STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF FINAL PERMIT

In the Matter of an
Application for Permit by:

Orange Cogeneration Limited Partnership
1125 U.S. 98 South
Suite 100
Lakeland, Florida 33801

DEP File No.1050231-005-AC, PSD-FL-206C
Orange Cogeneration Facility
Polk County

Enclosed is Final Permit Number 1050231-005-AC. This permit authorizes Orange Cogeneration Limited Partnership to install wet technologies on the Orange Cogeneration Facility's Units 1 and 2 in an effort to reduce the NO_x emission rate to 15 ppmvd while firing natural gas or biogas. This permit is issued pursuant to Chapter 403, Florida Statutes.

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

Executed in Tallahassee, Florida.

C. H. Fancy, 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 12-28-99 to the person(s) listed:

Wade Smith, Orange Cogeneration *
Gregg Worley, EPA
Doug Neeley, EPA
John Bunyak, NPS
Bill Proses, DEP-SWD

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.

Kyni Faber (Clerk) 12-28-99 (Date)

FINAL DETERMINATION

Orange Cogeneration Limited Partnership
Orange Cogeneration Facility
DEP File No. 1050231-005-AC, PSD-FL-206C

The Department distributed a public notice package on November 23, 1999 to allow the applicant to modify its permit at the Orange Cogeneration Facility located in Polk County. The Public Notice of Intent to Issue was published in the Polk County Democrat on November 25, 1999.

COMMENTS/CHANGES

No comments were received by the Department from the public.

Neither the EPA nor the National Park Service had adverse comments.

No comments were received from the applicant.

CONCLUSION

The final action of the Department is to issue the permit without changes.

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

December 28, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Wade Smith
General Manager
Orange Cogeneration Limited Partnership
1125 US Highway 98 South
Suite 100
Lakeland, Florida 33801

Re: DEP File No. 1050231-005-AC; Modification of Permit No. PSD-FL-206C
Orange Cogeneration / Polk County

The applicant, Orange Cogeneration Limited Partnership (OCLP), applied on October 25, 1999, to the Department for a modification to air construction permit number PSD-FL-206C for its Orange Cogeneration Facility located in PolkCounty. The request is to allow the facility to install NO_X control equipment on Emission Units 001 and 002, GE LM 6000 DLE units configured for combined cycle operation. The specific equipment requested will allow SPRINT™ and selective water injection to be installed in addition to the Dry Low Emissions equipment. The Department has reviewed the modification request. The referenced permit is hereby modified as follows:

Specific Condition 8 and Table 1 (note e): Each CT shall have a maximum heat input (LHV) of 368.3 MMBtu/hr, which is approximately 389,300 CFH of natural gas, when using dry low NO_X and/or wet injection technologies ~~technology~~ to control NO_X emissions.

Specific Condition 10: Prior to September ~~January~~ 1, ~~2000~~ 2001, the maximum NO_X concentration, 1 hour average, from each CT/HRSG unit shall not exceed 25 parts per million by volume dry corrected to 15 percent oxygen at ISO standard ambient conditions (ppmvd @ 15% O_2 at ISO conditions), as determined by the procedures in Specific Conditions No. 16, 17 and 18.

Specific Condition 11 and Table 1 (note d): After ~~December 31, 1999~~ August 31, 2001, the maximum NO_X concentration, ~~+~~ 24-hour block average, from each CT/HRSG unit shall not exceed 15 ppmvd @ 15% O_2 at ISO conditions as determined by the procedure in Specific Condition Nos. 16, 17 and 18. No further extensions of this permit shall be granted for the purpose of achieving the targeted 15 ppmvd NO_X emissions, with the exception of a reasonable time required to install SCR. The permittee shall obtain prior approval from the Department for any air pollution control equipment not addressed in this permit that is needed to meet the NO_X emission standard. The Department may revise the limit based upon the capabilities of alternative equipment installed.

Specific Condition 19: Prior to ~~January 1, 1998~~ September 1, 2000, the permittee shall provide a report showing how the allowable NO_X emissions of 15 ppmvd @ 15% O_2 ISO conditions is achieved by the CTs.

A copy of this letter shall be filed with the referenced permit and shall become part of the permit. This permit modification is issued pursuant to Chapter 403, Florida Statutes.

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

Executed in Tallahassee, Florida.

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

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this permit modification was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 12-28-99 to the person(s) listed:

Wade Smith, Orange Cogeneration LP *
Doug Neely, EPA
John Bunyak, NPS
Bill Proses, DEP-SWD
Mr. Gregg Worley, EPA

Clerk Stamp

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

(Clerk) 12-28-99 (Date)

Florida Department of
Environmental Protection

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

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

PERMITTEE:
Orange Cogeneration Limited Partnership
23046 Avenida De La Carlota
Suite 400
Laguna Hills, CA 92653

Permit Number: AC53-233851
PSD-FL-206
Expiration Date: April 1, 1998
County: Polk
Latitude/Longitude: 27°52'15"N
81°49'31"W
Project: Two Combustion Turbines

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-212 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto and specifically described as follows:

Installation of two natural gas/equivalent biogas fired GE LM 6000 (or equivalent) combustion turbines (CT), two heat recovery steam generators, one steam turbine and, being permitted separately, an auxiliary boiler (AC53-233852). The CTs will be initially equipped with either a water injection system or a dry low NO_X system to control nitrogen oxides (NO_X) emission. The water injection system, if installed, will be replaced with dry low NO_X combustion technology by December 31, 1995. Each CT will be equipped with a 100 ft. high, 11 ft. diameter stack that will handle approximately 300,000 actual cubic feet per minute of flue gas at 230°F. The cogeneration facility will be located on Clear Springs Road, Bartow, Polk County, Florida 33830.

The UTM coordinates of this facility are Zone 17, 418.75 kmE and 3083.0 kmN.

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. Application received July 1, 1993
2. DEP July 22, 1993, letter
3. KBN August 5, 1993, letter
4. KBN August 29, 1993, letter
5. Tables 1 and 2, Allowable Emission Rates

GENERAL CONDITIONS:

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

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

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

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

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

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.

GENERAL CONDITIONS:

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.

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

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

GENERAL CONDITIONS:

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

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-730.300, 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.

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

13. This permit also constitutes:

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

14. The permittee shall comply with the following:

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

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.

GENERAL CONDITIONS:

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:

Construction Requirements

1. Water/steam injection systems or dry low NO_x systems shall be installed and operated on each combustion turbine (CT). If a water/steam injection system is initially installed, it will be replaced by dry low NO_x combustion technology.

