



Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

PERMITTEE:
Utility Board of the
City of Key West
1001 James Street
P.O. Drawer 6100
Key West, FL 33041

Permit Number: AC 44-245399
PSD-FL-210
Expiration Date: December 31, 1996
County: Monroe
Latitude/Longitude: 24°33'49"N
81°44'03"W
Project: 23.5 MW Simple Cycle
Combustion Turbine

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-212 and 62-4, Florida Administrative Code (F.A.C.). 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 specifically described as follows:

For the relocation of a simple cycle combustion turbine (CT) generator from Key West Power Plant to the existing Stock Island Power Plant (near Key West) in Monroe County. This generator is a General Electric (GE) Frame 5 model PG5341 CT (equipped with water injection for fuel oil firing) with a rated capacity of 23.5 megawatts at ISO conditions. The GE CT will have a heat input at 59°F of 312 MMBtu/hr (oil). The CT will be fired with No. 2 low sulfur fuel oil with a sulfur content not to exceed 0.05% by weight. NO_x emissions are controlled by a water injection system.

The source/emission unit(s) 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. Key West City Electric System application received February 14, 1994.
2. DEP's letter dated March 10, 1994.
3. R.W. Beck's letter dated June 10, 1994.
4. DEP's letter dated July 28, 1994.
5. R.W. Beck's letter dated March 3, 1995.
6. DEP's letter dated April 10, 1995.
7. R.W. Beck's letter dated April 20, 1995.

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GENERAL CONDITIONS:

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

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

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

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

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of F.S. 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.

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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 F.S. or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

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

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11. This permit is transferable only upon Department approval in accordance with Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

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;
 - 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.

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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:

The construction and operation of the Project shall be in accordance with all applicable provisions of Chapters 62-210 to 62-297, F.A.C. In addition to the foregoing, the Project shall comply with the following conditions as indicated.

A. General Requirements

1. Pursuant to Rule 62-212.200(56), F.A.C., Potential to Emit (PTE), the maximum heat input to the GE combustion turbine (CT) at an ambient temperature of 59^oF shall not exceed 312 MMBtu/hr while firing fuel oil. Heat input may vary depending on ambient conditions and the CT characteristics. Manufacturer's curves or equations for correction to other temperatures shall be provided to DEP for review and approval 90 days prior to the initial compliance test. The approved manufacturer's curves shall be used to establish heat input rates over a range of temperatures for the purpose of compliance determination.

2. Pursuant to Rule 62-212.200(56), F.A.C., only No. 2 fuel oil is allowed to be fired in the CT. The maximum sulfur content of the No. 2 fuel oil shall not exceed 0.05 percent, by weight.

3. Pursuant to Rule 62-212.200(56), F.A.C., the maximum No. 2 fuel oil consumption allowed to be burned in the CT is 7,100,000 gallons per year, which is equivalent to 2888.5 hours per year of operation at full-load. The CT may operate for more than 2888.5 hours per year if operating at part-load.

4. Pursuant to Rule 62-296.310(3), F.A.C., Unconfined Emissions of Particulate Matter, the emissions of unconfined particulate matter shall be minimized during the relocation and construction period by covering or watering dust generating areas.

5. The facility shall comply with all the requirements of 40 CFR Part 60 Subpart GG.

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B. Emission Limits

1. Pursuant to Rule 62-212.410, F.A.C., BACT, the maximum allowable emissions from the CT, when firing No. 2 fuel oil at 15% O₂, shall not exceed:

ALLOWABLE EMISSIONS LIMITATIONS - GE CT

<u>POLLUTANT</u>	<u>BASIS</u>	<u>lbs/hr(a)</u>	<u>TPY</u>
NO _x	75 ppmvd(b)	96	138
PM/PM ₁₀		18	43
CO	20/136 ppmvd(c)	64	152
Visible Emissions	20 percent opacity		

(a) Emission limitations in lbs/hr are a 1-hour average as determined pursuant to the Performance Testing conducted pursuant to Condition C.1 below.

(b) Fuel oil NO_x emissions are based on BACT at 15% oxygen. Compliance shall be determined through the initial and annual compliance tests. The annual compliance test will be required if the fuel oil operation is more than 400 hrs/yr.

(c) The ppmvd numbers are at 100% / 50% load respectively. The mass emission rates for CO emissions are based on 136 ppmvd.

