

Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

January 29, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Walter P. Bussels, Managing Director and CEO  
Jacksonville Electric Authority  
Kennedy Generating Station  
21 West Church Street  
Jacksonville, Florida 32202-3139

Re: DEP File No.0310047-002AC  
JEA Kennedy Generating Station  
170 MW Simple Cycle Peaking Unit

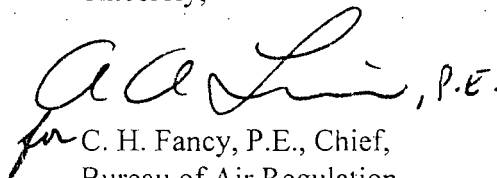
Dear Mr. Bussels:

Enclosed is one copy of the Draft Permit, Technical Evaluation and Preliminary Determination, for the referenced project in Duval County. The Department's Intent to Issue Permit and the "PUBLIC NOTICE OF INTENT TO ISSUE" are also included.

The "Public Notice of Intent to Issue Permit" must be published as soon as possible in a newspaper of general circulation in the area affected. Proof of publication, i.e., newspaper affidavit, must be provided to the Department's Bureau of Air Regulation office within 7 (seven) days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

Please submit any written comments you wish to have considered concerning the Department's proposed action to A. A. Linero, P.E., Administrator, New Source Review Section at the above letterhead address. If you have any questions, please call Ms. Teresa Heron at 850/921-9529.

Sincerely,

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

CHF/th

Enclosures

# NOTICE TO BE PUBLISHED IN THE NEWSPAPER

## PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP File No. 0310047-002-AC

Jacksonville Electric Authority Kennedy Generating Station  
170 Megawatt Combustion Turbine-Electrical Generator  
Duval County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Jacksonville Electric Authority (JEA). The permit is to install a nominal 170 megawatt natural gas and No. 2 fuel oil-fired combustion turbine-electrical generator to replace a natural gas and fuel oil-fired steam electrical unit (KE10) at the Kennedy Generating Station in Jacksonville, Duval County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Jacksonville Electric Authority, 21 West Church Street, Jacksonville, Florida 32202-3139.

The proposed unit is a nominal 170 megawatt General Electric MS7241FA gas and No. 2 fuel oil-fired combustion turbine-electrical generator and a 90 foot stack. The unit will operate a maximum of 4050 hours on natural gas or 1260 hours on No. 2 fuel oil with a maximum sulfur content of 0.05%. It will operate for various combinations of hours on either fuel such that the annual emissions increases in carbon monoxide (CO) and nitrogen oxides (NO<sub>x</sub>) remain at or below the values given below. The proposed unit will operate only in a simple cycle mode.

NO<sub>x</sub> emissions while firing natural gas, will be controlled by Dry Low NO<sub>x</sub> (DLN-2.6) combustors tuned to achieving emissions of 15 parts per million (ppm) by volume at 15 percent oxygen. During oil firing, NO<sub>x</sub> emissions will be 42 ppm and controlled by wet injection. Emissions of carbon monoxide (CO) for gas and oil firing will be controlled to 15 and 20 ppm, respectively. Emissions of volatile organic compounds (VOC) will be 1.4 and 3.5 ppm for gas and oil firing, respectively. Emissions of sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (SAM), and particulate matter (PM/PM<sub>10</sub>) will be very low because of the limited hours of operation and use of clean fuels.

The proven capabilities of the selected unit, together with the operational restrictions, will ensure that the annual emission levels required to avoid PSD Review are attained. There will be very small decreases in regulated air pollutants. However the unit will be able to produce substantially more electrical energy while maintaining maximum total annual emissions near past levels. Actual emissions will likely be substantially lower because the unit will primarily operate in intermittent duty. The maximum potential annual emissions in tons per year are summarized below along with the most recent annual emissions from Boiler KE10 (Unit 009) slated for retirement, the changes due to the project, and the PSD-significant levels.

<u>Pollutants</u>	<u>KE10 Actual Emissions</u>	<u>CT Potential Emissions</u>	<u>Change</u>	<u>PSD Significant Levels</u>
PM/PM <sub>10</sub>	21.7	18.2	-3.5	25/15
SAM	11.9	6.3	-5.6	7
SO <sub>2</sub>	266	62	-204	40
NO <sub>x</sub>	161.5	200.5	39	40
VOC	1.6	5.7	4.1	40
CO	14.5	97.2	82.7	100

An air quality impact analysis was not required or conducted. No significant impacts are due as a result of this project.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

# NOTICE TO BE PUBLISHED IN THE NEWSPAPER

The JEA Kennedy Generating Station combustion turbine-electrical generator project is not subject to review under Section 403.506 F.S. (Power Plant Siting Act), because it provides for no expansion in steam generating capacity.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Dept. of Environmental Protection Bureau of Air Regulation 111 S. Magnolia Drive, Suite 4 Tallahassee, Florida, 32301 Telephone: 850/488-0114 Fax: 850/922-6979	Regulatory & Environmental Services Dept. Air & Water Quality Division 117 W. Duval Street, Suite 225, Jacksonville, Florida 32202 Telephone: 850/630-3484 Fax: 850/630-3638	Dept. of Environmental Protection Northeast District Office 7825 Baymeadows Way, Suite 200B Jacksonville, Florida 32256-7590 Telephone: 850/448-4300 Fax: 850/448-4363
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The complete project file includes the application, technical evaluations, Draft Permit, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

In the Matter of an  
Application for Permit by:

Mr. Walter P. Bussels, Managing Director and CEO  
Jacksonville Electric Authority  
21 West Church Street  
Jacksonville, Florida 32202-3139

DEP File No. 0310047-002-AC  
170 MW Combustion Turbine Project  
Simple Cycle Peaking Unit  
Duval County

### INTENT TO ISSUE AIR CONSTRUCTION PERMIT

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit (copy of DRAFT Permit attached) for the proposed project, detailed in the application specified above and the attached Technical Evaluation and Preliminary Determination, for the reasons stated below.

The applicant, Jacksonville Electric Authority (JEA), applied on October 30, 1998 to the Department to construct/install a nominal 170 megawatt natural gas and No. 2 fuel oil-fired combustion turbine-electrical generator to replace a natural gas and fuel oil-fired steam electrical unit (KE10) at the Kennedy Generating Station in Jacksonville, Duval County.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, and 62-212. The above actions are not exempt from permitting procedures. The Department has determined that an air construction permit is required to conduct the work.

The Department intends to issue this air construction permit based on the belief that reasonable assurances have been provided to indicate that operation of these emission units will not adversely impact air quality, and the emission units will comply with all appropriate provisions of Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297, F.A.C.

Pursuant to Section 403.815, F.S., and Rule 62-110.106(7)(a)1., F.A.C., you (the applicant) are required to publish at your own expense the enclosed "Public Notice of Intent to Issue Air Construction Permit." The notice shall be published one time only in the legal advertisement section of a newspaper of general circulation in the area affected. For the purpose of these rules, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. Where there is more than one newspaper of general circulation in the county, the newspaper used must be one with significant circulation in the area that may be affected by the permit. If you are uncertain that a newspaper meets these requirements, please contact the Department at the address or telephone number listed below. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400 (Telephone: 850/488-0114; Fax 850/922-6979). The Department suggests that you publish the notice within thirty days of receipt of this letter. You must provide proof of publication within seven days of publication, pursuant to Rule 62-110.106(5), F.A.C. No permitting action for which published notice is required shall be granted until proof of publication of notice is made by furnishing a uniform affidavit in substantially the form prescribed in section 50.051, F.S. to the office of the Department issuing the permit or other authorization. Failure to publish the notice and provide proof of publication may result in the denial of the permit pursuant to Rules 62-110.106(9) & (11), F.A.C.

The Department will issue the final permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of thirty (30) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above. Mediation is not available in this proceeding.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542 F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2) F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.



TECHNICAL EVALUATION  
AND  
PRELIMINARY DETERMINATION

Jacksonville Electric Authority

Kennedy Generating Station  
170 Megawatt Simple Cycle Peaking Unit

Duval County

DEP File No. 0310047-002-AC

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

January 29, 1999

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 1. APPLICATION INFORMATION

### 1.1 Applicant Name and Address

Jacksonville Electric Authority (JEA)  
21 West Church Street  
Jacksonville, Florida 32202-3139

Authorized Representative: Walter P. Bussels, Managing Director & CEO

### 1.2 Reviewing and Process Schedule

10-30-98: Date of Receipt of Application  
11-25-98: DEP completeness request  
12-23-98: Application deemed complete.  
01-26-99: Issued Intent

## 2. FACILITY INFORMATION

### 2.1 Facility Location

Refer to Figure 1. The JEA Kennedy Generating Station is located at 4215 Talleyrand Ave in Jacksonville, Duval County. The UTM coordinates of this facility are Zone 17; 440.0 km E; 3,591.0 km N.

### 2.2 Standard Industrial Classification Codes (SIC)

Industry Group No.	49	Electric, Gas, and Sanitary Services
Industry No.	4911	Electric Services

### 2.3 Facility Category

The JEA Kennedy Generating Station produces electric power from three natural gas and fuel oil-fired steam units with a combined generating capacity of 250 megawatts (MW), a 21 MW natural gas and fuel oil-fired auxiliary boiler, and three No. 2 distillate fuel oil-fired simple cycle combustion turbines-electrical generator with a combined capacity of approximately 170 MW.

This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 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). Per Table 62-212.400-2, modifications at the facility resulting in emissions increases greater than 40 TPY of NO<sub>x</sub> or SO<sub>2</sub>, 25/15 TPY of PM/PM<sub>10</sub>, or 3 TPY of fluorides (F) require review per the PSD rules and a determination for Best Available Control Technology (BACT) per Rule 62-212.400, F.A.C. The present modification results in net emissions decreases or less-than-significant increases in PSD pollutants. Therefore the modification is not subject to PSD.

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/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 TPY.



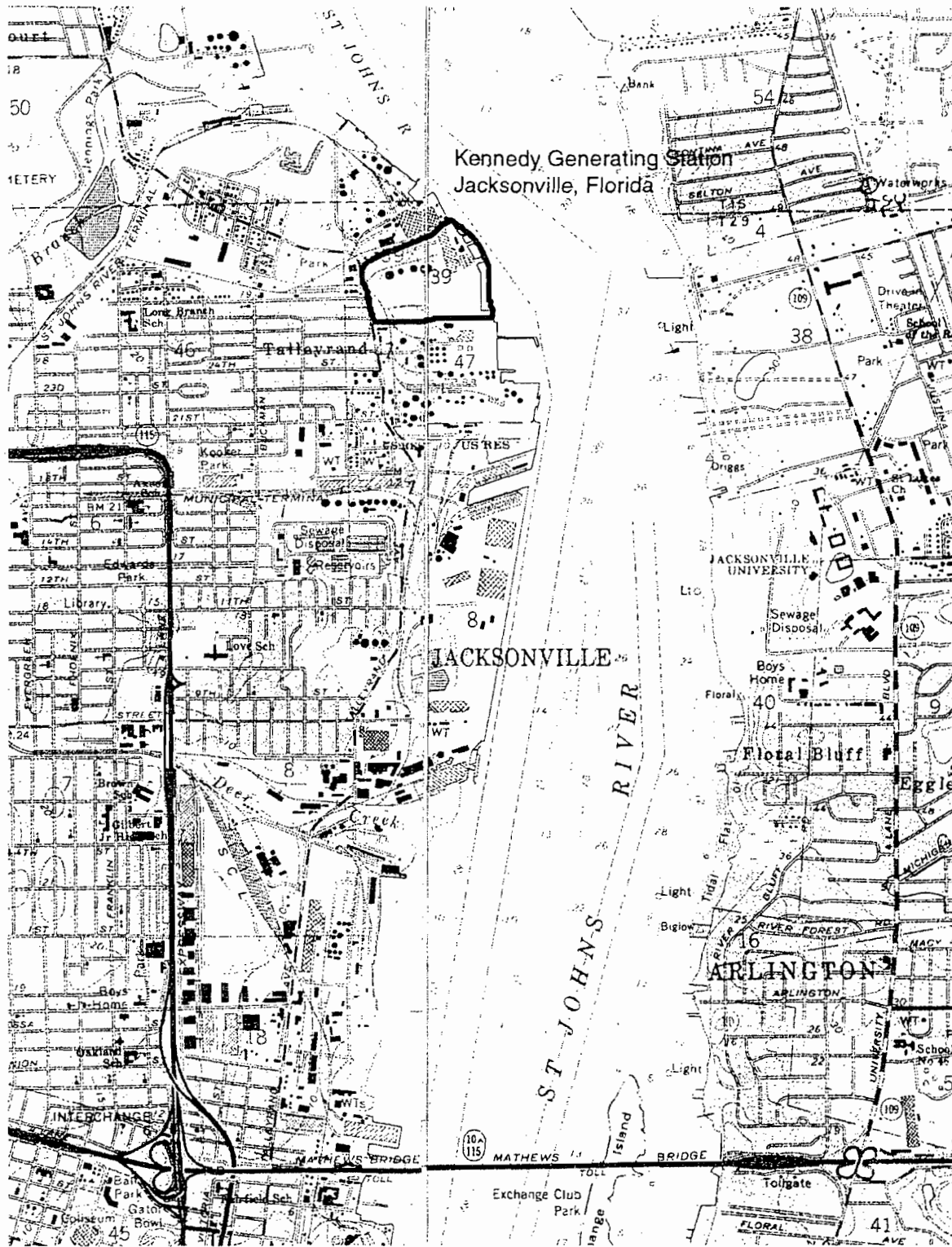


Figure 1 - Location of JEA Kennedy Generating Station

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 3. PROJECT DESCRIPTION

This permit addresses the following emissions unit:

EMISSION UNIT NO.	SYSTEM	EMISSION UNIT DESCRIPTION
00X	Power Generation	One 170 MW Combustion Turbine-Electrical Generator

JEA proposes to install a nominal 170 MW combustion turbine-electrical generator. The proposed unit is a General Electric PG 7241 FA combustion turbine that will burn natural gas and No. 2 distillate fuel oil. It will operate in simple cycle mode and intermittent duty. This turbine will replace an existing 150 MW natural gas and fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

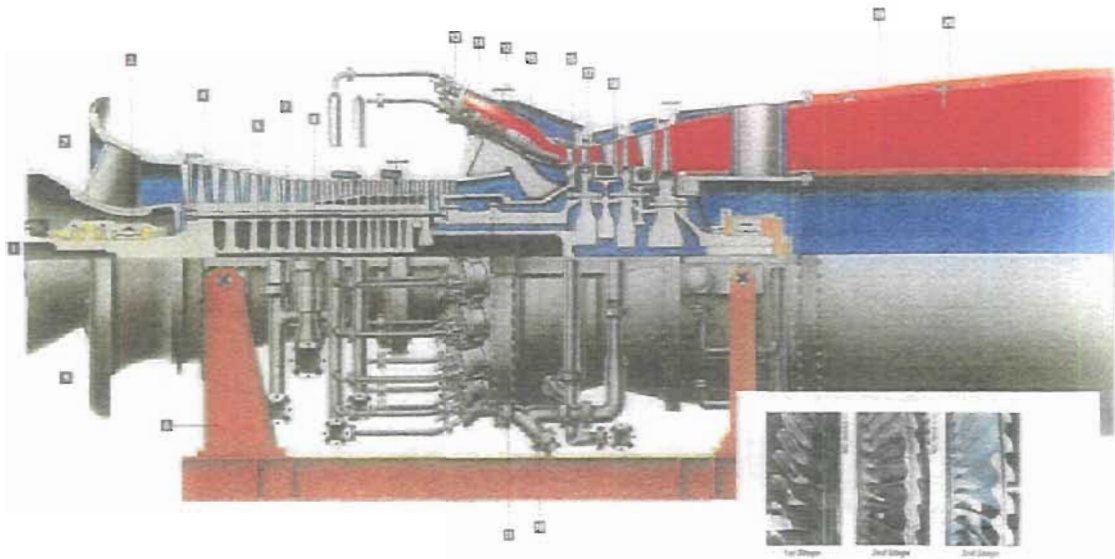
The prime mover and source of air pollution will be a General Electric PG7241FA (7FA) combustion turbine-electrical generator. It will be equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors tuned to control NO<sub>x</sub> emissions to 15 ppmvd at 15% O<sub>2</sub> between 50 and 100% of full load conditions during normal operations. Both natural gas and maximum 0.05 % sulfur fuel oil will be used in the unit.

A photograph of a GE 7001FA (a predecessor of the PG 7241FA) is shown in Figure 2. An internal view is shown in Figure 3.



**Figure 2 - Photograph of General Electric MS 7001FA Combustion Turbine**

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION



**Figure 3 - Internal View of General Electric MS 7001FA Combustion Turbine**

Hours of operation will be limited to 4050 hours per year on natural gas or 1260 hours per year on fuel oil. An algorithm is proposed by JEA to operate varying combinations of hours on natural gas and or fuel oil such that the maximum emissions do not exceed those related with exclusive firing of either fuel.

This combustion turbine will have a heat input of 1,623 million Btu per hour (natural gas) and 1822 million Btu per hour (fuel oil), lower heating value (MMBtu/hr, LHV) referenced to 59°F and 60 % relative humidity. At those heat input rates and conditions, the gross power output from the electrical generator is 173 MW for gas and 182 MW for oil. Depending on compressor inlet conditions, full load power capacity will range from approximately 150 to 187 MW while burning gas and 160 to 191 while burning fuel oil.

Emission decreases will occur for carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub> mist or SAM), particulate matter (PM/PM<sub>10</sub>), volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>). Net emission changes of these pollutants will be less than the significant emission levels per Table 62-212.400-2, F.A.C. Therefore review for the Prevention of Significant Deterioration (PSD) is not required.

According to the application, this unit will emit approximately 200 tons per year (TPY) of NO<sub>x</sub>, 97 TPY of CO, 18 TPY of PM/PM<sub>10</sub>, 62 TPY of SO<sub>2</sub>, 6 TPY of VOC, and 6 TPY of SAM.



# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## **4. PROCESS DESCRIPTION**

Much of the following discussion is from a 1993 EPA document on Alternative Control Techniques for NO<sub>x</sub> Emissions from Stationary Gas turbines.<sup>1</sup> Project specific information is interspersed where appropriate.

A gas turbine is an internal combustion engine that operates with rotary rather than reciprocating motion. Ambient air is drawn into the 18-stage compressor of the GE 7FA where it is compressed by a pressure ratio of about 15 times atmospheric pressure. The compressed air is then directed to the combustor section, where fuel is introduced, ignited, and burned. The combustion section consists of 14 separate can-annular combustors.

Flame temperatures in a typical combustor section can reach 3600 degrees Fahrenheit (°F). Units such as the 7FA operate at lower flame temperatures which minimize NO<sub>x</sub> formation. The hot combustion gases are then diluted with additional cool air and directed to the turbine section at temperatures of approximately 2400 °F. Energy is recovered in the turbine section in the form of shaft horsepower, of which typically more than 50 percent is required to drive the internal compressor section. The balance of recovered shaft energy is available to drive the external load unit such as an electrical generator.

In the JEA project, the unit will operate primarily as a peaking unit in the simple cycle mode. Cycle efficiency, defined as a percentage of useful shaft energy output to fuel energy input, is approximately 35 percent for F-Class combustion turbines in the simple cycle mode. In addition to shaft energy output, 1 to 2 percent of fuel input energy can be attributed to mechanical losses. The balance is exhausted from the turbine in the form of heat. Figure 4 is a process flow diagram for this simple cycle operation.

In combined cycle operation, the gas turbine drives an electric generator while the exhausted gases are used to raise steam in a heat recovery steam generator (HRSG). In combined cycle mode, the thermal efficiency of the 7FA can exceed 56 percent.

Additional process information related to the combustor design, and control measures to minimize NO<sub>x</sub> formation are given in the control technology section below.

## **5. RULE APPLICABILITY**

The proposed project is subject to preconstruction review requirements under the provisions of Chapter 403, Florida Statutes, and Chapters 62-4, 62-204, 62-210, 62-212, 62-214, 62-296, and 62-297 of the Florida Administrative Code (F.A.C.).

This facility is located in Duval County, an area designated as unclassifiable for sulfur dioxide, as an air quality maintenance area for ozone and particulate matter in accordance with Rule 62-204.360, F.A.C. The proposed project is not subject to review under Rule 62-212.400., F.A.C., Prevention of Significant Deterioration (PSD), because the net emission increases for CO, VOC and NO<sub>x</sub> do not exceed the significant emission rates given in Chapter 62-212, Table 62-212.400-2, F.A.C.

The net emissions increase/decrease for all PSD pollutants as a result of this modification are calculated below:

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## CONTEMPORANEOUS CREDITABLE CHANGES (TPY)

Pollutants	Past Emissions (Boiler KE10)	Future Emissions (170 MW CT)	Increase (decrease)	PSD Significance	PSD Review?
PM/PM <sub>10</sub>	21.7	18.2	(3.5)	25/15	No
SAM	11.9	6.3	(5.5)	7	No
SO <sub>2</sub>	266	62	(204)	40	No
NO <sub>x</sub>	161.5	200.5	39	40	No
VOC	1.6	5.7	4.1	40	No
CO	14.5	97.2	82.7	100	No

This evaluation consists of a review of the control technology for PM/PM<sub>10</sub>, VOC, CO, SO<sub>2</sub>, and NO<sub>x</sub> to insure that it is sufficient to restrict future emissions to levels lower than past emissions or net increases in emissions to levels less than the significant emission rates as described above. An analysis of the air quality impact from proposed project is required to insure that there are no exceedances of the National or State Ambient Air Quality Standards.

The emission unit affected by this permit shall comply with all applicable provisions of the Florida Administrative Code (including applicable portions of the Code of Federal Regulations incorporated therein) and, specifically, the following Chapters and Rules:

### 5.1 State Regulations

Chapter 62-4	Permits.
Rule 62-204.220	Ambient Air Quality Protection
Rule 62-204.240	Ambient Air Quality Standards
Rule 62-204.800	Federal Regulations Adopted by Reference
Rule 62-210.300	Permits Required
Rule 62-210.350	Public Notice and Comments
Rule 62-210.370	Reports
Rule 62-210.550	Stack Height Policy
Rule 62-210.650	Circumvention
Rule 62-210.700	Excess Emissions
Rule 62-210.900	Forms and Instructions
Rule 62-212.300	General Preconstruction Review Requirements
Chapter 62-213	Operation Permits for Major Sources of Air Pollution
Chapter 62-214	Requirements For Sources Subject To The Federal Acid Rain Program
Rule 62-296.320	General Pollutant Emission Limiting Standards
Rule 62-297.310	General Test Requirements
Rule 62-297.401	Compliance Test Methods
Rule 62-297.520	EPA Continuous Monitor Performance Specifications

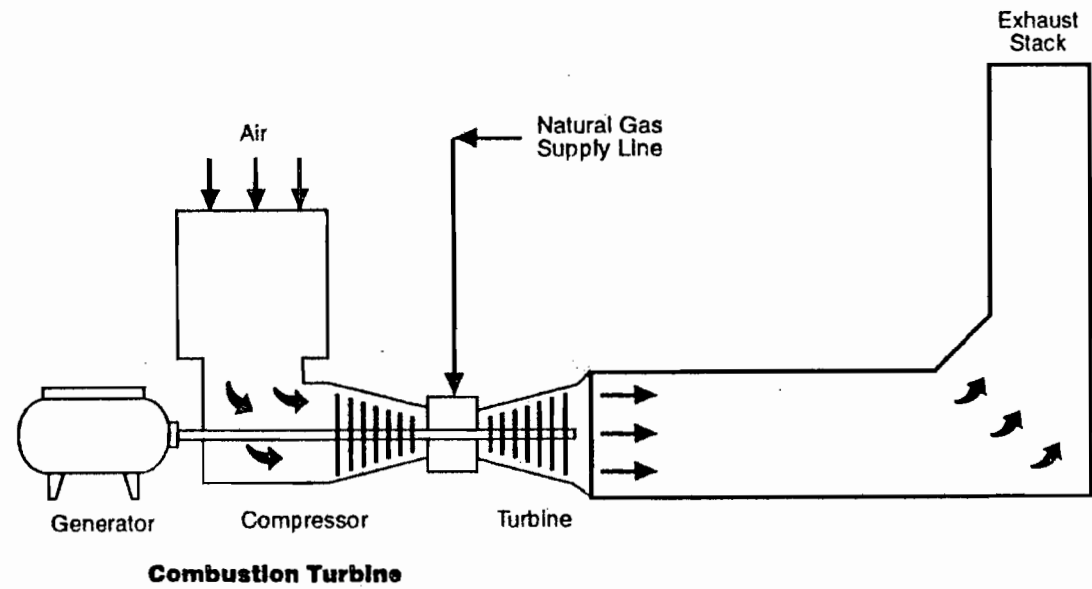


Figure 4 - Simple Cycle Combustion Turbine Process Flow Diagram

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 5.2 Federal Rules

40 CFR 60	NSPS Subparts GG
40 CFR 60	Applicable sections of Subpart A, General Requirements
40 CFR 72	Acid Rain Permits (applicable sections)
40 CFR 73	Allowances (applicable sections)
40 CFR 75	Monitoring (applicable sections including applicable appendices)
40 CFR 77	Acid Rain Program-Excess Emissions (future applicable requirements)

## 6. AIR POLLUTION CONTROL TECHNOLOGY

### 6.1 Applicant Control Technology Proposal

POLLUTANT	CONTROL TECHNOLOGY	PROPOSED LIMIT
PM/PM <sub>10</sub> (Non-Condensables)	Combustion Controls	9 lb/hr (NG)* 17 lb/hr (F.O.)*
Volatile Organic Compounds	As Above	1.4 ppm (NG) 3.5 ppm (F.O.)
Carbon Monoxide	As Above	15 ppm (NG) 20 ppm (F.O.)
Sulfur Dioxide	As Above	2 gr/100 scf (NG) 0.05% Sulfur Fuel Oil
H <sub>2</sub> SO <sub>4</sub>	As Above	10 lb/hr
Opacity	As Above	5 (NG) 20 (F.O.)
Nitrogen Oxides	Dry Low NO <sub>x</sub> - Natural Gas Wet Injection - Fuel Oil	15 ppm @ 15% O <sub>2</sub> (NG) 42 ppm @ 15% O <sub>2</sub> (F.O.)

### 6.2 Standards of Performance for New Stationary Sources

The minimum project control technology basis is 40 CFR 60, Subpart GG, Standards of Performance for Stationary Gas Turbines (NSPS). Subpart GG was adopted by the Department by reference in Rule 62-204.800, F.A.C. The key emission limits required by Subpart GG are 75 ppm NO<sub>x</sub> @15% O<sub>2</sub>. (assuming 25 percent efficiency) and 150 ppm SO<sub>2</sub> @15% O<sub>2</sub> (or <0.8% sulfur in fuel). The proposal is consistent with the NSPS which allows NO<sub>x</sub> emissions over 100 ppm for the high efficiency unit to be purchased by JEA. No National Emission Standards for Hazardous Air Pollutants exist for stationary gas turbines.

### 6.3 Determinations by EPA and States

Recent Best Available Control Technology (BACT) proposals and determinations for NO<sub>x</sub> in simple cycle gas turbine projects have ranged from 9 to 15 ppm @ 15% O<sub>2</sub> by Dry Low NO<sub>x</sub> Combustion or Hot Selective Catalytic Reduction. Values when firing oil are typically 42 ppm by wet injection. In addition to being a simple cycle project, this unit will operate as a "peaker" and emissions will not trigger PSD and BACT. JEA has proposed a limits of 15 ppm for gas firing and 42 ppm for oil firing, which will avoid PSD. These are within the

## **TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION**

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range of recent simple cycle, peaker BACT limits. Similarly, the proposed CO and VOC limits are within the range of recent BACT determinations for both simple and combined cycle projects.

### **6.4 Review of Combustion Turbine Control Technologies**

A complete discussion of control options was not required because the project is not subject to a Best Available Control Technology Determination. However the applicant discussed the technology to be employed in order to comply with the New Source Performance Standards and the requested limits. The Department has included other information typically included in a complete BACT determination for comparison purposes.

#### **6.4.1 Nitrogen Oxides Formation**

Much of the discussion in this section is based on a 1993 EPA document on Alternative Control Techniques for NO<sub>x</sub> Emissions from Stationary Gas Turbines. Project-specific information is included where applicable.

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<sub>x</sub> forms in the high temperature area of the gas turbine combustor. Thermal NO<sub>x</sub> 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<sub>x</sub> formation. Prompt NO<sub>x</sub> is formed in the proximity of the flame front as intermediate combustion products. The contribution of Prompt to overall NO<sub>x</sub> is relatively small in lean, near-stoichiometric combustors and increases for leaner fuel mixtures. This provides a practical limit for NO<sub>x</sub> control by lean combustion.

Fuel NO<sub>x</sub> is formed when fuels containing bound nitrogen are burned. This phenomenon is not important when combusting natural gas.

Uncontrolled emissions range from about 100 to over 600 parts per million by volume, dry, corrected to 15 percent oxygen (ppm @15% O<sub>2</sub>). For large modern turbines, the Department estimates uncontrolled emissions at approximately 200 ppm @15% O<sub>2</sub>.

#### **6.4.2 NO<sub>x</sub> Control Techniques**

##### Combustion Controls

The excess air in lean combustion, cools the flame and reduces the rate of thermal NO<sub>x</sub> formation. Lean premixing of fuel and air prior to combustion can further reduce NO<sub>x</sub> 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.



## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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The above principle is depicted in Figure 5 for a General Electric 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<sub>x</sub> emissions, GE developed the DLN-2 combustor (cross section shown in Figure 5) wherein air usage (other than for premixing) was minimized. The venturi and the centerbody assembly were eliminated and the combustor has a single burning zone. So-called "quaternary fuel" is introduced through pegs located on the circumference of the outward combustion casing.

The emission characteristics of General Electric's DLN 2 combustors are given in Figure 6 (gas) and 7 (fuel oil). NO<sub>x</sub> concentrations are higher in the exhaust at lower loads because at lower loads, the combustor do not operate in the lean pre-mix mode. Therefore such a combustor emits NO<sub>x</sub> at concentrations of 25 parts per million (ppm) at loads between 50 and 100 percent of capacity, but concentrations as high as 100 ppm at less than 50 percent of capacity.

Simplified cross sectional views of the totally premixed DLN-2.6 combustor to be installed at the JEA project are shown in Figure 8. The combustor is similar to the DLN-2 with the addition of a sixth (center) fuel nozzle to achieve emissions as low as 9 ppm of NO<sub>x</sub> and 9 ppm of CO. The expected emission characteristics of General Electric's DLN 2.6 combustors, tuned for the proposed project, are given in Figure 9 (gas). Emissions characteristics while firing oil are expected to be the same as shown for the DLN-2 in Figure 7. Note that VOC comprises a very small amount of the "unburned hydrocarbons" which in turn are mostly non-VOC methane,

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<sub>x</sub> 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, results in a lower 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

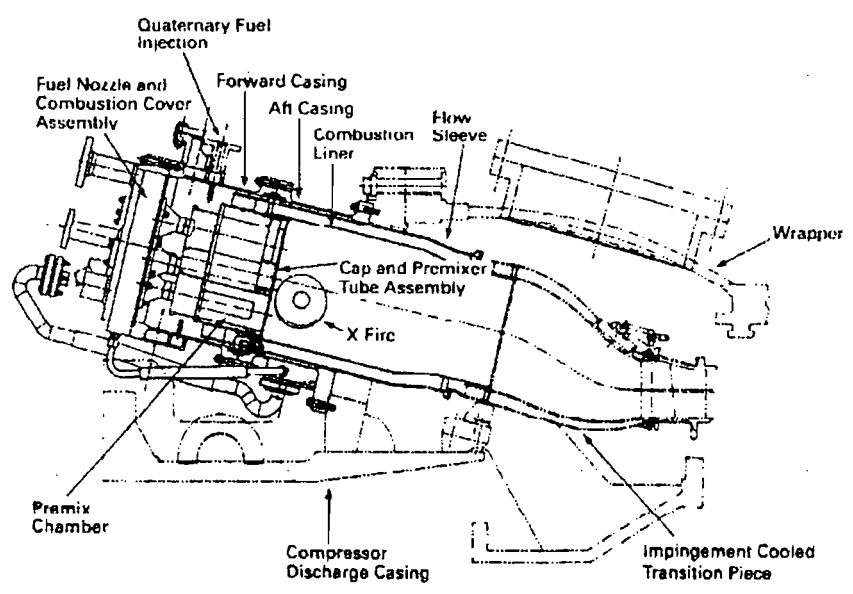
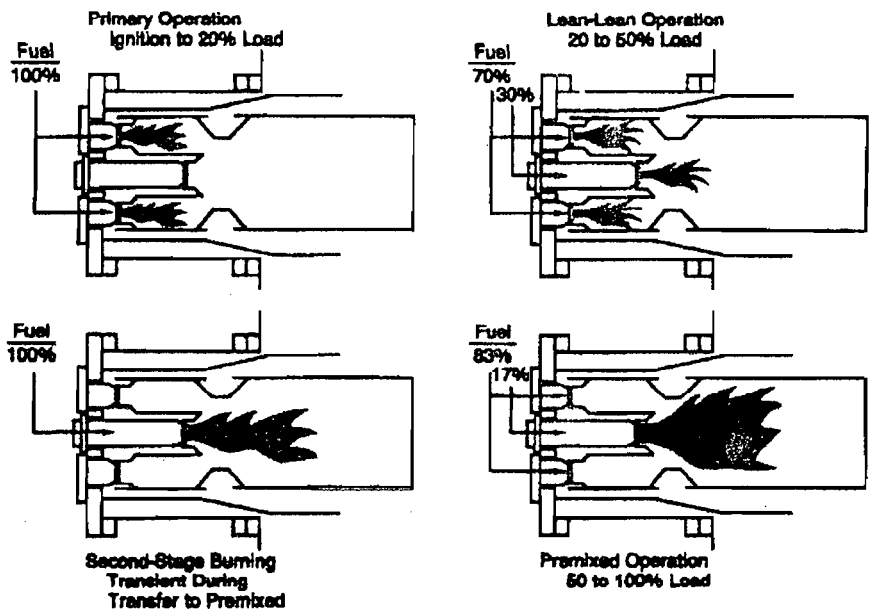


