

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF FINAL PERMIT

In the Matter of an
Application for Permit by:


Mr. J. Christopher Allen
Reliant Energy Osceola, L.L.C.
P.O. Box 4455
Houston, Texas 77210-4455

DEP File No. 0970071-001-AC, PSD-FL-273
Reliant Energy Osceola Power Project
Osceola County

Enclosed is Final Permit Number 0970071-001-AC. This permit authorizes Reliant Energy Osceola, L.L.C. to construct the Osceola Power Project. This permit is issued pursuant to Chapter 403, Florida Statutes.

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

Executed in Tallahassee, Florida.


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


CERTIFICATE OF SERVICE

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

J. Christopher Allen, Reliant*
Gregg Worley, EPA
John Bunyak, NPS
Len Kozlov, DEP CD
Chair, Osceola County BCC
Donald Schultz, P.E., Black & Veatch

Clerk Stamp

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


(Clerk)

12-28-99
(Date)

FINAL DETERMINATION

Reliant Energy
Reliant Energy Osceola, L.L.C./ Osceola County
DEP File No.0970071, PSD-FL-273

The Department distributed a public notice package on November 9, 1999 to allow the applicant to construct a new plant known as the Reliant Energy Osceola Project located near Holopaw, Osceola County. The Public Notice of Intent to Issue was published in Orlando Sentinel on November 19, 1999.

COMMENTS/CHANGES

Comments were received from the EPA by letters dated November 19, 1999 and December 8, 1999.

Comments were received on the application from the Fish and Wildlife Service by letter dated September 15, 1999.

Comments were received from the applicant by electronic correspondences dated December 15 and December 7 as well as by letters dated December 6 and December 15, 1999.

The applicant commented on the Technical Evaluation and Preliminary Determination (TEPD), the Draft BACT and the DRAFT Permit. The comments related to the BACT and permit are summarized below and the Department's responses are included following each comment. Comments related to the TEPD are noted and maintained in the file.

The Fish and Wildlife Service commented on the applicant's proposed BACT Analysis, specifically on the NO_x emission rate while firing natural gas.

EPA commented on the proposed Custom Fuel Monitoring Schedule as well as the Draft BACT and Draft Permit.

GENERAL COMMENT BY THE DEPARTMENT

As a result of local input, Reliant Energy Osceola moved the proposed site about 1.5 km southwest of the original location near Holopaw, Osceola County (New UTM coordinates: Zone 17, 3111.307 North, 490.429 East). Accordingly, new modeling was submitted to show that the proposed facility would still meet all ambient air quality standards. All stack parameters remained the same in the new modeling except for the locations, however entirely new building locations and boundary parameters were input into the model. The results of the revised modeling were consistent with the modeling that was submitted for the original location. There were a few minor differences, which can be attributed to the new building and boundary receptor locations. All predicted modeled impacts for the new facility location were still less than the respective PSD Significant Impact Levels for all pollutants and all averaging periods. Also, since the facility was moved by only 1.5 km from the original location, there was no need to conduct a Class I analysis.

DRAFT Permit Facility Description:

The applicant noted that the Facility Description did not mention the gas pipeline heater nor the emergency diesel fire pump and requested that these be noted therein.

RESPONSE: The Facility Description will be revised to incorporate these pieces of equipment, as they were provided for within the applicant's request.

FINAL DETERMINATION

Reliant Energy
Reliant Energy Osceola, L.L.C./ Osceola County
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DRAFT Permit Specific Conditions:

1. *Specific Conditions 10, 27 and 42:* The applicant requested that up to 5 working days be allowed in which to submit a report to FDEP regarding emission limit exceedances. The submitted rationale included "additional time will provide an opportunity for facility staff to fully characterize the nature of the emission exceedance, develop an appropriate response to correct the situation and provide a comprehensive description of the event to FDEP."

RESPONSE: Rule 62-4.130, F.A.C. states "...the permittee shall immediately notify the Department. Notification shall include pertinent information as to the cause...". The Department has consistently construed the *immediately* requirement in this rule to mean within one day. The permit condition (as worded) expands the one-day requirement to "...(1) working day, excluding weekends and holidays." This requirement is consistent with and standard for all similar permits issued by the Department. Accordingly, these permit conditions will not be revised.

2. *Specific Condition 19:* The USEPA commented that the 24-hour block average as measured by CEMS is an excessive averaging period for determining compliance with a unit which will run intermittently.

RESPONSE: The Department believes that a 24-hour block average is a reasonable averaging time for compliance with the NO_x emission rate for combustion of the primary fuel on an intermittently run unit. These units are being permitted for operation up to 3000 hours per year. On average, this equates to just over 8 hours per day. Since the 24-hour block average applies only to each calendar day, it has the effect of being reasonably equivalent to an 8-hour block average. However, by setting the averaging time at 24 hours, compliance becomes more manageable by both the permittee as well as the compliance office as there will be one compliance period per operating day, regardless of operating hours. Conversely, for the secondary fuel (oil) the permitted hours of operation are 750 per year. On average, this equates to about 2 hours per day of oil operation suggesting that a shorter averaging period may be appropriate.

3. *Specific Condition 19B:* The applicant requested that the condition be removed. The applicant indicated the requirement "...reasonable measures shall be implemented to maintain the concentration of NO_x in the exhaust gas at 9 ppmvd..." in light of the proposed permit limit of 10.5 ppmvd may lead to future disagreements on the interpretation of the limit.

RESPONSE: The Department agrees with the applicant concerning potential interpretation issues. However, the Fish and Wildlife Service noted that "...emissions in the 9-ppm range are readily achievable and feasible on the overwhelming majority of newer simple cycle units with DLN". The Department wishes to ensure that the permit condition allow for a 10.5 ppmvd limit in the event that actual operation yields this emission rate. However, the Department also wishes to ensure that emissions are maintained in the 9-ppmvd range should actual operation support this emission rate. Accordingly, the Department will eliminate the referenced language, but will provide for its concerns in specific condition 29 (discussed below).

4. *Specific Condition 19D:* The applicant requested that this requirement be removed. The applicant noted that a 42 ppmvd limit "...is justified and appropriate for the Osceola facility while firing fuel oil." The applicant additionally noted that the proposed "...750 hours cumulatively" requirement for developing the proposed NO_x reduction plan for oil firing was an inadequate amount of operating time. Lastly, the applicant requested that (if the condition

FINAL DETERMINATION

Reliant Energy
Reliant Energy Osceola, L.L.C./ Osceola County
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must remain) it should "...address the likely event that no new NO_x emission limit is justified while the units fire fuel oil."

RESPONSE: The purpose of the requirement is precisely to ensure that the 42 ppmvd NO_x limit while firing oil is appropriate and that the applicant takes all measures to minimize these emissions. Therefore, the condition will not be eliminated, but will be revised to require this plan after any individual combustion turbine reaches 750 hours of operation on fuel oil.

5. *Specific Condition 20*: The applicant noted that the 70.0 lb/hr CO emission rate referenced in the condition should specifically state "while firing fuel oil".

RESPONSE: The Department concurs with this request.

6. *Specific Condition 25 and 26*: The applicant requested that operation below 50% output should be allowed for up to two hours for each startup or shutdown event. The proposed condition required that "Operation below 50% output shall be limited to 2 hours per unit cycle (breaker closed to breaker open)." Rationale cited by the applicant included operational flexibility and minimization of reliability impacts. The USEPA commented that the allowance for excess emissions of up to 2 hours in a 24-hour period is excessive and should be reduced to 1-hour in 24. Rationale included citing the January, 1999 preliminary determination for KUA Cane Island Power Park, which allowed for only 1 hour.

RESPONSE: Department does not concur with the applicant's request. Emissions of the proposed machines are significantly higher at outputs below 50%, prompting the Department's requirement. Allowing for the applicant's request could lead to as many as 1460 hours per year (based upon 4 hours per day for 365 days per year) out of with the permitted 3000 hours per year of operation to be at these higher emission rates. Additionally, a day during which CT operating time is less than 4 hours could be completely within the requested time allotment. Concerning the EPA's comments, the Florida Administrative Code, Rule 62-210.700 allows for excess emissions up to two hours in a 24-hour period provided that certain criteria are met.

7. *Specific Condition 29*: The applicant requested that the annual stack testing requirement for demonstrating NO_x compliance should be deleted based upon several factors including the concurrent (and more representative) proposed requirement of compliance via CEMS.

RESPONSE: [Refer to Department's comments on *Specific Condition 19B* above]. The permit condition will be revised to allow for the elimination of the requirement for an annual NO_x compliance test (however an annual CEMS RATA will still be required). This allowance will be granted annually upon satisfactory submittal to the Department (within the notification letter described in *Specific Condition 35*) that an average of 9 ppmvd NO_x emissions is being achieved while firing natural gas. This demonstration shall consist of an average of all valid CEMS 24-hour block average compliance periods (described in *Specific Condition 30*) during which the unit operated on gas since the last compliance test requirement.

8. *Specific Conditions 31, 45 and 45B*: The applicant requested clarification on issues related to a Custom Fuel Monitoring Schedule.

RESPONSE: The Department believes that the EPA's letter dated November 19, 1999 on this subject satisfies the clarification required by the applicant. This letter was sent via facsimile to the applicant on December 7, 1999.

FINAL DETERMINATION

Reliant Energy
Reliant Energy Osceola, L.L.C./ Osceola County
DEP File No.0970071, PSD-FL-273

DRAFT BACT Determination:

1. *BACT Determination Requested by the Applicant:* The applicant requested that the summary table be revised to reflect 2.0 gr/scf for the natural gas sulfur content and that the textual description of the annual emission limits be based upon 59°F ambient temperature.

RESPONSE: The Department concurs.

2. *Standards of Performance for New Stationary Sources:* The final sentence in the first paragraph should be revised to read "...which allows NO_x emissions over 110 ppmvd...".

RESPONSE: The Department concurs.

3. *Review of Sulfur Dioxide (SO₂) and Sulfuric Acid Mist:* The applicant noted that the annual emission limit should be 123 tons/year.

RESPONSE: The Department concurs and will additionally revise the text below the table on page BD-1 to indicate the same.

4. *Rationale for Department's Determination:* The USEPA noted that several GE 7FA dual-fuel simple cycle CT's have been permitted with NO_x emission rates of 9 ppmvd. The Agency recommended that the Department address the difference between the Reliant Osceola facility and those other facilities if indeed differences exist.

RESPONSE: The Department concurs and will buttress its rationale accordingly.

CONCLUSION

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



Department of Environmental Protection

Jeb Bush
Governor

PERMITTEE:

Reliant Energy Osceola, L.L.C.
P.O. Box 4455
Houston, Texas 77210-4455

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

David B. Struhs
Secretary

File No.	PSD-FL-273
FID No.	0970071
SIC No.	4911
Expires:	July 1, 2002

Authorized Representative:

J. Christopher Allen

PROJECT AND LOCATION:

Air Construction Permit pursuant to the requirements for the Prevention of Significant Deterioration of Air Quality Permit for: three dual-fuel nominal 170 megawatt (MW) General Electric PG7241FA combustion turbine-electrical generators; one 3-million gallon fuel oil storage tank; and three 75-foot stacks. The units will operate in simple cycle mode and intermittent duty. The units will be equipped with Dry Low NO_x (DLN-2.6) combustors and wet injection capability.

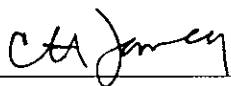
The project will be located on the south edge of a local road, approximately 7,000 feet west of U.S. 441. The local road intersects U.S. 441 approximately 5,000 feet south of the intersection of U.S. 192 and U.S. 441, Osceola County UTM coordinates are: Zone 17; 490.429 km E; 3111.307 km N.

STATEMENT OF BASIS:

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

Attached Appendices and Tables made a part of this permit:

Appendix BD	BACT Determination
Appendix GC	Construction Permit General Conditions


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

AIR CONSTRUCTION PERMIT PSD-FL-273 (0970071-001-AC)

SECTION I. FACILITY INFORMATION

FACILITY DESCRIPTION

This facility is a new site. This permitting action is to install three dual-fuel nominal 170 megawatt (MW) General Electric PG7241FA combustion turbine-electrical generators with three 75-foot stacks and a 3-million gallon fuel oil storage tank. Additionally a gas pipeline heater and a diesel fire pump are authorized for installation. Emissions from the new CT's will be controlled by Dry Low NO_x (DLN-2.6) combustors when operating on natural gas and wet injection when firing fuel oil. Inherently clean fuels and good combustion practices will be employed to control all pollutants.

