLN technology at the time the units were to start up in 1998. Seminole Electric will install SCR on a previously permitted 501F unit at the Hardee Unit 3 project. The reasons are similar to those for the FPC Hines Power Block 1.

Kissimmee Utilities Authority (KUA) will install SCR at the Cane Island Unit 3 project as a result of insistence by EPA that DLN technology to achieve 9 ppmvd of NO<sub>x</sub> was not BACT. The KUA project will meet a limit of 3.5 ppmvd with a combination of DLN and SCR. Since then, the Department has consistently advised prospective applicants that BACT is 3.5 ppmvd. Accordingly, FPC submitted an application for the Hines Power Block II project with a BACT NO<sub>x</sub> proposal of 3.5 ppmvd by SCR. A permit was issued recently to CPV for its Gulfcoast Power Generating Facility in Manatee County that required SCR to achieve 3.5 ppmvd. CPV proposes the same for the present project by SCR. TECO proposes the same limit by SCR for its Bayside Repowering Project.

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Figure 6 below is a diagram of a HRSG including an SCR reactor with honeycomb catalyst and the ammonia injection grid. The SCR system lies between low and high-pressure steam systems where the temperature requirements for conventional SCR can be met. Figure 8 is a photograph of FPC Hines Energy Complex. The external lines to the ammonia injection grid are easily visible. The magnitude of the installation can be appreciated from the relative size compared with nearby individuals and vehicles.

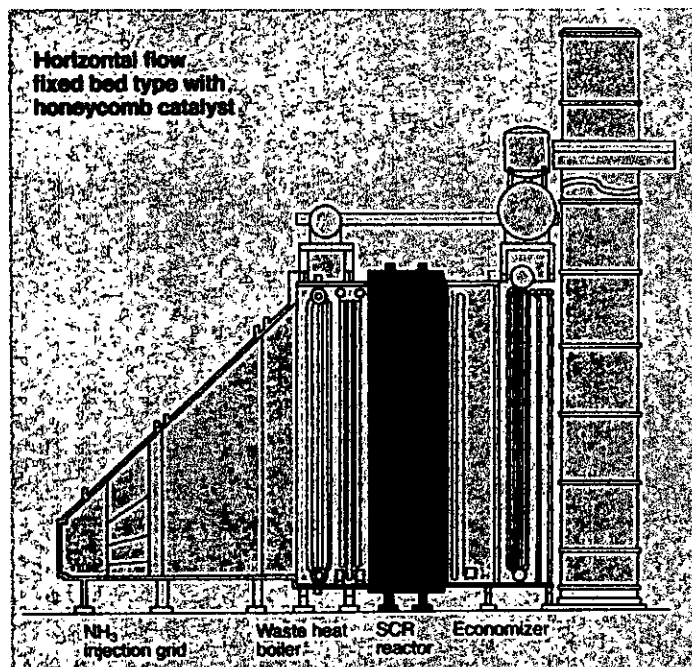


Figure 6 – SCR System within HRSG



Figure 7 – FPC Hines Power Block I

Excessive ammonia use tends to increase emissions of at least ammonia (slip) and particulate matter (when sulfur-bearing fuels are used). Permit limits as low as 2 to 3.5 ppmvd NO<sub>x</sub> have been specified using SCR on combined cycle F Class projects throughout the country. Such values are roughly equal to the inherent uncertainty in the sampling and analysis methods.

#### Selective Non-Catalytic Reduction (SNCR)

Selective non-catalytic reduction works on the same principle as SCR. The differences are that it is applicable to hotter streams than conventional or hot SCR, no catalyst is required, and urea can be used as a source of ammonia. No applications have been identified wherein SNCR was applied to a gas turbine because the exhaust temperature of 1100 °F is too low to support the NO<sub>x</sub> removal mechanism.

The acceptable temperature for the removal reactions is between 1400 and 2000 °F. Temperatures on the order of 1800 °F can be achieved in supplementally-fired HRSGs with very large duct burners. An example is the Santa Rosa Energy Center, which incorporates a 585-mmBtu/hr duct burner. SNCR is not feasible for un-fired HRSG planned for the CPV project.



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**SCONO<sub>x</sub><sup>TM</sup>**

SCONO<sub>x</sub> is a catalytic add-on technology (and registered trademark) that achieves NO<sub>x</sub> control by oxidizing and then absorbing the pollutant onto a honeycomb structure coated with potassium carbonate. The pollutant is then released as molecular nitrogen during a regeneration cycle that requires dilute hydrogen gas. The technology has been demonstrated on small units in California and has been purchased for a small source in Massachusetts.<sup>10</sup>

California regulators and industry sources have stated that the first 250 MW block to install SCONO<sub>x</sub> will be at PG&E's La Paloma Plant near Bakersfield.<sup>11</sup> The overall project includes several more 250 MW blocks with SCR for control.<sup>12</sup> USEPA has identified an "achieved in practice" BACT value of 2.0 ppmvd over a three-hour rolling average based upon the recent performance of a Vernon, California natural gas-fired 32 MW combined cycle turbine equipped with SCONO<sub>x</sub><sup>TM</sup>.

