

Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

June 5, 1992

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. John P. Jones, President
Orlando Cogen (I), Inc.
Orlando Cogen Limited, L.P.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Dear Mr. Jones:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit to construct a 129 MW cogeneration facility consisting of one combined cycle gas turbine generator and associated steam cycle.

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

Sincerely,

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

CHF/BM/rbm

Attachments

c: C. Collins, CD
K. Kosky, P.E., KBN
J. Harper, EPA
C. Shaver, NPS
D. Nester, OCEPD
P. Cunningham, Esq., HBG&S

SENDER:

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

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

1. Addressee's Address
2. Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. John P. Jones, President
Orlando Cogen (I), Inc.
7201 Hamilton Boulevard
Allentow, PA 18195-1501

4a. Article Number

P 710 058 541

4b. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

7. Date of Delivery

June 11 1992

5. Signature (Addressee)

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

6. Signature (Agent)

PS Form 3811, October 1990

U.S. GPO: 1990-273-861

DOMESTIC RETURN RECEIPT

P 710 058 541

**Certified Mail Receipt**

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

Sent to	
Mr. John P. Jones, Orlando	
Street & No. Cogen Limited	
7201 Hamilton Blvd.	
P.O., State & ZIP Code	
Allentow, PA 18195-1501	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	\$
Postmark or Date	
Mailed: 6-8-92	
Permit: AC:48-206720	
PSD-FL-184	

PS Form 3800, June 1990

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

CERTIFIED MAIL

In the Matter of an
Application for Permit by:

DER File No. AC 48-206720
PSD-FL-184
Orange County

Orlando Cogen Limited, L.P.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

INTENT TO ISSUE

The Department of Environmental Regulation gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the application specified above, for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Orlando Cogen Limited, L.P., applied on December 30, 1991, to the Department of Environmental Regulation for a permit to construct a 129 MW cogeneration facility consisting of one combined cycle gas turbine generator and associated steam cycle; also, steam will be provided to the Air Products and Chemicals Plant located adjacent to the proposed site. The proposed facility will be located in the Orlando Central Park, Orange County, Florida.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.) and Florida Administrative Code (F.A.C.) Chapters 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that a construction permit is required for the proposed work.

Pursuant to Section 403.815, F.S., and Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. Where there is more than one newspaper of general circulation in the county, the newspaper used must be the one with significant circulation in the area that may be affected by the permitting action. If you are

uncertain that a newspaper meets these requirements, please contact the Department at the address or telephone number listed below. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 (904-488-1344), within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

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

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

The Petition shall contain the following information;

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

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

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399
904-488-1344

c: C. Collins, CD
K. Kosky, P.E., KBN
J. Harper, EPA
C. Shaver, NPS
D. Nester, OCEPD
P. Cunningham, Esq., HBG&S

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this INTENT TO ISSUE and all copies were mailed by certified mail before the close of business on 6-8-92 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to §120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Karin J. May
Clerk

6-8-92
Date

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF INTENT TO ISSUE PERMIT

AC 48-206720
PSD-FL-184

The Department of Environmental Regulation gives notice of its intent to issue a permit to Orlando Cogen Limited, L.P., 7201 Hamilton Boulevard, Allentown, PA 18195-1501, to construct a 129 MW cogeneration facility consisting of one combined cycle gas turbine generators and associated steam cycle; also, steam will be supplied to the Air Products and Chemical Plant located adjacent to the proposed site. The proposed facility will be located in the Orlando Central Park, Orange County, Florida. A determination of Best Available Control Technology (BACT) was required. The Class I PM₁₀ PSD increment consumed is 0.02 vs. 8 allowable 24-hour average and 0.001 vs. 4 allowable annual average, in micrograms per cubic meter. The Class I nitrogen dioxide increment consumed is 0.01 vs. 2.5 allowable annual average, in micrograms per cubic meter. The maximum predicted increases in ambient concentrations for the above three pollutants for all averaging times are less than significant in the Class II area surrounding the plant, thus no increment consumption was calculated. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

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

The Petition shall contain the following information;

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

- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and,
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

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

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

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

Department of Environmental Regulation
Central District
3319 Maguire Blvd., Suite 232
Orlando, Florida 32803-3767

Any person may send written comments on the proposed action to Mr. Preston Lewis at the Department's Tallahassee address. All comments received within 30 days of the publication of this notice will be considered in the Department's final determination. Further, a public hearing can be requested by any person. Such requests must be submitted within 30 days of this notice.