2. Excess emissions from the CT resulting from start-up, shutdown, malfunction, or load change shall be acceptable providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized, but in no case exceed two hours in any 24-hour period unless specifically authorized by the Department for a longer duration. The permittee shall provide a general description of the procedures to be followed during periods of start up, shutdown, malfunction, or load change to ensure that the best operational practices to minimize emissions will be adhered to and the duration of any excess emissions will be minimized. The description should be submitted to the Department along with the initial compliance test data. The description may be updated as needed by submitting such update to the Department within thirty (30) days of implementation.

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C. Performance Testing

1. Initial (I) compliance tests shall be performed on the CT while firing oil. Testing of emissions shall be conducted at 95-100% of the manufacturer's rated heat input based on the average ambient air temperature during the test. Annual (A) compliance tests shall be performed on the CT if the No. 2 fuel was used for more than 400 hours in the preceding 12-month period. Tests shall be conducted using EPA reference methods in accordance with 40 CFR 60, Appendix A, as adopted by reference in Chapter 62-297, F.A.C.:

- a. Reference Method 5B for PM (I, A).
- b. Reference Method 9 for VE (I, A).
- c. Reference Method 10 for CO (I, A).
- d. Reference Method 20 for NOx (I, A).

e. ASTM D4294 (or equivalent) for sulfur content of distillate oil (I, A). Compliance with SO₂ emission limits will be demonstrated if the fuel oil analysis indicates a sulfur content of 0.05% by weight or less.

f. Other methods may be used for compliance testing after obtaining prior Departmental approval, in writing.

2. The No. 2 fuel oil shall be monitored for the sulfur content. The frequency of determination shall be in accordance with the requirements of 40 CFR 60.334. Testing for sulfur content of the fuel oil in the storage tanks shall be conducted upon each occasion that fuel is transferred to the storage tanks. Testing for fuel oil lower heating value shall also be conducted on the same schedule.

D. Monitoring Requirements

1. For the simple cycle unit, the permittee shall install, operate, and maintain a continuous monitoring system (CMS) to monitor and record the fuel consumption, the ratio of water to fuel being fired in the turbine, and the electrical output in MW. The system shall be accurate to within ± 5.0 percent and shall be approved by the Department.

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2. For purposes of the reports required under this permit, excess emissions are defined as any calculated average emission rate, as determined pursuant to Specific Condition B.2 herein, which exceeds the applicable emission limits in Specific Condition B.1.

E. Notification, Reporting and Recordkeeping

1. To determine compliance with the fuel oil firing heat input limitation, the permittee shall maintain daily records of fuel oil consumption for the turbine and the heating value for the fuel. All records shall be maintained for a minimum of two years after the date of each record and shall be made available to representatives of the Department upon request.

2. The project shall comply with all the applicable requirements of Chapter 62-297, F.A.C. and 40 CFR 60, Subpart A. The requirements shall include:

a. 40 CFR 60.7(a)(1) - By postmarking or delivering notification of the start of construction no more than 30 days after such date.

b. 40 CFR 60.7(a)(2) - By postmarking or delivering notification of the anticipated date of the initial start up of the CT not less than 30 days prior to such date.

c. 40 CFR 60.7(a)(3) - By postmarking or delivering notification of the actual start up of the turbine within 15 days after such date.

d. 40 CFR 60.7(a)(6) - By postmarking or delivering notification of the anticipated date for conducting the opacity observations no less than 30 days prior to such date.

e. 40 CFR 60.7(b) - By initiating a recordkeeping system to record the occurrence and duration of any start up, shutdown or malfunction of the turbine, and of any malfunction of the air pollution control equipment.

f. 40 CFR 60.7(c) - By postmarking or delivering a quarterly excess emissions and monitoring system performance report within 30 days after the end of each calendar quarter. This report shall contain the information specified in 40 CFR 60.7(c) and (d).

g. 40 CFR 60.8(a) - By conducting all performance tests within 60 days after achieving the maximum turbine firing rates, but not more than 180 days after the initial start up of the CT.

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h. 40 CFR 60.8(d) - By postmarking or delivering notification of the date of each performance test required by this permit at least 30 days prior to the test date; and,

i. Rule 62-297.345, F.A.C. - By providing stack sampling facilities for the turbine.

j. All notifications and reports required by this Specific Condition shall be submitted to the Department's Air Program of the South District office. Performance test results shall be submitted within 45 days of completion of such test.