SCONO<sub>x</sub> technology (at 2.0 ppmvd) is considered to represent LAER in non-attainment areas where cost is not a factor in setting an emission limit. It competes with less-expensive SCR in those areas, but has the advantages that it does not cause ammonia emissions in exchange for NO<sub>x</sub> reduction. Advantages of the SCONO<sub>x</sub> process include in addition to the reduction of NO<sub>x</sub>, the elimination of ammonia and the control of VOC and CO emissions. SCONO<sub>x</sub><sup>TM</sup> has not been applied on any major sources in ozone attainment areas.

Recently EPA Region IX acknowledged that SCONO<sub>x</sub> was demonstrated in practice to achieve 2.0 ppmv NO<sub>x</sub>.<sup>13</sup> Permitting authorities planning to issue permits for future combined cycle gas turbine systems firing exclusively on natural gas, and subject to LAER must recognize this limit which, in most cases, would result in a LAER determination of 2.0 ppmv. More recently, Goaline submitted information to EPA and states in support of its contention that the technology has achieved 1 ppmvd in practice.<sup>14</sup>

According to a recent press release, the Environmental Segment of ABB Alstom Power offers the technology (with performance guarantees) to "all owners and operators of natural gas-fired combined cycle combustion turbines, regardless of size."<sup>15</sup> The technology was considered for one of the seven combined cycle units to be installed at the TECO Bayside Project (repowering of coal-fired Gannon Station Units 5 and 6). It was rejected on the basis of cost.

**REVIEW OF SULFUR DIOXIDE (SO<sub>2</sub>) AND SULFURIC ACID MIST (SAM)**

SO<sub>2</sub> control processes can be classified into five categories: fuel/material sulfur content limitation, absorption by a solution, adsorption on a solid bed, direct conversion to sulfur, or direct conversion to sulfuric acid. A review of the BACT determinations for combustion turbines contained in the BACT Clearinghouse shows that the exclusive use of low sulfur fuels constitutes the top control option for SO<sub>2</sub>.

For this project, the applicant has proposed as BACT the use of 0.05% sulfur oil and pipeline natural gas. The applicant estimated total emissions for the project at 76 TPY of SO<sub>2</sub> and 12 TPY of SAM. The Department expects that emissions will be lower because of the limited oil consumption and because typical natural gas distributed in Florida that contains less than the 0.0065% sulfur specification proposed as BACT.

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**REVIEW OF PARTICULATE MATTER (PM/PM<sub>10</sub>) CONTROL TECHNOLOGIES:**

Particulate matter is generated by various physical and chemical processes during combustion and will be affected by the design and operation of the NO<sub>x</sub> controls. The particulate matter emitted from this unit will mainly be less than 10 microns in diameter (PM<sub>10</sub>).

Natural gas and 0.05 percent sulfur No. 2 (or superior grade) distillate fuel oil will be the only fuels fired and are efficiently combusted in gas turbines. Such fuels are necessary to avoid damaging turbine blades and other components already exposed to very high temperature and pressure. Natural gas is an inherently clean fuel and contains no ash. The fuel oil to be combusted contains a minimal amount of ash and will be used for approximately 720 hours per year making any conceivable add-on control technique for PM/PM<sub>10</sub> either unnecessary or impractical.

A technology review indicated that the top control option for PM/PM<sub>10</sub> is a combination of good combustion practices, fuel quality, and filtration of inlet air. As previously mentioned, the NO<sub>x</sub> control technology of SCR increases PM/PM<sub>10</sub> emissions due to formation of ammonium nitrates and ammonium sulfates. The problem is more significant when firing fuel oil (despite the low sulfur specification). This effect will be minimized by limiting fuel oil firing to less than 720 hours per year and limiting ammonia emissions (slip) to 5 ppmvd.

**REVIEW OF CARBON MONOXIDE (CO) CONTROL TECHNOLOGIES**

CO is emitted from combustion turbines due to incomplete fuel combustion. Most combustion turbines incorporate good combustion to minimize emissions of CO. There is a great deal of uncertainty regarding actual CO emissions from installed units. Despite the relatively high BACT limits typically proposed when using combustion controls, much lower emissions have actually been reported from several facilities without use of oxidation catalyst. For example, although Westinghouse does not offer a single digit CO guarantee on the 501F, the units installed at the FPC Hines Energy Complex achieved CO emissions in the range of 1-3 ppmvd on both gas and fuel oil.<sup>16</sup> As previously discussed, GE 7FA units achieved similar results when firing gas at the City of Tallahassee Purdom Unit 8 and the TECO Polk Power Station Unit 2.

CO emissions *should* be low (at least at full load) because of the very high combustion temperatures characteristic of "F-Class" turbines. It appears that contract writing has not yet "caught up" with the field experience to consistently guarantee low CO emissions for F-Class units, at least at high loads.