Technical Evaluation
and
Preliminary Determination

Orlando Cogen Limited, L.P.
Orange County, Florida

129 MW Combined Cycle Gas Turbine Cogeneration Facility

Permit Number: AC 48-206720
PSD-FL-184

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

June 5, 1992

I. Application

A. Applicant

Orlando Cogen Limited, L.P.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

B. Project Description and Location

The applicant proposes to construct a 129 MW (megawatt) cogeneration facility consisting of one combined cycle gas turbine generator and associated steam cycle; also, steam will be supplied to the Air Products and Chemical Plant located adjacent to the proposed site. The proposed facility will be located in the Orlando Central Park, Orange County, Florida. The UTM coordinates are Zone 17, 459.5 km East and 3,146.1 km North.

C. Process and Controls

The proposed project will consist of one CT (combustion turbine) that will exhaust through one HRSG (heat recovery steam generator). The CT will be an Asea Brown Boveri (ABB) 11N-EV machine. The ABB 11N-EV is a heavy frame industrial gas turbine that uses a single dry low-NOx combustion chamber. The CT will be served by a single HRSG, exhausting to an individual stack. There will be no bypass stacks on the CT for simple cycle operation. There will be an electrical generator, which will be driven directly by the CT and a steam turbine.

Only natural gas will be used to fuel the CT; distillate oil will not be used. Supplementary firing of only natural gas in the HRSG will occur only when the ambient temperature is 59°F or greater. The supplementary firing is expected to occur during "on-peak" power demand time periods. Maximum heat input to the CT and HRSG are 856.9×10^6 Btu/hr and 122×10^6 Btu/hr, respectively. Maximum net capacities for the CT and HRSG are 78.83 MW and 50.1 MW, respectively (-129 MW, total).

Air emission sources associated with the proposed project consist of the CT and supplemental firing in the HRSG. Dry low-NOx combustion will be used to control emissions of NOx from the CT; low-NOx burners will minimize NOx emissions when duct firing. The use of natural gas will minimize the emissions of sulfur dioxide (SO₂) and other pollutants.

D. The Standard Industrial Codes are:

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

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

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

~~4911 - Electric Generation (Distribution)~~

see:

1-02-002-31 Industrial ~~2~~ gas: Natural Gas - Turbine cogeneration

10⁶ ft³ burned

II. Rule Applicability

The proposed project is subject to preconstruction review in accordance with Chapter 403, Florida Statutes, Florida Administrative Code (F.A.C.) Chapters 17-2 and 17-4, and the 40 CFR (July, 1991 version).

The plant is located in an area designated as an air quality maintenance area for the air pollutant ozone in accordance with F.A.C. Rule 17-2.460(1)(b) and attainment for all other criteria pollutants.

The proposed facility will be classified as a major emitting facility. The proposed project will emit approximately 274 tons per year (TPY) of nitrogen oxides (NOx), 12 TPY of sulfur dioxide (SO₂), 42 TPY of particulate matter (PM/PM₁₀), 115 TPY of carbon monoxide, 20 TPY of volatile organic compounds (VOC), and 0.1 TPY of sulfuric acid mist.

The proposed project will be reviewed under F.A.C. Rule 17-2.500(5), new source review for Prevention of Significant Deterioration (PSD), because it will be a new major facility. This review consists of a determination of Best Available Control Technology (BACT) pursuant to F.A.C. Rule 17-2.630; and, unless otherwise exempted, an analysis of the air quality impact of the increased emissions. No air quality impact analysis is required for ozone, even though there will be an increase in VOC emissions, because this increase is less than 40 tons per year. The review also includes an analysis of the project's impacts on soils, vegetation and visibility, along with air quality impacts resulting from associated commercial, residential and industrial growth.

The proposed source shall be in compliance with all applicable provisions of F.A.C. Chapters 17-2 and 17-4 and the 40 CFR (July, 1991 version). The proposed source shall be in compliance with all applicable provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; 17-2.660: Standards of Performance for New Stationary Sources (NSPS); 17-2.700: Stationary Point Source Emission Test Procedures; and, 17-4.130: Plant Operation-Problems.