3. The following protocols shall be submitted to the Department's Air Program of the South District office for approval;

a. CMS Protocol - Within 60 days after selection of the CMS, but prior to the initial startup, a CMS protocol describing the system, its installation, operating and maintenance characteristics and requirements.

b. Performance Test Protocol - At least 90 days prior to conducting the initial performance tests required by this permit, the permittee shall submit to the Department's Air Program of the South District office a protocol outlining the procedures to be followed and the test methods that will be used to verify compliance with the conditions of this permit. The Department shall approve the testing protocol provided that it meets the requirements of this permit.

F. Modifications

The permittee shall give written notification to the Department when there is any modification to this facility. This notice shall be submitted timely and in advance of any critical date involved to allow sufficient time for review, discussion, and revision of plans, if necessary. Such notice shall include, but not be limited to, information describing the precise nature of the change; modifications to any emission control system; production capacity of the facility before and after the change; and, the anticipated completion date of the change.

G. No. 2 Fuel Oil Storage Tank

The permittee shall be in compliance with the monitoring requirements specified in 40 CFR 60.116b(b), which requires maintaining a record of the dimension of the storage vessel and an analysis showing the capacity of the storage vessel.

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H. Additional General Conditions

1. Pursuant to Rule 62-4.090, F.A.C., the permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Department's Bureau of Air Regulation prior to 60 days before the expiration of the permit.

2. Pursuant to Rules 62-4.055 and 62-4.220, F.A.C., an application for an operation permit must be submitted to the Department's South 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.

**STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION**



Howard L. Rhodes, Director
Division of Air Resources
Management

Best Available Control Technology (BACT) Determination
 Key West City Electric System
 Monroe County
 PSD-FL-210

The applicant proposes to relocate a simple cycle combustion turbine (CT) generator from the Key West Power Plant, where it is currently permitted, to the existing Stock Island Power Plant (near Key West) in Monroe County. The CT is a General Electric Frame 5 model PG5341 unit with a nominal base load rating of 23.5 megawatt (MW) at ISO conditions [ISO standard day conditions means 288 degrees Kelvin (59°F), 60 percent relative humidity and 101.3 kilopascals pressure]. The Stock Island Power Plant currently consists of a nominal 37 MW steam-electric generating unit, two nominal 8.6 MW medium speed diesel-electric generating units, three nominal 2 MW high speed diesel-electric generating units, fuel storage tanks, and other electrical generating support equipment. The CT will be fired with No. 2 low sulfur fuel oil with a sulfur content not to exceed 0.05 percent, by weight, and a fuel oil consumption limit of 7.1 million gallons per year.

The applicant has indicated that the maximum annual air pollutant emission rates for the CT, based on consumption of 7.1 million gallons of No. 2 fuel oil, with a maximum sulfur content of 0.05%, by weight, will be:

Pollutant	Emissions (TPY)	PSD Significant Emission Rate (TPY)	Subject to PSD review?
NO _x *	138	40	Yes
SO ₂	24	40	No
PM/PM ₁₀ **	43	25/15	Yes
CO**	152	100	Yes
VOC	15	40	No
Lead	0.004	0.6	No

* - Based on firing No. 2 fuel oil (0.05% sulfur by weight) at a maximum of 7.1 million gals/yr at full load.

** - Based on firing No. 2 fuel oil (0.05% sulfur by weight) at a maximum of 7.1 million gals/yr at 50% load.

Rule 62-212.400, Florida Administrative Code (F.A.C.), Stationary Source Preconstruction Review, 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 14, 1994

Date Application Complete:
May 5, 1995

BACT Determination Requested by the Applicant:

Pollutant	Emission Limits & Control Technology
NOx	75 ppmvd @ 15% O ₂ and ISO conditions; Water Injection; Use of Good Quality Fuel Oil (<0.05% Sulfur) and Limited Operation
CO	20 ppmvd @ 15% O ₂ / 100% load 136 ppmvd @ 15% O ₂ / 50% load Combustion Control
PM/PM ₁₀	Combustion Control; use of good quality fuel oil (<0.05% Sulfur) and Limited Operation

BACT Determination Procedure

In accordance with Rule 62-212.410, F.A.C., Best Available Control Technology Review, Stationary Source - Preconstruction Review, the 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 objection.

