

**Florida
Power**
CORPORATION

0004895

June 23, 1994

Mr. John C. Brown, P.E.
Administrator of Permitting
Division of Air Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Brown:

Re: Request to Amend DeBary Construction Permit AC 64-191015 PSD-FL-167
Request to Amend Intercession City Construction Permit AC 49-203114 PSD-FL-180

Florida Power Corporation (FPC) requests that the permits referenced above be amended to incorporate an ISO corrected NO_x limit of 57 ppm @ 15% O₂, a fuel bound nitrogen allowance and clarifying language on the application of a heat input vs. ambient temperature curve. Included in this submission are detailed discussions supporting each of these requested changes. The request to amend these permits is consistent with FPC's understanding of the strategy mutually agreed upon by FDEP and FPC at the meeting held in Tallahassee on February 3, 1994 to resolve outstanding permitting issues at these facilities.

Attachment #1 contains the rationale supporting the addition of a new ISO-corrected NO_x limit of 57 ppm @ 15% O₂ for these facilities. The current limits of 42 ppm @ 15% O₂ and 182 lb./hour @ 59°F would remain unchanged. This limit would result in no increase in emissions from these sources, therefore, this change would not require a modification of the permits. This change would allow the use of the GE NO_x algorithm to continuously adjust water injection based on ambient temperature and humidity. In addition to NO_x control, this algorithm eliminates the current procedure requiring over-injection of water, thus conserving one of Florida's most valuable resources.

Attachment #2 contains the rationale supporting the use of a fuel bound nitrogen (FBN) allowance in determining allowable NO_x emissions. This allowance was requested in the PSD application for these facilities and FPC is requesting the BACT determination be corrected to allow the use of this FBN allowance. As detailed in Attachment #2, FPC is proposing to use the FBN allowance in the determination of allowable excess emissions as provided in 40 CFR 60.334(c)(1).

Attachment #3 explains FPC's proposal for the use of a heat input vs. ambient temperature curve during compliance testing. FPC is requesting clarifying language be added to the construction permits which incorporates current/proposed FDEP guidance on this issue.

Mr. John C. Brown, P.E.

June 23, 1994

Page Two

It is FPC's desire to meet with you and your staff at your office in the near future to discuss this submittal and respond to any questions resulting from FDEP's initial review. We will be contacting you during the next several days in order to schedule this meeting.

A check in the amount of \$250.00 for the processing of this permit amendment request is attached. Please contact Mike Kennedy at (813)866-4344 or Kent Hedrick at (813)866-4281 if you have any questions or comments.

Sincerely,



W. Jeffrey Pardue, C.E.P., Manager
Environmental Programs - Energy Supply

KDH

Attachments

cc: Mr. Mike Harley, FDEP Tallahassee
Mr. Alexander Alexander, FDEP Central District

Attachment 1

NO_x ISO-Corrected Limit

Discussion of Separate ISO-Based NO_x Limit

New DeBary and Intercession City Combustion Turbines

1.0 Introduction

Florida Power Corporation (FPC) is proposing to add a separate ISO-based NO_x concentration limit of 57 ppm for the new combustion turbines at its DeBary (P7 - P10) and Intercession City (P7 - P10) facilities. The current mass emission limits in lbs./hour and tons/year will not change. In addition, the proposed ISO-based limit is equivalent to the limit of 42 ppm at 15% O₂ given in the BACT determination for both facilities.

2.0 Discussion

The construction permit applications for the new GE Frame 7EA combustion turbines at both the DeBary and Intercession City facilities contained a proposed NO_x concentration limit of 42 ppm corrected to 15% O₂. This limitation was adopted as part of the BACT determination for both facilities and incorporated into the construction permits. The BACT determination supersedes the emission limitations established in the federal New Source Performance Standards (NSPS), which are codified at 40 CFR Part 60, Subpart GG.

It was subsequently determined that the BACT limit established for the new GE Frame 7EA combustion turbines is to be corrected to ISO conditions, as reflected in the compliance testing portions of the permits. The ISO correction is contained in the NSPS for combustion turbines. Its original purpose was to ensure that each new source could meet the NSPS limit as if it were tested at ISO conditions. Since the BACT determinations are based on manufacturer's data which is corrected to 15% O₂ only, and the determinations have resulted in limits which are well below the NSPS, FPC believes the use of the ISO correction is not necessary or appropriate. However, FPC is aware that an ISO based NO_x limit will be required by FDEP for these turbines and establishment of this requirement is a prerequisite in obtaining FDEP approval to use the GE Mark IV ambient temperature/humidity correction algorithm. This strategy was adopted by FPC, FDEP and USEPA as a mutually agreeable solution to this issue during previous meetings attended by these parties.