2. Dry low NO_x combustion technology shall be installed and in operation on the CTs prior to December 31, 1995.

3. A system, accurate to within 5 percent, to continuously monitor the fuel consumption and the ratio of water/steam to fuel being fired shall be installed on each CT.

4. The heat recovery steam generator (HRSG) installed on each CT shall not be equipped with an auxiliary/duct burner.

5. Each CT stack shall be equipped with stack sampling facilities (sample ports, work platforms, access, and electrical power) that meet the specifications given in F.A.C. Rule 17-297.345.

Operation Limitations

6. The CTs shall comply with all requirements of 40 CFR 60, Subpart GG (July, 1993), Standard of Performance for Stationary Gas Turbines, which is adopted by references in F.A.C. Rule 17-296.800(2)(a).

SPECIFIC CONDITIONS:

7. The facility is allowed to operate continuously, 8760 hours per year.

8. Only natural gas/equivalent biogas fuel shall be used for fuel at this facility.

9. Each CT shall have a maximum heat input based on the lower heating value (LHV) of the fuel of 388 million British thermal units per hour (MMBtu/hr), which is approximately 409,900 cubic feet per hour (CFH) of natural gas, when using water/steam injection to control nitrogen oxides (NO_X) emission.

10. Each CT shall have a maximum heat input (LHV) of 368.3 MMBtu/hr, which is approximately 389,300 CFH of natural gas, when using dry low NO_X technology to control NO_X emissions.

11. The operation of this facility shall not create a nuisance or discharge air pollutants that cause or contribute to objectionable odors.

Emission Limitation

12. Prior to January 1, 1998, the maximum NO_X concentration, 1 hour average, from each CT/HRSG unit shall not exceed 25 parts per million by volume dry corrected to 15 percent oxygen and ISO standard ambient conditions (ppmvd @ 15% O_2 ISO conditions), as determined by the procedures in Specific Conditions No. 18 and 19.

13. After December 31, 1997, the maximum NO_X concentration, 1-hour average, from each CT/HRSG unit shall not exceed 15 ppmvd @ 15% O_2 ISO conditions as determined by the procedure in Specific Conditions Nos. 18 and 19. Should 15 ppmvd NO_X @ 15% O_2 ISO conditions not be achieved during the initial compliance tests, the permittee will provide the Department with a plan and schedule to meet this standard. If the standard has not been met by December 31, 1997, the Department may require the installation of a selective catalytic reduction system (SCR) on these CTs.

14. The maximum emission rates for particulate matter (PM/PM_{10}), volatile organic compounds (VOC), NO_X, and carbon monoxide (CO) shall not exceed any of the rates listed in Tables 1 and 2, Allowable Emission Rates. Allowable emissions shall be extrapolated between the temperatures listed in the CT manufacturer's curve for emission rates of different air inlet temperatures.

15. Visible emissions shall not exceed 10 percent opacity, 6 minute average.

16. The emission rates for sulfur dioxide (SO_2) and sulfuric acid mist (H_2SO_4), listed in the following table, shall be used for inventory purposes only.

ORANGE COGENERATION LIMITED PARTNERSHIP
AC53-233851 (PSD-FL-206)
42 MW SIMPLE CYCLE GAS TURBINE

Table 1 - Allowable Emission Rates for each combustion turbine

Pollutant[a]	Basis	Allowable Emissions Standards/Limitations[b] ISO Conditions lb/hr	ISO Conditions TPY	Maximum Corrected[c] lb/hr	Maximum Corrected[c] TPY	Basis for Limit
NO_x	25 ppmvd[d] at 15% O_2	36.3	159.1	38.5	168.5	BACT
CO	30 ppmvd	26.8	117.5	27.8	122.0	BACT
PM/PM_{10}	0.0139 lb/MMBtu	5	21.9	5	21.9	BACT
VOC	10 ppmvd	3.83	16.8	3.98	17.4	BACT

a Pollutant emissions are based on 8,760 hours per year operation firing natural gas or equivalent biogas at 59° F.

b Emissions rates are based on 100% load and at ISO conditions. Pollutant emission rates may vary depending on the air inlet temperature to the combustion turbine (CT) and CT characteristics. Manufacturer's curves for the emission rate corrections to other temperatures at different loads shall be provided to DEP for review 90 days after selection of the CT. Subject to approval by the Department, the manufacturer's curve may be used to establish pollutant emission rates over a range of temperature for the purpose of compliance determination.

c Maximum emission rates not to be exceeded after correction for air inlet temperature to the combustion turbine.

d The NO_x maximum concentration will be lowered to 15 ppmvd at 15% O_2 at ISO conditions by 12/31/97 using appropriate combustion technology improvements. Should this level of control not be achieved when the compliance demonstration stack test are performed, the permittee must provide the Department with the expected compliance dates which will be updated annually. After 12/31/97, the Department may require SCR to be installed. NO_x emission concentrations are to be corrected to ISO conditions to demonstrate compliance with the NO_x emissions standard.

ORANGE COGENERATION LIMITED PARTNERSHIP
AC53-233851 (PSD-FL-206)
42 MW COMBINED CYCLE GAS TURBINE

Table 2 - Allowable Emission Rates for each combustion turbine

Pollutant[a]	Control[e]	Allowable Emissions Standards/Limitations[b]					
			ISO Conditions		Maximum Corrected[c]		Basis for Limit
		Basis	lb/hr	TPY	lb/hr	TPY	
NO_x	WI	25 ppmvd[d] at 15% O_2	36.3	159.1	38.5	168.5	BACT
	DLN	25 ppmvd at 15% O_2	34.8	152.3	37.0	161.9	BACT
CO	WI	30 ppmvd	26.8	117.5	27.8	122.0	BACT
	DLN	30 ppmvd	27	118.2	27.8	161.9	BACT
PM/PM_{10}	WI	0.0139 lb/MMBtu	5	21.9	5	21.9	BACT
	DLN	0.0147 lb/MMBtu	5	21.9	5	21.9	BACT
VOC	WI	10 ppmvd	3.83	16.8	3.98	17.4	BACT
	DLN	10 ppmvd	3.86	19.8	3.98	17.4	BACT

[a] Pollutant emissions are based on 8,760 hours per year operation firing natural gas or equivalent biogas at 59° F.