One alternative is to complete the combustion by installation of an oxidation catalyst. Among the most recently permitted projects with oxidation catalyst requirements are the 500 MW Wyandotte Energy project in Michigan, the El Dorado project in Nevada, Ironwood in Pennsylvania, Millenium in Massachusetts, and Sutter Calpine in California. The permitted CO values of these units are between 3 and 5 ppmvd. Catalytic oxidation was recently installed at a cogeneration plant at Reedy Creek (Walt Disney World), Florida to avoid PSD review, which would have been required due to increased operation at low load. Seminole Electric will install oxidation catalyst to meet the permitted CO limit at its planned 244 MW Westinghouse 501FD combined cycle unit in Hardee County, Florida.<sup>17</sup>

The limit proposed by CPV when firing natural gas is 9 ppmvd at the entire operating range between 50 and 100 percent of full load. This is consistent with the description of the DLN-2.6 technology. A higher limit of 15 ppmvd is proposed during power augmentation. Under this mode, steam from the HRSG is re-injected into the combustors to boost power production. One consequence is that CO

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emissions can increase. The emission limit of 20 ppmvd during limited fuel oil firing appears reasonable, although much lower values are likely to be achieved.

**REVIEW OF VOLATILE ORGANIC COMPOUND (VOC) CONTROL TECHNOLOGIES**

Volatile organic compound (VOC) emissions, like CO emissions, are formed due to incomplete combustion of fuel. The high flame temperature is very efficient at destroying VOC. The applicant has proposed good combustion practices to control VOC. The limits proposed by CPV for this project are 1.4 ppmvw for gas and 3.6 ppmvw for oil firing. According to GE, VOC emissions less than 1.4 ppm were achieved during recent tests of the DLN-2.6 technology when firing natural gas.<sup>18</sup>

Based on the chosen equipment, the Department believes that annual VOC emissions will be less than 40 TPY. Therefore a BACT determination is not required.

**BACKGROUND ON SELECTED GAS TURBINE**

CPV plans to purchase a 170 MW (nominal) General Electric 7FA combined cycle gas turbine with an unfired heat recovery steam generator (HRSG). Per the discussion above, such units are capable of achieving and have achieved (with DLN and SCR technology) all of the emission limits proposed by CPV as BACT.

The GE Speedtronic™ Mark VI Gas Control System will be used. This control system is designed to fulfill all gas turbine control requirements. These include control of liquid, gas, or both fuels in accordance with the requirements of the speed, load control under part-load conditions, temperature control under maximum capability conditions, or during start-up conditions. The Mark V also monitors the DLN process and controls fuel staging and combustion modes to maintain the programmed NO<sub>x</sub> values prior to the SCR unit.<sup>19</sup>

**DEPARTMENT BACT DETERMINATION**

Following are the BACT limits determined for the CPV project assuming full load. Values for NO<sub>x</sub>, CO, and VOC are corrected to 15% O<sub>2</sub>. The emission limits or their equivalents in terms of pounds per hour and NSPS units, as well as the applicable averaging times, are given in the permit Specific Conditions No. 16 through 21.

POLLUTANT	CONTROL TECHNOLOGY	PROPOSED BACT LIMIT
Nitrogen Oxides	Selective Catalytic Reduction	3.5 ppmvd @15% O <sub>2</sub> (gas) 10 ppmvd@15% O <sub>2</sub> (oil)
Carbon Monoxide	Combustion Controls	9 ppmvd (gas) 15 ppmvd (power augmentation) 20 ppmvd (oil)
Particulate Matter	Inherently Clean Fuels Combustion Controls Ammonia Slip < 5 ppmvd	11 lb/hr (gas) 36 lb/hr (oil) 10 percent Opacity
Sulfur Dioxide and Sulfuric Acid Mist	Low Sulfur Fuels	0.0065% sulfur (gas) 0.05% sulfur (oil)

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**RATIONALE FOR DEPARTMENT'S DETERMINATION**

- The Lowest Achievable Emission Rate (LAER) for NO<sub>x</sub> is approximately 2 ppmvd while firing natural gas. It has been achieved at the 32 MW Federal Merchant Plant in Los Angeles. The owner, Goal Line, has requested recognition of a 1.3 ppmvd NO<sub>x</sub> value as *achieved in practice*.
- There are several projects for large turbines requiring SCR with a NO<sub>x</sub> emission limit of 2 ppmvd.
- The "Top" technology in a top/down analysis will achieve 2 ppmvd by either SCONO<sub>x</sub> or SCR.
- CPV chose SCR over SCONO<sub>x</sub> for technical and economic reasons. The Department does not necessarily accept the technical rationale. The Department does not necessarily accept the economic figures submitted by CPV of \$2,835 and \$24,916 per ton of NO<sub>x</sub> removed by SCR and SCONO<sub>x</sub> respectively.
- If the costs submitted by CPV were *doubled* to \$5,600 per ton by SCR and *halved* to \$12,500 per ton by SCONO<sub>x</sub>, the former control technology would still be more cost-effective than the latter. The difference of almost \$7,000 per ton of NO<sub>x</sub> removed is sufficient reason to select SCR over SCONO<sub>x</sub> for this project.
- CPV proposes a NO<sub>x</sub> limit of 3.5 ppmvd while firing natural gas. This is equal to the lowest emission rate in Florida and nearby states to-date.
- Based on previous projects such as KUA Cane Island, the Department believes that the costs of NO<sub>x</sub> control by SCR are on the order of \$6,000 per ton when ammonia emissions are held to 5 ppmvd.
- Uncertainties (and statistical variances) in NO<sub>x</sub> emissions related to instrumentation, methodology, calibration and sampling errors, exhaust flow, ammonia slip bias, corrections to 15% O<sub>2</sub> and ambient conditions, etc., are approximately equal to "ultra low NO<sub>x</sub>" limits (2.5-3.5 ppmvd).<sup>20</sup>
- Although further reduction to 2 ppmvd is possible (though difficult to measure), the marginal costs escalate rapidly and ammonia emissions increase.
- The Department agrees with CPV that 3.5 ppmvd (with 5 ppmvd ammonia slip) while firing natural gas constitutes BACT. This value for the SCR option takes into consideration the uncertainties mentioned above and minimize the negative effects of ammonia emissions.
- The Department previously documented the environmental and cost impacts associated with the use of SCR to achieve 3.5 ppmvd of NO<sub>x</sub> at the KUA Cane Island Project in comparison with DLN to achieve 9 ppmvd NO<sub>x</sub>.
- EPA Region IV determined that there are no there were "no unusual site-specific conditions associated with the KUA project to indicate that the use of SCR to achieve NO<sub>x</sub> emissions of 3.5 ppm would cause greater problems than experienced elsewhere at other similar facilities."
- In comparison with the KUA project, there are no obvious site-specific conditions that would make it unadvisable to use ammonia at the CPV project. It is noted that the site is adjacent to I-95. However, this at least minimizes transportation through densely populated areas.
- The conclusion is that the cost and environmental impacts of SCR for this project are acceptable in view of the NO<sub>x</sub> reduction.