Under the warm, humid conditions prevalent in central Florida, this additional correction results in a NO_x limit which is several parts per million lower than 42 ppm corrected to 15% O₂, causing the injection of additional water in order to control NO_x emissions to a lower level. In addition, the use of the GE Mark IV ambient temperature/humidity correction algorithm, which is an integral part of the NO_x control system, was not permitted. This system uses the moisture present in the ambient air to contribute to the water injection. As a result of the inability to use the algorithm as it is designed, additional over-injection of water is occurring at both DeBary and Intercession City.

The water/fuel ratios which result from the two factors described above are as high as 1.3/1 on equipment which is designed for ratios of 0.9/1 to 1.0/1. This additional water use is unfortunate from a water conservation standpoint and causes significant unnecessary wear on the combustion turbines. The additional maintenance and major outage costs that FPC will incur are conservatively estimated to be approximately \$4.7 million per unit over the lifetime of the units. This estimate does not include an additional \$5 million per unit plus replacement energy costs which would occur as the result of a catastrophic failure. The replacement energy costs would be significant since the failure would occur during a peak demand period. FPC is already observing cracks in the combustors at the DeBary facility, which are occurring after less than a year of operation.

The 42 ppm NOx limit corrected to ISO conditions presents a greater problem for the DeBary and Intercession City units than for other GE Frame 7 units in the state of Florida. Other units use natural gas as the primary fuel with No. 2 oil only as a backup in the event gas is not available. The FPC units use only No. 2 oil for fuel. The over-injection of water which occurs continuously in the FPC units occurs infrequently for short periods of time in other units in Florida, in most cases only for compliance testing. Therefore, the excessive wear as a result of additional water injection does not become evident on the other units.

3.0 Proposed ISO-Based NOx Limit

Because of the reasons discussed above, a separate ISO-based NOx concentration limit for the new combustion turbines at DeBary and Intercession City is justified. The units were designed to use the ambient temperature/humidity correction algorithm for a NOx limit of 42 ppm corrected to 15% O₂. FPC proposes an additional NOx limit to be corrected to ISO conditions while retaining the current limits contained in the BACT determination.

In order to develop an ISO-based equivalent to the limit of 42 ppm at 15% O₂, 42 ppm was used as a basis in the ISO correction equation contained in 40 CFR 60 Subpart GG. A worst-case ISO limit was calculated using temperature and humidity conditions which could reasonably be expected to occur.

For representative temperature and humidity conditions, hourly meteorological ISO-Based NOx Limit observations from the National Weather Service office at the Orlando International Airport were obtained. Data for the years 1991 through 1993 were examined for worst-case combinations of temperature and humidity. (Copies of the meteorological data will be forwarded to the DEF upon request, but are not included with this submittal because there are 1096 pages of data.)

The combination of 85 degrees F. and 100% relative humidity is the worst-case set of ambient conditions which can reasonably be expected to occur at the DeBary and Intercession City plant sites. The following shows the derivation of the proposed ISO-based NOx limit using 42 ppm at 15% O₂ and the worst-case meteorology.

$$NOx_{(ISO)} = (NOx_{(obs)})(P_{(ref)}/P_{(obs)})^{0.5} e^{19(H_{(obs)} - 0.00633)} (288^{\circ}K/T_{(amb)})^{1.53}$$

Where:

NOx_(ISO) = Emissions of NOx at 15% O₂ and ISO standard conditions

NOx_(obs) = NOx emissions at 15% O₂ (= 42 ppm)

(P_(ref)/P_(obs)) = Reference combustor inlet pressure/measured combustor inlet pressure (= approximately 1)

H_(obs) = Specific humidity (= 0.027 from psychrometric chart)

T_(amb) = Ambient temperature (= 85° F. = 302° K.)