[b] Emissions rates are based on 100% load and at ISO conditions. Pollutant emission rates may vary depending on the air inlet temperature to the combustion turbine (CT) and CT characteristics. Manufacturer's curves for the emission rate correction to other temperatures at different loads shall be provided to DEP for review 90 days after selection of the CT. Subject to approval by the Department, the manufacturer's curve may be used to establish pollutant emission rates over a range of temperature for the purpose of compliance determination.

[c] Maximum emission rates not to be exceeded after correction for air inlet temperature to the combustion turbine.

[d] The NO_x maximum concentration will be lowered to 15 ppmvd at 15% O_2 at ISO conditions by 12/31/97 using appropriate combustion technology improvements. Should this level of control not be achieved when the compliance demonstration stack test are performed, the permittee must provide the Department with the expected compliance dates which will be updated annually. After 12/31/97, the Department may require SCR to be installed. NO_x emission concentrations are to be corrected to ISO conditions to demonstrate compliance with the NO_x emissions standard.

[e] Wet injection (WI) and Dry Low-NO_x (DLN) combustors.

SPECIFIC CONDITIONS:

Maximum Emission Rates for Each Combustion Turbine
For inventory purposes or PSD tracking

Pollutant	Combustion Turbine Water Injection		Combustion Turbine Dry Low NO_x Combustion	
	lb/hr	TPY	lb/hr	TPY
SO_2	1.17	5.1	1.11	4.87
H_2SO_4	0.09	0.39	0.085	0.37

17. Manufacturer's curves for the emission rate correction to other temperatures at different loads shall be provided to DEP for review 90 days after selection of the CT. Subject to approval by the Department, the manufacturer's curve may be used to establish pollutant emission rates over a range of inlet air temperatures for the purpose of compliance determination. The maximum allowable emissions at different air inlet temperatures shall be based on the CT manufacturer's curve but shall not exceed the maximum rates listed in Tables 1 and 2, Allowable Emission Rates.

Compliance Determination

18. Testing of emissions shall be conducted with the source operating at capacity. Capacity is defined as 90-100% of rated capacity. If it is impracticable to test at capacity, then sources may be tested at less than capacity; in this case subsequent source operation is limited to 110% of the test load until a new test is conducted. Once the unit is so limited, then operation at higher capacities is allowed for no more than fifteen days for purposes of additional compliance testing to regain the rated capacity in the permit, with prior notification to the Department. Compliance with the visible emissions, NO_x, SO_2, CO, PM/PM_{10}, and VOC emission standards shall be determined within 60 days of achieving maximum production but not later than 180 days after initial firing of each CT (40 CFR 60.8). Compliance with the visible emission, NO_x, and SO_2 standards will be determined annually thereafter. The tests shall be conducted initially when the CTs are using water/steam system and again when dry low-NO_x technology is employed. Tests will be conducted on both natural gas and biogas fuels.

SPECIFIC CONDITIONS:

19. Compliance shall be determined by the following test methods listed in 40 CFR 60, Appendix A (July, 1993).

EPA Method	Pollutant
5, 201A, or 201B	PM/PM_{10}
9	Visible Emissions
10	CO
20	NO_X and SO_2
18 or 25	VOC

Other test methods may be used for compliance testing after prior Department approval.

Administrative Requirement

20. Prior to January 1, 1998, the permittee shall provide a report showing how the allowable NO_X emissions of 15 ppmvd @ 15% O_2 ISO conditions is achieved by the CTs.

21. The permittee shall provide the Southwest District office with the following notifications required by 40 CFR 60.7:

- When construction commenced within 30 days of commencement of construction
- Anticipated date of initial starting 30 to 60 days prior to startup
- Actual date of startup up within 15 days after the starting
- Notification of the date of the compliance tests not less than 30 days prior to the test

22. Pursuant to F.A.C. Rule 17-210.300(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: sulfur content and the lower heating value of the fuel being fired, fuel usage, hours of operation, and air emissions. Annual reports shall be sent to the Department's Southwest District office by March 1 of each calendar year.

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

SPECIFIC CONDITIONS:

24. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit. 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 _____, 1993

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

_____
Virginia B. Wetherell, Secretary

Florida Department of
Environmental Protection

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

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

PERMITTEE:
Orange Cogeneration Limited Partnership
23046 Avenida De La Carlota
Suite 400
Laguna Hills, CA 92653

Permit Number: AC53-233852
PSD-FL-206
Expiration Date: April 1, 1996
Latitude/Longitude: 27°52'15"N
81°49'31"W
Project: Auxiliary Boiler
County: Polk

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-212 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto and specifically described as follows:

Installation of a 100 million British thermal unit per hour (MMBtu/hr) natural gas/equivalent biogas fired tube boiler equipped with a 65 foot high, 3.67 foot diameter stack designed to produce approximately 83,000 pounds per hour of saturated steam at 205 pounds per square inch gauge (psig) pressure. The heat input is based on the High Heating Value (HHV) of the fuel. The auxiliary boiler will be located on Clear Springs Road, Bartow, Polk County, Florida 33830.

The UTM coordinates of this facility are Zone 17, 418.75 kmE and 3083.0 kmN.

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. Application received July 1, 1993
2. DEP July 22, 1993, letter
3. KBN August 5, 1993, letter

GENERAL CONDITIONS:

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

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

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

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

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

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.

GENERAL CONDITIONS:

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.

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

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

GENERAL CONDITIONS:

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

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-730.300, 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.

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

13. This permit also constitutes:

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

14. The permittee shall comply with the following:

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

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.

GENERAL CONDITIONS:

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:

Construction Requirements

1. The auxiliary boiler shall be equipped with low-NO_X burners.

2. The boiler stack shall be equipped with stack sampling facilities (sample ports, work platforms, access, electrical power) that meet the specifications given in F.A.C. Rule 17-297.345.

Operation Limitations

3. The auxiliary boiler shall comply with all applicable requirements of 40 CFR 60, Subpart Dc.

4. The boiler is allowed to operate continuously, 8760 hours per year.

5. Only natural gas/equivalent biogas fuel shall be burned in this boiler.

6. The maximum heat input to the boiler based on the high heating value (HHV) of the fuel shall not exceed 100 MMBtu/hr which is the heat content of approximately 105,700 cubic feet of natural gas per hour.

7. The maximum allowable sulfur content (total) of the natural gas/biogas burned in the boiler shall not exceed 1 grain per 100 cubic feet (1 gr/100 CF) of gas.