Figure 5 - Dry Low NOx Operating Modes - DLN-1

Cross Section of DLN-2.0

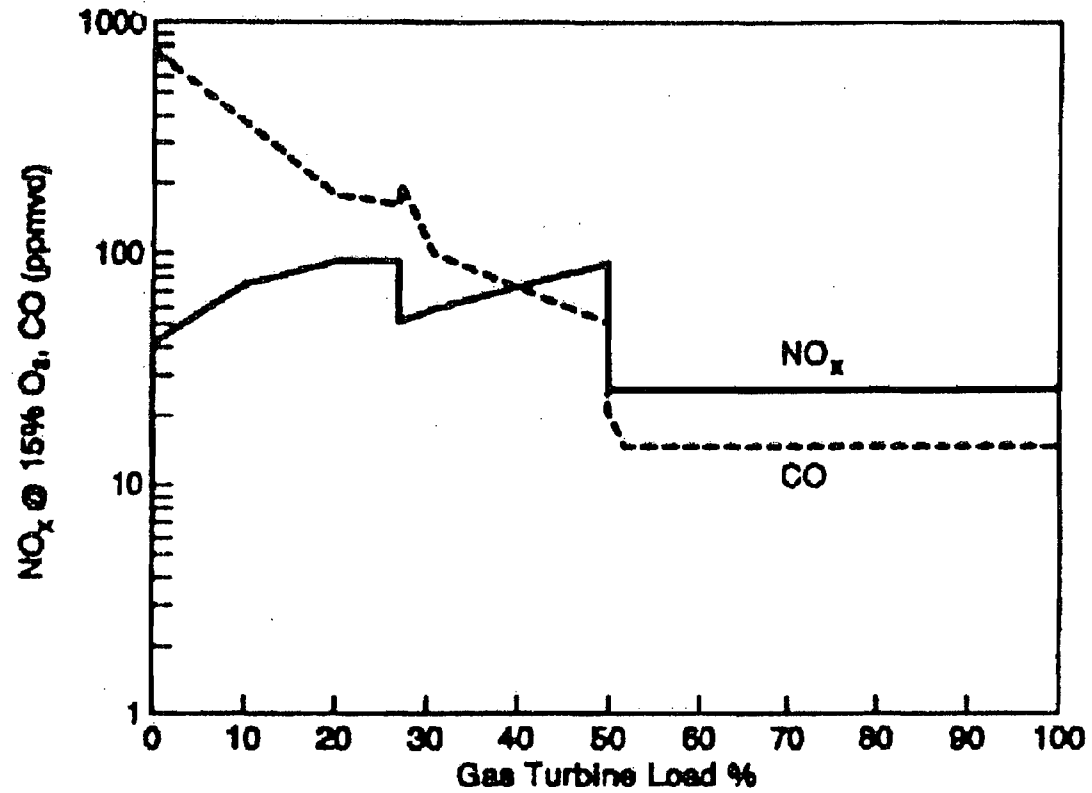


Figure 6 - Emissions Performance Curves for GE DLN-2 Combustor

Firing Natural Gas in a Dual Fuel GE 7FA Combustion Turbine

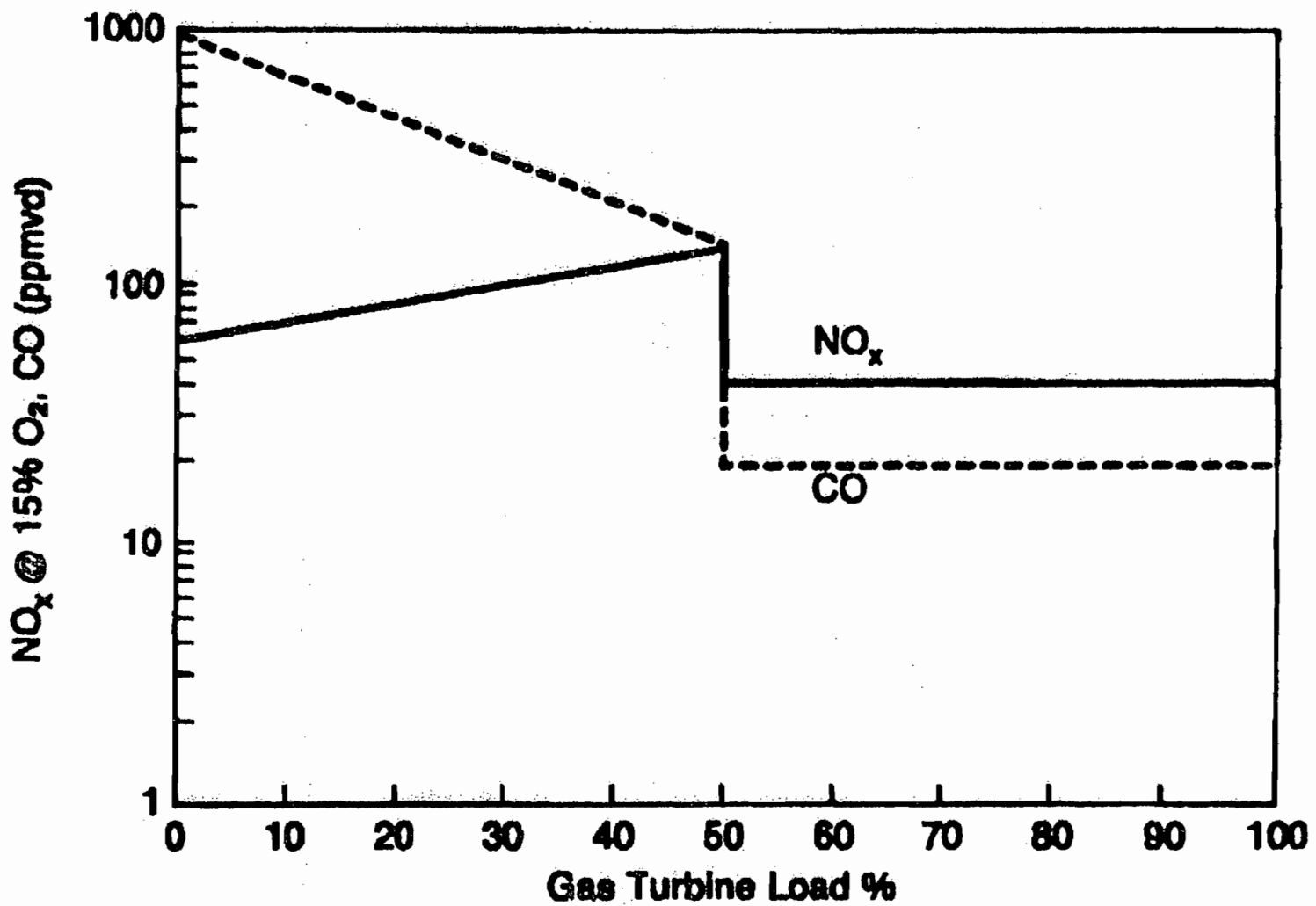
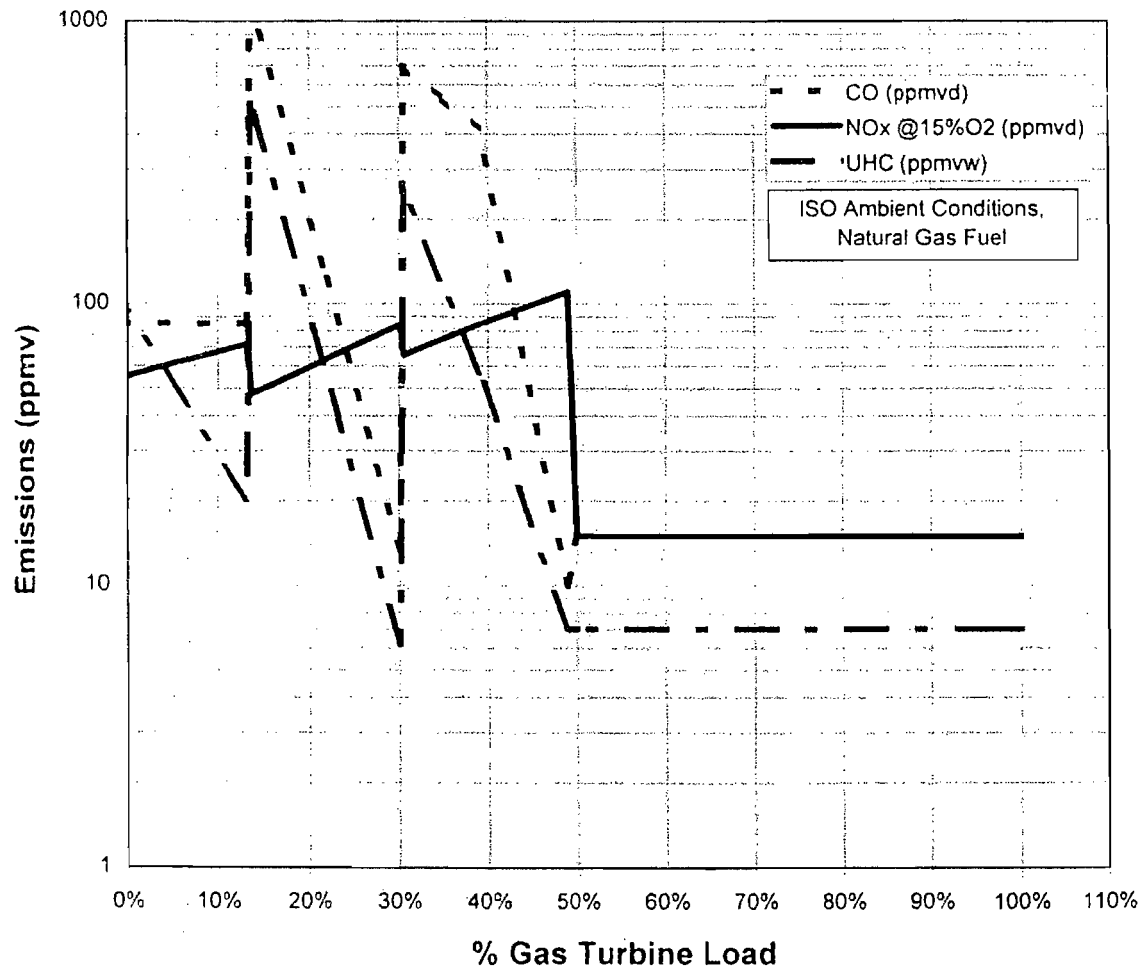


Figure 7 - Emissions Performance Curves for GE DLN-2 Combustor  
Firing Fuel Oil in Dual Fuel GE 7FA Turbine





**Figure 9 - 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 ppm NOx)

## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

back to the 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<sub>x</sub> 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<sub>x</sub> formation can be appreciated from Figure 10 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 low as 9 ppm (and even lower) from gas turbines smaller than about 200 MW (simple cycle), such as the F class.

### Selective Catalytic Combustion

Selective catalytic reduction (SCR) is an add-on NO<sub>x</sub> control technology that is employed in the exhaust stream following the gas turbine. SCR reduces NO<sub>x</sub> emissions by injecting ammonia into the flue gas. As of early 1992, over 100 gas turbine installations already used SCR in the United States. The only combustion turbines in Florida employing SCR are at the FPC Hines Energy Complex, where Westinghouse is unable to meet the DLN limits at the present time. Recently, FPC proposed a second construction phase incorporating SCR in two Westinghouse 501F combustion turbines. Seminole Electric recently advised the Department that it would install SCR in a previously Westinghouse 501F project, originally based on DLN. Virtually all SCR units are used in combination with wet injection or combustion controls.

Ammonia reacts with NO<sub>x</sub> in the presence of a catalyst and excess oxygen yielding molecular nitrogen and water. The catalyst used in combined cycle, low temperature applications (conventional SCR), is usually vanadium or titanium oxide and accounts 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.

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

In a manner analogous to balancing control of NO<sub>x</sub> from the combustor with emissions of CO and hydrocarbon, similar balancing is required when controlling NO<sub>x</sub> by SCR. Excessive ammonia use tends to increase emissions of CO, ammonia (slip), and particulate matter (when sulfur bearing fuels are used). Permit BACT limits as low as 3.5 ppm NO<sub>x</sub> have been specified using SCR for a combined cycle F Class project in Alabama and proposed for another F Class project in Mississippi.

## Gas Turbine - Hot Gas Path Parts

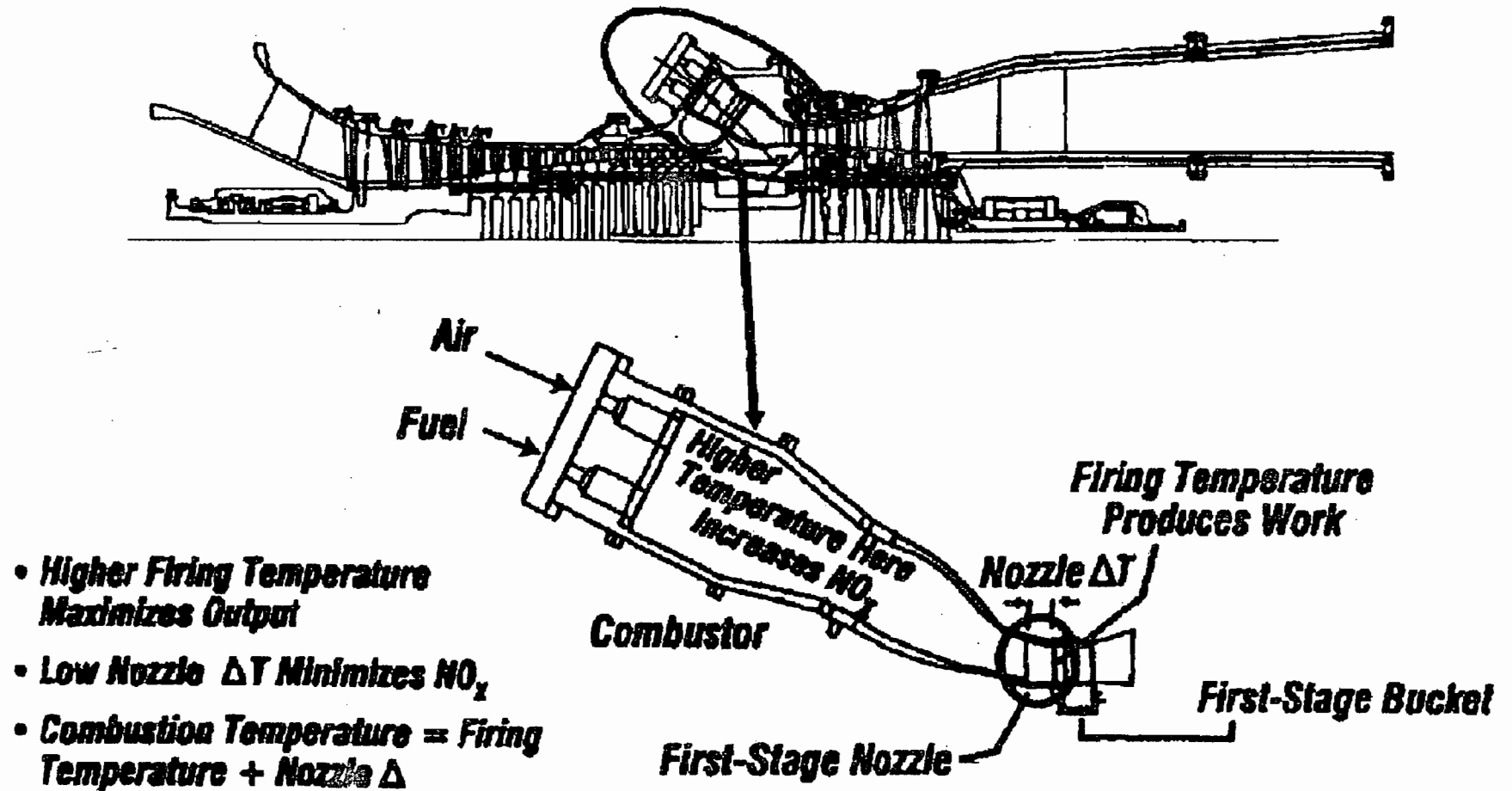


Figure 10 - Relation Between Flame Temperature and firing Temperature



## TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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### 6.4.3 Particulate Matter (PM/PM<sub>10</sub>) Control

Particulate matter is generated by various physical and chemical processes during combustion and will be affected by the design and operation of the NO<sub>x</sub> controls. Particulate matter emitted from this unit will mainly be less than 10 microns in diameter (PM<sub>10</sub>).

Natural gas and maximum 0.05 percent sulfur No. 2 fuel oil will be the only fuels fired and are efficiently combusted in gas turbines. Clean 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 used contains minimal ash.

A technology review indicated that the top control option for PM<sub>10</sub> is a combination of good combustion practices, fuel quality, and filtration of inlet air. This has been chosen as BACT by the applicant and the Department concurs. Annual emissions of PM/PM<sub>10</sub> are expected to be less than 20 tons per year.

### 6.4.4 Carbon Monoxide (CO) Control

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.

Most installations using catalytic oxidation are located in the Northeast. Among them are the 272 MW Berkshire, Massachusetts facility, 240 MW Brooklyn Navy Yard Facility, the 240 MW Masspower facility, the 165 MW Pittsfield Generating Plant in Massachusetts, and the 345 MW Selkirk Generating Plant in New York. 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. Along with its recent proposal to install SCR on a Westinghouse 501F unit (Hardee Unit 3), Seminole Electric proposes to install an oxidation catalyst for CO control.

Most combustion turbines incorporate good combustion to minimize emissions of CO. These installations typically achieve CO emissions between 10 and 30 ppm at full load, even as they achieve relatively low NO<sub>x</sub> emissions by SCR or dry low NO<sub>x</sub> means. By comparison, the value of 15 ppm proposed JEA's application for gas firing appears relatively low, but consistent with the capabilities of the DLN-2.6 technology as discussed above. A CO limit of 20 ppm is proposed when burning oil. Annual emissions are expected not to exceed 97 ton per year.

### 6.4.5 Volatile Organic Compound (VOC) Control

Volatile organic compound (VOC) emissions, like CO emissions, are formed due to incomplete combustion of fuel. There are no viable add-on control techniques as the combustion turbine itself is very efficient at destroying VOC. The applicant has proposed good combustion practices to control VOC to 1.4 ppm (gas) and 3.5 (oil). These values are as low as any BACT-based VOC limit previously set by the Department. According to GE, even lower VOC emissions were achieved during recent tests of the DLN-2.6 technology when firing natural gas.<sup>2</sup> Annual emissions of VOC are not expected to exceed 6 TPY.

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 6.5 Background on Selected Gas Turbine

JEA plans to install a nominal 170 MW General Electric MS7241FA combustion turbine to be operated in a simple cycle mode.

The first commercial GE 7F Class unit was installed at the Virginia Power Chesterfield Station in 1990.<sup>2</sup> 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 line was redesignated as the 7FA Class.