NOx_(ISO) = 57.7 ppm when solved using the input given above

FPC requests that a separate ISO-based NOx concentration limit of 57 ppm, corrected to 15% O₂ and ISO conditions, be added to the construction permits for the new combustion turbines at DeBary and Intercession City. The current BACT limits for each GE Frame 7EA unit will not be

changed. Compliance will be maintained with these existing limitations. In addition, FPC requests that the ISO-based limit of 57 ppm, corrected to 15% O₂ and ISO conditions, be added to the conditions for the other new units which are contained in the Intercession City construction permit.

Attachment 2

Fuel-Bound Nitrogen Allowance

Discussion of Fuel-Bound Nitrogen Allowance

New DeBary and Intercession City Combustion Turbines

1.0 Introduction

Florida Power Corporation (FPC) is requesting a permit condition allowing for the use of a fuel-bound nitrogen (FBN) allowance for the new combustion turbines at its DeBary and Intercession City peaking facilities. FPC is not requesting a change in the current NO_x emission limits in lb/hr or tons per year. FPC originally requested this provision in the construction permit applications for both facilities. At the time the construction permit was issued, FPC did not have the necessary data to determine the need for this allowance. FPC now has determined, based on test data of FBN concentrations in the fuel being burned at these facilities, this allowance is needed.

2.0 Discussion

The new combustion turbines at these facilities are regulated by the provisions in 40 CFR 60, Subpart GG. This subpart contains language on the use of a fuel-bound nitrogen allowance at 40 CFR 60.332(a) and 60.334(c). FPC referenced this allowance in the construction permit application and indicated it would be needed if the FBN concentration in the fuel being burned at these facilities was higher than the assumed concentration of 0.015 percent.

FPC has collected over 12 months of data on the FBN levels in the fuel at the DeBary facility. These data indicate that the average FBN concentration is 0.023 percent with a range of approximately 0.004 to 0.033 percent. FPC believes this level of FBN is representative of the long term supply of fuel to these facilities.

Discussions were held with the current fuel suppliers for these facilities on the potential to specify an FBN level of 0.015 percent in the fuel contract. Both suppliers indicated that they could not supply a fuel with the current sulfur content and an FBN at or below 0.015 percent. (Please see the attached letters from BP Oil and Coastal Refining and Marketing.) The only supply of fuel that could be guaranteed to this level of FBN would be ultra-low sulfur fuel oil (i.e. 0.05 percent S) and would require special handling in the form of dedicated terminal storage tanks and/or analyzing various terminal bulk supplies of ultra-low sulfur oil to locate acceptable FBN concentrations. FPC has estimated the potential increase in fuel costs above the current cost of fuel for these facilities to be \$0.05/gallon. Based on the permitted allowable heat input of the combustion turbines, this represents a potential fuel cost increase of approximately \$1,223,000 per year for each combustion turbine. Based on a total of eight combustion turbines, the total potential fuel cost increase is \$9,784,000 per year (see attached calculation sheet). FPC's fuel suppliers and contact names are given at the end of this discussion.

3.0 Proposed Fuel-Bound Nitrogen Allowance

Based on the above discussion, the use of an FBN allowance is justified at the DeBary and Intercession City new combustion turbine facilities. FPC requested the FBN allowance in the .

original construction permit application pending collection of actual FBN concentrations in the fuel and 40 CFR 60 Subpart GG requires the use of an FBN allowance in determining allowable NO_x emissions.

FPC is proposing that language be added to the construction permits for DeBary and Intercession City allowing the use of an FBN allowance up to an FBN concentration of 0.030 percent and not exceeding an allowable NO_x ISO-corrected concentration of 57 ppm. This approach would limit the allowance for NO_x emissions to an additional 6 ppm. Using the estimated cost impact of \$9,784,000 per year, the potential cost impact of having to purchase fuel with an FBN concentration of 0.015 percent would be \$28,277 per ton NO_x removed (see attached calculation sheet). This is not an economically justified alternative.

The FBN allowance would be used to determine allowable excess emissions from each combustion turbine. Current permit requirements include fuel testing for FBN, which would be used to determine the amount of the FBN allowance and identify periods of excess emissions. During a compliance test, a fuel sample would be taken and analyzed to determine the FBN concentration. The allowance would be determined and used to set the water to fuel ratio during the compliance test for unit operation.

During normal operation, the FBN will be monitored and recorded. Anytime the FBN level exceeds 0.015 percent, the period would be included in the quarterly excess emissions report and noted as an allowable exceedance in accordance with the FBN allowance. These exceedances would be allowable up to a limit of 0.030 percent FBN (i.e. 6 ppm NO_x) and not exceeding an ISO corrected NO_x concentration of 57 ppm.

