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State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Carol M. Browner

FROM: Howard L. Rhodes

DATE: December 11, 1992

SUBJ: Approval of Construction Permit **AC**53-208321 (PSD-FL-185)
Auburndale Power Partners

Attached for your approval and signature is a permit prepared by the Bureau of Air Regulation for the above mentioned company to construct a 156 MW combined cycle system.

Auburndale Power Partners, Limited Partnership proposes to operate a combined cycle system consisting of one 104 MW combustion turbine (CT), Westinghouse 501D, one 52 MW steam turbine (ST), and one unfired heat recovery steam generator (HRSG) and ancillary equipment. This total system is rated at 156 MW output nominal capacity. Natural gas will be the primary fuel for the cogeneration facility over its lifetime. A long-term contract for natural gas has been obtained, and a pipeline to the site is scheduled to be completed by December 1, 1994. No. 2 distillate fuel oil (0.05% S by weight) will be the backup fuel. Fuel oil will be delivered to the site by truck and stored on site in two 600,000 gallon storage tanks. Pending the completion of the natural gas pipeline, fuel oil may be used continuously during the facility's first 18 months of operation. Fuel oil will be used for a maximum of 400 hours per year thereafter. 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.

No adverse comments were submitted by the U.S. Environmental Protection Agency (EPA) in their letter dated October 28, 1992, or by the U.S. Department of the Interior in their letter dated November 5, 1992. Comments regarding an error in Table 1 were received from Mr. Thomas W. Davis, Senior Environmental Engineer for Environmental Consulting & Technology, Inc. (ECT). The Bureau has considered Mr. Davis' comments and has corrected Table 1 as requested.

I recommend your approval and signature.

CHF/TH/plm

Attachments

Final Determination

Auburndale Power Partners, Limited Partnership
Auburndale, Polk County, Florida

156 MW Combined Cycle System

Permit Number: AC53-208321
PSD-FL-185

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

December 11, 1992

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

In the matter of an
Application for Permit by:

DER File No. AC 53-208321
PSD-FL-185
Polk County

Ms. Patricia A. Haslach
Environmental Manager
Auburndale Power Partners, Limited Partnership
12500 Fair Lakes Circle, Suite 420
Fairfax, Virginia 22033

_____/

Enclosed is Permit Number AC 53-208321 to construct a 156 MW combined cycle combustion turbine at the Auburndale Power Partners, Limited Partnership facility in Auburndale, Polk County, Florida. This permit is issued pursuant to Section(s) 403, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

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, FL 32399-2400
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 12-17-92 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.

(Clerk) 12-17-92 (Date)

Copies furnished to:

T. Davis, P.E.
B. Thomas, SWD
J. Harper, EPA
B. Mitchell, NPS
D. Martin, PCPD

FINAL DETERMINATION

The Technical Evaluation and Preliminary Determination for the permit to construct a 156 MW combined cycle combustion turbine at the Auburndale Power Partners (APP), Limited Partnership facility in Auburndale, Polk County, was distributed on October 1, 1992. The Notice of Intent was published in The Auburndale Star on October 8, 1992. Copies of the evaluation were available for inspection at the Department's offices in Tampa and Tallahassee.

APP's application for a permit to construct a 156 MW combined cycle combustion turbine at their Auburndale site has been reviewed by the Bureau of Air Regulation in Tallahassee.

No adverse comments were submitted by the U.S. Environmental Protection Agency (EPA) in their letter dated October 28, 1992, or by the U.S. Department of the Interior in their letter of November 5, 1992. Comments regarding an error in Table 1 were received from Mr. Thomas W. Davis, Senior Environmental Engineer for Environmental Consulting & Technology, Inc. (ECT). The Bureau has considered Mr. Davis' comments and has corrected Table 1 as requested.

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

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:
Auburndale Power Partners
12500 Fair Lakes Circle, Ste. 420
Fairfax, Virginia 22033

Permit Number: AC 53-208321
PSD-FL-185
Expiration Date: Oct. 30, 1995
County: Polk
Latitude/Longitude: 28°03'15"N
81°48'20"W
Project: 156 MW Combined Cycle System

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 or on file with the Department and made a part hereof and specifically described as follows:

Auburndale Power Partners proposes to operate a combined cycle system consisting of one combustion turbine, one steam turbine, and one heat recovery steam generator and ancillary equipment. This total system is rated at 156 MW output nominal capacity (52 MW output from the steam turbine generator). This facility is located on County Road 544-A (Derby Avenue) in Auburndale, Polk County, Florida. The UTM coordinates are Zone 17, 420.8 km East and 3103 km North.