EMISSION UNITS

This permit addresses the following emission units:

ARMS EMISSIONS UNIT	SYSTEM	EMISSION UNIT DESCRIPTION
001	Power Generation	One nominal 170 Megawatt Gas Simple Cycle Combustion Turbine-Electrical Generator
002	Power Generation	One nominal 170 Megawatt Simple Cycle Gas Combustion Turbine-Electrical Generator
003	Power Generation	One nominal 170 Megawatt Simple Cycle Gas Combustion Turbine-Electrical Generator
004	Fuel Storage	One 3 Million Gallon Fuel Oil Storage Tank

REGULATORY CLASSIFICATION

The facility is classified as a Major or Title V Source of air pollution because emissions of at least one regulated air pollutant, such as particulate matter (PM/PM₁₀), sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

This facility is not within an industry included in the list of the 28 Major Facility Categories per Table 212.400-1, F.A.C. Because emissions are greater than 250 TPY for at least one criteria pollutant, the facility is also a Major Facility with respect to Rule 62-212.400, Prevention of Significant Deterioration (PSD). Pursuant to Table 62-212.400-2, modifications at this facility resulting in emissions increases greater than any of the following values require review per the PSD rules as well as a determination of Best Available Control Technology (BACT): 40 TPY of NO_x, SO₂, or VOC; 25/15 TPY of PM/PM₁₀; 100 TPY of CO; or 7 TPY of sulfuric acid mist (SAM). This facility and the project are also subject to applicable provisions of Title IV, Acid Rain, of the Clean Air Act.

AIR CONSTRUCTION PERMIT PSD-FL-273 (0970071-001-AC)

SECTION I. FACILITY INFORMATION

PERMIT SCHEDULE

- 11/19/99 Notice of Intent published in The Orlando Sentinel
- 11/01/99 Distributed Intent to Issue Permit
- 10/29/99 Application deemed complete
- 08/03/99 Received Application

RELEVANT DOCUMENTS:

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

- Application received on August 3, 1999
- Applicant's response dated October 6, 1999 to Department Request dated August 25, 1999
- Applicant's e-mail dated October 20, 1999
- Applicant's additional submittal dated October 28, 1999
- Department's Intent to Issue and Public Notice Package dated November 8, 1999
- Department's Final Determination and Best Available Control Technology Determination issued concurrently with this permit.

AIR CONSTRUCTION PERMIT PSD-FL-273 (0970071-001-AC)

SECTION II. ADMINISTRATIVE REQUIREMENTS

1. Regulating Agencies: All documents related to applications for permits to construct, operate or modify an emissions unit should be submitted to the Bureau of Air Regulation (BAR), Florida Department of Environmental Protection (FDEP), at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 and phone number (850) 488-0114. All documents related to reports, tests, and notifications should be submitted to the DEP Central District office, 3319 Maguire Boulevard, Orlando, Florida 32803-3767 and phone number 407/894-7555.
2. General Conditions: The owner and operator is subject to and shall operate under the attached General Permit Conditions G.1 through G.15 listed in Appendix GC of this permit. General Permit Conditions are binding and enforceable pursuant to Chapter 403 of the Florida Statutes. [Rule 62-4.160, F.A.C.]
3. Terminology: The terms used in this permit have specific meanings as defined in the corresponding chapters of the Florida Administrative Code.
4. Forms and Application Procedures: The permittee shall use the applicable forms listed in Rule 62-210.900, F.A.C. and follow the application procedures in Chapter 62-4, F.A.C. [Rule 62-210.900, F.A.C.]
5. Modifications: The permittee shall give written notification to the Department when there is any modification to this facility. This notice shall be submitted sufficiently in advance of any critical date involved to allow sufficient time for review, discussion, and revision of plans, if necessary. Such notice shall include, but not be limited to, information describing the precise nature of the change; modifications to any emission control system; production capacity of the facility before and after the change; and the anticipated completion date of the change. [Chapters 62-210 and 62-212]
6. Expiration: Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, or if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The Department may extend the 18-month period upon a satisfactory showing that an extension is justified. [40 CFR 52.21(r)(2)].
7. BACT Determination: In accordance with Rule 62-212.400(6)(b), F.A.C. (and 40 CFR 51.166(j)(4)), the Best Available Control Technology (BACT) determination shall be reviewed and modified as appropriate in the event of a plant conversion. This paragraph states: "For phased construction project, the determination of best available control technology shall be reviewed and modified as appropriate at the latest reasonable time which occurs no later than 18 months prior to commencement of construction of each independent phase of the project. At such time, the owner or operator of the applicable stationary source may be required to demonstrate the adequacy of any previous determination of best available control technology for the source." This reassessment will also be conducted for this project if there are any increases in heat input limits, hours of operation, oil firing, low or baseload operation (e.g. conversion to combined-cycle operation) short-term or annual emission limits, annual fuel heat input limits or similar changes. [40 CFR 51.166(j)(4) and Rule 62-212.400(6)(b), F.A.C.]

SECTION II. ADMINISTRATIVE REQUIREMENTS

8. Application for Title V Permit: An application for a Title V operating permit, pursuant to Chapter 62-213, F.A.C., must be submitted to the DEP's Bureau of Air Regulation, and a copy to the Department's Central District office. [Chapter 62-213, F.A.C.]
9. New or Additional Conditions: Pursuant to Rule 62-4.080, F.A.C., for good cause shown and after notice and an administrative hearing, if requested, the Department may require the permittee to conform to new or additional conditions. The Department shall allow the permittee a reasonable time to conform to the new or additional conditions, and on application of the permittee, the Department may grant additional time. [Rule 62-4.080, F.A.C.]
10. Annual Reports: Pursuant to Rule 62-210.370(2), F.A.C., Annual Operation Reports, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. Annual operating reports shall be sent to the DEP's Central District office by March 1st of each year. [Rule 62-210.370(2), F.A.C.]
11. Stack Testing Facilities: Stack sampling facilities shall be installed in accordance with Rule 62-297.310(6), F.A.C.
12. Permit Extension: 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 [Rule 62-4.080, F.A.C.]
13. Quarterly Reports: Quarterly excess emission reports, in accordance with 40 CFR 60.7 (a)(7) (c) (1998 version), shall be submitted to the DEP's Central District office. Each excess emission report shall include the information required in 40 CFR 60.7(c) and 60.334.

AIR CONSTRUCTION PERMIT PSD-FL-273 (0970071-001-AC)

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

APPLICABLE STANDARDS AND REGULATIONS:

1. Unless otherwise indicated in this permit, the construction and operation of the subject emission unit(s) shall be in accordance with the capacities and specifications stated in the application. The facility is subject to all applicable provisions of Chapter 403, F.S. and Florida Administrative Code Chapters 62-4, 62-103, 62-204, 62-210, 62-212, 62-213, 62-214, 62-296, 62-297; and the applicable requirements of the Code of Federal Regulations Section 40, Parts 60, 72, 73, and 75.
2. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements or regulations. [Rule 62-210.300, F.A.C.]
3. These emission units shall comply with all applicable requirements of 40CFR60, Subpart A, General Provisions including:
 - 40CFR60.7, Notification and Recordkeeping
 - 40CFR60.8, Performance Tests
 - 40CFR60.11, Compliance with Standards and Maintenance Requirements
 - 40CFR60.12, Circumvention
 - 40CFR60.13, Monitoring Requirements
 - 40CFR60.19, General Notification and Reporting requirements
4. ARMS Emission Units 001-003, Power Generation, consisting of three 170 megawatt combustion turbines (with evaporative coolers) shall comply with all applicable provisions of 40CFR60, Subpart GG, Standards of performance for Stationary Gas Turbines, adopted by reference in Rule 62-204.800(7)(b), F.A.C. The Subpart GG requirement to correct test data to ISO conditions applies. However, such correction is not used for compliance determinations with the BACT standard(s). [Rule 62-204.800(7)(b), F.A.C.]
5. ARMS Emission Unit 004, Fuel Storage, consisting of one 3 million gallon distillate fuel oil storage tank shall comply with all applicable provisions of 40CFR60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels, adopted by reference in Rule 62-204.800, F.A.C. [Rule 62-204.800(7)(b), F.A.C.]
6. All notifications and reports required by the above specific conditions shall be submitted to the DEP's Central District.

GENERAL OPERATION REQUIREMENTS

7. Fuels: Only pipeline natural gas or maximum 0.05 percent sulfur fuel oil No. 2 or superior grade of distillate fuel oil shall be fired in these units. [Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)] {Note: The limitation of this specific condition is more stringent than the NSPS sulfur dioxide limitation and thus assures compliance with 40 CFR 60.333 and 60.334}

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

8. Capacity: The maximum heat input rates, based on the lower heating value (LHV) of each fuel to each Unit (1-3) at ambient conditions of 19°F temperature, 60% relative humidity, 100% load, and 14.7 psi pressure shall not exceed 1,709 million Btu per hour (MMBtu/hr) when firing natural gas, nor 1,942 MMBtu/hr when firing No. 2 or superior grade of distillate fuel oil. These maximum heat input rates will vary depending upon ambient conditions and the combustion turbine characteristics. Manufacturer's curves corrected for site conditions or equations for correction to other ambient conditions shall be provided to the Department of Environmental Protection (DEP) within 45 days of completing the initial compliance testing. [Design, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]
9. Unconfined Particulate Emissions: During the construction period, unconfined particulate matter emissions shall be minimized by dust suppressing techniques such as covering and/or application of water or chemicals to the affected areas, as necessary. [Rule 62-296.320(4)(c), F.A.C.]
10. Plant Operation - Problems: If temporarily unable to comply with any of the conditions of the permit due to breakdown of equipment or destruction by fire, wind or other cause, the owner or operator shall notify the DEP Central District as soon as possible, but at least within (1) working day, excluding weekends and holidays. The notification shall include: pertinent information as to the cause of the problem; the steps being taken to correct the problem and prevent future recurrence; and where applicable, the owner's intent toward reconstruction of destroyed facilities. Such notification does not release the permittee from any liability for failure to comply with the conditions of this permit and the regulations. [Rule 62-4.130, F.A.C.]
11. Operating Procedures: Operating procedures shall include good operating practices and proper training of all operators and supervisors. The good operating practices shall meet the guidelines and procedures as established by the equipment manufacturers. All operators (including supervisors) of air pollution control devices shall be properly trained in plant specific equipment. [Rule 62-4.070(3), F.A.C.]
12. Circumvention: The owner or operator shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rules 62-210.650, F.A.C.]
13. Maximum allowable hours: Each stationary gas turbine shall only operate up to 3,000 hours in any consecutive twelve month period, of which up to 750 hours may be on fuel oil. See Specific Condition 40. for compliance requirements. [Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions), Rule 62-212.400, F.A.C. (BACT)]
14. Fuel oil usage: The amount of back-up fuel (fuel oil) burned at the site (in BTU's) shall not exceed the amount of natural gas (primary fuel) burned at the site (in BTU's) during any consecutive 12-month period [Rule 62-210.200, F.A.C. (BACT)]

AIR CONSTRUCTION PERMIT PSD-FL-273 (0970071-001-AC)

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

Control Technology

- 15. Dry Low NO_x (DLN-2.6) combustors shall be installed on the stationary combustion turbine to control nitrogen oxides (NO_x) emissions while firing natural gas. [Design, Rules 62-4.070 and 62-212.400, F.A.C. (BACT)]
- 16. A water injection (WI) system shall be installed for use when firing No. 2 or superior grade distillate fuel oil for control of NO_x emissions. [Design, Rules 62-4.070 and 62-212.400, F.A.C. (BACT)]
- 17. The permittee shall provide manufacturer's emissions performance versus load diagrams for the DLN and wet injection systems prior to their installation. DLN systems shall each be tuned upon initial operation to optimize emissions reductions consistent with normal operation and maintenance practices and shall be maintained to minimize NO_x emissions and CO emissions, consistent with normal operation and maintenance practices. Operation of the DLN systems in the diffusion-firing mode shall be minimized when firing natural gas. [Rule 62-4.070 and 62-210.650 F.A.C.]

EMISSION LIMITS AND STANDARDS

- 18. Following is a summary of the emission limits and required technology. Values for NO_x are corrected to 15 % O₂ on a dry basis. These limits or their equivalent in terms of lb/hr or NSPS units, as well as the applicable averaging times, are followed by the applicable specific conditions [Rules 62-212.400, 62-204.800(7)(b) (Subpart GG), 62-210.200 (Definitions-Potential Emissions) F.A.C.]

POLLUTANT	CONTROL TECHNOLOGY	EMISSION LIMIT
PM/PM ₁₀ , VE	Pipeline Natural Gas Good Combustion	18/34 lb/hr (Gas/Fuel Oil) 10 Percent Opacity (Gas or Fuel Oil)
VOC	As Above	1.5 ppmvw (Gas) 3.7 ppmvw (Fuel Oil)
CO	As Above	10.5 ppmvd (Gas) 20 ppmvd (Fuel Oil)
SO ₂ and Sulfuric Acid Mist	Pipeline Natural Gas Low Sulfur Fuel Oil	2 gr S/100 ft ³ (in Gas) 0.05% S (in Fuel Oil)
NO _x	Dry Low NO _x for Natural Gas Wet Injection and limited Fuel Oil usage	10.5 ppmvd (Gas) 42 ppmvd (Fuel Oil)

19. Nitrogen Oxides (NO_x) Emissions:

- While firing Natural Gas: The emission rate of NO_x in the exhaust gas shall not exceed 10.5 ppmvd @15% O₂ on a 24 hr block average as measured by the continuous emission monitoring system (CEMS). In addition, NO_x emissions calculated as NO₂ shall not exceed 60 pounds per hour (at ISO conditions) and 9 ppmvd @15% O₂ to be demonstrated by the initial "new and clean" GE performance stack test. [Rule 62-212.400, F.A.C.]