Using the criteria stated above and the regulatory provisions contained in 40 CFR 60.332 and 40 CFR 60.334, FPC proposes the following language be added as a specific condition in the DeBary and Intercession City construction permits:

During normal unit operation, periods of excess NO_x emissions caused solely by an increase in fuel-bound nitrogen will be allowed. NO_x emissions shall not exceed 57 ppm @ 15 % O₂ corrected to ISO conditions in accordance with the fuel-bound nitrogen allowance provided in the following table.

Fuel Bound Nitrogen (percent by weight)	NO _x Allowance (ppm)
$N \leq 0.015$	0
$0.015 < N \leq 0.030$	200(N)

Fuel Oil Supplier Information

Coastal Refining and Marketing, Inc.

Contact: Mr. J. R. Sauls
Telephone: (305) 551-5239

BP Oil

Contact: Mr. William Smith
Telephone: (404) 641-2501

Calculation Sheet

Data

Maximum permitted CT Heat Input @ 59°F = 1029 mmBtu/Hr

Maximum permitted hours of operation = 3328 Hrs/Year (0.38% capacity factor)

Heat content of No. 2 fuel oil = 140,000 Btu/Gal

Incremental fuel cost increase = \$0.05/Gal

Maximum allowable NOx emission rate = 182 lb./hr. @ 59°F

Annual Potential Cost Increase

$$1029 \frac{\text{mmBtu}}{\text{Hr}} \times 3328 \frac{\text{Hrs}}{\text{Yr}} \times \frac{\text{Gal}}{140,000 \text{ Btu}} \times \frac{\$0.05}{\text{Gal}} \approx \$1,223,000 \text{ per CT}$$

$$\frac{\$1,223,000}{\text{CT}} \times 8 \text{ CTs} \approx \$9,784,000 \text{ per year}$$

$$\frac{6 \text{ ppm}}{42 \text{ ppm}} \times 182 \frac{\text{lb}}{\text{Hr}} = 26 \quad (\text{Potential NOx emissions controlled by specifying FBN level of 0.015\% in fuel contract})$$

$$26 \frac{\text{lb}}{\text{Hr}} \times 3328 \frac{\text{Hr}}{\text{Yr}} \times \frac{1 \text{ Ton}}{2000 \text{ lb}} = 43 \frac{\text{Tons}}{\text{Yr}} \times 8 \text{ CTs} \approx 346 \frac{\text{Tons}}{\text{Yr}}$$

$$\frac{\$9,784,000}{\text{Yr}} \times \frac{\text{Yr}}{346 \text{ Tons}} \approx \frac{\$28,277}{\text{Ton}}$$



BP OIL

BP Oil Company
9010 Roswell Road, Suite 520
Atlanta, Georgia 30350 1150
1-800-544-3210
(404) 641-2500

May 10, 1994

Mr. Dan Putnam
Florida Power Corp.
3201 Thirty-Fourth St., S.
St. Petersburg, FL 33733

RE: LOW NITROGEN #2 FUEL

Dear Mr. Putnam:

We have historically been able to produce #2 Fuel Oil with a guaranteed Maximum Nitrogen Content of 150 PPM. We were the only oil company, to my knowledge, able to make this guarantee for two reasons: 1. We processed very sweet crude through our refinery; and, 2. We had the ability to blend to this very tight specification. The costs associated with this blending and separate storage were between four and six cents per gallon.

Recent changes in our refining configuration to allow us to process a wider range of crude oils may have jeopardized our ability to provide low nitrogen at any cost. We are presently testing the refinery output and expect to have a much better indication of our ability by May 20th. Until the 20th, I am unable to commit to our ability to supply on a guaranteed basis at any cost.

Sincerely,

W. F. Smith
Manager, Direct Fuels South

WFS:PG

cc: S. F. Johnston



Coastal
The Energy People

April 20, 1994

FAX NO. 813-866-4936

Mr. T. D. Putnam
Buyer, Fuel Supply
FLORIDA POWER CORPORATION
P. O. Box 14042
St. Petersburg, FL 33733

Dear Mr. Putnam:

Confirming our recent conversation, in order to supply Florida Power Corporation with No. 2 Fuel Oil having a maximum of 150 PPM of fuel bound nitrogen, Coastal would supply low sulfur No. 2 Fuel Oil 0.05% maximum which is usually below 150 PPM but can be up to 200 PPM.