SPECIFIC CONDITIONS:

8. The operation of this boiler shall not emit air pollutants that cause or contribute to objectionable odors.

9. Visible emissions shall not exceed 15 percent opacity.

10. Emissions from the boiler shall not exceed any of the following limits:

Pollutant	lbs/MMBtu	lbs/hr	TPY
NO_X	0.13	13.0	56.9
CO	0.10	10.0	43.8
VOC	0.04	4.3	18.8

11. Sulfur dioxide (SO_2) emissions from the boiler shall not exceed 0.003 lbs/MMBtu, 0.30 lbs/hr, and 1.3 TPY. An analysis of the fuel showing the sulfur content does not exceed 1 grain of total sulfur per 100 cubic feet of gas will be accepted as proof of compliance with the sulfur dioxide emission limit. Total sulfur content of the gas shall be determined by test method ASTM D 1072-80 (40 CFR 60.17 (July, 1993)).

12. Particulate matter (PM/PM_{10}) emissions from the boiler shall not exceed 0.01 lbs/MMBtu, 1.0 lbs/hr, and 4.4 TPY. No PM/PM_{10} stack test that is required if the visible emissions are less than 15 percent opacity.

Testing Requirements

13. Testing of emissions shall be conducted with the source operating at capacity. Capacity is defined as 90-100% of rated capacity. If it is impracticable to test at capacity, then sources may be tested at less than capacity; in this case subsequent source operation is limited to 110% of the test load until a new test is conducted. Once the unit is so limited, then operation at higher capacities is allowed for no more than fifteen days for purposes of additional compliance testing to regain the rated capacity in the permit, with prior notification to the Department. Compliance with the visible emissions, NO_X, CO, and VOC emission standards shall be determined within 60 days of achieving maximum production but not later than 180 days after initial firing of the boiler. Compliance with the visible emissions and NO_X standards will be determined annually thereafter.

SPECIFIC CONDITIONS:

14. Compliance shall be determined by the following test methods listed in 40 CFR 60, Appendix A (July, 1993).

EPA Method	Pollutant
9	Visible Emissions
10	CO
7E	NO_x
18 or 25	VOC

Other test methods may be used for compliance testing after prior Department approval.

15. The permittee shall provide the Southwest District office with the following notifications required by 40 CFR 60.7:

- When construction commenced within 30 days of commencement of construction.
- Anticipated date of initial startup, 30 to 60 days prior to startup.
- Actual date of startup within 15 days after the startup.
- Notification of the date of the compliance tests not less than 30 days prior to the tests.

16. Pursuant to F.A.C. Rule 17-210.300(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: sulfur content and the lower heating value of the fuel being fired, fuel usage, hours of operation, air emission limits, etc. Annual reports shall be sent to the Department's Southwest District office by March 1 of each calendar year.

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

18. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate

SPECIFIC CONDITIONS:

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 _____, 1993

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

_____
Virginia B. Wetherell, Secretary

Best Available Control Technology (BACT) Determination
Orange Cogeneration Limited Partnership
Polk County
AC53-233851, **AC**53-233852, PSD-FL-206

The applicant proposes to construct a 103 gross megawatt (MW) natural gas/equivalent biogas fired cogeneration facility in Bartow, Polk County, Florida. Major components of the cogeneration facility are: two combustion turbines (CT), each with a heat recovery steam generator (HRSG), an auxiliary boiler, steam turbine generator, and associated equipment. Both CTs will consume up to 776 million British thermal units per hour (MMBtu/hr) of gas fuel based on the lower heating value (LHV) of the fuel and produce 78 MW of electricity. The HRSGs, which do not use supplemental fuel, produce approximately 100,000 lbs/hr of steam that can generate 25 MW of electricity. The fire-tube auxiliary boiler consumes 100 MMBtu/hr of gas fuel and produces approximately 83,000 lbs/hr of steam.

The following table lists the estimated maximum emissions from the cogeneration facility.

	Two CTs		Auxiliary Boiler	
Pollutant	lbs/hr	TPY	lbs/hr	TPY
Sulfur dioxide (SO_2)	2.34	10.3	0.3	1.3
Particulate Matter (PM/PM_{10})	10	43.8	1.0	4.4
Nitrogen Oxide (NO_x)	77.0	336.9	13.0	56.9
Carbon Monoxide (CO)	57.2	343.9	10.0	43.8
Volatile Organic Compounds (VOC)	8.17	34.9	4.3	18.8
Sulfuric Acid Mist	0.18	0.79	0.023	0.1

The cogeneration facility requires a BACT determination for NO_x, CO, PM, and VOC. In addition, the auxiliary boiler requires a BACT determination for SO_2.

Date of Receipt of a BACT Application

July 1, 1993

BACT Requested by the Applicant

Pollutant	Proposed Limit	Air Pollution Control
Combustion Turbine		
PM	0.01 gr/scf*	Clean Fuel (gas)
NO_x	25 ppmvd @ 15%**	Wet Injection (WI) or
	15 ppmvd @ 15%**	Dry Low-NO_x Combustors

CO	30 ppmvd	Combustion Controls
VOC	10 ppmvd	Combustion Controls

Auxiliary Boiler

PM	0.01 lbs/MMBtu	Clean Fuel (gas)
NO_X	0.13 lbs/MMBtu	Low-NO_X burners
SO_2	1 grain/100CF natural gas	Clean Fuel (natural gas)
CO	0.10 lbs/MMBtu	Combustion Control
VOC	0.043 lbs/MMBtu	Combustion Control

*grains per standard cubic foot
**parts per million by volume dry at 15 percent oxygen and ISO conditions
Applicant is committed to meeting 15 ppmvd @ 15% O_2 and ISO conditions with dry low-NO_X combustors after December 31, 1997.

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-212, 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 cogeneration facilities 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:

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

Although all of the pollutants addressed in the BACT analysis may be subjected 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, 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.

BACT Pollutant Analysis for Combustion Turbines (CT)

Nitrogen Oxides (NO_X)

The emissions of nitrogen oxides represent a significant proportion of the total emissions generated by this project, and need to be controlled if deemed appropriate. As such, the applicant presented an extensive analysis of the different available technologies for NO_X control. The control technologies evaluated were selective catalytic reduction (SCR), wet injection (WI), dry low-NO_X combustor, NO_XOUT process, thermal DeNO_X, and selective noncatalytic reduction (SNCR).

NO_XOUT (urea with catalyst), thermal DeNO_X (ammonia with catalyst), and selective noncatalytic reduction system (ammonia without catalyst) to reduce NO_X emissions from the CT were not feasible because of process constraints (flue gas temperature too low and oxygen content too high).

SCR, dry low-NO_X combustor technology, and wet injection controls were considered feasible.