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

- While firing Fuel oil: The concentration of NO_x in the exhaust gas shall not exceed 42 ppmvd at 15% O₂ on the basis of a 3-hr average as measured by the continuous emission monitoring system (CEMS). In addition, NO_x emissions calculated as NO₂ shall not exceed 323 lb/hr (at ISO conditions) and 42 ppmvd @15% O₂ to be demonstrated by stack test. [Rule 62-212.400, F.A.C.]
 - The permittee shall develop a NO_x reduction plan when the hours of oil firing on any individual combustion turbine reaches 750 hours. This plan shall include a testing protocol designed to establish the maximum water injection rate and the lowest NO_x emissions possible without affecting the actual performance of the gas turbine. The testing protocol shall set a range of water injection rates and attempt to quantify the corresponding NO_x emissions for each rate and noting any problems with performance. Based on the test results, the plan shall recommend a new NO_x emissions limiting standard and shall be submitted to the Department's Bureau of Air Regulation and Compliance Authority for review. If the Department determines that a lower NO_x emissions standard is warranted for oil firing, this permit shall be revised. [BACT Determination].
20. Carbon Monoxide (CO) Emissions: The concentration of CO in the stack exhaust gas shall exceed neither 10.5 ppmvd and 36.2 lb/hr (at ISO conditions) while firing gas and neither 20 ppmvd and 70.0 lb/hr (at ISO conditions) while firing oil. The permittee shall demonstrate compliance with these limits by stack test using EPA Method 10. [Rule 62-212.400, F.A.C.]
21. Volatile Organic Compounds (VOC) Emissions: The concentration of VOC in the stack exhaust gas with the combustion turbine operating on natural gas shall exceed neither 1.5 ppmvw nor 3.0 lb/hr (ISO conditions) and neither 3.7 ppmvw nor 8.0 lb/hr (ISO conditions) while operating on oil to be demonstrated by initial stack test using EPA Method 18, 25 or 25A. [Rule 62-212.400, F.A.C.]
22. Sulfur Dioxide (SO₂) Emissions: SO₂ emissions shall be limited by firing pipeline natural gas (sulfur content less than 2 grains per 100 standard cubic foot) or by firing No. 2 or superior grade distillate fuel oil with a maximum 0.05 percent sulfur for 750 hours per year per unit. Emissions of SO₂ (at ISO conditions) shall not exceed 1.1 lb/hr (natural gas) and 104.3 lb/hr (fuel oil) as measured by applicable compliance methods described below. [40CFR60 Subpart GG and Rules 62-4.070, 62-212.400, and 62-204.800(7), F.A.C.]
23. Particulate Matter (PM/PM₁₀) PM/PM₁₀ emissions shall not exceed 18.0 lb/hr when operating on natural gas and shall not exceed 34.0 lb/hr when operating on fuel oil. Visible emissions testing shall serve as a surrogate for PM/PM₁₀ compliance testing. [Rule 62-212.400, F.A.C.]
24. Visible Emissions (VE): VE emissions shall serve as a surrogate for PM/PM₁₀ emissions and shall not exceed 10 opacity. Rules 62-4.070, 62-212.400, and 62-204.800(7), F.A.C.]

EXCESS EMISSIONS

25. Excess emissions resulting from startup, shutdown, or malfunction shall be permitted provided that best operational practices are adhered to and the duration of excess emissions shall be

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minimized. Excess emissions occurrences shall in no case exceed two hours in any 24-hour period for other reasons unless specifically authorized by DEP for longer duration. Operation below 50% output shall be limited to 2 hours per unit cycle (breaker closed to breaker open).

26. Excess emissions entirely or in part by poor maintenance, poor operation, or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction, shall be prohibited pursuant to Rule 62-210.700, F.A.C. These emissions shall be included in the 24-hr average for NO_x.
27. Excess Emissions Report: If excess emissions occur due to malfunction, the owner or operator shall notify DEP's Central District within (1) working day of: the nature, extent, and duration of the excess emissions; the cause of the excess emissions; and the actions taken to correct the problem. In addition, the Department may request a written summary report of the incident. Following the NSPS format, 40 CFR 60.7 Subpart A, periods of startup, shutdown, malfunction, shall be monitored, recorded, and reported as excess emissions when emission levels exceed the permitted standards listed in Specific Condition No. 18 and 19. [Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C., and 40 CFR 60.7 (1998 version)].

COMPLIANCE DETERMINATION

28. Compliance with the allowable emission limiting standards shall be determined within 60 days after achieving the maximum production rate, but not later than 180 days of initial operation of the unit, and annually thereafter as indicated in this permit, by using the following reference methods as described in 40 CFR 60, Appendix A (1998 version), and adopted by reference in Chapter 62-204.800, F.A.C.
29. Initial (I) performance tests (for both fuels) shall be performed on each unit while firing natural gas as well as while firing oil. Initial tests shall also be conducted after any modifications (and shake down period not to exceed 100 days after re-starting the CT) of air pollution control equipment such as change or tuning of combustors. Annual (A) compliance tests shall be performed during every federal fiscal year (October 1 - September 30) pursuant to Rule 62-297.310(7), F.A.C., on each unit as indicated. The following reference methods shall be used. No other test methods may be used for compliance testing unless prior DEP approval is received in writing.
- EPA Reference Method 9, "Visual Determination of the Opacity of Emissions from Stationary Sources" (I, A).
 - EPA Reference Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources" (I, A).
 - EPA Reference Method 20, "Determination of Oxides of Nitrogen Oxide, Sulfur Dioxide and Diluent Emissions from Stationary Gas Turbines." Initial test only for compliance with 40CFR60 Subpart GG and (I, A) short-term NO_x BACT limits (EPA reference Method 7E, "Determination of Nitrogen Oxides Emissions from Stationary Sources" or

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

RATA test data may be used to demonstrate compliance for annual test requirements). Annual compliance demonstration via EPA Method 7E shall not be required upon satisfactory demonstration that the emission unit is operating at 9 ppmvd NO_x emissions or less. This demonstration shall consist of an average of each of all valid CEMS 24-hour block average compliance periods (described in Specific Condition 30.) for which the unit operated on natural gas since the last compliance test requirement. This demonstration shall be provided within the test notification letter (described in Specific Condition 35.); but does not relieve the permittee of the annual CEMS RATA requirement.

- EPA Reference Method 18, 25 and/or 25A, "Determination of Volatile Organic Concentrations." Initial test only.
30. Continuous compliance with the NO_x emission limits: Continuous compliance with the NO_x emission limits shall be demonstrated with the CEM system based on the applicable averaging time of 24-hr block average (DLN). Based on CEMS data, a separate compliance determination is conducted at the end of each operating day and a new average emission rate is calculated from the arithmetic average of all valid hourly emission rates from the previous operating day. A valid hourly emission rate shall be calculated for each hour in which at least two NO_x concentrations are obtained at least 15 minutes apart. Valid hourly emission rates shall not include periods of start up, shutdown, or malfunction unless prohibited by 62-210.700 F.A.C. These excess emissions periods shall be reported as required in Conditions 25 and 26. [Rules 62-4.070 F.A.C., 62-210.700, F.A.C., 40 CFR 75 and BACT]
- All continuous monitoring systems (CEMS) shall be in continuous operation except for breakdowns, repairs, calibration checks, and zero and span adjustments. These CEMS shall meet minimum frequency of operation requirements: one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period. Data recorded during periods of continuous monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments shall not be included in the data average. [40CFR60.13]
31. Compliance with the SO₂ and PM/PM₁₀ emission limits: Notwithstanding the requirements of Rule 62-297.340, F.A.C., the use of pipeline natural gas, is the method for determining compliance for SO₂ and PM₁₀. For the purposes of demonstrating compliance with the 40 CFR 60.333 SO₂ standard, ASTM methods D4084-82 or D3246-81 (or equivalent) for sulfur content of gaseous fuel shall be utilized in accordance with the EPA-approved custom fuel monitoring schedule or natural gas supplier data may be submitted or the natural gas sulfur content referenced in 40 CFR 75 Appendix D may be utilized. However, the applicant is responsible for ensuring that the procedures in 40 CFR60.335 or 40 CFR75 are used when determination of fuel sulfur content is made. Analysis may be performed by the owner or operator, a service contractor retained by the owner or operator, the fuel vendor, or any other qualified agency pursuant to 40 CFR 60.335(e) (1998 version).
32. Compliance with CO emission limit: An initial test for CO shall be conducted concurrently with the initial NO_x test, as required. The initial NO_x and CO test results shall be the average of three valid one-hour runs. Annual compliance testing for CO may be conducted at less than capacity

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when compliance testing is conducted concurrent with the annual RATA testing for the NO_x CEMS required pursuant to 40 CFR 75

33. Compliance with the VOC emission limit: An initial test is required to demonstrate compliance with the VOC emission limit. Thereafter, the CO emission limit and periodic tuning data will be employed as surrogate and no annual testing is required.
34. Testing procedures: Testing of emissions shall be conducted with the combustion turbine operating at permitted capacity. Permitted capacity is defined as 90-100 percent of the maximum heat input rate allowed by the permit, corrected for the average ambient air temperature during the test (with 100 percent represented by a curve depicting heat input vs. ambient temperature). If it is impracticable to test at permitted capacity, the source may be tested at less than permitted capacity. In this case, subsequent operation is limited by adjusting the entire heat input vs. ambient temperature curve downward by an increment equal to the difference between the maximum permitted heat input (corrected for ambient temperature) and 110 percent of the value reached during the test until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purposes of additional compliance testing to regain the permitted capacity. Procedures for these tests shall meet all applicable requirements (i.e., testing time frequency, minimum compliance duration, etc.) of Chapters 62-204 and 62-297, F.A.C.
35. Test Notification: The DEP's Central District shall be notified, in writing, at least 30 days prior to the initial performance tests and at least 15 days before annual compliance test(s).
36. Special Compliance Tests: The DEP may request a special compliance test pursuant to Rule 62-297.310(7), F.A.C., when, after investigation (such as complaints, increased visible emissions, or questionable maintenance of control equipment), there is reason to believe that any applicable emission standard is being violated.
37. Test Results: Compliance test results shall be submitted to the DEP's Central District no later than 45 days after completion of the last test run. [Rule 62-297.310(8), F.A.C.]

NOTIFICATION, REPORTING, AND RECORDKEEPING

38. Records: All measurements, records, and other data required to be maintained by Reliant shall be recorded in a permanent form and retained for at least five (5) years following the date on which such measurements, records, or data are recorded. These records shall be made available to DEP representatives upon request.
39. Compliance Test Reports: A test report indicating the results of the required compliance tests shall be filed as per Condition No.37 above. The test report shall provide sufficient detail on the tested emission unit and the procedures used to allow the Department to determine if the test was properly conducted and if the test results were properly computed. At a minimum, the test report shall provide the applicable information listed in Rule 62-297.310(8), F.A.C.
40. Hours of Operation and Fuel Usage: Reliant shall maintain records on-site of each CT's "hours of operation by fuel type" and "BTU input by fuel type" for each month. These shall

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

be tabulated for each consecutive 12-month period (as per specific permit conditions identified herein) and made available upon request for Department use. Additionally, this data shall be submitted annually with the AOR.