The sources 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. Auburndale Power Partners (APP) application received February 10, 1992.
2. Department's letter dated March 10, 1992.
3. APP's letter received April 28, 1992.
4. APP's letter received May 19, 1992.
5. APP's letter received June 18, 1992.

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 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

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

13. This permit also constitutes:

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

14. The permittee shall comply with the following:

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

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;

GENERAL CONDITIONS:

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

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

SPECIFIC CONDITIONS:

Emission Limits

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

2. Visible emissions shall not exceed 20% opacity. At full load, visible emissions shall not exceed 10% opacity.

Operating Rates

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

4. This source is allowed to use natural gas as the primary fuel and low sulfur No. 2 distillate oil as the secondary fuel (with the conditions specified in Specific Condition No. 5 below).

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

a) Maximum low sulfur No. 2 fuel oil consumption for the facility shall be allowed for the equivalent of 18 months (13,140 hours) of the initial facility operation, or until the Florida Gas Transmission (FGT) Phase III expansion is complete and natural gas is available; whichever occurs first. The unit start-up is expected by 10/94 and natural gas would be used by 4/96.

b) Once the FGT Phase III expansion is complete and natural gas is available to the facility, low sulfur No. 2 fuel oil firing shall be limited to 400 hours annually.

SPECIFIC CONDITIONS:

c) Maximum sulfur content in No. 2 fuel oil shall not exceed 0.05 percent by weight.

d) The maximum heat input of 1,170 MMBtu/hr LHV at ISO conditions (base load) for distillate fuel oil No. 2.

e) The maximum heat input of 1,214 MMBtu/hr LHV at ISO conditions (base load) for natural gas.

6. Any change in the method of operation, equipment or operating hours shall be submitted to DER's Bureau of Air Regulation.

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

Compliance Determination

8. Compliance with the NO_x, SO_2, CO, PM, PM_{10}, and VOC standards shall be determined (while operating at 95-100% of the permitted maximum heat rate input) within 180 days of initial operation and annually thereafter, by the following reference methods as described in 40 CFR 60, Appendix A (July, 1991 version) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 5. Determination of Particulate Matter Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 8. Determination of the Sulfuric Acid of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 20. Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines (initial test only)
- Method 25A. Determination of the Volatile Organic Compounds Emissions from Stationary Sources

Other DER approved methods may be used for compliance testing after prior Departmental approval.

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

SPECIFIC CONDITIONS:

10. Compliance with the SO_2 emission limit can also be determined by calculations based on fuel analysis using ASTM D4292 for the sulfur content of liquid fuels and ASTM D4084-82 or D3246-81 for sulfur content of gaseous fuel.

11. Trace elements of Beryllium (Be) shall be tested during initial compliance test using EMTIC Interim Test Method. As an alternative, Method 104 may be used; or Be may be determined from fuel sample analysis using either Method 7090 or 7091, and sample extraction using Method 3040 as described in the EPA solid waste regulations SW 846.

12. Mercury (Hg) shall be tested during initial compliance test using EPA Method 101 (40 CFR 61, Appendix B) or fuel sampling analysis using methods acceptable to the Department.

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

$$NO_X = (NO_{X\ obs}) \left(\frac{P_{ref}}{P_{obs}}\right)^{0.5} e^{19\ (H_{obs} - 0.00633)} \left(\frac{288°K}{T_{AMB}}\right)^{1.53}$$

where:

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

$NO_{X\ obs}$ = Measured NO_X emission at 15 percent oxygen, ppmv.

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

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

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

e = Transcendental constant (2.718).

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

14. Test results will be the average of 3 valid runs. The Southwest District office will be notified at least 30 days in writing in advance of the compliance test(s). The sources shall

SPECIFIC CONDITIONS:

operate between 95% and 100% of permitted capacity during the compliance test(s) as adjusted for ambient temperature. Compliance test results shall be submitted to the Southwest District office no later than 45 days after completion.

15. The permittee shall leave sufficient space suitable for future installation of SCR equipment should the facility be unable to meet the NO_X standards, if required.