## APPENDIX BD

### BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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- The CO limits of 9 ppmvd while firing natural gas and 15 ppmvd under power augmentation are low and within the range of recent BACT determinations for combustion turbines in the Southeast. The CO limit during the limited hours of fuel oil firing will be set at 20 ppmvd (full load).
- The CO impact on ambient air quality is lower compared to other pollutants because the allowable concentrations of CO are much greater than for NO<sub>x</sub>, SO<sub>2</sub>, or PM<sub>10</sub>.
- CPV initially estimated levelized costs for CO catalyst control at \$4,350 to reduce emissions from the 9-20 range to a 2-4 ppm range. EPA made several comments regarding cost estimation techniques used by CPV that suggest the estimate is biased to the high side. Revised CPV estimates range from \$2,856 to \$3,576.
- In view of the performance of GE 7FA units cited in the discussion above (Tallahassee and TECO Polk Power data) without add-on control (~ 1 ppmvd), it appears to the Department that oxidation catalyst costs are substantially biased to the low side based on *actual* emissions.
- The measured CO values (~ 1 ppmvd) at Tallahassee and TECO Polk Power *without control* are less than the objective to be obtained by catalytic reduction (e.g. reducing CO from 20 to 4 ppm or from 9 to 2 ppm).
- The Department will set CO limits reflecting the "new and clean test" guarantees rather than actual performance because GE will not (yet) guarantee the lower values. The Department will gather more information and may substantially reduce CO limits in future projects if such performance is maintained at the new installations throughout the state. The Department will also limit the extent to which CPV can operate in power augmentation mode to 2000 hours unless CPV installs oxidation catalyst or proves that actual performance is much better than guaranteed (thus rendering control not cost effective).
- There is no benefit in penalizing the applicant with a lower limit at this time just because the performance at another site was far better than guaranteed or expected. There also appears to be no benefit in installing a catalytic oxidation system. The applicant will be among the first to install a continuous CO monitor. It is expected that data from continuous measurement will conclusively show that oxidation catalyst is not needed and is not cost effective for this project.
- The Department agrees that inlet air filtration, good combustion, and use of inherently clean fuels constitute BACT for PM/PM<sub>10</sub>. Furthermore, the Department will set the ammonia limit at 5 ppmvd to minimize additional PM formation.
- PM<sub>10</sub> emissions will be very low and difficult to measure. The values of 11 and 36 lb/hr for natural gas and oil respectively will be included in the permit. These values include front-half catch only.
- The Department will set a visible emissions BACT limit at 10 percent. The Department will rely on VE observation as a surrogate for PM/PM<sub>10</sub> BACT compliance (after the initial PM/PM<sub>10</sub> test).

### COMPLIANCE PROCEDURES

The following compliance procedures apply to this BACT determination. The precise details are given in the permit.

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**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

POLLUTANT	COMPLIANCE PROCEDURE
Visible Emissions (initial, annual)	Method 9
PM/PM <sub>10</sub>	Method 5 (Front-half catch)
VOC	Method 25A corrected by methane from Method 18
CTM-027(initial, quarterly, annual)	Procedure for Collection and Analysis of Ammonia in Stationary Sources
SO <sub>2</sub> /SAM	Record keeping for the sulfur content of fuels delivered to the site
CO (initial, annual, CEMS)	Method 10; CO-CEMS (continuous 24-hr)
NO <sub>x</sub> (continuous 24-hr)	NO <sub>x</sub> CEMS, O <sub>2</sub> or CO <sub>2</sub> diluent monitor, and flow device as needed
NO <sub>x</sub> (initial and annual)	Annual Method 20 (can use RATA if at capacity); Method 7E

**BACT EXCESS EMISSIONS APPROVAL**

Pursuant to the Rule 62-210.700 F.A.C., the Department through this BACT determination will allow excess emissions as follows: Valid hourly emission rates shall not include periods of startup, shutdown, or malfunction as defined in Rule 62-210.200 F.A.C., where emissions exceed the applicable NO<sub>x</sub> standard. These excess emissions periods shall be reported as required in Specific Condition 24 of the Permit. A valid hourly emission rate shall be calculated for each hour in which at least two NO<sub>x</sub> concentrations are obtained at least 15 minutes apart [Rules 62-4.070 F.A.C., 62-210.700 F.A.C. and applicant request].