MONITORING REQUIREMENTS

41. Continuous Monitoring System: The permittee shall install, calibrate, maintain, and operate a continuous emission monitor in the stack to measure and record the nitrogen oxides emissions from these units. Upon request from EPA or DEP, the CEMS emission rates for NO_x on these Units shall be corrected to ISO conditions to demonstrate compliance with the NO_x standard established in 40 CFR 60.332. [Rules 62-204.800, 62-210.700, 62-4.130, 62-4.160(8), F.A.C., 40 CFR 75 and 40 CFR 60.7 (1998 version)].
42. CEMS for reporting excess emissions: Excess Emissions and Monitoring System Performance Reports shall be submitted as specified in 40 CFR 60.7(c). CEM monitor downtime shall be calculated and reported according to the requirements of 40 CFR 60.7(c)(3) and 40 CFR 60.7(d)(2). Periods when NO_x emissions (ppmvd @ 15% oxygen) are above the BACT standards, listed in Specific Conditions No 18 and 19, shall be reported to the DEP Central District within one working day (verbally) followed up by a written explanation not later than three (3) working days (alternatively by facsimile within one working day).
43. CEMS in lieu of Water to Fuel Ratio: The NO_x CEMS shall be used in lieu of the water/fuel monitoring system for reporting excess emissions in accordance with 40 CFR 60.334(c)(1), Subpart GG (1998 version). The calibration of the water/fuel monitoring device required in 40 CFR 60.335 (c)(2) (1998 version) will be replaced by the 40 CFR 75 certification tests of the NO_x CEMS
44. Continuous Monitoring Certification and Quality Assurance Requirements: The monitoring devices shall comply with the certification and quality assurance, and any other applicable requirements of Rule 62-297.520, F.A.C., 40 CFR 60.13, including certification of each device in accordance with 40 CFR 60, Appendix B, Performance Specifications and 40 CFR 60.7(a)(5) or 40 CFR Part 75. Quality assurance procedures must conform to all applicable sections of 40 CFR 60, Appendix F or 40 CFR 75. The monitoring plan, consisting of data on CEM equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location shall be provided to the DEP Emissions Monitoring Section Administrator and EPA for review no later than 45 days prior to the first scheduled certification test pursuant to 40 CFR 75.62.
45. Natural Gas Monitoring Schedule: A custom fuel monitoring schedule pursuant to 40 CFR 75 Appendix D for natural gas may be used in lieu of the daily sampling requirements of 40 CFR 60.334 (b)(2) provided the following requirements are met:
 - The permittee shall apply for an Acid Rain permit within the deadlines specified in 40 CFR 72.30.

SECTION III. EMISSION UNITS SPECIFIC CONDITIONS

- The permittee shall submit a monitoring plan, certified by signature of the Designated Representative, that commits to using a primary fuel of pipeline supplied natural gas (sulfur content less than 2 gr/100 scf pursuant to 40 CFR 75.11(d)(2)).
- Each unit shall be monitored for SO₂ emissions using methods consistent with the requirements of 40 CFR 75 and certified by the USEPA.

This custom fuel monitoring schedule will only be valid when pipeline natural gas is used as a primary fuel. If the primary fuel for these units is changed to a higher sulfur fuel, SO₂ emissions must be accounted for as required pursuant to 40 CFR 75.11(d).

46. Fuel Oil Monitoring Schedule: The following monitoring schedule for No. 2 or superior grade fuel oil shall be followed: For all bulk shipments of No. 2 fuel oil received at this facility an analysis which reports the sulfur content and nitrogen content of the fuel shall be provided by the fuel vendor. The analysis shall also specify the methods by which the analyses were conducted and shall comply with the requirements of 40 CFR 60.335(d).

47. Determination of Process Variables:

- The permittee shall operate and maintain equipment and/or instruments necessary to determine process variables, such as process weight input or heat input, when such data is needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.
- Equipment and/or instruments used to directly or indirectly determine such process variables, including devices such as belt scales, weigh hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value [Rule 62-297.310(5), F.A.C]

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

- G.1 The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
- G.2 This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings or exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
- G.3 As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey 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 or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
- G.4 This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
- G.5 This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
- G.6 The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
- G.7 The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:
- a) Have access to and copy and records that must be kept under the conditions of the permit;
 - b) Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
 - c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
- Reasonable time may depend on the nature of the concern being investigated.
- G.8 If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
- a) A description of and cause of non-compliance; and
 - b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

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.

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

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

APPENDIX BD
BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

Reliant Energy Osceola Power Project
PSD-FL-273 and 0970071-001-AC
Osceola County, Florida

BACKGROUND

The applicant, Reliant Energy Osceola, L.L.C. (Reliant) proposes to install three nominal 170-megawatt (MW) General Electric PG 7241 FA combustion turbine-electrical generators at the planned Osceola Power Project at Holopaw, Osceola County. The proposed project will constitute a New Major Facility per Rule 62-212.400(d)2.a., Florida Administrative Code (F.A.C.) because it will have the potential to emit at least 250 tons per year of a regulated pollutant. It is therefore subject to review for the Prevention of Significant Deterioration (PSD) and a determination of Best Available Control Technology (BACT) per Rule 62-212.400, F.A.C. Emissions of particulate matter (PM and PM₁₀), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO₂), and sulfuric acid mist (SAM) will exceed the "Significant Emission Rates" with respect to Table 212.400-2, (F.A.C.). PSD and BACT reviews are required for each of these pollutants.

The new units will operate in simple cycle mode and intermittent duty and exhaust through separate 75-foot stacks. Reliant proposes to operate these units up to 3,000 hours per year per unit of which 750 hr/yr/unit may be on maximum 0.05 percent sulfur distillate fuel oil. Descriptions of the process, project, air quality effects, and rule applicability are given in the Technical Evaluation and Preliminary Determination dated November 8, 1999, accompanying the Department's Intent to Issue.

DATE OF RECEIPT OF A BACT APPLICATION:

The application was received on August 3, 1999 and included a proposed BACT proposal prepared by the applicant's consultant, Black & Veatch.

REVIEW GROUP MEMBERS:

M.P.Halpin, P.E.

BACT DETERMINATION REQUESTED BY THE APPLICANT:

POLLUTANT	CONTROL TECHNOLOGY	PROPOSED BACT LIMIT
Nitrogen Oxides	Dry Low NO _x Combustors Water Injection (Oil)	10.5 ppmvd @ 15% O ₂ (gas) 42 ppmvd @ 15% O ₂ (oil)
Particulate Matter	Pipeline Natural Gas No. 2 Distillate Oil (750 hr/yr) Combustion Controls	18 pounds per hour (gas) 34 pounds per hour (oil)
Carbon Monoxide	As Above	10.5 ppmvd (gas, baseload) 20 ppmvd (oil baseload)
Sulfur Dioxide/Sulfuric Acid Mist	As Above	2.0 grain S/100 std cubic feet (gas) 0.05 percent sulfur (oil)

According to the application, the maximum emissions from the facility (based upon a 59° F ambient temperature) will be approximately 569 tons per year (TPY) of NO_x, 185 TPY of CO, 99 TPY of PM/PM₁₀, 123 TPY of SO₂, 19 TPY of SAM, and 20 TPY of VOC.

APPENDIX BD
BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

BACT DETERMINATION PROCEDURE:

In accordance with Rule 62-212.400, F.A.C., this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department of Environmental Protection (Department), on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that, in making the BACT determination, the Department shall give consideration to:

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

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

STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES:

The minimum basis for a BACT determination is 40 CFR 60, Subpart GG, Standards of Performance for Stationary Gas Turbines (NSPS). The Department adopted subpart GG by reference in Rule 62-204.800, F.A.C. The key emission limits required by Subpart GG are 75 ppmvd NO_x @ 15% O₂ (assuming 25 percent efficiency) and 150 ppmvd SO₂ @ 15% O₂ (or <0.8% sulfur in fuel). The BACT proposed by Reliant is within the NSPS limit, which allows NO_x emissions over 110 ppmvd for the high efficiency units to be purchased for the Osceola Power Project.

No National Emission Standard for Hazardous Air Pollutants exists for stationary gas turbines.

DETERMINATIONS BY EPA AND STATES:

The following table is based primarily on "F" Class intermittent-duty simple cycle turbines recently permitted or still under review. One project (PREPA) based on smaller units but permitted to operate continuously is included as an example of a simple cycle unit with add-on control equipment. Another continuous-duty project (Lakeland) based on the larger "G" Class is also included. The proposed Reliant Osceola Power Project is included to facilitate comparison.

APPENDIX BD
BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

Project Location	Power Output and Duty	NO _x Limit ppmvd @ 15% O ₂ and Fuel	Technology	Comments
Vandolah Hardee, FL	680 MW SC INT	9 - NG 42 - No. 2 FO	DLN WI	4x170 MW GE PG7241FA CTs Application 8/99. 1000 hrs on oil
Oleander Brevard, FL	850 MW SC INT	9 - NG 42 - No. 2 FO	DLN WI	5x170 MW GE PG7241FA CTs Draft 4/99. 1000 hrs on oil
JEA Baldwin, FL	510 MW SC INT	10.5 - NG 42 - No. 2 FO	DLN WI	3x170 MW GE MS7241FA CTs Issued 10/99. 750 hrs on oil
Reliant Osceola, FL	510 MW SC INT	10.5 - NG 42 - No. 2 FO	DLN WI	3x170 MW GE MS7241FA CTs Application 8/99. 750 hrs on oil
TEC Polk Power, FL	330 MW SC INT	10.5 - NG 42 - No. 2 F.O.	DLN WI	2x165 MW GE MS7241FA CTs Issued 10/99. 750 hrs on oil
Dynegy Heard, GA	510 MW SC INT	15 - NG	DLN	3x170 MW WH 501F CTs Application. Gas only
Tenaska Heard, GA	960 MW SC INT	15 - NG 42 - No. 2 FO	DLN WI	6x170 MW GE PG7241FA CTs Issued 12/98. 720 hrs on oil
Thomaston, GA	680 MW SC INT	15 - NG 42 - No. 2 FO	DLN WI	4x170 MW GE PG7241FA CTs Application. 1687 hrs on oil
Dynegy Reidsville, NC	900 MW SC INT	15 - NG (by 2002) 42 - No. 2 FO	DLN WI	5x180 MW WH 501F CTs Initially 25 ppm NO _x limit on gas Draft 5/98. 1000 hrs on oil.
RockGen Cristiana, WI	525 MW SC INT	15/12 - NG 42 - No. 2 FO	DLN WI	3x175 MW GE PG7241FA CTs 15/12 ppm are on 1/24 hr basis Issued 1/99. 800 hrs on oil
Lakeland, FL	250 MW SC CON	9/9 - NG (by 2002) 42/15 - No. 2 FO	DLN/HSCR WI/HSCR	250 MW WH 501G CT Initially 25 ppm NO _x limit on gas Issued 7/98. 250 hrs on oil.
PREPA, PR	248 MW SC CON	10 - No. 2 FO	WI & HSCR	3x83 MW ABB GT11N CTs Issued 12/95.

CON = Continuous DLN = Dry Low NO_x Combustion FO = Fuel Oil GE = General Electric
 SC = Simple Cycle SCR = Selective Catalytic Reduction NG = Natural Gas WH = Westinghouse
 INT = Intermittent HSCR = Hot SCR WI = Water or Steam Injection ABB = Asea Brown Boveri

Project Location	CO - ppm (or as indicated)	VOC - ppm (or as indicated)	PM - lb/hr (or as indicated)	Technology and Comments
Vandolah Hardee, FL	12 - NG 20 - FO	1.4 - NG 7 - FO	10 lb/hr - NG 17 lb/hr - FO	Clean Fuels Good Combustion
Oleander Brevard, FL	12 - NG 20 - FO	3 - NG 6 - FO	10% Opacity	Clean Fuels Good Combustion
JEA Baldwin, FL	12 - NG 20 - FO	1.4 - NG/FO Not PSD	9/17 lb/hr - NG/FO 10% Opacity	Clean Fuels Good Combustion
Reliant Osceola, FL	10.5 - NG 20 - FO	1.5 - NG 3.7 - FO	18 lb/hr - NG 34 lb/hr - FO	Clean Fuels Good Combustion
TEC Polk Power, FL	15 - NG 33 - FO	7 - NG 7 - FO	10% Opacity	Clean Fuels Good Combustion
Dynegy Heard Co., GA	25 - NG	? - NG	? - NG	Clean Fuels Good Combustion
Tenaska Heard Co., GA	15 - NG 20 - FO	? - NG ? - FO	? - NG ? lb/hr - FO	Clean Fuels Good Combustion
Dynegy Reidsville, NC	25 - NG 50 - FO	6 lb/hr - NG 8 lb/hr - FO	6 lb/hr - NG 23 lb/hr - FO	Clean Fuels Good Combustion
RockGen Cristiana, WI	12@>50% load - NG 15@>75% 24@<75% - FO	2 - NG 5 - FO	18 lb/hr - NG 44 lb/hr - FO	Clean Fuels Good Combustion
Lakeland, FL	25 - NG or 10 by Ox Cat 75 - FO @ 15% O ₂	4 - NG 10 - FO	10% Opacity	Clean Fuels Good Combustion
PREPA, PR	9 - FO @ 15% O ₂	11 - FO @ 15% O ₂	0.0171 gr/dscf	Clean Fuels Good Combustion

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OTHER INFORMATION AVAILABLE TO THE DEPARTMENT:

Besides the information submitted by the applicant and that mentioned above, other information available to the Department consists of:

- Comments from the Fish and Wildlife Service dated September 15, 1999
- Comments from EPA Region IV dated November 19, 1999
- DOE website information on Advanced Turbine Systems Project
- Alternative Control Techniques Document - NO_x Emissions from Stationary Gas Turbines
- General Electric 39th Turbine State-of-the-Art Technology Seminar Proceedings
- GE Guarantee for JEA Brandy Branch Station Project
- GE Combustion Turbine Startup Curves
- Goal Line Environmental Technologies Website – www.glet.com
- Catalytica Website – www.catalytica-inc.com

REVIEW OF NITROGEN OXIDES CONTROL TECHNOLOGIES:

Some of the discussion in this section is based on a 1993 EPA document on Alternative Control Techniques for NO_x Emissions from Stationary Gas Turbines. Project-specific information is included where applicable.