The first GE 7F/FA project in Florida was at the FPL Martin Plant in 1993 and entered commercial service in 1994.<sup>3</sup> The units were equipped with DLN-2 combustors with a permitted NO<sub>x</sub> limit of 25 ppm. These actually achieve less than 25 ppm of NO<sub>x</sub> and 15 ppm of CO. The City of Tallahassee recently received approval to install a GE 7FA Class unit at its Purdom Plant.<sup>4</sup> Although permitted emissions are 12 ppm of NO<sub>x</sub>, the City obtained a performance guarantee from GE of 9 ppm.<sup>5</sup>

General Electric, other manufacturers, and their customers are relying on further advancement and refinement of DLN technology to provide sufficient NO<sub>x</sub> control for their combined cycle turbines in Florida. Where required by BACT determinations of certain states, General Electric incorporates SCR in combined cycle projects.<sup>6</sup>

The approach of progressively refining such technology is a proven one, even on some relatively large units. Basically this was the strategy adopted in Florida throughout the 1990's. Recently GE Frame 7 FA units met performance guarantees of 9 ppm with DLN-2.6 burners at Fort St. Vrain, CO and Clark County, WA.<sup>7</sup> GE has already achieved emissions of approximately 6 ppm on gas at a dual-fuel MW 7EA (120 MW combined cycle) unit at Cane Island Power Park in Kissimmee, FL.<sup>8</sup> The Cane Island unit is equipped with DLN-2 combustors. According to GE, similar performance is expected soon on the 7FA line and performance guarantees less than 9 ppm can be expected using the DLN-2.6 combustors for units delivered in a couple of years.<sup>9</sup>

## 6.6 Control Technology Determination

Following are the emission limits determined for the JEA project assuming full load. *Values for NO<sub>x</sub> are corrected to 15% O<sub>2</sub> on a dry basis.* These limits or their equivalents in terms of pounds per hour, are given in the permit Specific Conditions.

NO <sub>x</sub>	SO <sub>2</sub>	CO	VOC	PM/Visibility (% Opacity)	Technology and Comments
15 ppm (NG) 42 ppm (FO)	<2gr S/100scf of gas 0.05% S in FO	15 ppm (NG) 20 ppm (FO)	1.4 ppm (NG) 3.5 ppm (FO)	10.	Dry Low NO <sub>x</sub> Combustors Wet Injection Pipeline Natural Gas Good Combustion Fuel Oil, 0.05% Sulfur

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

## 6.7 Rationale for Control Technology Determination

- JEA obtained a guarantee from GE for DLN-2.6 combustors which have been demonstrated to meet all of the above limits on "7FA" Class gas turbines.
- The JEA project "nets out" of PSD review and BACT.
- All of the combustion turbine emission limits comply with the NSPS and are close or equal to recent Department BACT determinations applicable to new units at start-up.
- $PM_{10}$  emissions will be very low and difficult to measure. Therefore, the Department, with JEA's concurrence, will set a visible emission standard of 10 percent opacity.
- The Department will set CO limits achievable by good combustion equal to 15 ppm on gas and 20 ppm on oil. CO limits for the FPL Fort Myers Repowering Project and the Santa Rosa Energy Center are 12 ppm on gas. Similar limits have been proposed in recently issued Intents for Kissimmee Utilities Cane Island Unit 3 and the Duke Energy New Smyrna Beach Power Project.
- VOC emissions of 1.4 ppm (gas) and 3.5 (oil) proposed by JEA are at the lower end of values determined as BACT. Good Combustion is sufficient to achieve these low levels with the DLN-2.6 combustors while firing natural gas.
- $SO_2$  and  $H_2SO_{4Acid\ Mist}$  emissions compliance will be implemented through the Custom Fuel Monitoring Schedule for each allowed fuel.

## 6.8 Compliance Procedures

Pollutant	Compliance Procedure
Visible Emissions	Method 9
Volatile Organic Compounds	Method 18, 25, or 25A (initial tests only)
Carbon Monoxide	Annual Method 10 (can use RATA if at capacity)
$NO_x$ (24-hr average)	$NO_x$ CEMS, $O_2$ or $CO_2$ diluent monitor, and flow device as needed
$NO_x$ (NSPS initial performance)	Method 20 (can use RATA if at capacity)

## 7. SOURCE IMPACT ANALYSIS

An air quality analysis was not required because the modification is not subject to PSD review.

## 8. CONCLUSION

Based on the foregoing technical evaluation of the application and other available information, the Department has made a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations.

*A. A. Linero, P.E.*

*Teresa Heron, Review Engineer*

# TECHNICAL EVALUATION AND PRELIMINARY DETERMINATION

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## REFERENCES

- <sup>1</sup> EPA. "Alternative Control Techniques for NO<sub>x</sub> Emissions from Stationary Gas Turbines." 1993.
- <sup>2</sup> Telecon. Vandervort, C., GE, and Linero, A. A., DEP. VOC Emissions From FA Gas Turbines with DLN-2.6 Combustors.
- <sup>3</sup> Brochure. General Electric. "GE Gas Turbines - MS7001FA." Circa 1993.
- <sup>4</sup> Davis, L.B. "Dry Low NO<sub>x</sub> Combustion Systems for GE Heavy Duty Gas Turbines. 1994.
- <sup>5</sup> Florida DEP. PSD Permit, City of Tallahassee Purdom Unit 8. May, 1998.
- <sup>6</sup> City of Tallahassee. PSD/Site Certification Application. April, 1997.
- <sup>7</sup> State of Alabama. PSD Permit, Alabama Power/Barry (GE 7FA).
- <sup>8</sup> Telecon. Schorr, M., GE, and Costello, M., Florida DEP. March 31, 1998. Status of DLN-2.6 Program.
- <sup>9</sup> Florida DEP. Bureau of Air Regulation Monthly Report. June, 1998.
- <sup>10</sup> Telecon. Schorr, M., GE, and Linero, A. A., Florida DEP. August, 1998. Cost effectiveness of DLN versus SCR.

**PERMITTEE:**

Jacksonville Electric Authority  
Kennedy Generating Station  
21 West Church Street  
Jacksonville, Florida 32202-3139

Permit No.	0310047-002-AC
Project:	170 MW Simple Cycle Peaking Unit
SIC No.	4911
Expires:	December 31, 2002

*Authorized Representative:*

Walter P. Bussels  
Managing Director & Chief Executive Officer

**PROJECT AND LOCATION:**

Jacksonville Electric Authority (JEA) proposes to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59°F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG 7241 FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

This facility is located at 4215 Talleyrand Ave in Jacksonville, Duval County, Florida. UTM coordinates are: Zone 17; 440.0 km E and 3,591.00 km N.

**STATEMENT OF BASIS:**

This 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 MADE A PART OF THIS PERMIT:**

Appendix GC                      Construction Permit General Conditions

\_\_\_\_\_  
Howard L. Rhodes, Director  
Division of Air Resources  
Management

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

### FACILITY DESCRIPTION

Currently, this facility generates electric power from a 134 MW and two 44 MW natural gas/fuel oil-fired steam units, an auxiliary 21 MW boiler, and three oil fired 56.2 MW combustion turbines used as peaking units, all with a combined generating capacity of approximately 412 MW.

This permitting action is to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59 °F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG 7241 FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

This Project is exempt from the requirements of Rule 62-212.400, F.A.C., Prevention of Significant Deterioration (PSD) as discussed stated in the Technical Evaluation and Preliminary Determination dated January 29, 1999.

### EMISSION UNITS

This permit addresses the following emission unit:

Emission Unit No.	System	Emission Unit Description
00X	Power Generation	One 170 MW Simple Cycle Combustion Turbine-Generator - Peaking Unit

### REGULATORY CLASSIFICATION

This facility, JEA Kennedy Generating Station, 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/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 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).

This facility is a major source of hazardous air pollutants (HAPs) and is also subject to the provisions of Title IV, Acid Rain, Clean Air Act as amended in 1990 (Title V application received June 14, 1996).

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

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### PERMIT SCHEDULE

- xx/xx/99 Notice of Intent published in \_\_\_\_\_
- 01/29/99 Distributed Intent to Issue Permit
- 12/23/98 Application deemed complete
- 10/30/98 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 October 30, 1998.
- Department's Intent to Issue and Public Notice Package dated January 29, 1999.
- EPA comments dated February xx, 1999.
- JEA's comments dated December 23, 1998, January 19 and February XX, 1999.

DRAFT 1/29/99

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 (DEP), at 2600 Blirstone Road, Tallahassee, Florida 32399-2400 and phone number (850)488-0114. All documents related to reports, tests, and notifications should be submitted to the Jacksonville Regulatory & Environmental Services Department (RESD) Air & Water Quality Division, Suite 225, 117 W. Duval Street, Jacksonville, Florida 32202 and phone number 904/630-3484; and a copy to the DEP Northeast District offices, 7825 Baymeadows Way, Suite 200B Jacksonville, Florida 32256-7590 and phone number 904/448-4300.
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. Permit Extension: *This permit expires on December 31, 2002.* 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.]
7. Application for Title IV Permit: An application for a Title IV Acid Rain Permit, must be submitted to the U.S. Environmental Protection Agency Region IV office in Atlanta, Georgia and a copy to the DEP's Bureau of Air Regulation in Tallahassee 24 months before the date on which the new unit begins serving an electrical generator (greater than 25 MW). [40 CFR 72]
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 sent to the Department's Northeast District and the Jacksonville Regulatory & Environmental Protection Commission offices. [Chapter 62-213, F.A.C.]



## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices by March 1st of each year.
11. Stack Testing Facilities: Stack sampling facilities shall be installed in accordance with Rule 62-297.310(6), F.A.C.
12. Quarterly Reports: Quarterly excess emission reports, in accordance with 40 CFR 60.7 (a)(7) (c) (1997 version), shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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### APPLICABLE STANDARDS AND REGULATIONS:

1. Unless otherwise indicated in this permit, the construction and operation of the subject emission unit 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, 62-110, 62-204, 62-210, 62-212, 62-213, 62-214, 62-296, and 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 Unit 0XX, Power Generation, consisting of one (nominal) 170 MW combustion turbines (simple cycle peaking operation), 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 required to demonstrate compliance with non-NSPS permit standard(s).
5. All notifications and reports required by the above specific conditions shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

### GENERAL OPERATION REQUIREMENTS

6. 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 this unit. [Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]
7. Turbine Capacity: The maximum heat input rates to this combustion turbine based on the lower heating value (LHV) of the fuel at ambient conditions of 59° F, 60% relative humidity, 100% load, and 14.7 psi pressure shall not exceed 1,623 million Btu per hour (MMBtu/hr) while firing gas and 1,822 million Btu per hour (MMBtu/hr) while firing fuel oil. This maximum heat input rate will vary depending upon turbine inlet 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)]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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8. 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.
9. 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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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.]
10. 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.]
11. 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. [Rule 62-210.650, F.A.C.]
12. Maximum allowable hours of operation in any twelve month period: (MAXHROP) for this peaking unit shall not exceed 4050 hours on gas or 1260 hours on fuel oil or the hours calculated pursuant to the following formula:  
$$\text{MAXHROP} = 4050 - 3.215 \cdot \text{ACTHROPFO}$$

Where: ACTHROPFO = Actual hours of operation on fuel oil  
[Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]

### Control Technology

13. Dry Low NO<sub>x</sub> (DLN) combustor shall be installed on this stationary combustion turbine to control nitrogen oxides (NO<sub>x</sub>) emissions. [Design, Rule 62-4.070, F.A.C.]
14. The permittee shall provide manufacturer's emissions performance versus load diagrams for the DLN systems prior to their installation. DLN systems shall each be tuned upon initial operation to optimize emissions reductions and shall be maintained to minimize NO<sub>x</sub> emissions and CO emissions. [Rule 62-4.070, and 62-210.650 F.A.C.]
15. A water injection system shall be installed for use when firing No. 2 or superior grade distillate fuel oil for control of NO<sub>x</sub> emissions. [Design, Rules 62-4.070 and 62-212.400, F.A.C.]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

### EMISSION LIMITS AND STANDARDS

16. Following are the emission limits determined for this project assuming full load. Values for NO<sub>x</sub> are at 15% O<sub>2</sub> on a dry basis. These limits or their equivalents in terms of pounds per hour, as well as the applicable averaging times, are followed by the applicable specific conditions. [Applicant Requests, Rules 62-204.800(7)(b) (Subparts GG ), 62-210.200 (Definitions-Potential Emissions), F.A.C.].

NO <sub>x</sub>	SO <sub>2</sub>	CO	VOC	PM/Visibility (% Opacity)	Technology and Comments
15 ppm (NG)	<2gr/100scf (NG)	15 ppm (NG)	1.4 ppm (NG)	10	Dry Low NO <sub>x</sub> Combustors Pipeline Natural Gas Good Combustion Fuel Oil, 0.05% Sulfur Content
42 ppm (FO)	0.05% (FO)	20 ppm (FO)	3.5 ppm (FO)		

17. Nitrogen Oxides (NO<sub>x</sub>) Emissions:

- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 15 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning natural gas. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 15 ppm at 15% O<sub>2</sub> nor 99 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons per year (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 42 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning fuel oil. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 42 ppm at 15% O<sub>2</sub> nor 318 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons per year (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- When NO<sub>x</sub> monitoring data is not available, substitution for missing data shall be handled as required by Title IV (40 CFR 75) to calculate the specified average time.

18. Visible Emissions (VE): VE emissions shall not exceed 10 percent opacity.

19. Carbon Monoxide (CO) emissions: The concentration of CO in the exhaust gas shall not exceed 15 ppmvd (gas) and 20 ppmvd (oil) as measured by EPA Method 10. CO emissions (at ISO conditions) shall not exceed 48 lb/hr (gas) and 97 lb/hr (oil) to be demonstrated by stack test.

20. Volatile Organic Compounds (VOC) Emissions: The concentration of VOC in the exhaust gas shall not exceed 1.4 ppmvd (gas) and 3.5 ppm (oil) as determined by EPA Methods 18, 25 or 25 A. VOC emissions (at ISO conditions) shall not exceed 2.9 lb/hr (gas) and 19 lb/hr (oil).

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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21. Sulfur Dioxide (SO<sub>2</sub>) emissions: SO<sub>2</sub> emissions (at ISO conditions) shall not exceed 9.7 pounds per hour when firing pipeline natural gas and 98 pounds per hour when firing maximum 0.05 percent sulfur No. 2 or superior grade distillate fuel oil. Initial tests shall be performed by applicable compliance methods described below. Compliance with this requirement in conjunction with implementation of the Custom Fuel Monitoring Schedules in Specific Conditions 41 and 42 will demonstrate compliance with the applicable NSPS SO<sub>2</sub> emissions limitations. Confirmation by the Custom Fuel Monitoring Schedule that the actual sulfur content is less than 2 grains per 100 standard cubic feet (gas) and 0.05 % sulfur content (fuel oil) will demonstrate compliance with the permit limits for SO<sub>2</sub>. Emissions of SO<sub>2</sub> shall not exceed 62 tons per year. [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]

#### EXCESS EMISSIONS

22. Excess emissions resulting from startup, shutdown, or malfunction shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration. [Rule 62-210.700, F.A.C.].
23. 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.
24. Excess Emissions Report: If excess emissions occur for more than two hours due to malfunction, the owner or operator shall notify DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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. Pursuant to the New Source Performance Standards, all excess emissions shall also be reported in accordance with 40 CFR 60.7, Subpart A. Following this format, 40 CFR 60.7, periods of startup, shutdown, malfunction, and fuel switching shall be monitored, recorded, and reported as excess emissions when emission levels exceed the permitted standards listed in Specific Condition No. 16 and 17. [Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C., and 40 CFR 60.7 (1997 version)].

#### COMPLIANCE DETERMINATION

25. Compliance with the allowable emission limiting standards shall be determined within 60 days after achieving the maximum production rate at which each unit will be operated, but not later than 180 days following 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 (1997 version), and adopted by reference in Chapter 62-204.800, F.A.C.

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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26. Initial (I) performance stack tests shall be performed on this unit while firing natural gas and fuel oil. 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 these units 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.
  - EPA Reference Method 18 or 25 and/or 25A, "Determination of Volatile Organic Concentrations." Initial test only.
27. Continuous compliance with the NO<sub>x</sub> emission limits: Continuous compliance with the NO<sub>x</sub> emission limits shall be demonstrated with the CEM system based on the applicable averaging time of 24-hr block average. 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. Valid hourly emission rates shall not include periods of start up, shutdown, or malfunction unless prohibited by 62-210.700 F.A.C. A valid hourly emission rate shall be calculated for each hour in which at least two NO<sub>x</sub> concentrations are obtained at least 15 minutes apart. These excess emissions periods shall be reported as required in Condition 24. [Rules 62-4.070 F.A.C., 62-210.700, F.A.C., and 40 CFR 75]
28. Compliance with the SO<sub>2</sub> and PM/PM<sub>10</sub> emission limits: Notwithstanding the requirements of Rule 62-297.340, F.A.C., the use of pipeline natural gas and maximum 0.05 percent sulfur (by weight) No. 2 or superior grade distillate fuel oil, is the method for determining compliance for SO<sub>2</sub> and PM<sub>10</sub>. For the purposes of demonstrating compliance with the 40 CFR 60.333 SO<sub>2</sub> standard and the 0.05% S limit, fuel oil analysis using ASTM D2880-71 or D4294 (or equivalent) for the sulfur content of liquid fuels and D1072-80, D3031-81, 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. The applicant is responsible for ensuring that the procedures above are used for determination of fuel sulfur content. 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) (1997 version).

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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29. Compliance with CO emission limit: An initial test for CO, shall be conducted concurrently with the initial NO<sub>x</sub> test, as required. The initial NO<sub>x</sub> 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 when compliance testing is conducted concurrent with the annual NO<sub>x</sub> RATA testing which is performed pursuant to 40 CFR 75.
30. Compliance with the VOC emission limit: An initial test is required to demonstrate compliance with the VOC emission limit. Thereafter, CO emission limit will be employed as a surrogate and no annual testing is required.
31. Testing procedures: Testing of emissions shall be conducted with the combustion turbine operating at permitted capacity. Permitted capacity is defined as 95-100 percent of the maximum heat input rate allowed by the permit, corrected for the average turbine inlet 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. turbine inlet temperature curve downward by an increment equal to the difference between the maximum permitted heat input (corrected for ambient temperature) and 105 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. Test procedures shall meet all applicable requirements (i.e., testing time frequency, minimum compliance duration, etc.) of Chapter 62-204.800 F.A.C.
32. Test Notification: The DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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).
33. 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.
34. Test Results: Compliance test results shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices no later than 45 days after completion of the last test run.