The applicant has stated that BACT for nitrogen oxides will be met initially by using water/steam injection or advanced combustor design to limit emissions to 25 ppmvd 15% O_2 and ISO conditions when burning natural gas/equivalent biogas. After December 31, 1995, dry low NO_X combustion will be used to meet the same NO_X emission limit of 25

ppmvd @ 15% O_2 and ISO conditions. After December 31, 1997, a limit of 15 ppmvd @ 15% O_2 and ISO conditions will be met. Should 15 ppmvd NO_X @ 15% O_2 and ISO conditions not be achieved during the initial compliance tests, the permittee will provide the Department with a plan and schedule to meet this standard. If the standard has not been met by December 31, 1997,the Department may require the installation of SCR system on the CT's.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NO_X 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 SCR system.

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

The effect of exhaust gas temperature on NO_X reduction depends on the specific catalyst formulation and reactor design. Generally, SCR units can be designed to achieve effective NO_X control over a 100-300°F operating window within the bounds of 450-800°F, although recently developed zeolite-based catalysts are claimed to be capable of operating at temperatures as high as 950°.

Most commercial SCR systems operate over a temperature range of about 600-750°F. At levels above and below this window, the specific catalyst formulation will not be effective and NO_X reduction will decrease. Operating at high temperatures can permanently damage the catalyst through sintering of surfaces.

Increased water vapor content in the exhaust gas (as would result from water or steam injection in the gas turbine combustor) can shift the operating temperature window of the SCR reactor to slightly higher levels.

Although technically feasible, the applicant has rejected using SCR on the combined cycle because of economic, energy, and environmental impacts. The applicant has identified the following limitations:

a) Reduced power output.
b) Emissions of unreacted ammonia (slip).
c) Disposal of hazardous waste generated (spent catalyst).
d) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH_3 with SO_3 present in the exhaust gases.

e) The energy impacts of SCR will reduce potential electrical power generation by 0.8 percent.
f) Incremental cost effectiveness for the application of SCR technology to the Orange Cogeneration L.P. project was considered to be $7,970 when emissions are at 25 ppm and $23,510 when emissions are at 15 ppm. Since SCR has been determined to be BACT for gas turbines, 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 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."

The cost associated with controlling NO_X emissions must take into account the potential operating problems that can occur with using SCR.

A concern associated with the use of SCR on combustion turbines is the formation of ammonium bisulfate. For the SCR process, ammonium bisulfate can be formed due to the reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate formed has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. As this is the case, SCR has been judged to be technically infeasible in some previous BACT determinations. This salt also increases particulate matter (PM/PM_{10}) emissions.

For natural gas/equivalent biogas firing operation, NO_X emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater ammonia injection ratio. 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 with NO_X emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control established.

The applicant has indicated that the total levelized annual operating cost to install SCR on two CTs for this project at 100 percent capacity factor and burning natural gas/equivalent biogas is $1,648,000. Taking into consideration the total annual cost, a cost/benefit analysis of using SCR can now be developed.

Initially, NO_X emissions will be 25 ppmvd @ 15% O_2 and ISO conditions. Emissions will be 318 TPY NO_X with WI. When dry-low NO_X controls are installed, NO_X emissions will be 305 TPY. After the combustion turbines meet the NO_X emissions standard of 15 ppmvd @ 15% O_2 and ISO conditions, NO_X emissions will be 191 TPY. A SCR would reduce the NO_X emissions by 207 TPY during the first 2 years of operation when the CTs emit 25 ppmvd @ 15% O_2 and ISO conditions. Thereafter, when dry-low NO_X controls are used, a SCR would reduce NO_X emissions by 120 TPY. When these reductions are taken into consideration, the total cost with SCR is $21,900 per ton of NO_X removed. This calculated cost is higher than has previously been approved as BACT.

A review of the latest Department BACT determinations show limits of 15 ppmvd (natural gas) using low-NO_X burn technology for gas turbines. Most combustion turbine manufacturers are currently developing programs using both steam/water injection and dry low NO_X combustor to achieve NO_X emission control level of 9 ppm when firing natural gas. Therefore, this technology will likely be available by 1998.

BACT Determination for NO_X for the CT's by Department

NO_X Control

The information that the applicant presented and Department calculation indicate that the cost per ton of controlling NO_X for this turbine [$21,900 per ton] is high compared to other BACT determinations which require SCR. Based on the information presented by the applicant, the Department believes that the use of SCR for NO_X control is not justifiable as BACT at this time.

A review of the permitting activities for combustion turbine 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, and various capacity factors). Although, the cost and other concerns expressed by the applicant are valid, the Department, in this case, is willing to accept water/steam injection and low NO_X burner design as BACT for this project for a limited time (up to 12/31/97).

It is the Department's understanding that combustion turbine manufacturers are developing programs using either steam/water injection or dry low NO_X combustor technology to achieve a NO_X emission control level of 9 ppm when firing natural gas.

Based on this, the Department has determined to revise and lower the allowable BACT limit for this project to 15 ppmvd at 15% O_2 no later than 12/31/97. If the CT's are not meeting this standard by December 31, 1997, the Department may require the installation of an SCR system on each CT. For this turbine, an even lower NO_X emission level than 15 ppmvd, at 15% O_2 ISO conditions, may become a condition of the permit pursuant to F.A.C. Rule 17-4.080.

Carbon Monoxide (CO)

CO emissions are caused by incomplete combustion of the fossil fuel. The applicant investigated the use of combustion control and catalytic oxidation to control CO emission. With combustion control, CO emissions would be 30 ppmvd (236 TPY). With catalytic oxidation, CO emissions would be 10 ppmvd (78 TPY). The air quality impact of 236 TPY CO emissions is below the significant impact level. The annualized cost of the catalyst system is $834,700 or $5,280 per ton of CO removed.

BACT Determination for CO for the CT's by Department

Because catalytic oxidation would increase operation cost by $5,280 per ton of CO removed, and have no measurable reduction in air quality impact, the Department accepts an emission limit for CO of 30 ppmvd obtained through combustion control as BACT for these CTs.

Volatile Organic Compounds (VOC)

VOC emissions are caused by incomplete combustion of fossil fuel. The applicant proposes to meet an emission limit of 10 ppmvd through the use of clean fuel (natural gas) and combustion controls. This is similar to the BACT applied to other sources.

BACT Determinations for VOC for the CTs by Department

The Department accepts an emission limit for VOC of 10 ppmvd obtained through the use of clean fuel (natural gas) and combustion control as BACT for these CTs.