This source shall be in compliance with the NSPS for Gas Turbines, Subpart GG, and NSPS for Industrial Steam-Generating Units, Subpart Db, which are contained in the 40 CFR 60, Appendix A, and adopted by reference in F.A.C. Rule 17-2.660.

III. Emission Limitations and Impact Analysis

A. Emission Limitations

The proposed source is subject to emission limitations for the pollutants NOx, SO₂, CO, VOC, sulfuric acid mist, and PM/PM₁₀. The proposed source will also be subject to a visible emission (VE)

limitation. The impact of these pollutant emissions are below the Florida ambient air quality standards (AAQS) and/or the acceptable ambient concentration levels (AAC). The following Table 1 lists each contaminant and its maximum allowable emission rate:

Table 1

Pollutant	Source	Allowable Emission Standard/Limitation
NOx	CT	15 ppmvd @ 15% O ₂ (57.4 lbs/hr; 251.4 TPY)
	DB	0.1 lb/MMBtu (12.2 lbs/hr; 22.5 TPY)
	CT/DB	24-hr rolling average
CO	CT	10 ppmvd (22.3 lbs/hr; 92.1 TPY)
	DB	0.1 lb/MMBtu (12.2 lbs/hr; 22.5 TPY)
PM/PM ₁₀	CT	0.011 lb/MMBtu (9.0 lbs/hr; 39.4 TPY)
	DB	0.01 lb/MMBtu (1.2 lbs/hr; 2.2 TPY)
VOC	CT	3.0 lbs/hr; 13.0 TPY
	DB	3.7 lbs/hr; 6.8 TPY
VE	CT/DB	≤ 10 % opacity

NOTE:

1. CT: combustion turbine
DB: duct burner
2. Natural gas usage only in the CT and DB.
3. Hours of operation:
 - a. CT: 8760 hrs/yr
 - b. DB: 3688 hrs/yr
4. Maximum heat input:
 - a. CT: 856.9 x 10⁶ Btu/hr
 - b. DB: 122.0 x 10⁶ Btu/hr; 450,000 x 10⁶ Btu/yr
5. Pollutant basis:
 - a. NOx: BACT-see Table 1 received June 2, 1992
 - b. CO: BACT-see Table A-2 received March 2, 1992
 - c. PM/PM₁₀: BACT-see Table A-2 received March 2, 1992
 - d. VOC: applicant request-see Table A-2 received March 2, 1992
 - 1) CT: 3 ppm corrected to dry conditions
 - 2) DB: 0.03 lb/MMBtu
 - e. VE: BACT
6. DB operation planned when ambient temperature is greater than 59°F.

B. Air Toxics Evaluation

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

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

Where,

AAC = acceptable ambient concentration

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

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

MSDS = Material Safety Data Sheets

C. Air Quality Analysis

1. Introduction

The operation of the proposed natural gas-fired 129 MW cogeneration facility will result in emissions increases which are projected to be greater than the PSD significant emission rates for the following pollutants: CO, NO_x, PM/PM₁₀. Therefore, the project is subject to the PSD new source review requirements contained in F.A.C. Rule 17-2.500 for these pollutants. Part of these requirements is an air quality impact analysis for these pollutants, which includes:

- o An analysis of existing air quality;
- o A PSD increment analysis (for PM, PM₁₀, and NO_x);
- o An ambient Air Quality Standards analysis (AAQS);
- o An analysis of impacts on soils, vegetation, visibility and growth-related air quality impacts; and
- o A Good Engineering Practice (GEP) stack height determination.

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

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

2. Analysis of the Existing Air Quality

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

	CO	TSP and PM10	NOx
PSD de minimus Concentration (ug/m3)	575	10	14
Averaging Time	8-hr	24-hr	Annual
Maximum Predicted Impact (ug/m3)	12	2.4	0.37

As shown above, the predicted impacts are all less than the corresponding de minimus concentrations; therefore, no preconstruction monitoring is required for any pollutant.

3. Modeling Method

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

All modeling impacts presented herein were based on firing natural gas.