Nitrogen Oxides Formation

Nitrogen oxides form in the gas turbine combustion process as a result of the dissociation of molecular nitrogen and oxygen to their atomic forms and subsequent recombination into seven different oxides of nitrogen. Thermal NO_x forms in the high temperature area of the gas turbine combustor. Thermal NO_x increases exponentially with increases in flame temperature and linearly with increases in residence time. Flame temperature is dependent upon the ratio of fuel burned in a flame to the amount of fuel that consumes all of the available oxygen.

By maintaining a low fuel ratio (lean combustion), the flame temperature will be lower, thus reducing the potential for NO_x formation. Prompt NO_x is formed in the proximity of the flame front as intermediate combustion products. The contribution of Prompt to overall NO_x is relatively small in near-stoichiometric combustors and increases for leaner fuel mixtures. This provides a practical limit for NO_x control by lean combustion.

Fuel NO_x is formed when fuels containing bound nitrogen are burned. This phenomenon is not important when combusting natural gas. It is not a significant issue for the Osceola project because these units will not be continuously operated, but rather will be “peakers”. Also, low sulfur fuel oil (which has more fuel-bound nitrogen than natural gas) is proposed to be used for no more than 750 hours per year (per CT).

Uncontrolled emissions range from about 100 to over 600 parts per million by volume, dry, corrected to 15 percent oxygen (ppmvd @15% O₂). The Department estimates uncontrolled emissions at approximately 200 ppmvd @15% O₂ for each turbine of the Osceola Project. The proposed NO_x controls will reduce these emissions significantly.

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NO_x Control Techniques

Wet Injection

Injection of either water or steam directly into the combustor lowers the flame temperature and thereby reduces thermal NO_x formation. Typical emissions achieved by wet injection are in the range of 15–25 ppmvd when firing gas and 42 ppmvd when firing fuel oil in large combustion turbines. These values often form the basis, particularly in combined cycle turbines, for further reduction to BACT limits by other techniques. Carbon monoxide (CO) and hydrocarbon (HC) emissions are relatively low for most gas turbines. However steam and (more so) water injection may increase emissions of both of these pollutants.

Combustion Controls

The excess air in lean combustion cools the flame and reduces the rate of thermal NO_x formation. Lean premixing of fuel and air prior to combustion can further reduce NO_x emissions. This is accomplished by minimizing localized fuel-rich pockets (and high temperatures) that can occur when trying to achieve lean mixing within the combustion zones.

The above principle is depicted in Figure 1 for a General Electric DLN-1 can-annular combustor operating on gas. For ignition, warm-up, and acceleration to approximately 20 percent load, the first stage serves as the complete combustor. Flame is present only in the first stage, which is operated as lean stable combustion will permit. With increasing load, fuel is introduced into the secondary stage, and combustion takes place in both stages. When the load reaches approximately 40 percent, fuel is cut off to the first stage and the flame in this stage is extinguished. The venturi ensures the flame in the second stage cannot propagate upstream to the first stage. When the fuel in the first-stage flame is extinguished (as verified by internal flame detectors), fuel is again introduced into the first stage, which becomes a premixing zone to deliver a lean, unburned, uniform mixture to the second stage. The second stage acts as the complete combustor in this configuration.

To further reduce NO_x emissions, GE developed the DLN-2.0 (cross section shown in Figure 1) wherein air usage (other than for premixing) was minimized. The venturi and the centerbody assembly were eliminated and each combustor has a single burning zone. So-called “quaternary fuel” is introduced through pegs located on the circumference of the outward combustion casing.

GE has made further improvements in the DLN design. The most recent version is the DLN-2.6 (proposed for the Osceola project). The combustor is similar to the DLN-2 with the addition of a sixth (center) fuel nozzle. The emission characteristics of the DLN-2.6 combustor while firing natural gas are given in Figure 2 for a unit tuned to meet a 15 ppmvd NO_x limit (by volume, dry corrected to at 15 percent oxygen) at JEA’s Kennedy Station.

NO_x concentrations are higher in the exhaust at lower loads because the combustor does not operate in the lean pre-mix mode. Therefore such a combustor emits NO_x at concentrations of 15 ppmvd at loads between 50 and 100 percent of capacity, but concentrations as high as 100 ppmvd at less than 50 percent of capacity. Note that VOC comprises a very small amount of the “unburned hydrocarbons” which in turn is mostly non-VOC methane.

The combustor can be tuned differently to achieve emissions as low as 9 ppm of NO_x and 9 ppm of CO. Emissions characteristics by wet injection NO_x control while firing oil are expected to be

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similar for the DLN-2.6 as they are for those of the DLN-2.0 shown in Figure 3. Simplified cross sectional views of the totally premixed (while firing natural gas) DLN-2.6 combustor to be installed at the Osceola project are shown in Figure 4.

In all but the most recent gas turbine combustor designs, the high temperature combustion gases are cooled to an acceptable temperature with dilution air prior to entering the turbine (expansion) section. The sooner this cooling occurs, the lower the thermal NO_x formation. Cooling is also required to protect the first stage nozzle. When this is accomplished by air cooling, the air is injected into the component and is ejected into the combustion gas stream, causing a further drop in combustion gas temperature. This, in turn, lowers achievable thermal efficiency for the unit.

Larger units, such as the Westinghouse 501 G or the planned General Electric 7H, use steam in a closed loop system to provide much of the cooling. The fluid is circulated through the internal portion of the nozzle component or around the transition piece between the combustor and the nozzle and does not enter the exhaust stream. Instead it is normally sent back to a steam generator. The difference between flame temperature and firing temperature into the first stage is minimized and higher efficiency is attained.

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

The relationship between flame temperature, firing temperature, unit efficiency, and NO_x formation can be appreciated from Figure 5 which is from a General Electric discussion on these principles. In addition to employing pre-mixing and steam cooling, further reductions are accomplished through design optimization of the burners, testing, further evaluation, etc.

At the present time, emissions achieved by combustion controls are as low as 9 ppmvd from large gas turbines, such as the GE 7FA line. Specialized dual fuel DLN burners were installed in a project in Israel¹, but their performance on fuel oil is not known to the Department.

Selective Catalytic Combustion

Selective catalytic reduction (SCR) is an add-on NO_x control technology that is employed in the exhaust stream following the gas turbine. SCR reduces NO_x emissions by injecting ammonia into the flue gas in the presence of a catalyst. Ammonia reacts with NO_x in the presence of a catalyst and excess oxygen yielding molecular nitrogen and water. The catalysts used in combined cycle, low temperature applications (conventional SCR), are usually vanadium or titanium oxide and account for almost all installations. For high temperature applications (Hot SCR up to 1100 °F), such as simple cycle turbines, zeolite catalysts are available but used in few applications to-date. SCR units are typically used in combination with wet injection or DLN combustion controls.

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

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Excessive ammonia use tends to increase emissions of CO, ammonia (slip) and particulate matter (when sulfur-bearing fuels are used).

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

Permit limits as low as 2.25 to 3.5 ppmvd NO_x have been specified using SCR on combined cycle F Class projects firing natural gas throughout the country.

Selective Non-Catalytic Combustion

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

The Department did, however, specify SNCR as one of the available options for the combined cycle Santa Rosa Energy Center. The project will incorporate a large 600 MMBtu/hr duct burner in the heat recovery steam generator (HRSG) and can provide the acceptable temperatures (between 1400 and 2000 °F) and residence times to support the reactions.

Emerging Technologies: SCONOX™ and XONON™

There are at least two technologies on the horizon that will influence BACT determinations. These, as usual, are prompted by the needs specific to non-attainment areas such as Southern California.

The first technology is called SCONOX™ and is a catalytic technology that achieves NO_x control by oxidizing and then absorbing the pollutant onto a honeycomb structure coated with potassium carbonate. The pollutant is then released as harmless molecular nitrogen during a regeneration cycle that requires dilute hydrogen gas. The technology has been demonstrated on small units in California and has been purchased for a small source in Massachusetts.² California regulators and industry sources have stated that the first 250 MW block to install SCONOX™ will be at PG&E's La Paloma Plant near Bakersfield.³ The overall project includes several more 250 MW blocks with SCR for control.⁴ USEPA has identified an "achieved in practice" BACT value of 2.0 ppmvd over a three-hour rolling average based upon the recent performance of a Vernon, California natural gas-fired 32 MW combined cycle turbine (without duct burners) equipped with the patented SCONOX™ system

SCONOX™ technology (at 2.0 ppmvd) is considered to represent LAER in non-attainment areas where cost is not a factor in setting an emission limit. It competes with less-expensive SCR in those areas, but has the advantages that it does not cause ammonia emissions in exchange for NO_x reduction. Advantages of the SCONOX™ process include in addition to the reduction of NO_x, the elimination of ammonia and the control of VOC and CO emissions. SCONOX™ has not been applied on any major sources in ozone attainment areas.

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In a letter dated March 23, 1998 to Goal Line Environmental Technologies, the SCONOx™ process was deemed as technically feasible for maintaining NO_x emissions at 2 ppmvd on a combined cycle unit. ABB Environmental was announced on September 10, 1998 as the exclusive licensee for SCONOx™ for United States turbine applications larger than 100 MW. ABB Power Generation has stated that scale up and engineering work will be required before SCONOx™ can be offered with commercial guarantees for large turbines (based upon letter from Kreminski/Broemmelsiek of ABB Power Generation to the Massachusetts Department of Environmental Protection dated November 4, 1998). SCONO_x requires a much lower temperature regime that is not available in simple cycle units and is therefore not feasible for this project. Therefore the SCONO_x system cannot be considered as achievable or demonstrated in practice for this application.

The second technology is XONON™, which works by partially burning fuel in a low temperature pre-combustor and completing the combustion in a catalytic combustor. The overall result is low temperature partial combustion (and thus lower NO_x combustion) followed by flameless catalytic combustion to further attenuate NO_x formation. The technology has been demonstrated on combustors on the same order of size as SCONO_x™ has. XONON™ avoids the emissions of ammonia and the need to generate hydrogen. It is also extremely attractive from a mechanical point of view.

Catalytica Combustion Systems, Inc. develops, manufactures and markets the XONON™ Combustion System. In a press release on October 8, 1998 Catalytica announced the first installation of a gas turbine equipped with the XONON™ Combustion System in a municipally owned utility for the production of electricity. The turbine was started up on that day at the Gianera Generating Station of Silicon Valley Power, a municipally owned utility serving the City of Santa Clara, Calif. The XONON™ Combustion System, deployed for the first time in a commercial setting, is designed to enable turbines to produce environmentally sound power without the need for expensive cleanup solutions. Previously, this XONON™ system had successfully completed over 1,200 hours of extensive full-scale tests which documented its ability to limit emissions of nitrogen oxides, a primary air pollutant, to less than 3 parts per million.

Catalytica's XONON™ system is represented as a powerful technology that essentially eliminates the formation of nitrogen oxides air emissions in gas turbines without impacting the turbine's operating performance. In a definitive agreement signed on November 19, 1998, GE Power Systems and Catalytica agreed to cooperate in the design, application, and commercialization of XONON™ systems for both new and installed GE E and F-class turbines used in power generation and mechanical drive applications. This appears to be an up-and-coming technology, the development of which will be watched closely by the Department for future applications. It is not yet available for fuel oil and cycling operation.

REVIEW OF SULFUR DIOXIDE (SO₂) AND SULFURIC ACID MIST (SAM)

SO₂ control processes can be classified into five categories: fuel/material sulfur content limitation, absorption by a solution, adsorption on a solid bed, direct conversion to sulfur, or direct conversion to sulfuric acid. A review of the BACT determinations for combustion turbines contained in the BACT Clearinghouse shows that the exclusive use of low sulfur fuels constitutes the top control option for SO₂.

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For this project, the applicant has proposed as BACT the use of 0.05% sulfur oil and pipeline natural gas. The Department estimated total emissions for the project at 123 TPY of SO₂ and 19 TPY of SAM. The Department expects the emissions to be lower because of the limited oil consumption and the typical natural gas in Florida that contains less than 1 grain of sulfur per 100 standard cubic feet (gr S/100 scf). This value is well below the "default" maximum value of 20 gr S/100 scf, but high enough to require a BACT determination.

REVIEW OF PARTICULATE MATTER (PM/PM₁₀) CONTROL TECHNOLOGIES:

Particulate matter is generated by various physical and chemical processes during combustion and will be affected by the design and operation of the NO_x controls. The particulate matter emitted from this unit will mainly be less than 10 microns in diameter (PM₁₀).