Particulate Matter (PM/PM_{10})

PM emissions are caused by incomplete combustion and traces of solids in the fuel. Proper combustion of clean fuel will emit only trace amounts of PM/PM_{10}. Each proposed CT will emit 5 lbs/hr of PM/PM_{10} or about 0.01 grains per standard cubic foot (gr/dscf). This is similar to the PM/PM_{10} emissions that can be met with the best air pollution control device, a baghouse.

BACT Determination for PM/PM_{10} for the CTs by Department

The Department accepts an emission limit for PM/PM_{10} of 5 lbs/hr and 10 percent opacity as BACT for each CT.

BACT Pollutant Analysis for the Auxiliary Boiler

Nitrogen Oxides (NO_X)

Nitrogen oxide emissions from boilers can be controlled by selective catalytic reduction (SCR), flue gas recirculation (FGR), and low-NO_X combustors.

The applicant proposes to meet a NO_X emission limit of 0.13 lbs/MMBtu through the use of low-NO_X combustors. This emission limit is below the new source performance standard for large boilers. The cost of using SCR or FGR would exceed $5,000 per ton NO_X removed.

BACT Determined for NO_X for the Boiler by Department

The Department accepts an emission limit for NO_X of 0.13 lbs/MMBtu as BACT for this boiler.

Particulate Matter (PM/PM_{10}), Carbon Monoxide (CO), and Volatile Organic Compounds (VOC)

PM/PM_{10}, CO and VOC are the products of incomplete combustion of fossil fuel. The applicant proposes to meet emission limits of 0.01 lbs PM/MMBtu, 0.10 lbs CO/MMBtu, 0.04 lbs VOC/MMBtu through the use of clean fuel (natural gas/equivalent biogas) and combustion control. Visible emissions shall not exceed 15 percent opacity.

BACT Determination for PM, CO, and VOC for the Boiler by Department

The Department accepts the use of clean fuel (natural gas/equivalent biogas) and combustion controls to meet the proposed emission limits for PM/PM_{10}, CO, and VOC as BACT for this boiler.

Sulfur Dioxide (SO_2)

Sulfur dioxide emissions are caused by the oxidation of sulfur in the fuel. Natural gas/equivalent biogas contains only trace amounts of sulfur - 1 grain per 100 cubic feet (gr/100 CF). This will result in an estimated sulfur dioxide emission of 0.30 lbs/hr. Cleaner fuel is not available and add on controls for SO_2 are not justified at this low emission rate.

BACT Determination for SO_2 for the Boiler by Department

Natural gas/equivalent biogas fuel containing a maximum of 1 gr/100 CF is accepted as BACT for SO_2 control for this boiler.

Summary of the BACT Determination by Department

Pollutant	Emission Limits	EPA Test Methods
COMBUSTION TURBINE		
NOx	25 ppmvd @ 15% O_2 ISO conditions by Dec. 31, 1997 15 ppmvd @ 15% O_2 ISO conditions after Dec. 31, 1997	20
CO	30 ppmvd	10
VOC	10 ppmvd	25
PM/PM_{10}	5 lbs/hr	5,17,201, or 201A (any one)
AUXILIARY BOILER		
NO_x	0.13 lbs/MMBtu	7E
PM/PM_{10}	0.01 lbs/MMBtu	5,17,201,201A, or 9
CO	0.10 lbs/MMBtu	10 or 9
VOC	0.04 lbs/MMBtu	25 or 9
SO_2	1 gr sulfur/100 CF gas	fuel analysis
Visible Emissions	15 percent opacity	9

Details of the Analysis May be Obtained by Contacting:
Doug Outlaw, P.E., BACT Coordinator
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended by:

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

Date 1993

Approved by:

Virginia B. Wetherell, Secretary
Dept. of Environmental Protection

Date 1993

Best Available Control Technology (BACT) Determination
Orange Cogeneration Limited Partnership
Polk County
AC53-233851, AC53-233852, PSD-FL-206

The applicant proposes to construct a 103 gross megawatt (MW) natural gas/equivalent biogas fired cogeneration facility in Bartow, Polk County, Florida. Major components of the cogeneration facility are: two combustion turbines (CT), each with a heat recovery steam generator (HRSG), an auxiliary boiler, steam turbine generator, and associated equipment. Both CTs will consume up to 776 million British thermal units per hour (MMBtu/hr) of gas fuel based on the lower heating value (LHV) of the fuel and produce 78 MW of electricity. The HRSGs, which do not use supplemental fuel, produce approximately 100,000 lbs/hr of steam that can generate 25 MW of electricity. The fire-tube auxiliary boiler consumes 100 MMBtu/hr of gas fuel and produces approximately 83,000 lbs/hr of steam.

The following table lists the estimated maximum emissions from the cogeneration facility.

	Two CTs		Auxiliary Boiler	
Pollutant	lbs/hr	TPY	lbs/hr	TPY
Sulfur dioxide (SO_2)	2.34	10.3	0.3	1.3
Particulate Matter (PM/PM_{10})	10	43.8	1.0	4.4
Nitrogen Oxide (NO_X)	77.0	336.9	13.0	56.9
Carbon Monoxide (CO)	55.6	243.9	10.0	43.8
Volatile Organic Compounds (VOC)	7.96	34.9	4.3	18.8
Sulfuric Acid Mist	0.18	0.79	0.023	0.1

The cogeneration facility requires a BACT determination for NO_X, CO, PM, and VOC. In addition, the auxiliary boiler requires a BACT determination for SO_2.

Date of Receipt of a BACT Application

July 1, 1993

BACT Requested by the Applicant

Pollutant	Proposed Limit	Air Pollution Control
Combustion Turbine		
PM	0.01 gr/scf*	Clean Fuel (gas)
NO_X	25 ppmvd @ 15%**	Wet Injection (WI) or
	15 ppmvd @ 15%**	Dry Low-NO_X Combustors

CO	30 ppmvd	Combustion Controls
VOC	10 ppmvd	Combustion Controls

Auxiliary Boiler

PM	0.01 lbs/MMBtu	Clean Fuel (gas)
NO_x	0.13 lbs/MMBtu	Low-NO_x burners
SO_2	1 grain/100CF natural gas	Clean Fuel (natural gas)
CO	0.10 lbs/MMBtu	Combustion Control
VOC	0.043 lbs/MMBtu	Combustion Control

*grains per standard cubic foot
**parts per million by volume dry at 15 percent oxygen and ISO conditions
Applicant is committed to meeting 15 ppmvd @ 15% O_2 and ISO conditions with dry low-NO_x combustors after December 31, 1997.