4. Modeling Results

The applicant first evaluated the potential increase in ambient ground-level concentrations associated with the project to determine if these predicted ambient concentration increases would be greater than specified PSD significant impact levels for CO, NO_x, PM and PM₁₀. Dispersion modeling was performed with receptors placed along the 36 standard radial directions (10 degrees apart) surrounding the proposed source at the following downwind distances: (1) the first 36 receptors were located at the plant property boundaries with an additional near field grid of 35 receptors located 100 meters from the proposed source off of the plant property; and, (2) subsequent receptors were located at distances of 500; 1,000; 1,500; 2,000; 3,000; 3,500; 4,000; and, 5,000 meters. Refined analyses were then performed to determine maximum impacts. The results of this modeling presented below show that the increases in ambient ground-level concentrations for all averaging times are less than the PSD significant impact levels for CO, NO_x, PM, and PM₁₀.

<u>Pollutant</u>	<u>Averaging Time</u>	<u>PSD Significance Level (ug/m³)</u>	<u>Ambient Concentration Increase (ug/m³)</u>
CO	8-hour	500	12
	1-hour	2000	47
NO ₂	Annual	1.0	0.37
PM/PM ₁₀	Annual	1.0	0.07
	24-hour	5.0	2.44

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

The applicant performed dispersion modeling to determine the predicted ambient concentration increases in the Class I Chassahowitzka National Wilderness Area located 121 km away for the pollutants with Class I increments. The maximum predicted PM increases are 0.001 ug/m³ for the annual averaging time and 0.02 ug/m³ for the 24-hr averaging time. These values are less than the National Park Service's (NPS) proposed significance levels for PM of 0.08 ug/m³, annual average, and 0.27 ug/m³, 24-hour average. The maximum predicted NO₂ increase is 0.01 ug/m³ for the annual averaging time. This value is less than the NPS's proposed significance value for NO₂ of 0.025 ug/m³, annual average. Since the maximum predicted increases are less than corresponding significance levels, no further Class I increment modeling is required.

5. Additional Impacts Analysis

A Level-1 screening analysis using the EPA model, VISCREEN was used to determine any potential adverse visibility impacts on the Class I Chassahowitzka National Wilderness Area located 121 km away. Based on this analysis, the maximum predicted visual impacts due to the proposed project are less than the screening criteria both inside and outside the Class I area. Because the impacts from the proposed pollutants are predicted to be less than PSD significance levels, no harmful effects on soils and vegetation is expected. In addition, the proposed modification will not significantly change employment, population, housing or commercial/industrial development in the area to the extent that a significant air quality impact will result.

IV. CONCLUSION

Based on the information provided by Orlando Cogen Limited, L.P., the Department has reasonable assurance that the proposed installation of the 129 MW combined cycle gas turbine system, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

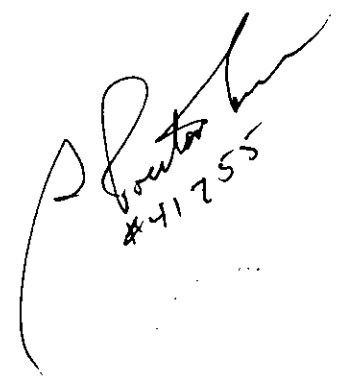
[Handwritten signature]
Director
#41955

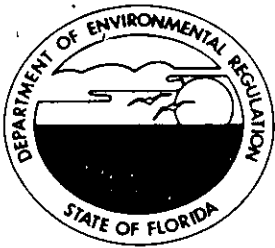
5. Additional Impacts Analysis

A Level-1 screening analysis using the EPA model, VISCREEN was used to determine any potential adverse visibility impacts on the Class I Chassahowitzka National Wilderness Area located 121 km away. Based on this analysis, the maximum predicted visual impacts due to the proposed project are less than the screening criteria both inside and outside the Class I area. Because the impacts from the proposed pollutants are predicted to be less than PSD significance levels, no harmful effects on soils and vegetation is expected. In addition, the proposed modification will not significantly change employment, population, housing or commercial/industrial development in the area to the extent that a significant air quality impact will result.

IV. CONCLUSION

Based on the information provided by Orlando Cogen Limited, L.P., the Department has reasonable assurance that the proposed installation of the 129 MW combined cycle gas turbine system, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.