### NOTIFICATION, REPORTING, AND RECORDKEEPING

35. Records: All measurements, records, and other data required to be maintained by the permittee 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.

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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36. Emission Compliance Stack Test Reports: A test report indicating the results of the required compliance tests shall be filed with the DEP Northeast District and Jacksonville RESD's Air & Water Quality Division Offices as soon as practical, but no later than 45 days after the last sampling run is completed. [Rule 62-297.310(8), F.A.C.]. 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.

#### MONITORING REQUIREMENTS

37. 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 this unit. Periods when NO<sub>x</sub> emissions (ppmv at 15% oxygen) are above the standards, listed in Specific Condition No 16 and 17, shall be provided to the DEP Bureau of Air Monitoring and Mobile Sources pursuant to 40CFR75.
38. CEMS in lieu of Water to Fuel Ratio: Subject to EPA approval, the NO<sub>x</sub> 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 (1997 version). Subject to EPA approval, the calibration of the water/fuel monitoring device required in 40 CFR 60.335(c)(2) (1997 version) will be replaced by the 40 CFR 75 certification tests of the NO<sub>x</sub> CEMS. Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this Unit shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332.
39. CEMS in lieu of the requirement for reporting excess emissions: Subject to EPA approval, the NO<sub>x</sub> CEMS shall be used in lieu of the requirement for reporting excess emissions in accordance with 40 CFR 60.334(c)(1), Subpart GG (1997 version). Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this CT shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332.
40. Continuous Monitoring System Reports: 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 40CFR75. Data on CEM equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location shall be provided to the Department's Northeast District and Jacksonville RESD's Air & Water Quality Division Offices for review at least 90 days prior to installation.
41. Natural Gas Monitoring Schedule: The following custom monitoring schedule for natural gas is approved in lieu of the daily sampling requirements of 40 CFR 60.334 (b)(2):



## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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- The permittee shall apply for an Acid Rain permit within the deadlines specified in 40 CFR 72.30.
- The permittee shall submit a monitoring plan, certified by signature of the Designated Representative (DR), that commits to using a primary fuel of pipeline supplied natural gas (sulfur content less than 20 gr/100 scf pursuant to 40 CFR 75.11(d)(2)).
- This unit shall be monitored for SO<sub>2</sub> emissions using methods consistent with the requirements of 40 CFR 75.11 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 this unit is changed to a higher sulfur fuel, SO<sub>2</sub> emissions must be accounted for as required pursuant to 40 CFR 75.11(d).

42. 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 or superior grade fuel oil received at the Kennedy Center Station, 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).

43. 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].

# Memorandum

# Florida Department of Environmental Protection

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TO: ~~C. H. Fancy~~

THRU Al Linero *aal* 1/26

FROM: Teresa Heron *TH*

DATE: January 26, 1999

SUBJECT: JEA Kennedy Generating Station 170 MW Combustion Turbine  
DEP File No. 0310047-002-AC

Attached is the draft public notice package including the Intent to Issue and the Technical Evaluation and Preliminary Determination for the Project. The application is for installation of a nominal 170 megawatt (MW) natural gas and No. 2 fuel oil-fired combustion turbine-electrical generator. The new unit will operate in simple cycle and intermittent duty. Hours of operation will be limited to 4050 hours on natural gas or 1260 hours on fuel oil. It will replace a conventional natural gas and fuel oil-fired conventional steam generator at the Kennedy Generating Station..

The project netted out of PSD and no BACT was required. Nitrogen Oxides (NO<sub>x</sub>) emissions will be controlled by Dry Low NO<sub>x</sub> (DLN-2.6) combustors tuned to achieve 15 parts per million (ppm) by volume at 15 percent oxygen. NO<sub>x</sub> emissions will be 42 ppm while firing No. 2 fuel oil. Emissions of carbon monoxide (CO) will be controlled to 15 ppm (gas) 20 ppm (oil), while emissions of volatile organic compounds (VOC) will be less than 1.4 ppm (gas) and 3.5ppm (oil). Emissions of sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (SAM), and particulate matter (PM/PM<sub>10</sub>) will be low due to use of clean fuels and the limited hours of operation.

We recommend your approval.

AAL/th

Attachments



# Department of Environmental Protection

Jeb Bush  
Governor

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

David B. Struhs  
Secretary

## P.E. Certification Statement

**Permittee:**

**DEP File No. 0310047-002-AC**

Jacksonville Electric Company  
Kennedy Generating Station  
Duval County

**Project type:**

Project to install a nominal 170 megawatt (MW) natural gas and No. 2 fuel-oil-fired combustion turbine-electrical generator to replace a conventional steam electric generating unit. Project includes a 90 foot stack. Service will be intermittent duty.

Nitrogen Oxides emissions will be controlled by Dry Low NO<sub>x</sub> (DLN-2.6) combustors tuned to achieve 15 parts per million (ppm) by volume at 15 percent oxygen. When firing fuel oil, emissions of NO<sub>x</sub> will be controlled by wet injection to 42 ppm. Emissions of carbon monoxide will be controlled to 15 ppm, while emissions of volatile organic compounds will be less than 1.4 ppm. Emissions of sulfur dioxide, sulfuric acid mist, and particulate matter will be low because of the use of inherently clean pipeline quality natural gas and maximum 0.05 percent sulfur fuel oil. The project "nets out" of PSD and a BACT determination was not required.

*I HEREBY CERTIFY that the engineering features described in the above referenced application and subject to the proposed permit conditions provide reasonable assurance of compliance with applicable provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 62-4 and 62-204 through 62-297. However, I have not evaluated and I do not certify aspects of the proposal outside of my area of expertise (including but not limited to the electrical, mechanical, structural, hydrological, and geological features).*

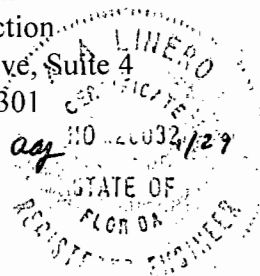
1/29/99

A. A. Linero, P.E.

Date

Registration Number: 26032

Bureau of Air Regulation  
New Source Review Section  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301  
Phone (850) 921-9523  
Fax (850) 922-6979



Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

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

I also wish to receive the following services (for an extra fee):

- 1.  Addressee's Address
- 2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
 Walter P. Bussels  
 JEA  
 Kennedy Generating S  
 21 West Church St.  
 Jacksonville, FL 32202-3139

4a. Article Number  
 Z 333 612 505

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

7. Date of Delivery  
 2-2-99

5. Received By: (Print Name)

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

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

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

Thank you for using Return Receipt Service.

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US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to	<i>Walter P Bussels</i>	
Street & Number	<i>JEA</i>	
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Postage	\$	
Certified Fee		
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to Whom & Date Delivered		
Return Receipt Showing to Whom, Date, & Addressee's Address		
TOTAL Postage & Fees	\$	
Postmark or Date	<i>03/0047-002-AC 1-29-99</i>	

PS Form 3800, April 1995



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

FEB 1 0 1999

RECEIVED

FEB 17 1999

BUREAU OF  
AIR REGULATION

4APT-ARB

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

SUBJECT: Request for Approval of a Custom Fuel Monitoring Schedule for Jacksonville  
Electric Authority (JEA)

0310047-002-AC

Dear Mr. Linero:

Thank you for your letter dated February 2, 1999, regarding the use of a custom fuel monitoring schedule for Jacksonville Electric Authority (JEA). JEA will operate a natural gas fired simple cycle combustion turbine subject to 40 C.F.R. Part 60, Subpart GG - Standards of Performance for Stationary Gas Turbines. As requested, Specific Conditions 37-39, 41 and 42 have been reviewed. The Environmental Protection Agency (EPA), Region 4 has concluded that the use of acid rain NO<sub>x</sub> continuous emission monitoring system (CEMS) for demonstrating compliance, as described in Specific Conditions 37-39, is acceptable. Region 4 has also concluded that the custom fuel monitoring schedule proposed in Specific Condition 41 and the fuel oil monitoring schedule described in Specific Condition 42 are both acceptable.

According to 40 C.F.R. 60.334(b)(2), owners and operators of stationary gas turbines subject to Subpart GG are required to monitor fuel nitrogen and sulfur content on a daily basis if a company does not have intermediate bulk storage for its fuel. 40 C.F.R. 60.334(b)(2) also contains provisions allowing owners and operators of turbines that do not have intermediate bulk storage for their fuel to request approval of custom fuel monitoring schedules that require less frequent monitoring of fuel nitrogen and sulfur content.

Region 4 reviewed Specific Condition 41, which allows SO<sub>2</sub> emissions to be quantified using procedures in 40 C.F.R. 75 Appendix D in lieu of daily sampling as required by 40 C.F.R. 60.334(b). Since the specific limitations listed in the permit condition are consistent with previous determinations, we have concluded that the use of this custom fuel monitoring schedule is acceptable.

Specific Conditions 37-39 involve the method used to monitor nitrogen oxides (NO<sub>x</sub>) excess emissions. Under the provisions for 40 C.F.R. 60.334(c)(1), the operating parameters used to identify NO<sub>x</sub> excess emissions for Subpart GG turbines are water-to-fuel injection rates

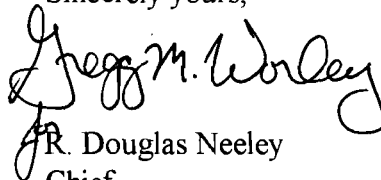
and fuel nitrogen content. As an alternative to monitoring NO<sub>x</sub> excess emissions using these parameters, JEA is proposing to use a NO<sub>x</sub> CEMS that is certified for measuring NO<sub>x</sub> emissions under 40 C.F.R. Part 75. Based upon a determination issued by EPA on March 12, 1993, NO<sub>x</sub> CEMS can be used to monitor excess emissions from Subpart GG turbines if a number of conditions specified in the determination are met and included in the permit condition.

Specific Conditions 38 and 39 address the potential for correcting results to ISO standard day conditions. The basis for this requirement is that, under the provisions of 40 C.F.R. 60.335(c), NO<sub>x</sub> results from performance tests must be converted to ISO standard day conditions. As an alternative to continuously correcting results to ISO standard day conditions, JEA plans to keep records of the data needed to make this conversion, so that NO<sub>x</sub> results could be calculated on an ISO standard day condition basis anytime at the request of EPA or the Florida DEP. This approach is acceptable, since the construction permit contains NO<sub>x</sub> limits that are more stringent than those in Subpart GG, and compliance with Subpart GG for these units would be a concern only in cases when a turbine is in violation of the NO<sub>x</sub> limits in its permit.

Finally, Specific Condition 42 addresses the monitoring schedule for fuel oil. According to 40 C.F.R. 60.334(b)(1), the nitrogen and sulfur content of the fuel oil must be monitored each time a new shipment of fuel oil is transferred to bulk storage. JEA is proposing to use the fuel analysis provided by the fuel vendor instead of sampling each shipment directly. This approach is acceptable, since the specific condition states that the fuel vendor's analyses will comply with the test method requirements of 40 C.F.R. 60.335(d).

If you have any questions regarding the determination provided in this letter, please call Katy Forney of my staff at 404-562-9130.

Sincerely yours,



R. Douglas Neeley  
Chief

Air and Radiation Technology Branch  
Air, Pesticides and Toxics  
Management Division

cc: J. Neuron, BAR  
NED  
Dural Co  
NPS

Keep  
904/818-6247

Bert Gianazza  
February 3, 1999  
Page 1

MEMORANDUM

February 17, 1999

TO: Teresa Heron, FDEP  
FROM: Bert Gianazza, JEA  
RE: Comments on Draft Construction Permit for Kennedy CT

---

Below please find our comments regarding the Draft Permit for the Kennedy Generating Station Simple Cycle Combustion Turbine. If you have any questions with regard to this matter, please advise.

1. Section III, Condition 17. NO<sub>x</sub> Emissions. Since this unit will be required to comply with a 15 ppm NO<sub>x</sub> limit (42 ppm on oil) as well as a ton per year limit, we request that the lb/hr limit be removed. Also, the total annual NO<sub>x</sub> emission limit of 200 tons per year should be on a 12-month rolling average basis. Also, to preserve JEA's option to use the protocol under 40 CFR Appendix E for the determination of compliance with the NO<sub>x</sub> limits, please add the following language to the end of Condition 17 and 27: "In lieu of utilizing CEMs for NO<sub>x</sub>, the permittee may elect to utilize the protocol specified under 40 CFR Part 75, Appendix E."
2. Condition 18. Visible Emissions. This condition should clarify that the VE limit while burning oil is 20% opacity in accordance with FAC 296.320(4)(b)1 and the limit on gas is 10%.
3. Condition 19. We request that the pound per hour limit on CO be removed and a tons per year limit of 97.2 be added to assure avoidance of PSD for CO.
4. Condition 21. We request that the pound per hour limits for SO<sub>2</sub> be removed since natural gas is the primary fuel and there is a limit of 0.05% on the sulfur content of the fuel oil. Accordingly, there should be no need for an initial compliance test. Also, four lines up from the bottom, the following edit should be made: "Confirmation by the Custom Fuel Monitoring Schedule ~~that~~ than . . ."
5. Condition 28. DEP's citation to Rule 62-297.340, F.A.C. is incorrect because this rule has been repealed. It is not clear what state rule requirement DEP is varying when the permit states "Notwithstanding the requirement of \_\_\_\_\_."

Bert Gianazza  
February 3, 1999  
Page 2

6. Condition 36. This condition is redundant to Condition 34 and therefore these two conditions should be consolidated for clarity.

7. Condition 37, line 4. In order to clarify that the excess emissions condition applies to NO<sub>x</sub>, please reference condition 22.

8. Condition 39. This Condition is nearly identical to Condition 38 and therefore these two conditions should be consolidated for clarity.

9. Condition 41. In the third bullet, what is meant by the statement that the methods should be "certified" by EPA?



# INTEROFFICE MEMORANDUM

**Date:** 12-Feb-1999 05:08pm  
**From:** Oracle Notifier TAL  
ORACLE\_NOTIFIER@A1@DER  
**Dept:** Send Oracle Notifications ONLY  
**Tel No:**

**Subject:** OGC ACTION - Clock Stopped

The Office of General Counsel has initiated the following case:

Case Number: 99-0251

Style: JACKSONVILLE ELECTRIC AUTHORITY (KENNEDY GEN. STAT.) V DEP

The following permit application has been locked from further updates until the case is resolved:

Permit Application: 0310047-002-AC

Application: ARMS

Program Area: AIR CFC PROGRAM

District: NORTHEAST

The lead attorney for this case is JEFFREY E BROWN

This notification should be e-mailed to:

Permit Processor: heron\_t

Lead Attorney: BROWN\_J

21 West Church Street  
Jacksonville, Florida 32202-3139

BUREAU OF  
AIR REGULATION  
FEB 11 1999  
RECEIVED



February 10, 1999

Mr. Clair H. Fancy, P.E.  
Chief, Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Subject: Kennedy Generating Station Simple Cycle Combustion Turbine

Dear Mr. Fancy:

Attached please find proof of publication, in the form of a newspaper affidavit, of the "PUBLIC NOTICE OF INTENT TO ISSUE" for the subject project.

If you have any questions with regard to this matter, please do not hesitate to call me at (904) 665-6247.

Sincerely,

A handwritten signature in black ink, appearing to read 'N. Bert Gianazza'.

N. Bert Gianazza, P.E.  
Environmental, Health & Safety Group

NBG

KGST2

Enclosure

cc: Steve Pace, RESD

T. Heaton  
NED  
Duval  
EPA  
NPS

**PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT**

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DEP file No. 0310047-002-AC

Jacksonville Electric Authority Kennedy Generating Station  
170 Megawatt Combustion Turbine-Electrical Generator  
Duval County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Jacksonville Electric Authority (JEA). The permit is to install a nominal 170 megawatt natural gas and No. 2 fuel oil-combustion turbine-electrical generator to replace a natural gas and fuel oil-fired steam electrical unit (KE10) of the Kennedy Generating Station in Jacksonville, Duval County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400, F.A.C. The applicant's name and address are Jacksonville Electric Authority, 21 West Church Street, Jacksonville, Florida 32202-3139.

The proposed unit is a nominal 170 megawatt General Electric PG7241FA gas and No. 2 fuel oil-fired combustion turbine-electrical generator and a 90 foot stack. The unit will operate a maximum of 4050 hours on natural gas or 1260 hours on No. 2 fuel oil with a maximum sulfur content of 0.05%. It will operate for various combinations of hours on either fuel such that the annual emissions increases in carbon monoxide (CO) and nitrogen oxides (NOx) remain at or below the values given below. The proposed unit will operate only in a simple cycle mode.

NOx emissions while firing natural gas, will be controlled by Dry Low NOx (DLN-2.6) combustors tuned to achieve emissions of 15 parts per million (ppm) by volume at 15 percent oxygen. During oil firing, NOx emissions will be 42 ppm and controlled by wet injection. Emissions of carbon monoxide (CO) for gas and oil firing will be controlled to 15 and 20 ppm, respectively. Emissions of volatile organic compounds (VOC) will be 1.4 and 3.5 ppm for gas and oil firing, respectively. Emissions of sulfur dioxide (SO2), sulfuric acid mist (SAM), and particulate matter (PM/PM10) will be very low because of the limited hours of operation and use of clean fuel.

The proven capabilities of the selected unit, together with the operational restrictions, will ensure that the annual emission levels required to avoid PSD Review are attained. There will be very small decreases in regulated air pollutants. However the unit will be able to produce substantially more electrical energy while maintaining maximum total annual emissions near past levels. Actual emissions will likely be substantially lower because the unit will primarily operate in intermittent duty. The maximum potential annual emissions in tons per year are summarized below along with the most recent annual emissions from Boiler KE10 (Unit 009) slated for retirement, the changes due to the project, and the PSD-significant levels.