Natural gas and 0.05 percent sulfur No. 2 (or superior grade) distillate fuel oil will be the only fuels fired and are efficiently combusted in gas turbines. Such fuels are necessary to avoid damaging turbine blades and other components already exposed to very high temperature and pressure. Natural gas is an inherently clean fuel and contains no ash. The fuel oil to be combusted contains a minimal amount of ash and its use is proposed for only 750 hours per year making any conceivable add-on control technique for PM/PM₁₀ either unnecessary or impractical.

A technology review indicated that the top control option for PM/PM₁₀ is a combination of good combustion practices, fuel quality, and filtration of inlet air. Total annual emissions of PM₁₀ for the project are expected to be approximately 99 tons per year.

REVIEW OF CARBON MONOXIDE (CO) CONTROL TECHNOLOGIES

CO is emitted from combustion turbines due to incomplete fuel combustion. Combustion design and catalytic oxidation are the control alternatives that are viable for the project. The most stringent control technology for CO emissions is the use of an oxidation catalyst.

All combustion turbines using catalytic oxidation appear to be combined cycle units. Among the most recently permitted ones are the 500 MW Wyandotte Energy project in Michigan, the El Dorado project in Nevada, Ironwood in Pennsylvania, Millenium in Massachusetts, and Sutter Calpine in California. The permitted CO values of these units are between 3 and 5 ppm. Catalytic oxidation was recently installed at a cogeneration plant at Reedy Creek (Walt Disney World), Florida to avoid PSD review which would have been required due to increased operation at low load. Seminole Electric recently proposed catalytic oxidation in order to meet the permitted CO limit at its planned 244 MW Westinghouse 501FD combined cycle unit in Hardee County, Florida.⁵

Most combustion turbines incorporate good combustion to minimize emissions of CO. So far this appears to be the only technology proposed at simple cycle turbine projects. These installations are typically permitted between 10 and 25 ppmvd at full load while firing gas. The values of 10.5 and 20 ppm for gas and oil respectively at baseload proposed in Reliant's original application are within the range of recent determinations for simple cycle CO BACT determinations. Values given in GE-based applications are representative of operations between 50 and 100 percent of full load.

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REVIEW OF VOLATILE ORGANIC COMPOUND (VOC) CONTROL TECHNOLOGIES

Volatile organic compound (VOC) emissions, like CO emissions, are formed due to incomplete combustion of fuel. There are no viable add-on control techniques, particularly for simple cycle combustion turbines. The high flame temperature is very efficient at destroying VOC. The applicant has proposed good combustion practices to control VOC. The limits proposed by Reliant for this project are 1.5 ppmvw for gas and 3.7 ppmvw for oil firing at baseload and fall well below the PSD significance rate of 40 TPY. According to GE, VOC emissions less than 1.4 ppm were achieved during recent tests of the DLN-2.6 technology when firing natural gas.⁶

BACKGROUND ON PROPOSED GAS TURBINE

Reliant plans the purchase of three 170 MW (nominal) General Electric PG 7241FA simple cycle gas turbines. This is the most recent designation of GE's line of "F" Class units.

The first commercial GE 7F (or 7FA) unit was installed in a combined cycle project at the Virginia Power Chesterfield Station in 1990.⁷ The initial units had a firing temperature of 2300 °F and a combined cycle efficiency exceeding 50 percent. By the mid-90s, the line was improved by higher combustor pressure, a firing temperature of 2400 °F, and a combined cycle efficiency of approximately 56 percent based on a 167 MW combustion turbine.

The first GE 7F/FA project in Florida was at the FPL Martin Plant in 1993 and entered commercial service in 1994.⁸ The units were equipped with DLN-2 combustors with a permitted NO_x limit of 25 ppmvd. These actually achieved emissions of 13-25 ppmvd of NO_x, 0-3 ppm of CO, and 0-0.17 ppm of VOC.⁹ The City of Tallahassee received a permit in 1998 to install a GE PG7231FA combustion turbine at its Purdom Plant.¹⁰ Although permitted emissions are 12 ppmvd of NO_x, the City obtained a performance guarantee from GE of 9 ppmvd.¹¹

FPL also obtained a guarantee and permit limit of 9 ppmvd NO_x for fourteen GE 7241FA turbines to be installed at the Fort Myers and Sanford Repowering Projects.^{12,13} The Santa Rosa Energy Center in Pace, Florida, also received a permit with a 9 ppmvd NO_x limit for a GE 7241FA turbine with DLN-2.6 burners.¹⁴ Draft BACT determinations of 9 ppmvd were proposed for the proposed combined cycle projects in Volusia (Duke Energy) and Osceola County (Kissimmee Utilities).^{15,16}

Most recently, the Department issued a draft BACT determination for the simple cycle Oleander project in Brevard County and final BACT determinations for the simple cycle TEC project in Polk County and the JEA Brandy Branch Project in Duval. These three draft permits also include "new and clean" NO_x limits of 9 ppmvd based on the DLN-2.6 technology installed on F Class units. The Oleander Project will meet 9 ppmvd on a 24-hour basis and will be allowed to burn fuel oil for 1000 hr/yr/unit. The TEC and JEA projects will meet 10.5 ppmvd on a 24-hour basis, but will be limited in oil firing to 750 hr/yr/unit.

General Electric has primarily relied on further advancement and refinement of DLN technology to provide sufficient NO_x control for their combustion turbines in Florida. When required by BACT determinations of most states, General Electric incorporates SCR in combined cycle projects.¹⁷ In its recent permits, Florida has included separate and lower limits in the event that GE's DLN technology does not achieve 9 ppmvd or the applicant selects a manufacturer that does not provide combustors capable of meeting 9 ppmvd.

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GE's approach of progressively refining such technology is a proven one, even on some relatively large units. Recently GE Frame 7FA units met performance guarantees of 9 ppmvd with "DLN-2.6" burners at Fort St. Vrain, Colorado and Clark County, Washington.¹⁸ Although the permitted limit is 15 ppmvd, GE has already achieved emission levels of approximately 6-7 ppmvd on gas at a dual-fuel 7EA (120 MW combined cycle) KUA Cane Island Unit 2.¹⁹ Unit 2 is equipped with DLN-2 combustors. According to GE, similar performance is expected soon on the 7FA line such as the one that will be installed for the Reliant Osceola Power Project. Performance guarantees less than 9 ppmvd can be expected for DLN-2.6 combustors on units delivered in a couple of years.²⁰

The 10.5-ppmvd NO_x limit on natural gas proposed by Reliant is quite reasonable for simple cycle 7FA combustion turbines. Typically, companies obtain a guarantee from GE to achieve 9 ppmvd during a test on a "new and clean unit." The test must be conducted at a steady-state load of 50 to 100 percent and completed within the first 100 fired hours of operation.

With the frequent start-ups and shutdowns of the unit, Reliant (as are TEC and JEA) is concerned about the ability to maintain the low NO_x values for long periods of time. As a result, TEC and JEA agreed to a "new and clean" limit of 9 ppmvd but a continuing limit of 10.5 ppmvd. Their permits reflect fewer hours on oil (than Oleander and Vandolah) for the higher NO_x value on gas. Presumably, their concern would be lessened should these units be converted to baseload combined cycle operation. Although the Department is not fully aware of the details of the GE guarantees for Oleander or Vandolah (proposed 9 ppmvd on simple cycle units), the Department is aware from discussions with other applicants that a continuing guarantee may be available at a substantial cost.²¹

The GE Speedtronic™ Mark V Gas Control System will be used. This control system is designed to fulfill all gas turbine control requirements. These include control of liquid, gas, or both fuels in accordance with the requirements of the speed, load control under part-load conditions, temperature control under maximum capability conditions, or during start-up conditions. The Mark V also monitors the DLN process and controls fuel staging and combustion modes to maintain the programmed NO_x values.²²

DEPARTMENT BACT DETERMINATION

Following are the BACT limits determined for the Reliant project assuming full load. Values for NO_x are corrected to 15% O₂ on a dry volume basis. The emission limits or their equivalents in terms of pounds per hour and NSPS units, as well as the applicable averaging times, are given in the permit Specific Conditions Nos. 18 through 23.

POLLUTANT	CONTROL TECHNOLOGY	PROPOSED BACT LIMIT
PM/PM ₁₀ , VE	Pipeline Natural Gas Good Combustion	10 Percent Opacity 18/34 lb/hr - Gas/Fuel Oil
CO	As Above	10.5 ppmvd - Gas 20 ppmvd - Fuel Oil
SO ₂ /SAM	As Above	2 grain of sulfur per 100 ft gas 0.05 Percent Sulfur in Fuel Oil
NO _x	Dry Low NO _x , WI for F.O., limited oil use	10.5 ppmvd - Gas 42 ppmvd - F.O. for 750 of 3,000 hours

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RATIONALE FOR DEPARTMENT'S DETERMINATION

- General Electric has provided a “clean and new” guarantee of 9 ppmvd NO_x. Given the little amount of actual operating hours for these dual-fuel machines and the lack of a long-term guarantee by the vendor, both the applicant and the Department find themselves in the position of estimating the actual long-term emission rate, which may be continuously achievable. The Department believes that the long-term emission rate is nearly certain to be less than 15 ppmvd, with likely values closer to 9 ppmvd. However, an increasing amount of risk is borne by the applicant for accepting the lower values. Accordingly, the Department attempts, on a case-by-case basis, to find that point of permitting where the evaluation of all variables combined (including such things as the requested hours of total operation, the amount of back-up fuel operation being requested, the requested limits of interrelated pollutants such as NO_x and CO, averaging times for compliance, etc.) provides ample reasonable assurance that the combined permit conditions can be met. For this application, the Department believes that a continuous emission rate limit of 10.5 ppmvd for NO_x is that point.
- Typical “continuous” permit limits nation-wide for these GE 7FA units while operating on natural gas and in simple cycle mode and intermittent duty are 9-15 ppmvd even though GE provides the same “new and clean” guarantees for them. Limits as high as 25 ppmvd have been recently proposed by some for similar units produced by other manufacturers.
- A level of 9 ppmvd NO_x by DLN has been demonstrated on GE 7FA combustion turbines at Fort St. Vrain, Colorado and Clark County, Washington. However the permitted limits are actually higher at these two facilities providing some level of operating margin.
- A limit of 9 ppmvd was proposed by Oleander for five GE7 FA units and is reflected in the Department's Draft BACT Determination for that facility. A BACT level of 9 ppmvd has been proposed by Virginia Power for a GE 7FA unit to avoid non-attainment New Source Review.
- The proposed 9 ppmvd limit at Oleander, Vandolah, and Virginia Power while firing natural gas is the lowest known Draft BACT value for an “F” frame combustion turbine operating in simple cycle mode and intermittent duty. The 42 ppmvd limit while firing fuel oil is typical.
- The Department issued permits for the TEC Polk Power and the JEA Brandy Branch Projects with 10.5 ppmvd limit for the same simple cycle GE 7241FA units, but limited the hours of operation on fuel oil to only 750 hours compared with 1000 hours at Oleander and Vandolah.
- The proposed BACT limit of 10.5 ppmvd is less than one-tenth of the applicable NSPS limit per 40 CFR 60, Subpart GG for units as efficient as the 7FA.
- The units will be operated in simple cycle mode. Therefore control options, which are feasible only for combined cycle units, are not applicable. This rules out Low Temperature (conventional) SCR, which achieves 4.5 ppmvd NO_x or lower. It also rules out the possibility of SCONOX. XONON is not available for F Class dual fuel projects.
- The simple cycle “F Class” turbines have very high exhaust temperatures of up to 1200 °F. Without additional cooling, this is at the higher limit of the present operational temperature of Hot SCR zeolite catalyst (around 1125 °F). The PREPA simple cycle turbines, which use Hot SCR, have exhaust temperatures ranging from 824 to 1024°F and burn exclusively #2 oil.
- The levelized costs of NO_x removal by Hot SCR for the JEA project were estimated by Black & Veatch at \$28,509 per ton assuming 1000 hours of operation on natural gas and a reduction from 10.5 to 5 ppmvd. The Department estimates that this figure is actually closer to \$10,000 per ton by including oil operation (up to 750 hours per year), 2250 hours per year of gas operation and other criteria.