16. 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).

17. A continuous monitoring system shall be installed to monitor and record the fuel consumption on each unit. While steam injection is being utilized for NO_X control, the steam to fuel ratio at which compliance is achieved ~~shall be incorporated into the permit and shall be continuously monitored~~. The system shall meet the requirements of 40 CFR Part 60, Subpart GG. with 40 CFR 60.5 Subpart GG Standards for NOx determined and recorded.

18. Sulfur, ~~nitrogen content~~ and lower heating value of the fuel being fired in the combustion turbines shall be based on a weighted 12 month rolling average from fuel delivery receipts. The records of fuel oil usage shall be kept by the company for a two-year period for regulatory agency inspection purposes. For sulfur dioxide, periods of excess emissions shall be reported if the fuel being fired in the gas turbine exceeds 0.05 percent sulfur by weight.

Rule Requirements

19. This source shall comply with all applicable provisions of Chapter 403, Florida Statutes, Chapters 17-210, 212, 296, 297 and 17-4, Florida Administrative Code and 40 CFR (July, 1991 version).

20. The sources shall comply with all requirements of 40 CFR 60, Subpart GG, and F.A.C. Rule 17-296.800(2)(a), Standards of Performance for Stationary Gas Turbines.

21. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-2.210.300(1)).

SPECIFIC CONDITIONS:

22. This source shall be in compliance with all applicable provisions of F.A.C. Rules 17-210.650: Circumvention; 17-2.250: Excess Emissions; 17-296.800: Standards of Performance for New Stationary Sources (NSPS); 17-297: Stationary Point Source Emission Test Procedures; and, 17-4.130: Plant Operation-Problems.

23. If construction does not commence within 18 months of issuance of this permit, then the permittee shall obtain from DER a review and, if necessary, a modification of the control technology and allowable emissions for the unit(s) on which contruction has not commenced (40 CFR 52.21(r)(2)).

24. Quarterly excess emission reports, in accordance with the July 1, 1991 version of 40 CFR 60.7 and 60.334 shall be submitted to DER's Southwest District office.

25. Literature on equipment selected shall be submitted as it becomes available. A CT-specific graph of the relationship between NOx emissions and steam injection and also another of ambient temperature and heat inputs to the CT shall be submitted to DER's Southwest District office and the Bureau of Air Regulation.

26. Construction period fugitive dust emissions shall be minimized by covering or watering dust generation areas.

27. 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, ~~nitrogen contents and~~ the lower heating value of the fuel being fired, fuel usage, hours of operation, air emissions limits, etc. Annual reports shall be sent to the Department's Southwest District office by March 1 of each calendar year.

28. 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).

29. 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

PERMITTEE:
Auburndale Power Partners

Permit Number: AC 53-208321
PSD-FL-185
Expiration Date: October 30, 1995

SPECIFIC CONDITIONS:

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 14th day
of December, 1992

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Carol M. Browner
Secretary

Best Available Control Technology (BACT) Determination
Auburndale Power Partners
Polk County

The applicant proposes to install a combustion turbine generator at their facility in Polk County. The generator system will consist of one nominal 104 megawatt (MW) combustion turbine (CT), with exhaust through heat recovery steam generator (HRSG), which will be used to power a nominal 52 MW steam turbine.

The combustion turbine (Westinghouse 501D) will be capable of combined cycle operation. The applicant requested that the combustion turbine use oil (0.05% S by weight) for the first eighteen (18) months; thereafter, they will use natural gas. The applicant has indicated the maximum annual tonnage of regulated air pollutants emitted from the facility based on 100 percent capacity factor and type of fuel fired to be as follows:

Pollutant	Emissions (TPY) Oil	Gas/Oil	PSD Significant Emission Rate (TPY)
NO_x	1,007	573.8	40
SO_2	307	175.2	40
PM/PM_{10}	161	46	25/15
CO	320	190	100
VOC	44	27	40
H_2SO_4	39	23	7
Be	0.01	0.01	0.0004
As	0.05	0.05	0.1
Pb	0.51	0.51	0.6

Florida Administrative Code (F.A.C.) Rule 17-212.400 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

February 2, 1992

BACT Determination Requested by the Applicant

Pollutant	Proposed Limits
NO_x	25 ppmvd @ 15% O_2 (natural gas burning) 42 ppmvd @ 15% O_2 for oil firing
SO_2	0.05% sulfur by weight
CO, VOC	Combustion Control
PM/PM_{10}	Combustion Control

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, than 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:

- Combustion Products (e.g., particulates). 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.