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-212, 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 cogeneration facilities 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:

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

Although all of the pollutants addressed in the BACT analysis may be subjected 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, 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.

BACT Pollutant Analysis for Combustion Turbines (CT)

Nitrogen Oxides (NO_X)

The emissions of nitrogen oxides represent a significant proportion of the total emissions generated by this project, and need to be controlled if deemed appropriate. As such, the applicant presented an extensive analysis of the different available technologies for NO_X control. The control technologies evaluated were selective catalytic reduction (SCR), wet injection (WI), dry low-NO_X combustor, NO_XOUT process, thermal DeNO_X, and selective noncatalytic reduction (SNCR).

NO_XOUT (urea with catalyst), thermal DeNO_X (ammonia with catalyst), and selective noncatalytic reduction system (ammonia without catalyst) to reduce NO_X emissions from the CT were not feasible because of process constraints (flue gas temperature too low and oxygen content too high).

SCR, dry low-NO_X combustor technology, and wet injection controls were considered feasible.

The applicant has stated that BACT for nitrogen oxides will be met initially by using water/steam injection or advanced combustor design to limit emissions to 25 ppmvd 15% O_2 and ISO conditions when burning natural gas/equivalent biogas. After December 31, 1995, dry low NO_X combustion will be used to meet the same NO_X emission limit of 25

ppmvd @ 15% O_2 and ISO conditions. After December 31, 1997, a limit of 15 ppmvd @ 15% O_2 and ISO conditions will be met. Should 15 ppmvd NO_X @ 15% O_2 and ISO conditions not be achieved during the initial compliance tests, the permittee will provide the Department with a plan and schedule to meet this standard.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NO_X 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 SCR system.

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

The effect of exhaust gas temperature on NO_X reduction depends on the specific catalyst formulation and reactor design. Generally, SCR units can be designed to achieve effective NO_X control over a 100-300°F operating window within the bounds of 450-800°F, although recently developed zeolite-based catalysts are claimed to be capable of operating at temperatures as high as 950°.

Most commercial SCR systems operate over a temperature range of about 600-750°F. At levels above and below this window, the specific catalyst formulation will not be effective and NO_X reduction will decrease. Operating at high temperatures can permanently damage the catalyst through sintering of surfaces.

Increased water vapor content in the exhaust gas (as would result from water or steam injection in the gas turbine combustor) can shift the operating temperature window of the SCR reactor to slightly higher levels.

Although technically feasible, the applicant has rejected using SCR on the combined cycle because of economic, energy, and environmental impacts. The applicant has identified the following limitations:

a) Reduced power output.
b) Emissions of unreacted ammonia (slip).
c) Disposal of hazardous waste generated (spent catalyst).
d) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH_3 with SO_3 present in the exhaust gases.

e) The energy impacts of SCR will reduce potential electrical power generation by 0.8 percent.
f) Incremental cost effectiveness for the application of SCR technology to the Orange Cogeneration L.P. project was considered to be $7,970 when emissions are at 25 ppm and $23,510 when emissions are at 15 ppm. Since SCR has been determined to be BACT for gas turbines, 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 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."

The cost associated with controlling NO_X emissions must take into account the potential operating problems that can occur with using SCR.

A concern associated with the use of SCR on combustion turbines is the formation of ammonium bisulfate. For the SCR process, ammonium bisulfate can be formed due to the reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate formed has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. As this is the case, SCR has been judged to be technically infeasible in some previous BACT determinations. This salt also increases particulate matter (PM/PM_{10}) emissions.

For natural gas/equivalent biogas firing operation, NO_X emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater ammonia injection ratio. 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 with NO_X emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control established.

The applicant has indicated that the total levelized annual operating cost to install SCR on two CTs for this project at 100 percent capacity factor and burning natural gas/equivalent biogas is $1,648,000. Taking into consideration the total annual cost, a cost/benefit analysis of using SCR can now be developed.

Initially, NO_X emissions will be 25 ppmvd @ 15% O_2 and ISO conditions. Emissions will be 318 TPY NO_X with WI. When dry-low NO_X controls are installed, NO_X emissions will be 305 TPY. After the combustion turbines meet the NO_X emissions standard of 15 ppmvd @ 15% O_2 and ISO conditions, NO_X emissions will be 191 TPY. A SCR would reduce the NO_X emissions by 207 TPY during the first 2 years of operation when the CTs emit 25 ppmvd @ 15% O_2 and ISO conditions. Thereafter, when dry-low NO_X controls are used, a SCR would reduce NO_X emissions by 120 TPY. When these reductions are taken into consideration, the total cost with SCR is $21,900 per ton of NO_X removed. This calculated cost is higher than has previously been approved as BACT.

A review of the latest Department BACT determinations show limits of 15 ppmvd (natural gas) using low-NO_X burn technology for gas turbines. Most combustion turbine manufacturers are currently developing programs using both steam/water injection and dry low NO_X combustor to achieve NO_X emission control level of 9 ppm when firing natural gas. Therefore, this technology will likely be available by 1998.

BACT Determination for NO_X for the CT's by Department

NO_X Control

The information that the applicant presented and Department calculation indicate that the cost per ton of controlling NO_X for this turbine [$21,900 per ton] is high compared to other BACT determinations which require SCR. Based on the information presented by the applicant, the Department believes that the use of SCR for NO_X control is not justifiable as BACT at this time.

A review of the permitting activities for combustion turbine 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, and various capacity factors). Although, the cost and other concerns expressed by the applicant are valid, the Department, in this case, is willing to accept water/steam injection and low NO_X burner design as BACT for this project for a limited time (up to 12/31/97).

It is the Department's understanding that combustion turbine manufacturers are developing programs using either steam/water injection or dry low NO_X combustor technology to achieve a NO_X emission control level of 9 ppm when firing natural gas.

Based on this, the Department has determined to revise and lower the allowable BACT limit for this project to 15 ppmvd at 15% O_2 no later than 1/1/98.

Carbon Monoxide (CO)

CO emissions are caused by incomplete combustion of the fossil fuel. The applicant investigated the use of combustion control and catalytic oxidation to control CO emission. With combustion control, CO emissions would be 30 ppmvd (236 TPY). With catalytic oxidation, CO emissions would be 10 ppmvd (78 TPY). The annualized cost of the catalyst system is $834,700 or $5,280 per ton of CO removed.