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- TEC estimated the cost of Hot SCR at \$9,717 per ton of NO_x removed assuming 4,380 and 876 hours per year of operation on gas and oil respectively.
- The Department previously concluded that Hot SCR is cost-effective for continuous duty simple cycle service (Lakeland). EPA also concluded Hot SCR is cost-effective on continuous duty simple cycle oil-fired projects (PREPA).
- Although the Department does not have a "bright line" cost-effectiveness figure and does not adopt the supplied cost calculations for the Osceola Power Project, Hot SCR is not cost-effective for this project.
- Comments from the National Park Service on the Oleander project suggested that a reduction from 42 to 25 ppmvd in NO_x emissions while burning fuel oil is possible. GE has advised that 42 ppmvd NO_x is the lowest guarantee on F Class units when firing oil. The Department has requested that GE work on developing wet or dry technologies to reduce NO_x emissions for units permitted to fire substantial amounts of fuel oil.²³
- The Department is aware that ABB offers a DLN technology for fuel oil firing applicable to at least certain smaller combustion turbines (ABB-GTX). It is noted, however, that ABB does not offer a guarantee of 9 ppmvd on the same unit when firing natural gas.
- It is possible that the NO_x emissions while firing oil from may be reduced from 42 ppmvd by increasing the water injection rate. In order to address this possibility, a specific condition will be added to conduct appropriate testing and prepare an engineering report. The report will be submitted for the Department's review to ensure that the lowest reliable NO_x emission rates while firing oil have been achieved.
- The Department's overall BACT determination is equivalent to approximately 0.75 lb./MW-hr NO_x emissions for combined gas and oil operation. For reference, the new NSPS promulgated on September 3, 1998 requires that new conventional power plants (based on boilers, etc.) meet a limit of 1.6 lb/MW-hr. FDEP BACT analyses typically target values less than 1.0 lb/MW-hr for simple cycle CT's and less than 0.5 lb/MW-hr for combined cycle units.
- Although not determined by BACT, proposed VOC emissions of 1.5 ppmvd while firing gas and 3.7 ppmvw firing oil reflect BACT.
- The Department will set CO limits achievable by good combustion at full load as 10.5 ppm (gas) and 20 ppm (oil). These values are equal to the lowest values from permitted or proposed simple cycle units. These limits are better than or equal to those proposed by the Department for the Oleander, JEA Brandy Branch, and TEC Polk Power projects.
- Black & Veatch evaluated the use of an oxidation catalyst for the JEA project with an 88/83 percent control efficiency (oil/gas) and having a three-year catalyst life. Levelized costs for CO catalyst control were calculated at \$12,888 per ton. The Department estimates this figure to be closer to \$4,000 per ton, but it does not appear to be cost-effective for removal of CO.
- BACT for PM₁₀ was determined to be good combustion practices consisting of: inlet air filtering; use of pipeline natural gas; use of clean, low ash, low sulfur fuels, and operation of the unit in accordance with the manufacturer-provided manuals.
- PM₁₀ emissions will be very low and difficult to measure. Additionally, the higher emission mode will involve fuel oil firing which will occur only approximately 750 hours per year. It is not practical to require running the turbine on oil, simply to conduct tests. Therefore, the Department will set a Visible Emission standard of 10 percent opacity as BACT for both natural gas and fuel oil firing, consistent with the definition of BACT. Examples of installations with similar VE limits include the

APPENDIX BD

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

City of Lakeland, JEA Brandy Branch, TEC Polk Power, Oleander Power and quite a number of combined cycle projects.

Compliance Procedures

POLLUTANT	COMPLIANCE PROCEDURE
Visible Emissions	Method 9
Volatile Organic Compounds	Method 18, 25, or 25A
Carbon Monoxide	Annual Method 10 (can use RATA if at capacity)
NO _x (performance)	Annual Method 20 (can use RATA if at capacity)
NO _x (24-hr block average)	NO _x CEMS, O ₂ or CO ₂ diluent monitor, and flow device as needed
SO ₂ and SAM	Custom Fuel Monitoring Schedule

DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:

M.P. Halpin, P.E. Review Engineer *M.P. Halpin P.E.*

A. A. Linero, P.E. Administrator *M.P. Halpin for AAC*

New Source Review Section
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended By:

Approved By:

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

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

12/23/99
Date:

12/23/99
Date:

APPENDIX BD
BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

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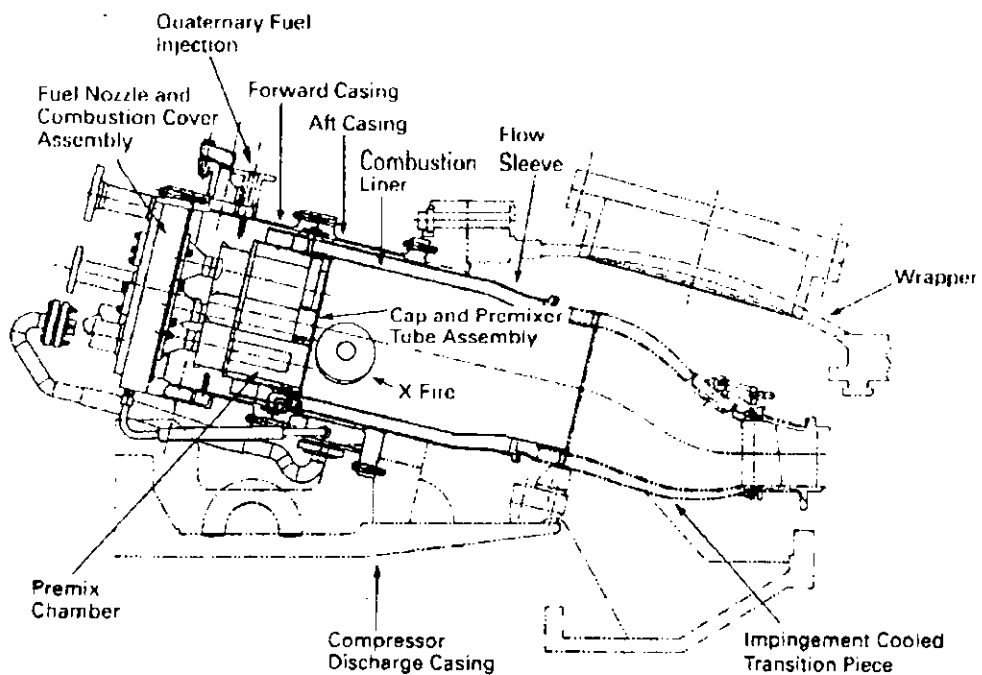
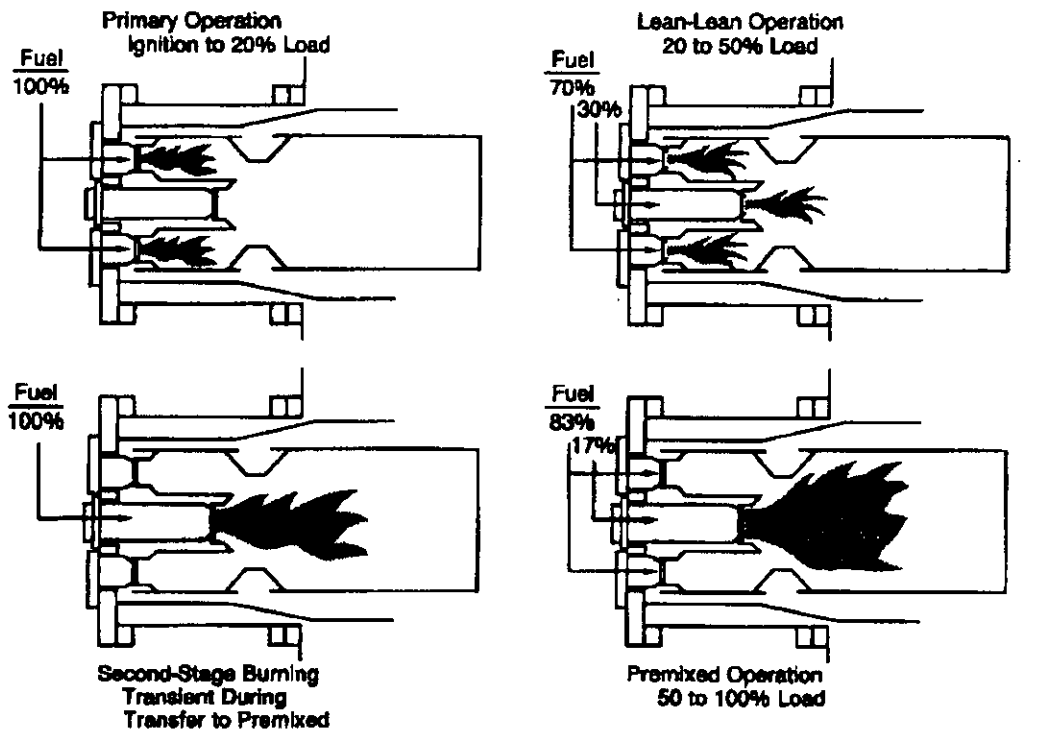


Figure 1 – Dry Low NO_x Operating Modes – DLN-1
Cross Section of GE DLN-2

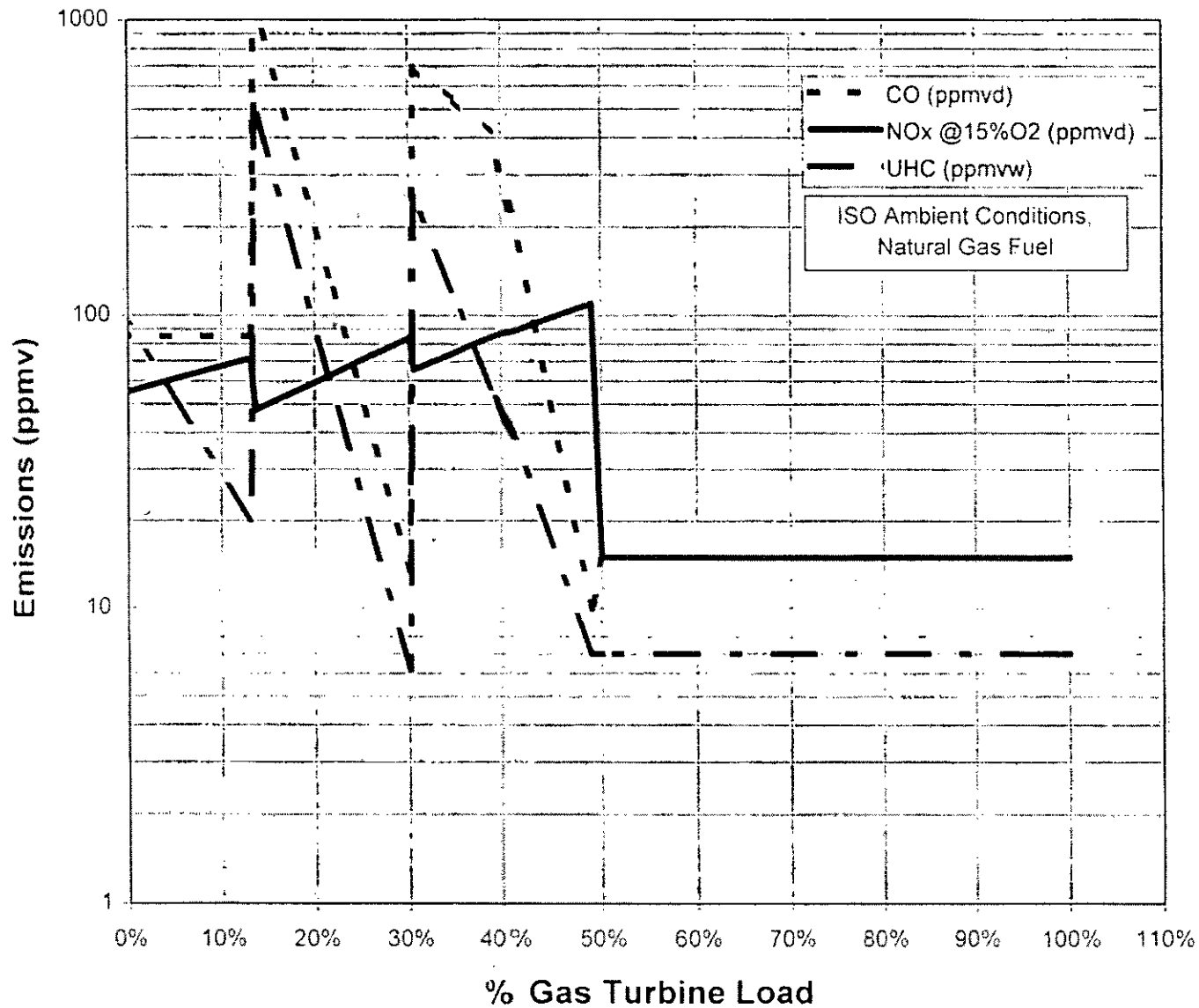


Figure 2 – Emissions Performance Curves for GE DLN-2.6 Combustor
 Firing Natural Gas in a Dual Fuel GE 7FA Combustion Turbine
 (Simple Cycle Intermittent Duty – If Tuned to 15 ppmvd NO_x)