The additional cost of low sulfur No. 2 oil has been from zero to 6 cents per gallon. Also there would be additional cost for transporting the oil from a terminal farther away which would be approximately 2 cents per gallon more.

If you have any questions or require additional information, please do not hesitate to contract me at (305) 551-5239.

Sincerely,

COASTAL REFINING & MARKETING, INC.

J. R. Sauls
Director, Utility Sales

Coastal Refining & Marketing, Inc.

A SUBSIDIARY OF THE COASTAL CORPORATION!
P O BOX 023406 - MIAMI FL 33102-8500 - 305 431-5200

Attachment 3

Heat Input vs. Ambient Temperature

Discussion of Heat Input vs. Ambient Temperature

New DeBary and Intercession City Combustion Turbines

1.0 Introduction

Florida Power Corporation (FPC) proposes that the Department of Environmental Protection (DEP) incorporate the final guidance on rate of operation during compliance testing for combustion turbines. FPC submits the attached heat input vs. ambient temperature curves, which are based on manufacturer's data of maximum unit performance, for each facility.

2.0 Discussion

The construction permit for the new combustion turbines at Intercession City contains the manufacturer's design heat input for three ambient temperatures, which provides the relationship of ambient temperature vs. heat input. Specific Condition 14 of the permit requires that compliance testing be performed while the units are operating at between 90 and 100% of heat input capacity as adjusted for ambient temperature.

The construction permit for the new combustion turbines at the DeBary facility was issued at an earlier date than that for Intercession City and does not contain the heat input vs. ambient temperature curve. Therefore, compliance testing must be performed while the units are operating at between 90 and 100% of the maximum permitted heat input, regardless of ambient temperature. Initial compliance testing was performed in July, 1993, and the ambient temperature was too high for the units to achieve the required heat input. Therefore, the units have been limited to less than full capacity since that time. Incorporation of the heat input vs. ambient temperature relationship into both the construction and operation permits for the DeBary combustion turbines is extremely important for the economical operation of the units at any ambient temperature in order to provide the electricity FPC customers need at reasonable cost.

3.0 Heat Input vs. Ambient Temperature Curves

FPC submits the attached heat input vs. ambient temperature curve for application to both the DeBary and Intercession City new combustion turbines. For DeBary, FPC requests that the curve be incorporated into the construction permit. FPC will then request that the Central District amend the operating permit accordingly.

For the new GE Frame 7EA combustion turbines at Intercession City, FPC requests that the DEP remove the current specific ambient temperature and heat input references contained in Specific Condition 4.D. The attached curve would then be incorporated into the construction permit, replacing the specific references.

4.0 Heat Input During Compliance Testing

DEP is in the process of developing guidance on the rate of operation during compliance testing for combustion turbines. FPC requests that the final guidance be incorporated into the construction permits for both the DeBary and Intercession City new combustion turbines. In addition, FPC requests that the following language be incorporated into both permits in order to address the potential situation of one or more of the units being unable to achieve the required Heat Input vs. Ambient Temperature percentage of maximum rated heat input as adjusted for ambient temperature during a compliance test. This suggested language is based on the DEP