BACT Determination for CO for the CT's by Department

Because catalytic oxidation would increase operation cost by $5,280 per ton of CO removed, and have no significant reduction in ambient air quality, the Department accepts an emission limit for CO of 30 ppmvd obtained through combustion control as BACT for these CTs.

Volatile Organic Compounds (VOC)

VOC emissions are caused by incomplete combustion of fossil fuel. The applicant proposes to meet an emission limit of 10 ppmvd through the use of clean fuel (natural gas) and combustion controls. This is similar to the BACT applied to other sources.

BACT Determinations for VOC for the CTs by Department

The Department accepts an emission limit for VOC of 10 ppmvd obtained through the use of clean fuel (natural gas) and combustion control as BACT for these CTs.

Particulate Matter (PM/PM_{10})

PM emissions are caused by incomplete combustion and traces of solids in the fuel. Proper combustion of clean fuel will emit only trace amounts of PM/PM_{10}. Each proposed CT will emit 5 lbs/hr of PM/PM_{10} or about 0.01 grains per standard cubic foot (gr/dscf). This is similar to the PM/PM_{10} emissions that can be met with the best air pollution control device, a baghouse.

BACT Determination for PM/PM_{10} for the CTs by Department

The Department accepts an emission limit for PM/PM_{10} of 5 lbs/hr and 10 percent opacity as BACT for each CT.

BACT Pollutant Analysis for the Auxiliary Boiler

Nitrogen Oxides (NO_x)

Nitrogen oxide emissions from boilers can be controlled by selective catalytic reduction (SCR), flue gas recirculation (FGR), and low-NO_x combustors.

The applicant proposes to meet a NO_x emission limit of 0.13 lbs/MMBtu through the use of low-NO_x combustors. This emission limit is below the new source performance standard for large boilers. The cost of using SCR or FGR would exceed $5,000 per ton NO_x removed.

BACT Determined for NO_x for the Boiler by Department

The Department accepts an emission limit for NO_x of 0.13 lbs/MMBtu as BACT for this boiler.

Particulate Matter (PM/PM_{10}), Carbon Monoxide (CO), and Volatile Organic Compounds (VOC)

PM/PM_{10}, CO and VOC are the products of incomplete combustion of fossil fuel. The applicant proposes to meet emission limits of 0.01 lbs PM/MMBtu, 0.10 lbs CO/MMBtu, 0.04 lbs VOC/MMBtu through the use of clean fuel (natural gas/equivalent biogas) and combustion control. Visible emissions shall not exceed 15 percent opacity.

BACT Determination for PM, CO, and VOC for the Boiler by Department

The Department accepts the use of clean fuel (natural gas/equivalent biogas) and combustion controls to meet the proposed emission limits for PM/PM_{10}, CO, and VOC as BACT for this boiler.

Sulfur Dioxide (SO_2)

Sulfur dioxide emissions are caused by the oxidation of sulfur in the fuel. Natural gas/equivalent biogas contains only trace amounts of sulfur - 1 grain per 100 cubic feet (gr/100 CF). This will result in an estimated sulfur dioxide emission of 0.30 lbs/hr. Cleaner fuel is not available and add on controls for SO_2 are not justified at this low emission rate.

BACT Determination for SO_2 for the Boiler by Department

Natural gas/equivalent biogas fuel containing a maximum of 1 gr/100 CF is accepted as BACT for SO_2 control for this boiler.

Summary of the BACT Determination by Department

Pollutant	Emission Limits	EPA Test Methods
COMBUSTION TURBINE		
NOx	25 ppmvd @ 15% O_2 ISO conditions until Dec. 31, 1997 15 ppmvd @ 15% O_2 ISO conditions after Dec. 31, 1997	20
CO	30 ppmvd	10
VOC	10 ppmvd	18, 25 or 25A
PM/PM_{10}	5 lbs/hr	5, 17*, or 201A and 202
AUXILIARY BOILER		
NO_x	0.13 lbs/MMBtu	7E
PM/PM_{10}	0.01 lbs/MMBtu	5, 17*, or 201A and 202
CO	0.10 lbs/MMBtu	10
VOC	0.04 lbs/MMBtu	18, 25 or 25A
SO_2	1 gr sulfur/100 CF gas	fuel analysis
Visible Emissions	15 percent opacity	9

*Stack flue gas temperature must be less than 320°F.

Details of the Analysis May be Obtained by Contacting:
Doug Outlaw, P.E., BACT Coordinator
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended by:

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

Dec 29 1993
Date

Approved by:

Virginia B. Wetherell, Secretary
Dept. of Environmental Protection

29 Dec 1993
Date

Florida Department of
Environmental Protection

Memorandum

TO: Howard L. Rhodes

FROM: Clair H. Fancy I SIGNED

DATE: December 27, 1999

SUBJECT: FINAL Permit No.: 1050231-005-AC
Orange Cogeneration Limited Partnership
Orange Cogeneration Facility

This permit is for a minor modification to the air construction permit for the subject facility. The permitted emission rate of nitrogen oxides (NO_X) for Units 1 and 2 while firing natural gas or biogas is 25 ppm. Effective January 1, 2000 the permitted NO_X emission rate for each unit decreases to 15 ppm while firing natural gas or biogas firing, causing the potential TPY of NO_X to be reduced by 67.4 TPY for each unit.

OCLP requests that the aforementioned NO_X emission rates for each unit remain at 25 ppm, for a period of time adequate to allow for the installation and testing of wet technologies. OCLP has determined that an extension of 20 months (through August 2001) will allow adequate time for the units to be capable of achieving the lower (15 ppm) limits through the application of this technology. No other emission limit increases are requested.

We received no public comments and no comments from OCLP on the DRAFT permit.

We received no adverse comments from Region 4, U.S. EPA or the NPS.

I recommend your signature.

Attachment

CHF/aal/mph

Z 031 391 913

US Postal Service
Receipt for Certified Mail
No Insurance Coverage Provided.
Do not use for International Mail *(See reverse)*

Sent to Wade Smith	
Street & Number Orange Cogen	
Post Office, State, & ZIP Code Lakeland FL	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date 12-28-99	

1050231-005-AC
POD-FL-206C

PS Form **3800**, April 1995

Is your RETURN ADDRESS completed on the reverse side?

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

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Wade Smith, Gen. Mgr
Orange Cogen, LP
1125 US 98 South
Lakeland, FL 33801

4a. Article Number
Z 031 391 913

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

7. Date of Delivery
12/30/99

5. Received By: *(Print Name)*

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

6. Signature: *(Addressee or Agent)*
X

Thank you for using Return Receipt Service.

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