Director
#41255



Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:

Orlando Cogen Limited, L.P.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Permit Number: AC 48-206720
PSD-FL-184

Expiration Date: June 30, 1994
County: Orange
Latitude/Longitude: 28°26'23"N
81°24'28"W

Project: 129-MW Combined Cycle
Gas Turbine

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), Florida Administrative Code (F.A.C.) Chapters 17-2 and 17-4, and 40 CFR (July, 1991 version). The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of a 129 MW (megawatt) combined cycle gas turbine cogeneration facility to be located in the Orlando Central Park, Orange County, Florida, and will supply steam to the adjacent Air Products and Chemicals Plant. The UTM coordinates are Zone 17, 459.5 km East and 3,146.1 km North.

The Standard Industrial Code: ~~4931-Electric and Other Services Combined~~
4911 - Electric Generation and Distribution

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

Attachments are listed below:

1. Orlando Cogen Limited, L.P.'s application received December 30, 1991.
2. Mr. C. H. Fancy's letter dated January 28, 1992.
3. Mr. Kennard F. Kosky's letter with enclosures received March 2, 1992.
4. Mr. Wayne A. Hinman's letter received via FAX May 27, 1992.
5. Mr. Kennard F. Kosky's letter with enclosure received May 27, 1992 (hand delivered).
6. Document (Table 1) received June 1, 1992, from Mr. Peter Cunningham (hand delivered).
7. 40 CFR (July, 1991 version).
8. Technical Evaluation and Preliminary Determination dated June 5, 1992.

PERMITTEE:
Orlando Cogen Limited, L.P.

Permit Number: AC 48-206720
PSD-FL-184
Expiration Date: June 30, 1994

GENERAL CONDITIONS:

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

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

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

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

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

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

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

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

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

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

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

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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.

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, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

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

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

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

13. This permit also constitutes:

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

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement

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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 for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

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

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

SPECIFIC CONDITIONS:

1. The CT (combustion turbine) is allowed to operate continuously (8,760 hours per year). The HRSG-DB (heat recovery steam generator-duct burner) is permitted to operate 3688 hrs/yr at a maximum heat input of 122×10^6 Btu/hr.

2. The CT and HRSG-DB are only allowed to use natural gas.

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

- Maximum heat input to the CT shall not exceed 856.9 MMBtu/hr at ISO conditions.
- Maximum heat input to the HRSG-DB shall not exceed 122 MMBtu/hr; 450,000 MMBtu/yr.

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SPECIFIC CONDITIONS:

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

Table 1

Pollutant	Source	Allowable Emission Standard/Limitation
NOx	CT	15 ppmvd @ 15% O ₂ (57.4 lbs/hr; 251.4 TPY)
	DB	0.1 lb/MMBtu (12.2 lbs/hr; 22.5 TPY)
	CT/DB	24-hr rolling average
CO	CT	10 ppmvd (22.3 lbs/hr; 92.1 TPY)
	DB	0.1 lb/MMBtu (12.2 lbs/hr; 22.5 TPY)
PM/PM ₁₀	CT	0.011 lb/MMBtu (9.0 lbs/hr; 39.4 TPY)
	DB	0.01 lb/MMBtu (1.2 lbs/hr; 2.2 TPY)
VOC	CT	3.0 lbs/hr; 13.0 TPY
	DB	3.7 lbs/hr; 6.8 TPY
VE	CT/DB	≤ 10 % opacity

NOTE:

1. CT: combustion turbine
DB: duct burner
2. Natural gas usage only in the CT and DB.
3. Hours of operation:
 - a. CT: 8760 hrs/yr
 - b. DB: 3688 hrs/yr
4. Maximum heat input:
 - a. CT: 856.9×10^6 Btu/hr
 - b. DB: 122.0×10^6 Btu/hr; $450,000 \times 10^6$ Btu/yr
5. DB operation planned when ambient temperature is greater than 59°F.
5. Any change in the method of operation, equipment or operating hours, pursuant to F.A.C. Rule 17-2.100, Definitions-Modification, shall be submitted to the Department's Bureau of Air Regulation and Central District offices.
6. Any other operating parameters established during compliance testing and/or inspection that will ensure the proper operation of this facility shall be included in the operating permit.