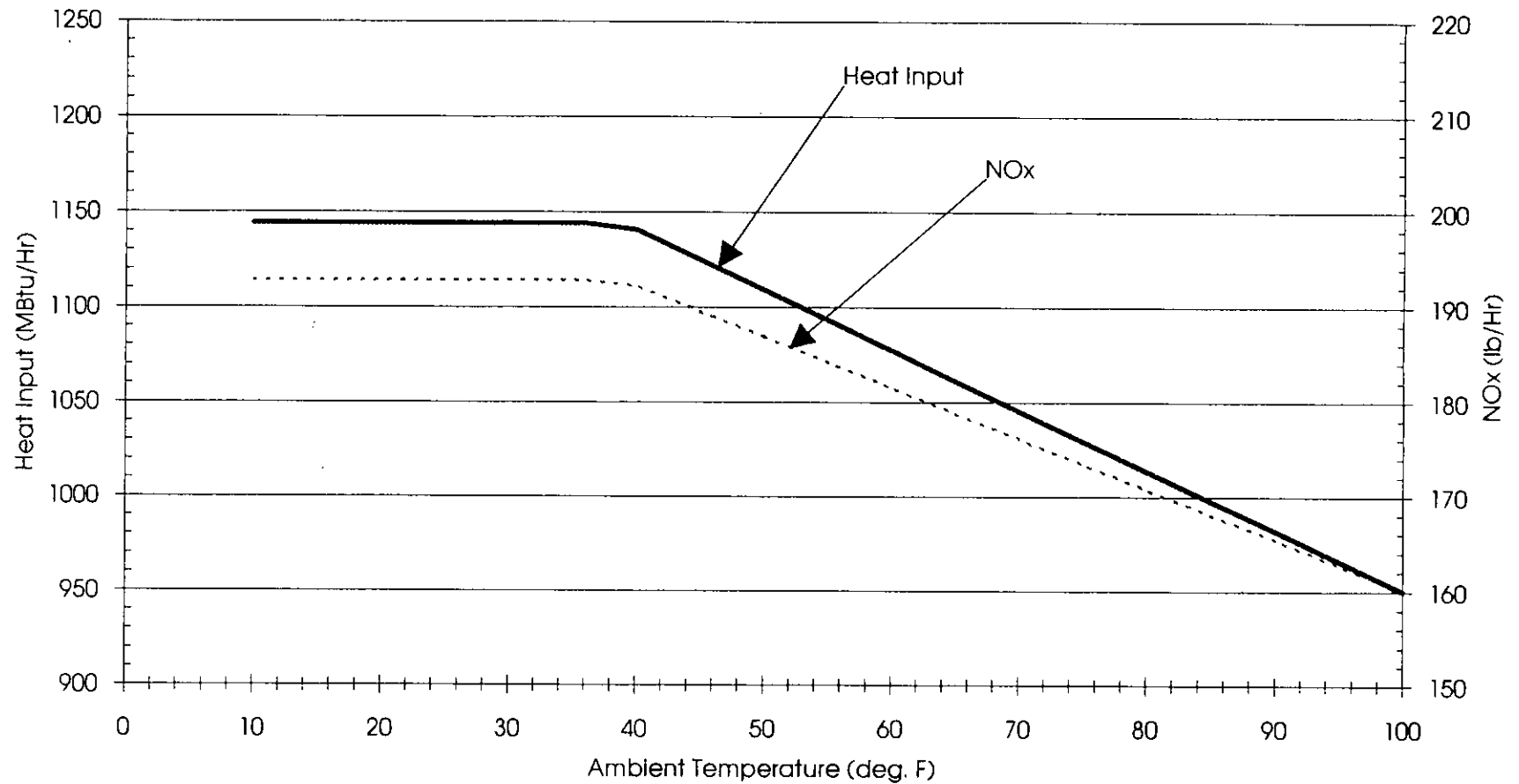
draft guidance dated May 4, 1994, which uses 95% as the required percentage of maximum rated capacity.

In the event that a combustion turbine does not achieve 95% of the design heat input capacity as adjusted for average ambient temperature during a compliance test, the entire heat input vs. ambient temperature curve will be adjusted downward by the increment equal to the difference between the design heat input value and 105% of the value reached during the test. The curve will be automatically adjusted upward upon demonstration of compliance at a higher heat input during a subsequent compliance test.

This language accounts for the possible degradation of the units over a period of time while allowing for the continued use of the ambient temperature vs. heat input relationship unique to combustion turbines.

Florida Power Corporation

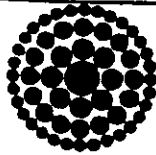
GE Frame 7EA Combustion Turbines



Note: Curves based on General Electric's (GE's) expected performance data.

6/10/94

Accounts Payable Department B3F
P.O. Box 14042
St. Petersburg, FL 33733-4042



**Florida
Power**
CORPORATION

0004895

83-115
631

DATE 06/20/94 CHECK NO. 1646777

PAY:

\$250*DOLLARS AND 00 CENTS

\$*****250.00

SunBank / Mid-Florida

TO
THE
ORDER
OF

FLA DEPT OF ENVIRONMENTAL
PROTECTION
2600 BLAIR STONE RD
TALLAHASSEE FL 32399-2400

Void after 60 days


Treasurer

⑈ 1001646777⑈ ⑆063101153⑆6990032052736⑈