Excess emissions may occur under the following startup scenarios:

Hot Start: One hour following a shutdown less than or equal to 8 hours.

Warm Start: Two hours following a shutdown between 8 and 48 hours.

Cold Start: Four hours following a shutdown greater than or equal to 48 hours.

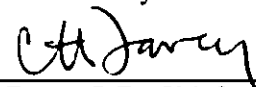
The *starts* are defined by the amount of time the HRSG has been shutdown, following the normal (hot) shutdown procedure described by General Electric, prior to the startup.<sup>21</sup>

**DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:**

Teresa Heron, Review Engineer, New Source Review Section  
A. A. Linero, P.E. Administrator, New Source Review Section  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

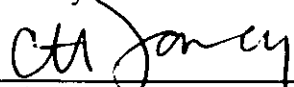
 4/27

Recommended By:

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

5/2/01

Approved By:

  
Howard L. Rhodes, Director  
Division of Air Resources Management

5/2/01

Date:

Date:

**APPENDIX BD**  
**BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)**

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**REFERENCES**

- <sup>1</sup> Report. Cubix Corporation. "Exhaust Emissions from a GE PG7241FA Simple Cycle Power Turbine at TECO Polk Power Station." September 2000.
- <sup>2</sup> Report. Cubix Corporation. "Exhaust Emissions from a GE PG7241FA Simple Cycle Power Turbine at TECO Polk Power Station." September 2000.
- <sup>3</sup> Telecom. Heron, T., FDEP and Gianazza, N. B., JEA. Additional Hours of Operation at JEA Kennedy Station. January 22, 2001.
- <sup>4</sup> Telecom. Linero, A.A., FDEP and Chalfin, J., GE. NO<sub>x</sub> control technology for fuel oil.
- <sup>5</sup> Paper. Mandai, S., et. al., MHI. "Development of Low NO<sub>x</sub> Combustor for Firing Dual Fuel." Mitsubishi Juko Giho, Vol.36 No.1 (1999).
- <sup>6</sup> Paper. Cohn, A. and Scheibel, J., EPRI. Current Gas Turbine Developments and Future Projects. October 1997.
- <sup>7</sup> Compliance Manual. California EPA, CARB Compliance Division. Gas Turbines. June 1996.
- <sup>8</sup> News Release. Catalytica. First Gas Turbine with Catalytica's XONON installed to Produce Electricity at a Utility. October 8, 1998.
- <sup>9</sup> News Release. Catalytica. XONONTM Specified With GE 7FA Gas Turbines For Enron Power Project. December 15, 1999.
- <sup>10</sup> News Release. Goal Line. Genetics Institute Buys SCONOX Clean Air System. August 20, 1999.
- <sup>11</sup> Publication "Control Maker Strives to Sway Utility Skeptics." Air Daily. Volume 5, No. 199. October 14, 1998.
- <sup>12</sup> Telecom. Linero, A.A., FDEP, and Beckham, D., U.S. Generating. Circa November 1998.
- <sup>13</sup> Letter. Haber, M., EPA Region IX to Danziger, R., GLET. SCONOX at Federal Cogeneration. March 23, 1998.
- <sup>14</sup> Letter. Bedwell, A.F., Goal Line to Linero, A.A., FDEP. Re: SCONOX 21000-Hour Report. September 29, 2000.
- <sup>15</sup> News Release. ABB Alstom Power, Environmental Segment. ABB Alstom Power to Supply Groundbreaking SCONOX<sup>TM</sup> Technology. December 1, 1999.
- <sup>16</sup> Reports. Cubix Corporation. "Initial Compliance Reports – Power Block I." February and May 1999.
- <sup>17</sup> Letter. Opalinski, M.P., SECI to Linero, A.A., FDEP. Turbines and Related Equipment at Hardee Unit 3. December 9, 1998.
- <sup>18</sup> Telecom. Vandervort, C., GE, and Linero, A.A., DEP. "VOC Emissions from FA Gas Turbines with DLN-2.6 Combustors."
- <sup>19</sup> Rowen, W.I. "General Electric Speedtronic<sup>TM</sup> Mark V Gas Turbine Control System. 1994."
- <sup>20</sup> Zachary, J, Joshi, S., and Kagolanu, R., Siemens. "Challenges Facing the Measurement and Monitoring of Very Low Emissions in Large Scale Gas Turbine Projects." Power-Gen Conference. Orlando, Florida. December 9-11, 1998.
- <sup>21</sup> General Electric. Combined Cycle Startup Curves. June 19, 1998.