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SPECIFIC CONDITIONS:

7. Initial and subsequent annual compliance tests shall be performed within 10 percent of the maximum heat rate input for the tested operating temperature. Tests shall be conducted using EPA reference methods in accordance with the July 1, 1991 version of the 40 CFR 60, Appendix A.

- a. 5 for PM
- b. 10 for CO
- c. 9 for VE
- d. 20 for NOx

Note: Other test methods may be used for compliance testing after prior Departmental approval has been received in writing.

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

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

10. During performance tests,, to determine compliance with the proposed NOx standard, measured NOx emission at 15 percent oxygen will be adjusted to ISO ambient atmospheric conditions by the following correction factor:

$$\text{NOx} = (\text{NOx obs}) \frac{[(P_{\text{Pref}})]}{P_{\text{Obs}}} 0.5 e^{19 (H_{\text{Obs}} - 0.00633)} \frac{[(288^{\circ}\text{K})]}{T_{\text{AMB}}} 1.53$$

where:

NOx = Emissions of NOx at 15 percent oxygen and ISO standard ambient conditions.

NOx obs = Measured NOx emission at 15 percent oxygen, ppmv.

Pref = Reference combustor inlet absolute pressure at 101.3 kilopascals (1 atmosphere) ambient pressure.

Pobs = Measured combustor inlet absolute pressure at test ambient pressure.

Hobs = Specific humidity of ambient air at test.

e = Transcendental constant (2.718).

TAMB = Temperature of ambient air at test.

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11. Test results will be the average of 3 valid runs. The Department's Central District office shall be notified at least 30 days in advance of the compliance test. The source shall operate between 90% and 100% of permitted capacity as adjusted for ambient temperature during the compliance test. Compliance test results shall be submitted to the Department's Central District office no later than 45 days after completion.
12. The permittee shall leave sufficient space suitable for future installation of SCR equipment.
13. The permittee shall install, calibrate, maintain, and operate a continuous emission monitor in the stack to measure and record the nitrogen oxides emissions from this source. The continuous emission monitor must comply with 40 CFR 60, Appendix B, Performance Specification 2, (July 1, 1991).
14. Combustion control shall be utilized for CO control. The permittee shall leave a sufficient space suitable for future installation of an oxidation catalyst. Once performance testing has been completed, the decision to require an oxidation catalyst will be based on a cost/benefit analysis of using such control.
15. This source shall be in compliance with all applicable provisions of Chapter 403, F.S., F.A.C. Chapters 17-2 and 17-4, and the 40 CFR (July, 1991 version).
16. This source shall be in compliance with all applicable requirements of 40 CFR 60, Subparts GG and Db, in accordance with F.A.C. Rule 17-2.660(2)(a), Standards of Performance for Stationary Gas Turbines and Standards of Performance for Industrial, Commercial, and Institutional Steam Generating Units.
17. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-2.210(1)).
18. This source shall be in compliance with all applicable provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; 17-2.660: Standards of Performance for New Stationary Sources (NSPS); 17-2.700: Stationary Point Source Emission Test Procedures; and, 17-4.130: Plant Operation-Problems.

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SPECIFIC CONDITIONS:

19. Pursuant to F.A.C. Rule 17-2.210(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: fuel usage, hours of operation, air emissions limits, etc. Annual reports shall be sent to the Department's Central District office by March 1 of each calendar year.

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

21. An application for an operation permit must be submitted to the Department's Central District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this _____ day
of _____, 1992

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Carol M. Browner, Secretary

Best Available Control Technology (BACT) Determination
Orlando Cogen Limited, L.P.
Orange County

The applicant proposes to install a combustion turbine generator at their facility in Orange County. The generator system will consist of one nominal 79 megawatt (MW) combustion turbine (CT), with exhaust through heat recovery steam generator (HRSG), which will be used to power a nominal 50 MW steam turbine.