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.

BACT POLLUTANT ANALYSIS

COMBUSTION PRODUCTS

Particulate Matter (PM/PM_{10})

The design of this system ensures that particulate emissions will be minimized by combustion control and the use of clean fuels. The particulate emissions from the combustion turbine when burning natural gas and fuel oil will not exceed 0.013 and 0.047 lb/MMBtu, respectively. The Department accepts the applicant's proposed control for particulate matter and heavy metals.

Lead, Arsenic, Berylium (Pb, As, Be)

The Department agrees with the applicant's rationale that there are no feasible methods to control lead, beryllium, and arsenic; except by limiting the inherent quality of the fuel.

Although the emissions of these 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 these pollutants.

PRODUCTS OF INCOMPLETE COMBUSTION

Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

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 15 ppmvd for natural gas firing and 25 ppmvd for fuel oil firing.

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.

Due to the oxidation of sulfur compounds and excessive formation of H_2SO_4 mist emissions, oxidation catalyst are not considered to be technically feasible for gas turbines fired with fuel oil. Catalytic oxidation has not been demonstrated on a continuous basis when using fuel oil.

Use of oxidation catalyst technology would be feasible for natural gas-fired unit; however, the cost effectiveness of $7,099 per ton of CO removed will have an economic impact on this project.

The Department is in agreement with the applicant's proposal of combustor design and good operating practices as BACT for CO and VOCs for this cogeneration project.

ACID GASES

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 applicant has stated that BACT for nitrogen oxides will be met by using steam injection and advanced combustor design to limit emissions to 25 ppmvd (corrected to 15% O_2) when burning natural gas and 42 ppmvd (corrected to 15% O_2) when burning fuel oil.

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 selective catalytic reduction (SCR) system.

Selective catalytic reduction 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 through the catalyst bed. The SCR process can achieve up to 90% reduction of NO_X with a new catalyst. As the catalyst ages, the maximum NO_X reduction will decrease to approximately 86 percent.

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

a) Reduced power output.
b) Ammonia slip.
c) Disposal of hazardous waste generated (spent catalyst).
d) A total SCR energy penalty of 14,911 MMBtu/yr, which is equivalent to the use of 14.2 million ft^3 of natural gas annually, based on a gas heating value of 1,050 Btu per ft^3.
e) Since several schools are located within close proximity to the site, the Polk County Planning Commission and the school boards have expressed concern over the potential for ammonia (NH_3) exposure to high concentration and storage, as well.
f) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH_3 with SO_3 present in the exhaust gases.
g) Cost effectiveness for the application of SCR technology to the Auburndale cogeneration project was considered to be $6,900 per ton of NO_X removed.

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 NO_X 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 NO_X injection ratio. For natural gas firing operation NO_X 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 NO_X 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 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 cost (operating plus amortized capital cost) to install SCR for this project at 100 percent capacity factor is $2,283,326. 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 NO_X emissions using steam injection and advanced combustor design will be 574 tons/year. Assuming that SCR would reduce the NO_X emissions by 65%, about 201 tons of NO_X would be emitted annually. When this reduction (373 TPY) is taken into consideration with the total levelized annual cost of $2,283,326; the cost per ton of controlling NO_X is $6,121. This calculated cost is higher than has previously been approved as BACT.

A review of the latest DER BACT determinations show limits of 15 ppmv (natural gas) using low-NO_X burn technology. Based on the equipment selected, the applicant could not achieve that limit (15 ppmv) due to the fact that it is technically infeasible since their vendor, Westinghouse, does not presently offer this technology. The applicant and their CT vendor, Westinghouse, have agreed to lower NO_X to 15 ppm by 9/30/97. This lower NO_X limit will be

achieved by application of low-NO_x burners or SCR. Therefore, the Department has accepted the steam injection and advanced combustor design as BACT for a limited time (up to 9/30/97).