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

- o Combustion Products (e.g., particulate matter and trace metals). Controlled generally by good combustion of clean fuels.
- o Products of Incomplete Combustion (e.g., CO and VOCs). Control is largely achieved by proper combustion techniques.
- o Acid Gases (e.g., SO₂, NO_x). Controlled generally by gaseous control devices and fuel quality.

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/PM₁₀)

The design of the CT system ensures that particulate matter emissions will be minimized by combustion control and the use of clean fuels. The particulate matter emissions from the combustion turbine, when burning No. 2 fuel oil (0.05% sulfur, by weight), will not exceed 18 lb/hr at 50% load.

PRODUCTS OF INCOMPLETE COMBUSTION

Carbon Monoxide (CO)

The emissions of carbon monoxide exceed the PSD significant emission rate of 100 TPY with the GE CT. The applicant has indicated that the carbon monoxide emissions from the proposed simple cycle turbine is 20 ppmvd at 15 % O₂ and 100% load for No. 2 fuel oil firing with water injection. The emissions at 50% load will be 136 ppmvd at 15% O₂.

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 post-combustion 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 on the order of 10 ppm (corrected to dry conditions).

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst such as platinum. Combustion of CO starts at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required. For CT/HRSG combinations, the oxidation catalyst can be located directly after the CT or in the HRSG. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency.

The application of oxidation catalyst is not technically feasible for combustion turbines fired with fuel oil due to the oxidation of sulfur compounds and excessive formation of H₂SO₄ mist emissions. Catalytic oxidation has not been demonstrated on a continuous basis when using fuel oil.

ACID GASES

Nitrogen Oxides (NO_x)

The emissions of nitrogen oxides represent a significant portion of the total emissions generated by this project and need to be controlled. The applicant presented an extensive analysis of the different available technologies for NO_x control.

The applicant stated that BACT for nitrogen oxides will be met by using water injection to limit emissions to 75 ppmvd @ 15% O₂ 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 6 ppmvd at 15% oxygen. This level of control was accomplished through the use of water injection and a selective catalytic reduction (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 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 NO_x reduction efficiency at constant ammonia slip 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. The preferable operating window is within the bounds of 600-750°F for effective NO_x control.

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.

As stated by the applicant, the exhaust temperature of the proposed simple cycle CT is approximately 1000°F. At temperatures of 1000°F and above, the zeolite catalyst (reported to operate within 600-950°F) will be irreparably damaged, and the temperature is high enough to oxidize ammonia to NO_x. The heat recovery steam generator allows attainment of, and provides relative stability for catalyst operation within the optimum temperature range (600-750°F) for a combined cycle operation. In this case, application of an SCR system to a simple cycle combustion turbine appears to be technically infeasible.

The applicant further looked at the dry low-NO_x burner technology for this project. The dry low-NO_x combustors are primarily utilized when natural gas is the fuel fired. However, when the fuel fired is distillate oil, water or steam injection must be utilized along with dry low-NO_x combustors to obtain emission levels comparable to those which are obtained by the use of conventional combustors with the application of water or steam

injection. Therefore, the use of a dry combustor when firing fuel oil does not offer any distinct advantages over conventional water or steam injection systems. Further, the applicant states that dry low-NO_x burners are not available for this existing combustion turbine.

The applicant reviewed water or steam injection technologies for NO_x control on simple cycle combustion turbine. Major manufacturers such as General Electric, and ASEA Brown Boveri, have recently begun to offer commercial guarantees of 25 ppmvd @ 15% O₂ using steam or water injection for large new gas-fired gas turbines even though the commercial operating experience at these levels is limited. NO_x emissions reduction to 65 ppmvd @ 15% O₂ for the relocated unit is technically feasible. However, meeting this limit would require modifications to the turbine existing water injection system and an increase in demineralized water supply. The total capital cost for a water injection system capable of meeting 65 ppmvd @ 15% O₂ is estimated at \$820,000. The total annualized cost is estimated at \$727,000 per year. This equates to cost per ton NO_x removed of \$2,754 based on full load operation and the annual fuel consumption limit. The incremental cost for additional water injection capacity to reduce NO_x emissions from the current 75 ppmvd @ 15% O₂ to 65 ppmvd @ 15% O₂ is estimated to be \$15,505 per ton. This cost is excessive for a unit which is being relocated within the same county.