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

<u>Pollutant</u>	<u>Emissions (TPY)</u>	<u>PSD Significant Emission Rate (TPY)</u>
NO _x	273.9	40
SO ₂	12.0	40
PM/PM ₁₀	41.7	25/15
CO	114.6	100
VOC	19.8	40
H ₂ SO ₄	0.9	7
Be	Neg.	0.0004
Hg	Neg.	0.1
Pb	Neg.	0.6

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

Date of Receipt of a BACT Application

December 30, 1991

BACT Determination Requested by the Applicant

<u>Pollutant</u>	<u>Determination</u>
NO _x	15 ppmvd @ 15% O ₂ (natural gas burning)--CT 0.1 lb/106 Btu--duct burner
CO	Combustion Control
PM/PM ₁₀	Combustion Control

BACT Determination Procedure

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

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

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

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

- o Combustion Products (e.g., particulates). Controlled generally by good combustion of clean fuels.
- o Products of Incomplete Combustion (e.g., CO). Control is largely achieved by proper combustion techniques.
- o Acid Gases (e.g., NO_x). Controlled generally by gaseous control devices.

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

Combustion Products

The projected emissions of particulate matter and PM₁₀ from the Orlando Cogen Limited, L.P. facility surpass the significant emission rates given in Florida Administrative Code Rule 17-2.500, Table 500-2.

A PM/PM₁₀ emissions limitations of 0.0011 lb/MMBtu from the CT when firing natural gas is reasonable as BACT for the Orlando Cogen Limited, L.P. facility. The duct burner PM/PM₁₀ emission rate of 0.01 lb/MMBtu is reasonable as BACT.

Products of Incomplete Combustion

The emissions of carbon monoxide exceed the PSD significant emission rate of 100 TPY. The applicant has indicated that the carbon monoxide emissions from the proposed turbine is on exhaust concentrations of 10 ppmvd for natural gas firing.

A review of the BACT/LAER clearinghouse indicates that several of the combustion turbines using dry low-Nox combustion technology to control NOx to 15 ppmvd (corrected to 15 percent O₂) have been permitted with CO limitations that are higher than those proposed by the applicant. The applicant has stated that the CT is a new design, and CO margins must be higher. The majority of BACT emissions limitations have been based on combustion controls for carbon monoxide and volatile organic compounds minimization, additional control is achievable through the use of catalytic oxidation. Catalytic oxidation is a postcombustion control that has been employed in CO nonattainment areas where regulations have required CO emission levels to be less than those associated with wet injection. These installations have been required to use LAER technology and typically have CO limits in the 10-ppm range (corrected to dry conditions).

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst such as platinum. Combustion of CO starts

at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required. For CT/HRSG combinations, the oxidation catalyst can be located directly after the CT or in the HRSG. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency. The existing gas turbine applications have been limited to smaller cogeneration facilities burning natural gas.

Given the applicant's proposed BACT level for carbon monoxide of 10 ppm, a lower emission rate as BACT would not produce a significant reduction in emissions or impacts. Also, this CO concentration level is near the lowest established as BACT even with catalytic oxidation. For these reasons, it appears that the limit proposed by the applicant is reasonable as BACT.

Emission of volatile organic compounds are each below the significant level and therefore do not require a BACT analysis.

Acid Gases

The emissions of nitrogen oxides represent a significant proportion of the total emissions and need to be controlled if deemed appropriate.

The applicant has stated that BACT for nitrogen oxides will be met by using dry low-NOx combustion to limit emissions to 15 ppmvd (corrected to 15% O₂) when burning natural gas.

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

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

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

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

The applicant has indicated that the total levelized annual cost (operating plus amortized capital cost) to install SCR for natural gas firing at 100 percent capacity factor is \$1,903,000. Taking into consideration the total annual cost, a cost/benefit analysis of using SCR can now be developed.

Based on the information supplied by the applicant, it is estimated that the maximum annual NOx emissions with dry low-NOx combustion from the Orlando Cogen Limited, L.P. facility will be 274 tons/year. Assuming that SCR would reduce the NOx emissions to a level of 9 ppmvd when firing natural gas, about 141 tons of NOx would be emitted annually. When this reduction is taken into consideration with the total levelized annual cost of \$1,900,300, the cost per ton of controlling NOx is \$14,308. This calculated cost is higher than has previously been approved as BACT.

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

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

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

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

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

The latest information available now indicates that SCR can be used for oil firing provided that adjustments are made in the ammonia to NOx injection ratio. For natural gas firing operation NOx

emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater injection ratio. By lowering the injection ratio for oil firing, testing has indicated that NOx can be controlled with efficiencies ranging from 60 to 75 percent. When the injection ratio is lowered there is not a problem with ammonium bisulfate formation since essentially all of the ammonia is able to react with the nitrogen oxides present in the combustion gases.