Sulfur Dioxide(SO_2) and Sulfuric Acid Mist (H_2SO_4)

The applicant has stated that sulfur dioxide (SO_2) and sulfuric acid mist (H_2SO_4) emissions when firing fuel oil will be controlled by lowering the operating time to 400 hours/year per unit and the fuel oil sulfur content to a maximum of 0.05 % by weight. This will result in an annual emission rate of 175 tons SO_2 per year and 23 tons H_2SO_4 mist per year.

In accordance with the "top down" BACT review approach, only two alternatives exist that would result in more stringent SO_2 emissions. These include the use of a lower sulfur content fuel oil or the use of wet lime or limestone-based scrubbers, otherwise known as flue gas desulfurization (FGD).

In developing the NSPS for stationary gas turbines, EPA recognized that FGD technology was inappropriate to apply to these combustion units. EPA acknowledged in the preamble of the proposed NSPS that "Due to the high volumes of exhaust gases, the cost of flue gas desulfurization (FGD) to control SO_2 emissions from stationary gas turbines is considered unreasonable."(23). EPA reinforced this point when, later on in the preamble, they stated that "FGD... would cost about two to three times as much as the gas turbine."(23). The economic impact of applying FGD today would be no different.

Furthermore, the application of FGD would have negative environmental and energy impacts. Sludge would be generated that would have to be disposed of properly, and there would be increased utility (electricity and water) costs associated with the operation of a FGD system. Finally, there is no information in the open literature to indicate that FGD has ever been applied to stationary gas turbines burning distillate oil.

The elimination of flue gas control as a BACT option then leaves the use of low sulfur fuel oil as the next option to be investigated. Auburndale Power Partners, as stated above, has proposed the use of No. 2 fuel oil with a 0.05% sulfur by weight as BACT for this project. The Department accepts their proposal as BACT for this project.

BACT Determination by DER

NO_X Control

The information that the applicant presented and Department calculations indicates that the cost of controlling NO_X ($6,900/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 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, 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 steam injection and advanced combustor design as BACT for a limited time (up to 9/30/97).

The Department will revise and lower the allowable BACT limit for this project no later than 9/30/97. It is the Department's understanding that Westinghouse will develop new combustor technology within this period. If the 15 (gas)/42 (oil) ppmvd emission rates cannot be met by September 30, 1997, SCR will be installed. Therefore, the permittee shall install a duct module suitable for future installation of SCR equipment.

SO_2 Control

BACT for sulfur dioxide is the burning of fuel oil No. 2 with 0.05% sulfur content by weight.

VOC and CO Control

Combustion control will be considered as BACT for CO and VOC when firing natural gas.

Other Emissions Control

The emission limitations for PM and PM_{10}, Be, Pb, and As are based on previous BACT determinations for similar facilities.

The emission limits for Auburndale Power Partners project are thereby established as follows:

Pollutant	Emission Standards/Limitations Oil[a]	Gas[b]	Method of Control
NO_X	42 ppmv	25 ppmv[c] 15 ppmv	Steam Injection
CO	73 lbs/hr	44 lbs/hr	Combustion
PM & PM10	37 lbs/hr	10 lbs/hr	Combustion
SO_2	70 lbs/hr	40 lbs/hr	No. 2 Fuel Oil (0.05% S)
H_2SO_4	14 lbs/hr	7.5 lbs/hr	No. 2 Fuel Oil (0.05% S)
VOC	10 lbs/hr	6 lbs/hr	Combustion
Pb	0.13 lb/hr		Fuel Quality
As	0.20 lb/hr		Fuel Quality
Be	0.003 lb/hr		Fuel Quality

(a) No. 2 fuel oil burning for the first eighteen (18) months of operation. Max. 0.05% S by weight.
(b) Natural gas (8360 hours per year), Fuel oil (400 hours per year).
(c) Initial NO_X emission rates for natural gas firing shall not exceed 25 ppm at 15% oxygen on a dry basis. The permittee shall achieve NO_X emissions of 15 ppm at 15% oxygen at the earliest achievable date based on steam injection technology or any other technology available, but no later than 9/30/97.

Details of the Analysis May be Obtained by Contacting:

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

Recommended by:

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

December 7, 1992
Date

Approved by:

Carol M. Browner, Secretary
Dept. of Environmental Regulation

December 14, 1992
Date

Best Available Control Technology (BACT) Determination
Auburndale Power Partners
Polk County

The applicant proposes to install a combustion turbine generator at their facility in Polk County. The generator system will consist of one nominal 104 megawatt (MW) combustion turbine (CT), with exhaust through heat recovery steam generator (HRSG), which will be used to power a nominal 52 MW steam turbine.