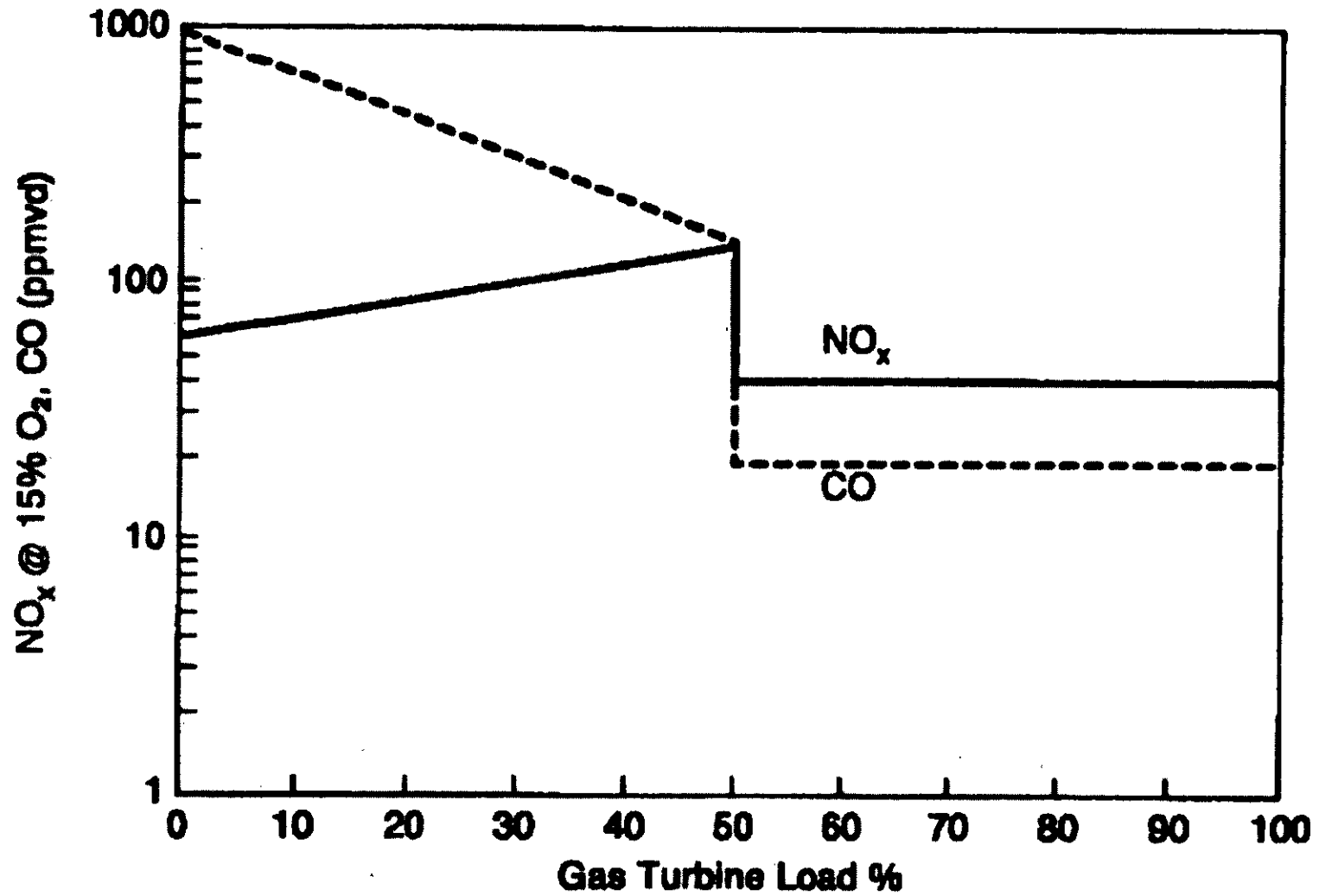


Figure 3 – Emissions Performance for DLN-2 Combustors
Firing Fuel Oil in Dual Fuel GE 7FA Turbine

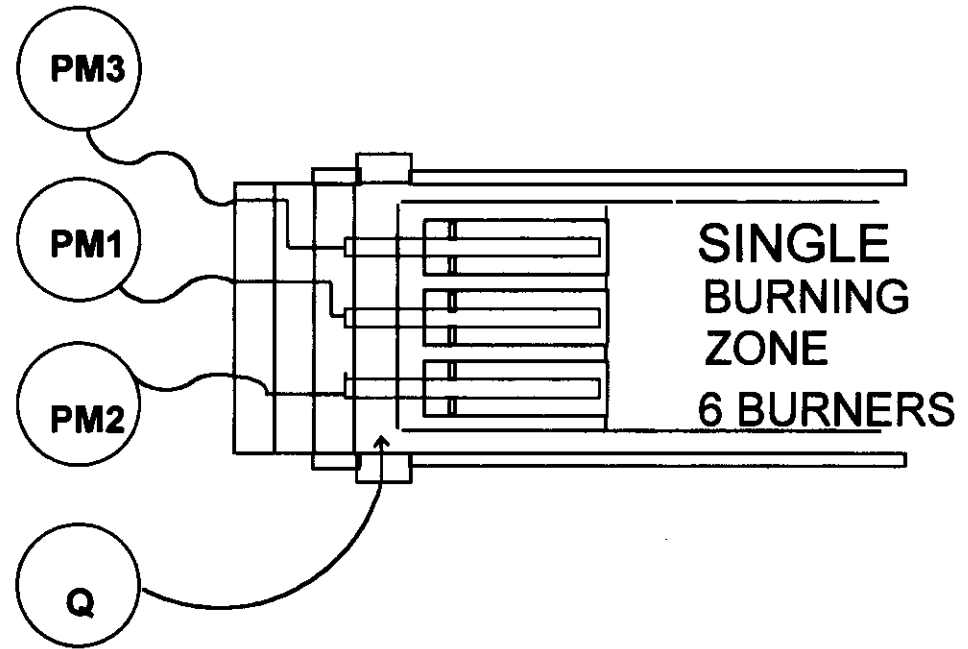
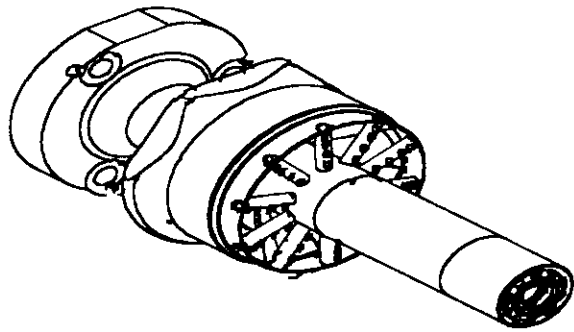
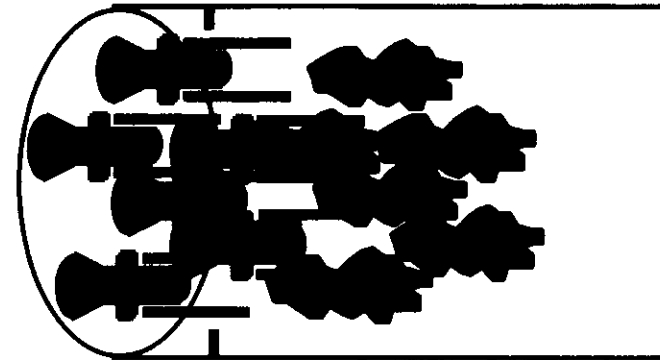
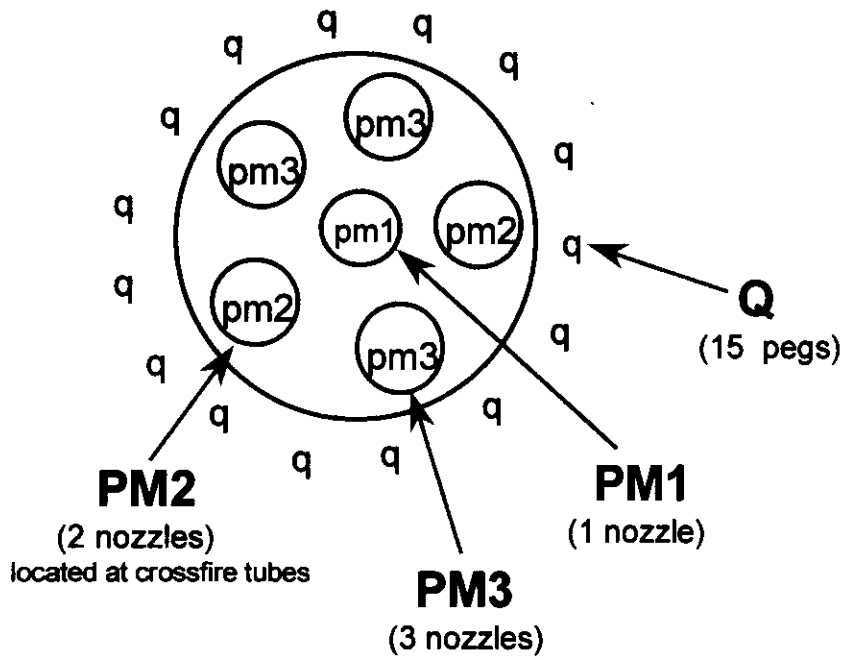


Figure 4 - DLN2.6 Fuel Nozzle Arrangement

Gas Turbine - Hot Gas Path Parts

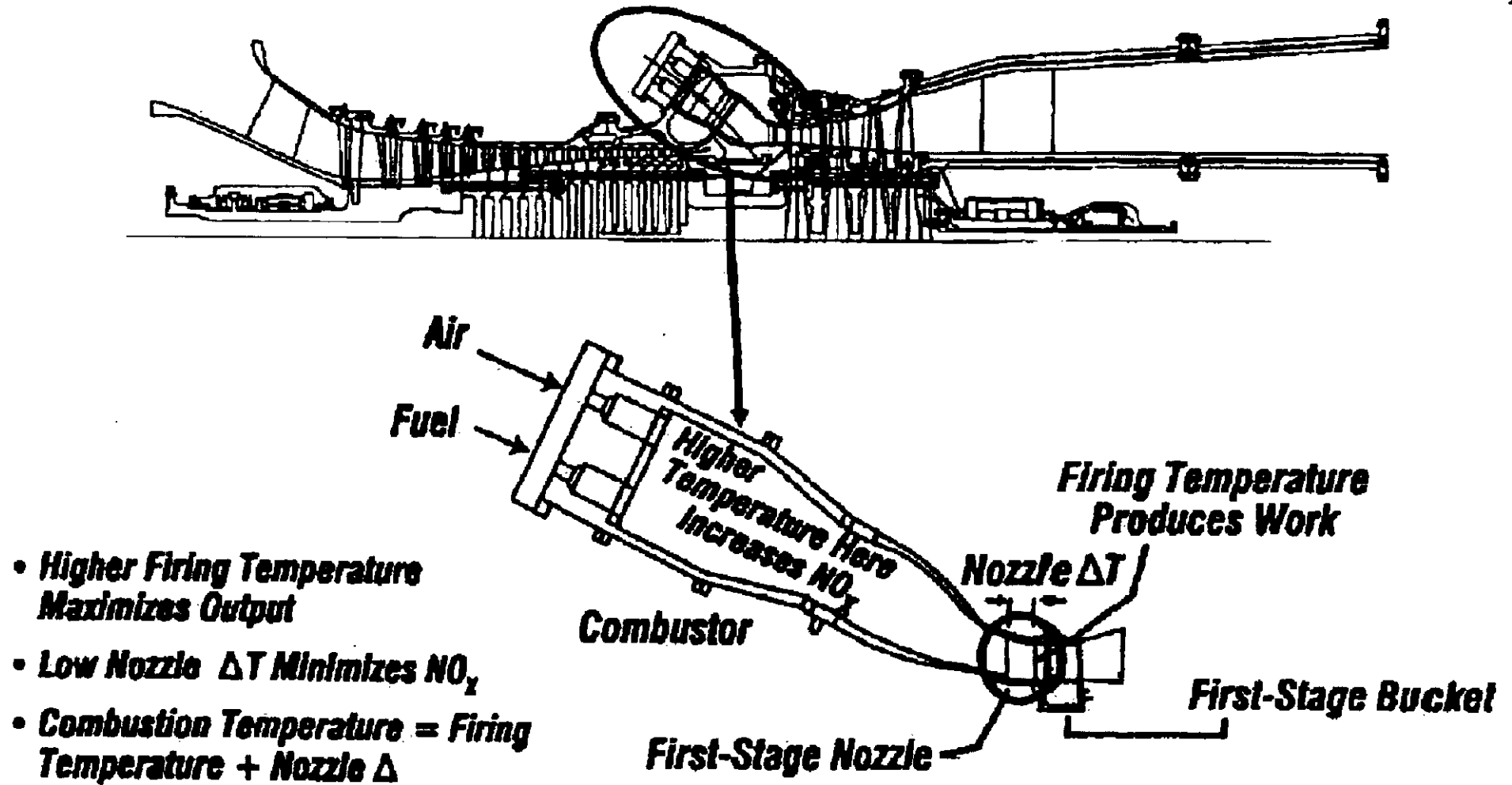


Figure 5 – Relation Between Flame Temperature and Firing Temperature

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