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

The Orlando Cogen Limited, L.P. facility has proposed not to utilize fuel oil; therefore, those consequences of SCR attributed to fuel oil firing will not likely occur. However, the small amount of sulfur in natural gas would likely form ammonium salts.

Environmental Impact Analysis

The predominant environmental impacts associated with this proposal are related to the use of SCR for NOx control. The use of SCR results in emissions of ammonia, which may increase with increasing levels of NOx control. In addition, some catalysts may contain substances which are listed as hazardous waste, thereby creating an additional environmental burden. Also, air emissions result from the lost generations that must be replaced. The lost generation is due to the back pressure on the turbine covered by the catalyst. Although the use of SCR does have some environmental impacts, the disadvantages may outweigh the benefit which would be provided by reducing nitrogen oxide emissions by 80 percent or greater. The benefit of NOx control by using SCR is substantiated by the fact that nearly one half of all BACT determinations have established SCR as the control measure for nitrogen oxides over the last five years.

In addition to the criteria pollutants, the impacts of toxic pollutants associated with the combustion of natural gas and No. 2 fuel oil have been evaluated. Toxics are expected to be emitted in minimal amounts, with the total emissions combined to be less than 0.1 tons per year.

Although the emissions of the toxic pollutants could be controlled by particulate control devices such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. As this is the case, the Department does not believe that the BACT determination would be affected by the emissions of the toxic pollutants associated with the firing of natural gas.

Potentially Sensitive Concerns

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

1. SCR would reduce output of combustion turbines by one-half percent.
2. SCR could result in the release of unreacted quantities of ammonia to the atmosphere.
3. SCR would require handling of ammonia by plant operators. Since it is a hazardous material, there is a concern about safety and productivity of operators.
4. SCR results in contaminated catalyst from flue gas trace elements which could be considered hazardous. Safety of operators and disposal of spent catalyst is a concern.

The combustion turbines proposed for the project (ABB 11N-EV) is a heavy-frame that is highly efficient and uses advanced dry low-NOx combustion technology. Information supplied by the applicant indicates that actual emissions will be 15 ppmvd (corrected to 15% O₂) or lower on a continuous basis.

BACT Determination by DER

NOx Control

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

The information that the applicant presented and Department calculations indicates that the incremental cost of controlling NOx (\$14,308/ton) is high compared to other BACT determinations which require SCR. Furthermore, actual NOx levels are expected to be less than the 15 ppmvd (corrected to 15% O₂), which would increase the cost effectiveness of SCR. Based on the information presented by the applicant and the studies conducted, the Department believes that the use of SCR for NOx control is not justifiable as BACT. Therefore, the Department is willing to accept dry low-NOx combustion as NOx control when firing natural gas.

The emissions of NOx from the duct burner will be limited to 0.1 lb/MMBtu, which has been the BACT limit established for similar facilities. Duct firing will be used for supplying steam and limited to an equivalent of 3,688 hours/year at 122 MMBtu/hr heat input (maximum).

CO Control

Combustion control will be considered as BACT for CO when firing natural gas. Also, due to the lack of operational experience with the ABB 11N-EV and the uncertainty of actual CO emissions, the permittee shall install a duct module suitable for future installation of oxidation catalyst.

Other Emissions Control

The emission limitations for PM and PM₁₀ are based on previous BACT determinations for similar facilities.

The emission limits for the Orlando Cogen Limited, L.P. project are thereby established as follows:

Pollutant	Emission Standards/Limitations	
	CT (Natural Gas Firing)	DB (Natural Gas Firing)
NOx	15 ppmvd @ 15% O ₂	0.1 lb/MMBtu
CO	10 ppmvd	0.1 lb/MMBtu
PM & PM ₁₀	0.011 lb/MMBtu	0.1 lb/MMBtu

Note: Natural gas will be used only for supplemental firing for no greater than 3688 full-load equivalent hours at 122 MMBtu/hr heat input on a total annual basis (maximum of 450,000 MMBtu/yr heat input annually).

Details of the Analysis May be Obtained by Contacting:

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

Recommended by:

Approved by:

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

Carol M. Browner, Secretary
Dept. of Environmental Regulation

Date 1992

Date 1992