Pollutants	KE10 Actual Emissions	CT Potential Emissions	Change	PSD Significant Levels
PM/PM10	21.7	18.2	-3.5	25/15
SAM	11.9	6.3	-5.6	7
SO2	266	62	-204	40
NOx	161.5	200.5	39	40
VOC	1.6	5.7	4.1	40
CO	14.5	97.2	82.7	100

An air quality impact analysis was not required or conducted. No significant impacts are due as a result of this project.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of fourteen (14) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station # 5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The JEA Kennedy Generating Station combustion turbine-electrical generator project is not subject to review under Section 403.506 F.S. (Power Plant Siting Act), because it provides for no expansion in steam generating capacity.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days or receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the applicant have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Dept. of Environmental Protection Bureau of Air Regulation 117 S. Magnolia Drive, Suite 4 Tallahassee, Florida, 32301 Telephone: 850/488-0114 Fax: 850/722-9777	Regulatory & Environmental Services Dept. Air & Water Quality Division 117 W. Duval Street, Suite 225, Jacksonville, Florida 32202 Telephone: 850/630-3484 Fax: 850/630-3638	Dept. of Environmental Protection Northeast District Office 7825 Boynton Road, Suite 2008 Jacksonville, Florida 32256-7590 Telephone: 850/448-4300 Fax: 850/448-4363
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The complete project file includes the application, technical evaluations, Draft Permit, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

**FLORIDA PUBLISHING COMPANY**  
Publisher  
JACKSONVILLE, DUVAL COUNTY, FLORIDA

STATE OF FLORIDA }  
COUNTY OF DUVAL }

Before the undersigned authority personally appeared \_\_\_\_\_

Steven L. Smith who on oath says that he is

Legal Advertising Representative of The Florida Times-Union,

a daily newspaper published at Jacksonville in Duval County, Florida; that the attached copy of advertisement, being a Legal Advertisement

in the matter of Public Notice of Intent to Issue

in the \_\_\_\_\_ Court,

was published in THE FLORIDA TIMES-UNION in the issues of \_\_\_\_\_

February 4, 1999

Affiant further says that the said The Florida Times-Union is a newspaper published at Jacksonville, in said Duval County, Florida, and that the said newspaper has heretofore been continuously published in said Duval County, Florida. The Florida Times-Union each day, has been entered as second class mail matter at the postoffice in Jacksonville, in said Duval County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

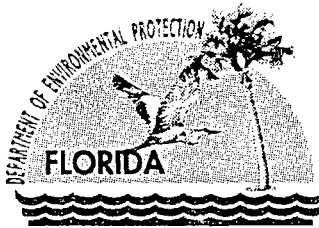
Sworn to and subscribed before me  
this 5th day of

February, A.D. 19 99

[Signature] Notary Public  
[Signature] Steven L. Smith

Notary Public  
State of Florida at Large  
My Commission Expires 11/01/2006  
CC 547806

My Commission Expires 11/01/2006  
BONDED THRU  
ATLANTIC COMMERCIAL CO. INC.



Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

February 2, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. R. Douglas Neeley, Chief  
Air, Radiation Technology Branch  
US EPA Region IV  
61 Forsyth Street  
Atlanta, GA 30303

Re: Review and Custom Fuel Monitoring Schedule  
Jacksonville Electric Authority (JEA)  
DEP FILE No. 0310047-002-AC

Dear Mr. Neeley:

Enclosed is a copy of the Department's draft permit to construct (the Department's Intent to Issue package was already mailed to Mr. Greg Worley) a 170 MW Combustion Turbine at the JEA facility in Duval County. It will be a 4050 hr/yr natural gas-fired simple cycle peaking unit with limited use of maximum 0.05 percent sulfur fuel oil (1260 hours /yr).

The project was not subject to PSD review.

Please send your written comments on or approval of the applicant's proposed custom fuel monitoring schedule. The plan is based on the letter dated January 16, 1996 from Region V to Dayton Power and Light. The Subpart GG limit on SO<sub>2</sub> emissions is 150 ppmvd @ 15% O<sub>2</sub> or a fuel sulfur limit of 0.8% sulfur. Neither of these limits could conceivably be violated by the use of pipeline quality natural gas which has a maximum SO<sub>2</sub> emission rate of 0.0006 lb/MMEtu (40 CFR 75 Appendix D Section 2.3.1.4). The sulfur content of pipeline quality natural gas in Florida has been estimated at a maximum of 0.003 % sulfur. Fuel oil will with a 0.05% sulfur content be used. The requirements have been incorporated into the enclosed draft permit as Specific Conditions 41 and 42 and read as follows:

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.
- 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 20 gr/100 scf pursuant to 40 CFR 75.11(d)(2)).

*"Protect, Conserve and Manage Florida's Environment and Natural Resources"*

- Each unit shall be monitored for SO<sub>2</sub> 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, SO<sub>2</sub> emissions must be accounted for as required pursuant to 40 CFR 75.11(d).

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).

Please comment on Specific Conditions 37-39 which allow the use of the acid rain NO<sub>x</sub> CEMS for demonstrating compliance as well as reporting excess emissions. Allowable NO<sub>x</sub> emissions for this project shall not exceed 15 ppmvd @15% O<sub>2</sub> (gas) and 42 ppmvd @15% O<sub>2</sub> (oil) which are substantially lower than the applicable Subpart GG limit based on the efficiency of the unit. A CEMS requirement is stricter and more accurate than any Subpart GG requirement for determining excess emissions.

The Department recommends your approval of the custom fuel monitoring schedules and these NO<sub>x</sub> monitoring provisions. We also request your comments on the Intent to Issue. If you have any questions on these matters please contact Teresa Heron at 850/921-9529.

Sincerely,



A. A. Linero, P.E., Administrator  
New Source Review Section

AAL/aal

Enclosures

**PERMITTEE:**

Jacksonville Electric Authority  
Kennedy Generating Station  
21 West Church Street  
Jacksonville, Florida 32202-3139

Permit No.	0310047-002-AC
Project:	170 MW Simple Cycle Peaking Unit
SIC No.	4911
Expires:	December 31, 2002

*Authorized Representative:*

Walter P. Bussels  
Managing Director & Chief Executive Officer

**PROJECT AND LOCATION:**

Jacksonville Electric Authority (JEA) proposes to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59°F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG-7241-FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

This facility is located at 4215 Talleyrand Ave in Jacksonville, Duval County, Florida. UTM coordinates are: Zone 17; 440.9 km E and 3,591,00 km N.

**STATEMENT OF BASIS:**

This 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 MADE A PART OF THIS PERMIT:**

Appendix GC                      Construction Permit General Conditions

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Howard L. Rhodes, Director  
Division of Air Resources  
Management

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

### FACILITY DESCRIPTION

Currently, this facility generates electric power from a 134 MW and two 44 MW natural gas/fuel oil-fired steam units, an auxiliary 21 MW boiler, and three oil fired 56.2 MW combustion turbines used as peaking units, all with a combined generating capacity of approximately 412 MW.

This permitting action is to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59 °F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG 7241 FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

This Project is exempt from the requirements of Rule 62-212.400, F.A.C., Prevention of Significant Deterioration (PSD) as discussed stated in the Technical Evaluation and Preliminary Determination dated January 29, 1999.

### EMISSION UNITS

This permit addresses the following emission unit:

Emission Unit No.	System	Emission Unit Description
00X	Power Generation	One 170 MW Simple Cycle Combustion Turbine-Generator - Peaking Unit

### REGULATORY CLASSIFICATION

This facility, JEA Kennedy Generating Station, 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/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 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).

This facility is a major source of hazardous air pollutants (HAPs) and is also subject to the provisions of Title IV, Acid Rain, Clean Air Act as amended in 1990 (Title V application received June 14, 1996).

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

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### PERMIT SCHEDULE

- xx/xx/99 Notice of Intent published in \_\_\_\_\_
- 01/29/99 Distributed Intent to Issue Permit
- 12/23/98 Application deemed complete
- 10/30/98 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 October 30, 1998.
- Department's Intent to Issue and Public Notice Package dated January 29, 1999.
- EPA comments dated February xx, 1999.
- JEA's comments dated December 23, 1998, January 19 and February XX, 1999.



# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 (DEP), at 2600 Blairstone Road, Tallahassee, Florida 32399-2400 and phone number (850)488-0114. All documents related to reports, tests, and notifications should be submitted to the Jacksonville Regulatory & Environmental Services Department (RES-D) Air & Water Quality Division, Suite 225, 117 W. Duval Street, Jacksonville, Florida 32202 and phone number 904/630-3484; and a copy to the DEP Northeast District offices, 7825 Baymeadows Way, Suite 200B Jacksonville, Florida 32256-7590 and phone number 904/448-4300.
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. Permit Extension: *This permit expires on December 31, 2002.* 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.]
7. Application for Title IV Permit: An application for a Title IV Acid Rain Permit, must be submitted to the U.S. Environmental Protection Agency Region IV office in Atlanta, Georgia and a copy to the DEP's Bureau of Air Regulation in Tallahassee 24 months before the date on which the new unit begins serving an electrical generator (greater than 25 MW). [40 CFR 72]
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 sent to the Department's Northeast District and the Jacksonville Regulatory & Environmental Protection Commission offices. [Chapter 62-213, F.A.C.]

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices by March 1st of each year.
11. Stack Testing Facilities: Stack sampling facilities shall be installed in accordance with Rule 62-297.310(6), F.A.C.
12. Quarterly Reports: Quarterly excess emission reports, in accordance with 40 CFR 60.7 (a)(7) (c) (1997 version), shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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### APPLICABLE STANDARDS AND REGULATIONS:

1. Unless otherwise indicated in this permit, the construction and operation of the subject emission unit 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, 62-110, 62-204, 62-210, 62-212, 62-213, 62-214, 62-296, and 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 Unit 0XX, Power Generation, consisting of one (nominal) 170 MW combustion turbines (simple cycle peaking operation), 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 required to demonstrate compliance with non-NSPS permit standard(s).
5. All notifications and reports required by the above specific conditions shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

### GENERAL OPERATION REQUIREMENTS

6. 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 this unit. [Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]
7. Turbine Capacity: The maximum heat input rates to this combustion turbine based on the lower heating value (LHV) of the fuel at ambient conditions of 59° F, 60% relative humidity, 100% load, and 14.7 psi pressure shall not exceed 1,623 million Btu per hour (MMBtu/hr) while firing gas and 1,822 million Btu per hour (MMBtu/hr) while firing fuel oil. This maximum heat input rate will vary depending upon turbine inlet 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)]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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8. 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.
9. 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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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.]
10. 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.]
11. 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. [Rule 62-210.650, F.A.C.]
12. Maximum allowable hours of operation in any twelve month period: (MAXHROP) for this peaking unit shall not exceed 4050 hours on gas or 1260 hours on fuel oil or the hours calculated pursuant to the following formula:  
$$\text{MAXHROP} = 4050 - 3.215 * \text{ACTHROPFO}$$

Where: ACTHROPFO = Actual hours of operation on fuel oil  
[Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]

### Control Technology

13. Dry Low NO<sub>x</sub> (DLN) combustor shall be installed on this stationary combustion turbine to control nitrogen oxides (NO<sub>x</sub>) emissions. [Design, Rule 62-4.070, F.A.C.]
14. The permittee shall provide manufacturer's emissions performance versus load diagrams for the DLN systems prior to their installation. DLN systems shall each be tuned upon initial operation to optimize emissions reductions and shall be maintained to minimize NO<sub>x</sub> emissions and CO emissions. [Rule 62-4.070, and 62-210.650 F.A.C.]
15. A water injection system shall be installed for use when firing No. 2 or superior grade distillate fuel oil for control of NO<sub>x</sub> emissions. [Design, Rules 62-4.070 and 62-212.400, F.A.C.]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

### EMISSION LIMITS AND STANDARDS

16. Following are the emission limits determined for this project assuming full load. Values for NO<sub>x</sub> are at 15% O<sub>2</sub> on a dry basis. These limits or their equivalents in terms of pounds per hour, as well as the applicable averaging times, are followed by the applicable specific conditions. [Applicant Requests, Rules 62-204.800(7)(b) (Subparts GG ), 62-210.200 (Definitions-Potential Emissions), F.A.C.].

NO <sub>x</sub>	SO <sub>2</sub>	CO	VOC	PM/Visibility (% Opacity)	Technology and Comments
15 ppm (NG)	<2gr/100scf (NG)	15 ppm (NG)	1.4 ppm (NG)	10	Dry Low NO <sub>x</sub> Combustors Pipeline Natural Gas Good Combustion Fuel Oil, 0.05% Sulfur Content
42 ppm (FO)	0.05% (FO)	20 ppm (FO)	3.5 ppm (FO)		

17. Nitrogen Oxides (NO<sub>x</sub>) Emissions:

- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 15 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning natural gas. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 15 ppm at 15% O<sub>2</sub> nor 99 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons per year (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 42 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning fuel oil. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 42 ppm at 15% O<sub>2</sub> nor 318 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons per year (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- When NO<sub>x</sub> monitoring data is not available, substitution for missing data shall be handled as required by Title IV (40 CFR 75) to calculate the specified average time.

18. Visible Emissions (VE): VE emissions shall not exceed 10 percent opacity.

19. Carbon Monoxide (CO) emissions: The concentration of CO in the exhaust gas shall not exceed 15 ppmvd (gas) and 20 ppmvd (oil) as measured by EPA Method 10. CO emissions (at ISO conditions) shall not exceed 48 lb/hr (gas) and 97 lb/hr (oil) to be demonstrated by stack test.

20. Volatile Organic Compounds (VOC) Emissions: The concentration of VOC in the exhaust gas shall not exceed 1.4 ppmvd (gas) and 3.5 ppm (oil) as determined by EPA Methods 18, 25 or 25 A. VOC emissions (at ISO conditions) shall not exceed 2.9 lb/hr (gas) and 19 lb/hr (oil).

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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21. Sulfur Dioxide (SO<sub>2</sub>) emissions: SO<sub>2</sub> emissions (at ISO conditions) shall not exceed 9.7 pounds per hour when firing pipeline natural gas and 98 pounds per hour when firing maximum 0.05 percent sulfur No. 2 or superior grade distillate fuel oil. Initial tests shall be performed by applicable compliance methods described below. Compliance with this requirement in conjunction with implementation of the Custom Fuel Monitoring Schedules in Specific Conditions 41 and 42 will demonstrate compliance with the applicable NSPS SO<sub>2</sub> emissions limitations. Confirmation by the Custom Fuel Monitoring Schedule that the actual sulfur content is less than 2 grains per 100 standard cubic feet (gas) and 0.05 % sulfur content (fuel oil) will demonstrate compliance with the permit limits for SO<sub>2</sub>. Emissions of SO<sub>2</sub> shall not exceed 62 tons per year. [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]

### EXCESS EMISSIONS

22. Excess emissions resulting from startup, shutdown, or malfunction shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration. [Rule 62-210.700, F.A.C.].
23. 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.
24. Excess Emissions Report: If excess emissions occur for more than two hours due to malfunction, the owner or operator shall notify DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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. Pursuant to the New Source Performance Standards, all excess emissions shall also be reported in accordance with 40 CFR 60.7, Subpart A. Following this format, 40 CFR 60.7, periods of startup, shutdown, malfunction, and fuel switching shall be monitored, recorded, and reported as excess emissions when emission levels exceed the permitted standards listed in Specific Condition No. 16 and 17. [Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C., and 40 CFR 60.7 (1997 version)].

### COMPLIANCE DETERMINATION

25. Compliance with the allowable emission limiting standards shall be determined within 60 days after achieving the maximum production rate at which each unit will be operated, but not later than 180 days following 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 (1997 version), and adopted by reference in Chapter 62-204.800, F.A.C.

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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26. Initial (I) performance stack tests shall be performed on this unit while firing natural gas and fuel oil. 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 these units 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.
  - EPA Reference Method 18 or 25 and/or 25A, "Determination of Volatile Organic Concentrations." Initial test only.
27. Continuous compliance with the NO<sub>x</sub> emission limits: Continuous compliance with the NO<sub>x</sub> emission limits shall be demonstrated with the CEM system based on the applicable averaging time of 24-hr block average. 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. Valid hourly emission rates shall not include periods of start up, shutdown, or malfunction unless prohibited by 62-210.700 F.A.C. A valid hourly emission rate shall be calculated for each hour in which at least two NO<sub>x</sub> concentrations are obtained at least 15 minutes apart. These excess emissions periods shall be reported as required in Condition 24. [Rules 62-4.070 F.A.C., 62-210.700, F.A.C., and 40 CFR 75]
28. Compliance with the SO<sub>2</sub> and PM/PM<sub>10</sub> emission limits: Notwithstanding the requirements of Rule 62-297.340, F.A.C., the use of pipeline natural gas and maximum 0.05 percent sulfur (by weight) No. 2 or superior grade distillate fuel oil, is the method for determining compliance for SO<sub>2</sub> and PM<sub>10</sub>. For the purposes of demonstrating compliance with the 40 CFR 60.333 SO<sub>2</sub> standard and the 0.05% S limit, fuel oil analysis using ASTM D2880-71 or D4294 (or equivalent) for the sulfur content of liquid fuels and D1072-80, D3031-81, 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. The applicant is responsible for ensuring that the procedures above are used for determination of fuel sulfur content. 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) (1997 version).

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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29. Compliance with CO emission limit: An initial test for CO, shall be conducted concurrently with the initial NO<sub>x</sub> test, as required. The initial NO<sub>x</sub> 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 when compliance testing is conducted concurrent with the annual NO<sub>x</sub> RATA testing which is performed pursuant to 40 CFR 75.
30. Compliance with the VOC emission limit: An initial test is required to demonstrate compliance with the VOC emission limit. Thereafter, CO emission limit will be employed as a surrogate and no annual testing is required.
31. Testing procedures: Testing of emissions shall be conducted with the combustion turbine operating at permitted capacity. Permitted capacity is defined as 95-100 percent of the maximum heat input rate allowed by the permit, corrected for the average turbine inlet 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. turbine inlet temperature curve downward by an increment equal to the difference between the maximum permitted heat input (corrected for ambient temperature) and 105 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. Test procedures shall meet all applicable requirements (i.e., testing time frequency, minimum compliance duration, etc.) of Chapter 62-204.800 F.A.C.
32. Test Notification: The DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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).
33. 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.
34. Test Results: Compliance test results shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices no later than 45 days after completion of the last test run.