**APPENDIX GC**  
**GENERAL PERMIT CONDITIONS [F.A.C. 62-4.160]**

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- G.1 The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
- G.2 This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings or exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
- G.3 As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey and vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
- G.4 This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
- G.5 This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
- G.6 The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
- G.7 The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:
- a) Have access to and copy and records that must be kept under the conditions of the permit;
  - b) Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
  - c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
- Reasonable time may depend on the nature of the concern being investigated.
- G.8 If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
- a) A description of and cause of non-compliance; and
  - b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.



**APPENDIX GC**  
**GENERAL PERMIT CONDITIONS [F.A.C. 62-4.160]**

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

- G.9 In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.
- G.10 The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.
- G.11 This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
- G.12 This permit or a copy thereof shall be kept at the work site of the permitted activity.
- G.13 This permit also constitutes:
- a) Determination of Best Available Control Technology (X)
  - b) Determination of Prevention of Significant Deterioration (X); and
  - c) Compliance with New Source Performance Standards (X).
- G.14 The permittee shall comply with the following:
- a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
  - b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application or this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
  - c) Records of monitoring information shall include:
    - 1. The date, exact place, and time of sampling or measurements;
    - 2. The person responsible for performing the sampling or measurements;
    - 3. The dates analyses were performed;
    - 4. The person responsible for performing the analyses;
    - 5. The analytical techniques or methods used; and
    - 6. The results of such analyses.
- G.15 When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

**APPENDIX GG**  
**40 CFR 60 NSPS REQUIREMENTS FOR GAS TURBINES**

**NSPS SUBPART GG REQUIREMENTS**

[Note: Inapplicable provisions have been deleted in the following conditions, but the numbering of the original rules has been preserved for ease of reference to the original rules. The term "Administrator" when used in 40 CFR 60 shall mean the Department's Secretary or the Secretary's designee. Department notes and requirements related to the Subpart GG requirements are shown in **bold** immediately following the section to which they refer. The rule basis for the Department requirements specified below is Rule 62-4.070(3), F.A.C.]

Pursuant to 40 CFR 60.332 Standard for Nitrogen Oxides:

- (a) On and after the date of the performance test required by § 60.8 is completed, every owner or operator subject to the provisions of this subpart as specified in paragraph (b) of this section shall comply with:
- (1) No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine, any gases which contain nitrogen oxides in excess of:

$$\text{STD} = 0.0075 \frac{(14.4)}{Y} + F$$

where:

STD = allowable NOx emissions (percent by volume at 15 percent oxygen and on a dry basis).

Y = manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NOx emission allowance for fuel-bound nitrogen as de-fined in paragraph (a)(3) of this section.

- (3) F shall be defined according to the nitrogen content of the fuel as follows:

Fuel-bound nitrogen (percent by weight)	F (NOx percent by volume)
$N \leq 0.015$	0
$0.015 < N \leq 0.1$	$0.04(N)$
$0.1 < N \leq 0.25$	$0.004 + 0.0067(N - 0.1)$
$N > 0.25$	0.005

Where, N = the nitrogen content of the fuel (percent by weight).

**Department requirement:** While firing gas, the "F" value shall be assumed to be 0.

[Note: This is required by EPA's March 12, 1993 determination regarding the use of NOx CEMS. The "Y" values provided by the applicant are approximately 10.0 for natural gas and 10.6 for fuel oil. The equivalent emission standards are 108 and 102 ppmvd at 15% oxygen. The emissions standards of this permit is more stringent than this requirement.]

- (b) Electric utility stationary gas turbines with a heat input at peak load greater than 107.2 gigajoules per hour (100 million Btu/hour) based on the lower heating value of the fuel fired shall comply with the provisions of paragraph (a)(1) of this section.

**APPENDIX GG**  
**40 CFR 60 NSPS REQUIREMENTS FOR GAS TURBINES**

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Pursuant to 40 CFR 60.333 Standard for Sulfur Dioxide:

On and after the date on which the performance test required to be conducted by 40 CFR 60.8 is completed, every owner or operator subject to the provision of this subpart shall comply with:

- (b) No owner or operator subject to the provisions of this subpart shall burn in any stationary gas turbine any fuel which contains sulfur in excess of 0.8 percent by weight.

Pursuant to 40 CFR 60.334 Monitoring of Operations:

- (b) The owner or operator of any stationary gas turbine subject to the provisions of this subpart shall monitor sulfur content and nitrogen content of the fuel being fired in the turbine. The frequency of determination of these values shall be as follows:
  - (1) If the turbine is supplied its fuel from a bulk storage tank, the values shall be determined on each occasion that fuel is transferred to the storage tank from any other source.

**Department requirement:** The owner or operator is allowed to use vendor analyses of the fuel as received to satisfy the sulfur content monitoring requirements of this rule for fuel oil. Alternatively, if the fuel oil storage tank is isolated from the combustion turbines while being filled, the owner or operator is allowed to determine the sulfur content of the tank after completion of filling of the tank, before it is placed back into service.

[Note: This is consistent with guidance from EPA Region 4 dated May 26, 2000 to Ronald W. Gore of the Alabama Department of Environmental Management.]