The combustion turbine (Westinghouse 501D) will be capable of combined cycle operation. The applicant requested that the combustion turbine use oil (0.05% S by weight) for the first eighteen (18) months; thereafter, they will use natural gas. The applicant has indicated the maximum annual tonnage of regulated air pollutants emitted from the facility based on 100 percent capacity factor and type of fuel fired to be as follows:

Pollutant	Emissions (TPY) Oil	Gas/Oil	PSD Significant Emission Rate (TPY)
NO_x	1,007	573.8	40
SO_2	307	175.2	40
PM/PM_{10}	161	46	25/15
CO	320	190	100
VOC	44	27	40
H_2SO_4	39	23	7
Be	0.01	0.01	0.0004
As	0.05	0.05	0.1
Pb	0.51	0.51	0.6

Florida Administrative Code (F.A.C.) Rule 17-212.400 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

February 2, 1992

BACT Determination Requested by the Applicant

Pollutant	Proposed Limits
NO_x	25 ppmvd @ 15% O_2 (natural gas burning) 42 ppmvd @ 15% O_2 for oil firing
SO_2	0.05% sulfur by weight
CO, VOC	Combustion Control
PM/PM_{10}	Combustion Control

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, than 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:

- Combustion Products (e.g., particulates). 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.

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.

BACT POLLUTANT ANALYSIS

COMBUSTION PRODUCTS

Particulate Matter (PM/PM_{10})

The design of this system ensures that particulate emissions will be minimized by combustion control and the use of clean fuels. The particulate emissions from the combustion turbine when burning natural gas and fuel oil will not exceed 0.013 and 0.047 lb/MMBtu, respectively. The Department accepts the applicant's proposed control for particulate matter and heavy metals.

Lead, Arsenic, Berylium (Pb, As, Be)

The Department agrees with the applicant's rationale that there are no feasible methods to control lead, beryllium, and arsenic; except by limiting the inherent quality of the fuel.

Although the emissions of these 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 these pollutants.

PRODUCTS OF INCOMPLETE COMBUSTION

Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

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 15 ppmvd for natural gas firing and 25 ppmvd for fuel oil firing.

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.

Due to the oxidation of sulfur compounds and excessive formation of H_2SO_4 mist emissions, oxidation catalyst are not considered to be technically feasible for gas turbines fired with fuel oil. Catalytic oxidation has not been demonstrated on a continuous basis when using fuel oil.

Use of oxidation catalyst technology would be feasible for natural gas-fired unit; however, the cost effectiveness of $7,099 per ton of CO removed will have an economic impact on this project.

The Department is in agreement with the applicant's proposal of combustor design and good operating practices as BACT for CO and VOCs for this cogeneration project.

ACID GASES

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 applicant has stated that BACT for nitrogen oxides will be met by using steam injection and advanced combustor design to limit emissions to 25 ppmvd (corrected to 15% O_2) when burning natural gas and 42 ppmvd (corrected to 15% O_2) when burning fuel oil.

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 selective catalytic reduction (SCR) system.

Selective catalytic reduction 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 through the catalyst bed. The SCR process can achieve up to 90% reduction of NO_X with a new catalyst. As the catalyst ages, the maximum NO_X reduction will decrease to approximately 86 percent.

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

a) Reduced power output.
b) Ammonia slip.
c) Disposal of hazardous waste generated (spent catalyst).
d) A total SCR energy penalty of 14,911 MMBtu/yr, which is equivalent to the use of 14.2 million ft^3 of natural gas annually, based on a gas heating value of 1,050 Btu per ft^3.
e) Since several schools are located within close proximity to the site, the Polk County Planning Commission and the school boards have expressed concern over the potential for ammonia (NH_3) exposure to high concentration and storage, as well.
f) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH_3 with SO_3 present in the exhaust gases.
g) Cost effectiveness for the application of SCR technology to the Auburndale cogeneration project was considered to be $6,900 per ton of NO_X removed.

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 NO_x 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.

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Details of the Analysis May be Obtained by Contacting:

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

Recommended by:

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

December 7, 1992
Date

Approved by:

Carol M. Browner, Secretary
Dept. of Environmental Regulation

December 14, 1992
Date