### NOTIFICATION, REPORTING, AND RECORDKEEPING

35. Records: All measurements, records, and other data required to be maintained by the permittee 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.



# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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36. Emission Compliance Stack Test Reports: A test report indicating the results of the required compliance tests shall be filed with the DEP Northeast District and Jacksonville RESD's Air & Water Quality Division Offices as soon as practical, but no later than 45 days after the last sampling run is completed. [Rule 62-297.310(8), F.A.C.]. 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.

### MONITORING REQUIREMENTS

37. 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 this unit. Periods when NO<sub>x</sub> emissions (ppmvd at 15% oxygen) are above the standards, listed in Specific Condition No 16 and 17, shall be provided to the DEP Bureau of Air Monitoring and Mobile Sources pursuant to 40CFR75.
38. CEMS in lieu of Water to Fuel Ratio: Subject to EPA approval, the NO<sub>x</sub> 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 (1997 version). Subject to EPA approval, the calibration of the water/fuel monitoring device required in 40 CFR 60.335 (c)(2) (1997 version) will be replaced by the 40 CFR 75 certification tests of the NO<sub>x</sub> CEMS. Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this Unit shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332.
39. CEMS in lieu of the requirement for reporting excess emissions: Subject to EPA approval, the NO<sub>x</sub> CEMS shall be used in lieu of the requirement for reporting excess emissions in accordance with 40 CFR 60.334(c)(1), Subpart GG (1997 version). Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this CT shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332.
40. Continuous Monitoring System Reports: 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 40CFR75. Data on CEM equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location shall be provided to the Department's Northeast District and Jacksonville RESD's Air & Water Quality Division Offices for review at least 90 days prior to installation.
41. Natural Gas Monitoring Schedule: The following custom monitoring schedule for natural gas is approved in lieu of the daily sampling requirements of 40 CFR 60.334 (b)(2):

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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- The permittee shall apply for an Acid Rain permit within the deadlines specified in 40 CFR 72.30.
- The permittee shall submit a monitoring plan, certified by signature of the Designated Representative (DR), that commits to using a primary fuel of pipeline supplied natural gas (sulfur content less than 20 gr/100 scf pursuant to 40 CFR 75.11(d)(2)).
- This unit shall be monitored for SO<sub>2</sub> emissions using methods consistent with the requirements of 40 CFR 75.11 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 this unit is changed to a higher sulfur fuel, SO<sub>2</sub> emissions must be accounted for as required pursuant to 40 CFR 75.11(d).

42. 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 or superior grade fuel oil received at the Kennedy Center Station, 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).

43. 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].

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

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

Give the following services (for an extra fee):

- 1.  Addressee's Address
- 2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
 Mr. Doug Meeley, Chief  
 Air Branch  
 US EPA Region II  
 61 Joseph St.  
 Atlanta, GA 30303

4a. Article Number  
 Z 333 612 509

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

7. Date of Delivery

5. Received By: (Print name)  
 JAYNE EVANS

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

6. Signature: (Addresser or Agent)  
 FEB 04 1999  
 X

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

Thank you for using Return Receipt Service.

Z 333 612 509

US Postal Service  
**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to		Doug Meeley	
Street & Number		US EPA	
Post Office, State, & ZIP Code		Atlanta GA	
Postage		\$	
Certified Fee			
Special Delivery Fee			
Restricted Delivery Fee			
Return Receipt Showing to Whom & Date Delivered			
Return Receipt Showing to Whom, Date, & Addressee's Address			
TOTAL Postage & Fees		\$	
Postmark or Date		JEA 2-2-99	
		0310047-002-AC	

PS Form 3800 April 1995

THE STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

al  
**RECEIVED**

FEB 15 1999

In the Matter of an  
Application for Permit by:

OGC CASE NO.:  
FDEP Permit No.: 0310047-002-AC

BUREAU OF  
AIR REGULATION

JACKSONVILLE ELECTRIC AUTHORITY  
Kennedy Generating Station  
Duval County, Florida

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**REQUEST FOR EXTENSION OF TIME**

By and through undersigned counsel, the Jacksonville Electric Authority (JEA) hereby requests, pursuant to Florida Administrative Code Rule 62-110.106(4), an enlargement of time, to and including April 1, 1999, in which to file a Petition for Administrative Proceedings in the above-styled matter. As good cause for granting this request, JEA states the following:

1. The Department of Environmental Protection (Department) issued an "Intent to Issue Air Construction Permit" (Draft Permit No. 0310047-002-AC) for the JEA Kennedy Generation Station facility located in Duval County, Florida, dated January 29, 1999. Along with the Intent to Issue, the Department issued a Draft Air Construction Permit and "Public Notice of Intent to Issue Air Construction Permit Revision."

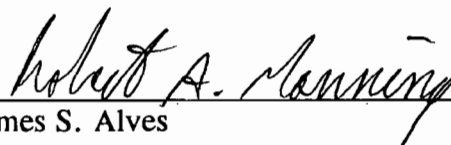
2. Based on JEA's review, the Draft Permit and associated documents contain several provisions that warrant clarification or correction.

3. This request is filed simply as a protective measure to avoid waiver of JEA's right to challenge certain conditions contained in the Draft Permit. Grant of this request will not prejudice either party, but will further their mutual interest and hopefully avoid the need to file

a petition and proceed to a formal administrative hearing. If the Department denies this request, JEA requests the opportunity to file a Petition for Administrative Proceeding within 10 days of such denial.

WHEREFORE, JEA respectfully requests that the time for filing of a Petition for Administrative Proceedings in regard to the Department's Intent to Issue Air Construction Permit for Draft Permit No. 0310047-002-AC be formally extended to and including April 1, 1999.

HOPPING GREEN SAMS & SMITH, P.A.

By: 

James S. Alves  
Florida Bar No. 443750  
Robert A. Manning  
Florida Bar No. 0035173  
Post Office Box 6526  
Tallahassee, FL 32314  
(850) 222-7500

**ATTORNEYS FOR JACKSONVILLE  
ELECTRIC AUTHORITY**

**CERTIFICATE OF SERVICE**

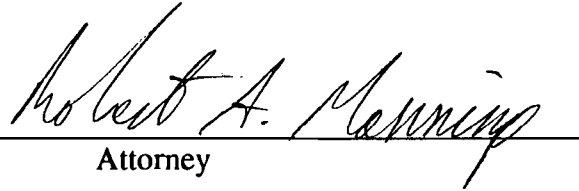
I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by

U.S. Mail on this 12 day of February, 1999:

Al Linero  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Jeff Brown, Esq.  
Department of Environmental Protection  
Room 669  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Teresa Heron  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

  
\_\_\_\_\_  
Attorney

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF PERMIT

In the Matter of an  
Application for Permit by:

Mr. Walter P. Bussels, Managing Director and CEO  
Jacksonville Electric Authority  
21 West Church Street  
Jacksonville, Florida 32202-3139

DEP File No. 0310047-002-AC  
170 MW Combustion Turbine Project  
Simple Cycle Peaking Unit  
Duval County

Enclosed is the Final Permit Number 0310047-002-AC for an air construction permit to construct/install a nominal 170 megawatt natural gas and No. 2 fuel oil-fired combustion turbine-electrical generator to replace a natural gas and fuel oil-fired steam electrical unit (KE10) at the Kennedy Generating Station in Jacksonville, Duval County. This permit is issued pursuant to Chapter 403, Florida Statutes.

Any party to this order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, F.S., by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Legal Office; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 (thirty) days from the date this Notice 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 3-8-99 to the person(s) listed:

Walter P. Bussels, JEA\*  
Bert Gianazza, JEA  
Chris Kurts, NED  
James L. Manning, P.E. RESD  
Gregg Worley, EPA  
John Bunyak, NPS  
Anthony L. Compaan, 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)

3-8-99  
(Date)

## FINAL DETERMINATION

Jacksonville Electric Authority (JEA))  
Kennedy Generating Station  
170 MW Simple Cycle Combustion Turbine  
DEP File No: 0310047-002-AC

An Intent to Issue an air construction permit, authorizing the construction of a 170 MW natural gas and fuel oil-fired simple cycle combustion turbine to Jacksonville Electric Authority (JEA) was distributed on January 29, 1999. This facility is located at the Kennedy Generating Station, in Jacksonville, Duval County, Florida.

The Public Notice of Intent to Issue Air Construction Permit was published in The Florida Times-Union on February 4, 1999. On February 12, a Request for Extension of Time to File a Petition for Administrative Proceedings was received from JEA. Accordingly, the Office of General Counsel initiated Case No. 99-0251 and advised that the application was "locked" from further updates until the case is resolved. On March 5, 1999, JEA and the Department agreed that all matters are resolved and JEA will file a request to withdraw the extension with the final permit as an attachment.

No comments were received following the public notice with the exception of comments received from JEA on February 17. JEA's written comments and the Department's responses follow. JEA commented only on the draft permit and not on the Technical Evaluation and Preliminary Determination. JEA's comments are keyed to the draft permit and to the Specific Conditions contained therein.

1. Section III, Condition 17. NO<sub>x</sub> Emissions. *Since this unit will be required to comply with a 15 ppm NO<sub>x</sub> limit (42 ppm on oil) as well as a ton per year limit, JEA requests that the lb/hr limit be removed. Also, that the total annual NO<sub>x</sub> emission limit of 200 tons per year should be on a 12-month rolling average basis. To preserve JEA's option to use the protocol under 40 CFR Appendix E for the determination of compliance with the NO<sub>x</sub> limits, JEA requests adding the following language at the end of Conditions 17 and 27: "In lieu of utilizing CEMs for NO<sub>x</sub>, the permittee may elect to utilize the protocol specified under 40 CFR Part 75, Appendix E."*

The Department will modify this condition to reflect a 12-month rolling average. The lb/hr limit will not be removed. Stack testing is only required initially to verify compliance with permit limits including the lb/hr proposed (refer to Comment 3 below). The request to utilize the protocol specified under 40 CFR Part 75, Appendix E, is acceptable as long as the applicability requirements of this Appendix E are met. The key requirement is that the unit must meet the definition of peaking unit as stated in 40 CFR 72.2 Definitions. Appendix E applicability requirements reads as follows: "This NO<sub>x</sub> emissions estimation procedure may be used in lieu of a continuous NO<sub>x</sub> emission monitoring system (lb/MMBtu) for determining the average NO<sub>x</sub> emission rate and hourly NO<sub>x</sub> rate from the gas-firing peaking unit and oil-fired peaking unit as defined in Section 72.2 of this chapter. If a unit's operations exceed the levels required to be a peaking unit, install and certify a continuous NO<sub>x</sub> emission monitoring system no later than December 31 of the following calendar year. The provisions of Section 75.12 apply to excepted monitoring systems under this appendix."



2. Specific Condition 18. Visible Emissions. JEA requests that this condition should "clarify that the VE limit while burning oil is 20% opacity in accordance with FAC 296.320(4)(b)1 and the limit on gas is 10%."

The particulate emissions rate of 17 lb/hour and the VOC concentration of 3.5 ppm while firing maximum 0.05 % sulfur fuel oil, suggests the expectation of low opacity. Because only initial VOC testing and no particulate testing were going to be required, it was important to set opacity limits representative of the low emissions for the mentioned parameters. Ten percent opacity is the Department's reasonable assurance pursuant to Rule 62-4.070, F.A.C. that the unit will comply with the permit conditions and not trigger PSD during operation on oil. There is no reason to expect a 20% opacity plume from a clean unit. In lieu of the 10 percent limit on oil, the Department will require annual demonstration that the unit will meet the particulate emission limit of 17 pounds per hour which JEA determined would allow the project to "net out" of PSD review for particulate matter. Subsequently, JEA may accept a 10 percent opacity limit and be relieved of an annual testing requirement.

3. Specific Condition 19: JEA requests that the pound per hour limit on CO be removed and a tons per year limit of 97.2 be added to assure avoidance of PSD for CO.

According to EPA (EPA's letter of May 21, 1998, comments to the Lakeland Unit 5 project), "to ensure that a PSD permit is practically enforceable, short-term BACT emission limits need to be provided in the PSD permit as opposed to 'ton/year' limits." Although this project did not go through PSD and BACT review, this comment is still valid since this project nets out of review and the lb/hr limit and hour of operations are crucial parameters for the determination of a project PSD applicability (in tons per year).

The short term emission limit for this emission unit is to provide reasonable assurance that the TPY limit will not be exceeded and to ensure that the non-PSD status of the permit is practically enforceable. This condition will not be changed. If JEA wishes to add a continuous monitor to log long-term emissions of CO, the permit can be subsequently modified.

4. Specific Condition 21. JEA requests that the pound per hour limits for SO<sub>2</sub> be removed since natural gas is the primary fuel and there is a limit of 0.05% on the sulfur content of the fuel oil. Accordingly, there should be no need for an initial compliance test. Also, four lines up from the bottom, the following edit should be made: "Confirmation by the Custom Fuel Monitoring Schedule that than. . . ."

Refer to the non- PSD applicability rationale discussed in Comment 3 above. Regarding the typographical error, this will be corrected in the final permit.

5. Specific Condition 28. JEA states that DEP's citation to Rule 62-297.340, F.A.C. is incorrect because this rule has been repealed. It is not clear what state rule requirement DEP is varying when the permit states "Notwithstanding the requirement of \_\_\_\_."

The Department agrees with the applicant that Rule 62-297.340, F.A.C was repealed. In reality, this rule was transferred to Rule 62-297.310 (7) F.A.C. Frequency of Compliance Tests. This condition will reflect the correct citation in the final permit.

6. Specific Condition 36. JEA states that this condition is redundant to Condition 34 and therefore these two conditions should be consolidated for clarity.

The Department agrees with the applicant. This condition is modified as follows:

Emission Compliance Stack Test Reports: A test report indicating the results of the required compliance tests shall be filed with the DEP Northeast District and Jacksonville RESD's Air & Water Quality Division Offices as soon as practical, but no later than 45 days after the last sampling run is completed. [Rule 62-297.310(8), F.A.C.]. 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.

7. Specific Condition 37, line 4. JEA suggests that in order to clarify that the excess emissions condition applies to NO<sub>x</sub>, please reference condition 22.

The Department believes that this condition is clear, therefore, this condition will not be revised. The NO<sub>x</sub> emission limits are as stated in Specific Conditions No. 16 and 17. This specific condition (37) clearly states: "Periods when NO<sub>x</sub> emissions ( ppmvd at 15% oxygen) are above the standards...."

8. Specific Condition 39. JEA affirms that this Condition is nearly identical to Condition 38 and therefore these two conditions should be consolidated for clarity.

The Department agrees with JEA. This condition would be modified as follows:

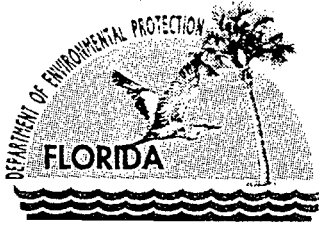
CEMS in lieu of the requirement for reporting excess emissions: Subject to EPA approval, the NO<sub>x</sub> CEMS shall be used in lieu of the requirement for reporting excess emissions in accordance with 40 CFR 60.334(c)(1), Subpart GG (1997 version). Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this CT shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332. This unit shall comply with the CEM frequency data report as specified in 40CFR60.7 (c). [Rule 62-204.800(7) and 40 CFR60.7]

9. Specific Condition 41. JEA states that in the third bullet, what is meant by the statement that the methods should be "certified" by EPA?

The statement reads as follows: "This unit shall be monitored for SO<sub>2</sub> using methods consistent with the statements of 40CFR75.11 and certified by the USEPA."

This statement means using methods consistent with the acid rain program (40 CFR Part 75) and that the monitoring system shall be certified by the US EPA Acid Rain Division.

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



Jeb Bush  
Governor

# Department of Environmental Protection

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

David B. Struhs  
Secretary

## PERMITTEE:

Jacksonville Electric Authority  
Kennedy Generating Station  
21 West Church Street  
Jacksonville, Florida 32202-3139

Permit No.	0310047-002-AC
Project:	170 MW Simple Cycle Peaking Unit
SIC No.	4911
Expires:	December 31, 2002

## Authorized Representative:

Walter P. Bussels  
Managing Director & Chief Executive Officer

## PROJECT AND LOCATION:

Jacksonville Electric Authority (JEA) proposes to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59°F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG 7241 FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE.10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack.

This facility is located at 4215 Talleyrand Ave in Jacksonville, Duval County, Florida. UTM coordinates are: Zone 17; 440.0 km E and 3,591.00 km N.

## STATEMENT OF BASIS:

This 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 MADE A PART OF THIS PERMIT:

Appendix GC                      Construction Permit General Conditions

Howard L. Rhodes, Director  
Division of Air Resources  
Management

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

### FACILITY DESCRIPTION

Currently, this facility generates electric power from a 134 MW and two 44 MW natural gas/fuel oil-fired steam units, an auxiliary 21 MW boiler, and three oil fired 56.2 MW combustion turbines used as peaking units, all with a combined generating capacity of approximately 412 MW.

This permitting action is to install one (1) natural gas/fuel-fired simple cycle unit that will consist of a nominal 170 MW (at 59 °F) combustion turbine-generator equipped with Dry Low NO<sub>x</sub> (DLN-2.6) combustors. The CT proposed is a General Electric PG 7241 FA and will be used as a peaking unit. This turbine will replace one existing natural gas/fuel oil-fired boiler identified by JEA as KE10 (ARMS Emission Unit 009) at the Kennedy Generating Station in Duval County. The project also includes a 90-foot new stack .

This Project is exempt from the requirements of Rule 62-212.400, F.A.C., Prevention of Significant Deterioration (PSD) as discussed stated in the Technical Evaluation and Preliminary Determination dated January 29, 1999.