- (2) If the turbine is supplied its fuel without intermediate bulk storage the values shall be determined and recorded daily. Owners, operators or fuel vendors may develop custom schedules for determination of the values based on the design and operation of the affected facility and the characteristics of the fuel supply. These custom schedules shall be substantiated with data and must be approved by the Administrator before they can be used to comply with paragraph (b) of this section.

**Department requirement:** The requirement to monitor the nitrogen content of pipeline quality natural gas fired is waived. The requirement to monitor the nitrogen content of fuel oil fired is waived because a NO<sub>x</sub> CEMS shall be used to demonstrate compliance with the NO<sub>x</sub> limits of this permit. For purposes of complying with the sulfur content monitoring requirements of this rule, the owner or operator shall obtain a monthly report from the vendor indicating the sulfur content of the natural gas being supplied from the pipeline for each month of operation.

[Note: This is consistent with EPA's custom fuel monitoring policy and guidance from EPA Region 4.]

- (c) For the purpose of reports required under 40 CFR 60.7(c), periods of excess emissions that shall be reported are defined as follows:
  - (1) *Nitrogen oxides.* Any one-hour period during which the average water-to-fuel ratio, as measured by the continuous monitoring system, falls below the water-to-fuel ratio determined to demonstrate compliance with 40 CFR 60.332 by the performance test required in § 60.8 or any period during which the fuel-bound nitrogen of the fuel is greater than the maximum nitrogen content allowed by the fuel-bound nitrogen allowance used during the performance test required in § 60.8. Each report shall include the average water-to-fuel ratio, average fuel consumption, ambient conditions, gas turbine load, and nitrogen content of the fuel during the period of excess emissions, and the graphs or figures developed under 40 CFR 60.335(a).

**APPENDIX GG**  
**40 CFR 60 NSPS REQUIREMENTS FOR GAS TURBINES**

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**Department requirement:** NO<sub>x</sub> emissions monitoring by CEM system shall substitute for the requirements of paragraph (c)(1) because a NO<sub>x</sub> monitor is required to demonstrate compliance with the standards of this permit. Data from the NO<sub>x</sub> monitor shall be used to determine "excess emissions" for purposes of 40 CFR 60.7 subject to the conditions of the permit.

[Note: As required by EPA's March 12, 1993 determination, the NO<sub>x</sub> monitor shall meet the applicable requirements of 40 CFR 60.13, Appendix B and Appendix F for certifying, maintaining, operating and assuring the quality of the system; shall be capable of calculating NO<sub>x</sub> emissions concentrations corrected to 15% oxygen; shall have no less than 95% monitor availability in any given calendar quarter; and shall provide a minimum of four data points for each hour and calculate an hourly average. The requirements for the CEMS specified by the specific conditions of this permit satisfy these requirements.]

(2) *Sulfur dioxide.* Any daily period during which the sulfur content of the fuel being fired in the gas turbine exceeds 0.8 percent.

Pursuant to 40 CFR 60.335 Test Methods and Procedures:

- (a) To compute the nitrogen oxides emissions, the owner or operator shall use analytical methods and procedures that are accurate to within 5 per-cent and are approved by the Administrator to determine the nitrogen content of the fuel being fired.
- (b) In conducting the performance tests required in 40 CFR 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as pro-vided for in 40 CFR 60.8(b). Acceptable alternative methods and procedures are given in paragraph (f) of this section.
- (c) The owner or operator shall determine compliance with the nitrogen oxides and sulfur dioxide standards in 40 CFR 60.332 and 60.333(a) as follows:
  - (1) The nitrogen oxides emission rate (NO<sub>x</sub>) shall be computed for each run using the following equation:

$$\text{NO}_x = (\text{NO}_{x0}) (\text{Pr}/\text{Po})^{0.5} e^{19(\text{Ho}-0.00633)} (288^\circ\text{K}/\text{Ta})^{1.53}$$

where:

NO<sub>x</sub> = emission rate of NO<sub>x</sub> at 15 percent O<sub>2</sub> and ISO standard ambient conditions, volume percent, \_\_

NO<sub>x0</sub> = observed NO<sub>x</sub> concentration, ppm by volume.

Pr = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg.

Po = observed combustor inlet absolute pressure at test, mm Hg.

Ho = observed humidity of ambient air, g H<sub>2</sub>O/g air.

e = transcendental constant, 2.718.

Ta = ambient temperature, °K.

**Department requirement:** The owner or operator is not required to have the NO<sub>x</sub> monitor required by this permit continuously calculate NO<sub>x</sub> emissions concentrations corrected to ISO conditions. However, the owner or operator shall keep records of the data needed to make the correction, and shall make the correction when required by the Department or Administrator.

[Note: This is consistent with guidance from EPA Region 4.]

**APPENDIX GG**  
**40 CFR 60 NSPS REQUIREMENTS FOR GAS TURBINES**

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- (2) The monitoring device of 40 CFR 60.334(a) shall be used to determine the fuel consumption and the water-to-fuel ratio necessary to comply with 40 CFR 60.332 at 30, 50, 75, and 100 percent of peak load or at four points in the normal operating range of the gas turbine, including the minimum point in the range and peak load. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer.