BACT Determination by DEP:

Simple Cycle Combustion Turbine

NO_x Control

The applicant presented information on different control technologies for the simple cycle combustion turbine. The information that the applicant presented and the Department's calculations indicate that the incremental cost per ton of reducing NO_x with additional water injection from the current 75 ppmvd @ 15% O₂ to 65 ppmvd @ 15% O₂ for the GE Frame 5 model PG5341 turbine to be \$15,505. This cost is excessive. Based on the information presented by the applicant, the Department believes that the use of additional water injection for NO_x control is not justifiable as BACT at this time.

The cost and other concerns expressed by the applicant are considered valid by the Department. Therefore, the Department accepts water injection to limit NO_x emissions to 75 ppmvd @ 15% O₂ as BACT for this project.

CO Control

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

Other Emissions Control

The emission limitations for PM and PM₁₀ is based on previous BACT determinations for similar facilities. Although the emissions of this pollutant could be controlled by particulate matter control devices, such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. Therefore, the Department does not believe that the BACT determination would be affected by the emissions of this pollutant. The Department accepts the applicant's proposed control of fuel quality for this pollutant as BACT for the simple cycle unit.

The emission limits for the Key West City Electric System project of the simple cycle unit for 23.5 MW are thereby established as follows at 15% O₂:

23.5 MW SIMPLE CYCLE COMBUSTION TURBINE

Pollutant	Emission Standards/Limitations(a)	Method of Control
NO _x	75 ppmvd @ 15% O ₂	Water Injection
CO	20 ppmvd 136 ppmvd @ 15% O ₂ @ 15% O ₂ @100% load @50% load	Combustion Controls Use of Good Quality Fuel Oil and Limited Operation
PM & PM ₁₀	18 lb/hr	Combustion Controls, Fuel Quality

(a) No. 2 fuel oil with a maximum of 0.05% sulfur, by weight, and consumption of 7.1 million gallons per year.

Details of the Analysis May be Obtained by Contacting:

Mr. A. A. Linero, P.E., Administrator
New Source Review Section
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

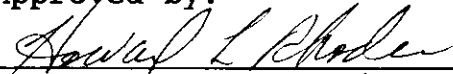
Recommended by:



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

Date 9/27, 1995

Approved by:



Howard L. Rhodes, Director
Division of Air Resources Management

Date 9/27, 1995

Final Determination

**Key West City Electric System
Monroe County, Florida**

**SIMPLE CYCLE COMBUSTION TURBINE
(23.5 megawatts)**

**Construction Permit No. AC 44-245399
PSD-FL-210**

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

September 20, 1995

Final Determination

The Technical Evaluation and Preliminary Determination for the permit to relocate a 23.5 megawatt simple cycle gas turbine generator from the Key West Power Plant to the existing Stock Island Power Plant in Key West, Monroe County, Florida, was distributed on July 31, 1995. The Notice of Intent to Issue was published in the Key West Citizen on August 13, 1995. Copies of the evaluation were available for public inspection at the Department offices in Fort Myers and Tallahassee.

No comments were submitted by the public, National Park Service, or the applicant. No adverse comments were submitted by U.S. Environmental Protection Agency in their letter dated September 12, 1995.

The final action of the Department will be to issue the PSD permit (PSD-FL-210) as proposed.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece 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:
 Robert R. Padon, Gen. Mgr.
 Utility Board -- City of Key West
 P.O. Drawer 6100
 Key West, FL 33047-6100

4a. Article Number
 Z 311 902 937

4b. Service Type

- Registered Insured
- Certified COD
- Express Mail Return Receipt for Merchandise

7. Date of Delivery
 4-17-95

5. Signature (Addressee)

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

6. Signature (Agent)
 [Signature]

PS Form 3811, December 1991 *U.S. GPO: 1993-352-714 **DOMESTIC RETURN RECEIPT**

Thank you for using Return Receipt Service.

Z 311 902 937



Receipt for Certified Mail

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

PS Form 3800, March 1993

Sent to	Robert Padon
Street and No.	Utility of the City
P.O. State and Zip Code	Key West
City	Key West, FL
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	4-10-95
	AC 44-245399
	P50-FI-210