**Department requirement:** The owner or operator is allowed to conduct initial performance tests at a single load because a NOx monitor shall be used to demonstrate compliance with the BACT NOx limits of this permit.

[Note: This is consistent with guidance from EPA Region 4.]

- (3) Method 20 shall be used to determine the nitrogen oxides, sulfur dioxide, and oxygen concentrations. The span values shall be 300 ppm of nitrogen oxide and 21 percent oxygen. The NOx emissions shall be determined at each of the load conditions specified in paragraph (c)(2) of this section.

**Department requirement:** The owner or operator is allowed to make the initial compliance demonstration for NOx emissions using certified CEM system data, provided that compliance be based on a minimum of three test runs representing a total of at least three hours of data, and that the CEMS be calibrated in accordance with the procedure in section 6.2.3 of Method 20 following each run. Alternatively, initial compliance may be demonstrated using data collected during the initial relative accuracy test audit (RATA) performed on the NOx monitor. The span value specified in the permit shall be used instead of that specified in paragraph (c)(3) above.

[Note: These initial compliance demonstration requirements are consistent with guidance from EPA Region 4. The span value is changed pursuant to Department authority and is consistent with guidance from EPA Region 4.]

- (d) The owner or operator shall determine compliance with the sulfur content standard in 40 CFR 60.333(b) as follows: ASTM D 2880-71 shall be used to determine the sulfur content of liquid fuels and ASTM D 1072-80, D 3031-81, D 4084-82, or D 3246-81 shall be used for the sulfur content of gaseous fuels (incorporated by reference – see 40 CFR 60.17). The applicable ranges of some ASTM methods mentioned above are not adequate to measure the levels of sulfur in some fuel gases. Dilution of samples before analysis (with verification of the dilution ratio) may be used, subject to the approval of the Administrator.

**Department requirement:** The permit species sulfur testing methods and allows the owner or operator to follow the requirements of 40 CFR 75 Appendix D to determine the sulfur content of liquid fuels.

[Note: This requirement establishes different methods than provided by paragraph (d) above, but the requirements are equally stringent and will ensure compliance with this rule.]

- (e) To meet the requirements of 40 CFR 60.334(b), the owner or operator shall use the methods specified in paragraphs (a) and (d) of this section to determine the nitrogen and sulfur contents of the fuel being burned. The analysis may be performed by the owner or operator, a service contractor retained by the owner or operator, the fuel vendor, or any other qualified agency.

[Note: The fuel analysis requirements of the permit meet or exceed the requirements of this rule and will ensure compliance with this rule.]

**SENDER: COMPLETE THIS SECTION**

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

## 1. Article Addressed to:

Mr. Gary Lambert, Exe. V.P.  
CPV Atlantic, Ltd.  
45 Braintree Hill Office Park  
Suite 107  
Braintree, MA 02184

## 2. Article Number (Copy from service label)

7099 3400 0000 1453 2115

**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly)

B. Date of Delivery

C. Signature

X *J LeBlanc*

☐ Agent☐ Addressee

D. Is delivery address different from item 1?

☐ Yes

If YES, enter delivery address below:

☐ No

## 3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☐ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

PS Form 3811, July 1999

Domestic Return Receipt

102595-99-M-1789

**U.S. Postal Service****CERTIFIED MAIL RECEIPT**

(Domestic Mail Only; No Insurance Coverage Provided)

Article Sent To:

Postage \$

Certified Fee

Return Receipt Fee  
(Endorsement Required)Restricted Delivery Fee  
(Endorsement Required)

Total Postage &amp; Fees \$

Postmark  
Here

Name (Please Print Clearly) (to be completed by mailer)

Gary Lambert, Exec. Vice Pres.

Street, Apt. No., or PO Box No.

45 Braintree Hill Office Park, Ste 107

City, State, Zip+4

Braintree, MA 02184

PS Form 3800, July 1999

See Reverse for Instructions

## Memorandum

## Florida Department of Environmental Protection

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TO: ~~Howard L. Rhodes~~

THRU: C. H. Fancy

FROM: Teresa Heron and A. A. Linero

DATE: April 25, 2001

SUBJECT: CPV Atlantic Power Generating Facility  
Combined Cycle Plant  
DEP File No. 1110101-001-AC (PSD-FL-312)

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Attached is the final permit and BACT determination for construction of a combined cycle plant to be known as the CPV Atlantic Power Generating facility near Port St. Lucie, Port Lucie County.

The basic unit is a nominal 170-megawatt General Electric 7FA gas and oil-fired combustion turbine-electrical generator. The project includes an un-fired HRSG and a steam turbine-electrical generator.

Emissions control include SCR on NO<sub>x</sub> to achieve 3.5 ppm while firing gas and 10 ppm while firing fuel oil and with an ammonia slip of 5 ppm (under fuel oil and gas). A CO monitor is required. The CPV projects (CPV Gulfcoast and CPV Atlantic) are among the best-controlled and monitored to-date.

Comments received during the public notice period are addressed in the Final Determination.

Day 90 is June 13, so we are well ahead of schedule. We recommend your signature and approval of this Final Permit.

AAL/th

Attachments