### EMISSION UNITS

This permit addresses the following emission unit:

ARMS Emissions Unit No.	System	Emission Unit Description
015	Power Generation	One 170 MW Simple Cycle Combustion Turbine-Generator - Peaking Unit

### REGULATORY CLASSIFICATION

This facility, JEA Kennedy Generating Station, 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/PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), or volatile organic compounds (VOC) exceeds 100 tons per year (TPY).

This facility is within an industry included in the list of the 28 Major Facility Categories per Table 62-212.400-1, F.A.C. Because emissions are greater than 100 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).

This facility is a major source of hazardous air pollutants (HAPs) and is also subject to the provisions of Title IV, Acid Rain, Clean Air Act as amended in 1990 (Title V application received June 14, 1996).

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION I. FACILITY INFORMATION

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### PERMIT SCHEDULE

- 02/04/99 Notice of Intent published in the Florida Times-Union
- 01/29/99 Distributed Intent to Issue Permit
- 12/23/98 Application deemed complete
- 10/30/98 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 October 30, 1998.
- Department's Intent to Issue and Public Notice Package dated January 29, 1999.
- JEA's comments to DEP incompleteness letter dated December 23, 1998 and January 19, 1999.
- EPA's approval of the Custom Fuel Monitoring Schedule dated February 10, 1999.
- JEA's request for Extension of Time to File a Petition for Administrative Proceedings dated February 12, 1999.
- JEA's comments to the draft permit and technical evaluation dated February 17, 1999.

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 (DEP), at 2600 Blairstone Road, Tallahassee, Florida 32399-2400 and phone number (850)488-0114. All documents related to reports, tests, and notifications should be submitted to the Jacksonville Regulatory & Environmental Services Department (RESD) Air & Water Quality Division, Suite 225, 117 W. Duval Street, Jacksonville, Florida 32202 and phone number 904/630-3484; and a copy to the DEP Northeast District offices, 7825 Baymeadows Way, Suite 200B Jacksonville, Florida 32256-7590 and phone number 904/448-4300.
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. Permit Extension: *This permit expires on December 31, 2002.* 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.].
7. Application for Title IV Permit: An application for a Title IV Acid Rain Permit, must be submitted to the U.S. Environmental Protection Agency Region IV office in Atlanta, Georgia and a copy to the DEP's Bureau of Air Regulation in Tallahassee 24 months before the date on which the new unit begins serving an electrical generator (greater than 25 MW). [40 CFR 72]
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 sent to the Department's Northeast District and the Jacksonville Regulatory & Environmental Protection Commission offices. [Chapter 62-213, F.A.C.]

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION II. EMISSION UNIT(S) ADMINISTRATIVE REQUIREMENTS

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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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices by March 1st of each year.
11. Stack Testing Facilities: Stack sampling facilities shall be installed in accordance with Rule 62-297.310(6), F.A.C.
12. Quarterly Reports: Quarterly excess emission reports, in accordance with 40 CFR 60.7 (a)(7) (c) (1997 version), shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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### APPLICABLE STANDARDS AND REGULATIONS:

1. Unless otherwise indicated in this permit, the construction and operation of the subject emission unit 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, 62-110, 62-204, 62-210, 62-212, 62-213, 62-214, 62-296, and 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 Unit 015, Power Generation, consisting of one (nominal) 170 MW combustion turbines (simple cycle peaking operation), 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 required to demonstrate compliance with non-NSPS permit standard(s).
5. All notifications and reports required by the above specific conditions shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices.

### GENERAL OPERATION REQUIREMENTS

6. 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 this unit. [Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]
7. Turbine Capacity: The maximum heat input rates to this combustion turbine based on the lower heating value (LHV) of the fuel at ambient conditions of 59°F, 60% relative humidity, 100% load, and 14.7 psi pressure shall not exceed 1,623 million Btu per hour (MMBtu/hr) while firing gas and 1,822 million Btu per hour (MMBtu/hr) while firing fuel oil. This maximum heat input rate will vary depending upon turbine inlet 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)]



## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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8. 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.
9. 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 Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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.]
10. 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.]
11. 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. [Rule 62-210.650, F.A.C.]
12. Maximum allowable hours of operation in any twelve month period: (MAXHROP) for this peaking unit shall not exceed 4050 hours on gas or 1260 hours on fuel oil or the hours calculated pursuant to the following formula:

$$\text{MAXHROP} = 4050 - 3.215 * \text{ACTHROPFO}$$

Where: ACTHROPFO = Actual hours of operation on fuel oil

[Applicant Request, Rule 62-210.200, F.A.C. (Definitions - Potential Emissions)]

#### Control Technology

13. Dry Low NO<sub>x</sub> (DLN) combustor shall be installed on this stationary combustion turbine to control nitrogen oxides (NO<sub>x</sub>) emissions. [Design, Rule 62-4.070, F.A.C.]
14. The permittee shall provide manufacturer's emissions performance versus load diagrams for the DLN systems prior to their installation. DLN systems shall each be tuned upon initial operation to optimize emissions reductions and shall be maintained to minimize NO<sub>x</sub> emissions and CO emissions. [Rule 62-4.070, and 62-210.650 F.A.C.]
15. A water injection system shall be installed for use when firing No. 2 or superior grade distillate fuel oil for control of NO<sub>x</sub> emissions. [Design, Rules 62-4.070 and 62-212.400, F.A.C.]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

### EMISSION LIMITS AND STANDARDS

16. Following are the emission limits determined for this project assuming full load. Values for NO<sub>x</sub> are at 15% O<sub>2</sub> on a dry basis. These limits or their equivalents in terms of pounds per hour, as well as the applicable averaging times, are followed by the applicable specific conditions. [Applicant Requests, Rules 62-204.800(7)(b) (Subparts GG ), 62-210.200 (Definitions-Potential Emissions), F.A.C.].

NO <sub>x</sub>	SO <sub>2</sub>	CO	VOC	PM/Visibility (% Opacity)	Technology and Comments
15 ppm (NG)	<2gr/100scf (NG)	15 ppm (NG)	1.4 ppm (NG)	10	Dry Low NO <sub>x</sub> Combustors Pipeline Natural Gas Good Combustion Fuel Oil, 0.05% Sulfur Content
42 ppm (FO)	0.05% (FO)	20 ppm (FO)	3.5 ppm (FO)		

### 17. Nitrogen Oxides (NO<sub>x</sub>) Emissions:

- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 15 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning natural gas. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 15 ppm at 15% O<sub>2</sub> nor 99 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons on a 12-month rolling average basis (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- The concentration of NO<sub>x</sub> concentrations in the exhaust gas of this CT shall not exceed 42 ppm at 15% O<sub>2</sub> (on a 24-hr block average) as measured by the CEMS (maintained in accordance with 40 CFR 75) while burning fuel oil. In addition, NO<sub>x</sub> emissions calculated as NO<sub>2</sub> (at ISO conditions) shall exceed neither 42 ppm at 15% O<sub>2</sub> nor 318 lb/hr to be demonstrated by stack test. Total annual NO<sub>x</sub> emissions shall not exceed 200 tons on a 12-month rolling average basis (gas/oil or gas or oil). [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]
- When NO<sub>x</sub> monitoring data is not available, substitution for missing data shall be handled as required by Title IV (40 CFR 75) to calculate the specified average time.
- In lieu of utilizing CEMs, for NO<sub>x</sub>, the permittee may elect to utilize the protocol specified under 40 CFR Part 75, Appendix E. [Rule 62-204.800 F.A.C., 40CFR72.2 and 40CFR75 Appendix E]

18. Visible Emissions (VE): In lieu of a particulate emission limit, VE emissions shall not exceed 10 percent opacity while burning natural gas. VE emissions shall not exceed 20 percent opacity and particulate emissions shall not exceed 17 lb/hr (non-condensable only) while burning oil during initial and annual tests. The permittee may request substitution of the PM limit and test requirement by a 10 percent opacity limitation while burning oil. [Rules 62-296.320 and 62-4.070(3) F.A.C.]

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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19. Carbon Monoxide (CO) emissions: The concentration of CO in the exhaust gas shall not exceed 15 ppmvd (gas) and 20 ppmvd (oil) as measured by EPA Method 10. CO emissions (at ISO conditions) shall not exceed 48 lb/hr (gas) and 97 lb/hr (oil) to be demonstrated by stack test.
20. Volatile Organic Compounds (VOC) Emissions: The concentration of VOC in the exhaust gas shall not exceed 1.4 ppmvd (gas) and 3.5 ppmvd (oil) as determined by EPA Methods 18, 25 or 25 A. VOC emissions (at ISO conditions) shall not exceed 2.9 lb/hr (gas) and 19 lb/hr (oil).
21. Sulfur Dioxide (SO<sub>2</sub>) emissions: SO<sub>2</sub> emissions (at ISO conditions) shall not exceed 9.7 pounds per hour when firing pipeline natural gas and 98 pounds per hour when firing maximum 0.05 percent sulfur No. 2 or superior grade distillate fuel oil. Initial tests shall be performed by applicable compliance methods described below. Compliance with this requirement in conjunction with implementation of the Custom Fuel Monitoring Schedules in Specific Conditions 41 and 42 will demonstrate compliance with the applicable NSPS SO<sub>2</sub> emissions limitations. Confirmation by the Custom Fuel Monitoring Schedule that the actual sulfur content is less than 2 grains per 100 standard cubic feet (gas) and 0.05 % sulfur content (fuel oil) will demonstrate compliance with the permit limits for SO<sub>2</sub>. Emissions of SO<sub>2</sub> shall not exceed 62 tons per year. [Rules 62-4.070 and 62-212.400, F.A.C. to avoid PSD Review]

### EXCESS EMISSIONS

22. Excess emissions resulting from startup, shutdown, or malfunction shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration. [Rule 62-210.700, F.A.C.].
23. 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.
24. Excess Emissions Report: If excess emissions occur for more than two hours due to malfunction, the owner or operator shall notify DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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. Pursuant to the New Source Performance Standards, all excess emissions shall also be reported in accordance with 40 CFR 60.7, Subpart A. Following this format, 40 CFR 60.7, periods of startup, shutdown, malfunction, and fuel switching shall be monitored, recorded, and reported as excess emissions when emission levels exceed the permitted standards listed in Specific Condition No. 16 and 17. [Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C., and 40 CFR 60.7 (1997 version)].

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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### COMPLIANCE DETERMINATION

25. Compliance with the allowable emission limiting standards shall be determined within 60 days after achieving the maximum production rate at which each unit will be operated, but not later than 180 days following 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 (1997 version), and adopted by reference in Chapter 62-204.800, F.A.C.
26. Initial (I) performance stack tests shall be performed on this unit while firing natural gas and fuel oil. 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 these units 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 5 or 17, "Determination of Particulate Emissions from Stationary Sources" (I, A).
  - 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.
  - EPA Reference Method 18 or 25 and/or 25A, "Determination of Volatile Organic Concentrations." Initial test only.
27. Continuous compliance with the NO<sub>x</sub> emission limits: Continuous compliance with the NO<sub>x</sub> emission limits shall be demonstrated with the CEM system based on the applicable averaging time of 24-hr block average. 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. Valid hourly emission rates shall not include periods of start up, shutdown, or malfunction unless prohibited by 62-210.700 F.A.C. A valid hourly emission rate shall be calculated for each hour in which at least two NO<sub>x</sub> concentrations are obtained at least 15 minutes apart. These excess emissions periods shall be reported as required in Condition 24. [Rules 62-4.070 F.A.C., 62-210.700, F.A.C., and 40 CFR 75]
28. Compliance with the SO<sub>2</sub> and PM/PM<sub>10</sub> emission limits: Notwithstanding the requirements of Rule 62-297.310(7), F.A.C., the use of pipeline natural gas and maximum 0.05 percent sulfur (by weight) No. 2 or superior grade distillate fuel oil, is the method for determining compliance for SO<sub>2</sub> and PM<sub>10</sub>. For the purposes of demonstrating compliance with the 40 CFR 60.333 SO<sub>2</sub> standard and the 0.05% S limit, fuel oil analysis using ASTM D2880-71 or D4294

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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(or equivalent) for the sulfur content of liquid fuels and D1072-80, D3031-81, 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. The applicant is responsible for ensuring that the procedures above are used for determination of fuel sulfur content. 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) (1997 version).

29. Compliance with CO emission limit: An initial test for CO, shall be conducted concurrently with the initial NO<sub>x</sub> test, as required. The initial NO<sub>x</sub> 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 when compliance testing is conducted concurrent with the annual NO<sub>x</sub> RATA testing which is performed pursuant to 40 CFR 75.
30. Compliance with the VOC emission limit: An initial test is required to demonstrate compliance with the VOC emission limit. Thereafter, CO emission limit will be employed as a surrogate and no annual testing is required.
31. Testing procedures: Testing of emissions shall be conducted with the combustion turbine operating at permitted capacity. Permitted capacity is defined as 95-100 percent of the maximum heat input rate allowed by the permit, corrected for the average turbine inlet 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. turbine inlet temperature curve downward by an increment equal to the difference between the maximum permitted heat input (corrected for ambient temperature) and 105 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. Test procedures shall meet all applicable requirements (i.e., testing time frequency, minimum compliance duration, etc.) of Chapter 62-204.800 F.A.C.
32. Test Notification: The DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices 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).
33. 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.
34. Test Results: Compliance test results shall be submitted to the DEP's Northeast District and Jacksonville RESD's Air & Water Quality Division offices no later than 45 days after completion of the last test run.

## AIR CONSTRUCTION PERMIT 0310047-002-AC

### SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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#### NOTIFICATION, REPORTING, AND RECORDKEEPING

35. Records: All measurements, records, and other data required to be maintained by the permittee 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.
36. Emission Compliance Stack Test Reports: 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.

#### MONITORING REQUIREMENTS

37. 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 this unit. Periods when NO<sub>x</sub> emissions (ppmvd at 15% oxygen) are above the standards, listed in Specific Condition No 16 and 17, shall be provided to the DEP Bureau of Air Monitoring and Mobile Sources pursuant to 40CFR75.
38. CEMS in lieu of Water to Fuel Ratio: Subject to EPA approval, the NO<sub>x</sub> 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 (1997 version). Subject to EPA approval, the calibration of the water/fuel monitoring device required in 40 CFR 60.335 (c)(2) (1997 version) will be replaced by the 40 CFR 75 certification tests of the NO<sub>x</sub> CEMS. Upon request from DEP, the CEMS emission rates for NO<sub>x</sub> on this Unit shall be corrected to ISO conditions to demonstrate compliance with the NO<sub>x</sub> standard established in 40 CFR 60.332.
39. CEMS requirement for reporting excess emissions. This unit shall comply with the CEM frequency data report as specified in 40CFR60.7 (c). [Rule 62-204.800 and 40 CFR 60.7]
40. Continuous Monitoring System Reports: 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 40CFR75. Data on CEM equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location shall be provided to the Department's Northeast District and Jacksonville RESD's Air & Water Quality Division Offices for review at least 90 days prior to installation.
41. Natural Gas Monitoring Schedule: The following custom monitoring schedule for natural gas is approved in lieu of the daily sampling requirements of 40 CFR 60.334 (b)(2):

# AIR CONSTRUCTION PERMIT 0310047-002-AC

## SECTION III. EMISSION UNIT(S) SPECIFIC CONDITIONS

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- The permittee shall apply for an Acid Rain permit within the deadlines specified in 40 CFR 72.30.
- The permittee shall submit a monitoring plan, certified by signature of the Designated Representative (DR), that commits to using a primary fuel of pipeline supplied natural gas (sulfur content less than 20 gr/100 scf pursuant to 40 CFR 75.11(d)(2)).
- This unit shall be monitored for SO<sub>2</sub> emissions using methods consistent with the requirements of 40 CFR 75.11 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 this unit is changed to a higher sulfur fuel, SO<sub>2</sub> emissions must be accounted for as required pursuant to 40 CFR 75.11(d).

42. 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 or superior grade fuel oil received at the Kennedy Center Station, 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).

43. 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]

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- 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.



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

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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.

- 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 ( )
  - b) Determination of Prevention of Significant Deterioration ( ); and
  - c) 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.
-

Memorandum

Florida Department of  
Environmental Protection

TO: Howard L. Rhodes  
THRU: C. H. Fancy *CH*  
A. A. Linero *aa*  
FROM: Teresa M. Heron *T.H.*  
DATE: March 5, 1999  
SUBJECT: JEA Kennedy Generating Station 170 MW Combustion Turbine  
DEP File No. 0310047-002-AC

*BAR*  
**RECEIVED**

MAR 08 1999

BUREAU OF  
AIR REGULATION

Attached is the final permit package for this project. The application is for installation of a nominal 170 megawatt (MW) natural gas and No. 2 fuel oil-fired combustion turbine-electrical generator. The new unit will operate in simple cycle and intermittent duty. Hours of operation will be limited to 4050 hours on natural gas or 1260 hours on fuel oil. It will replace a conventional natural gas and fuel oil-fired conventional steam generator at the Kennedy Generating Station.

The project netted out of PSD and no BACT was required. Nitrogen Oxides (NO<sub>x</sub>) emissions will be controlled by Dry Low NO<sub>x</sub> (DLN-2.6) combustors tuned to achieve 15 parts per million (ppm) by volume at 15 percent oxygen. NO<sub>x</sub> emissions will be 42 ppm while firing No. 2 fuel oil. Emissions of carbon monoxide (CO) will be controlled to 15 ppm (gas) 20 ppm (oil), while emissions of volatile organic compounds (VOC) will be less than 1.4 ppm (gas) and 3.5 ppm (oil). Emissions of sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (SAM), and particulate matter (PM/PM<sub>10</sub>) will be low due to use of clean fuels and the limited hours of operation.

We recommend your approval.

AAL/th

Attachments

Is your RETURN ADDRESS completed on the reverse side?

<b>SENDER:</b> ■ Complete items 1 and/or 2 for additional services. ■ Complete items 3, 4a, and 4b. ■ Print your name and address on the reverse of this form so that we can return this card to you. ■ Attach this form to the front of the mailpiece, or on the back if space does not permit. ■ Write "Return Receipt Requested" on the mailpiece below the article number. ■ The Return Receipt will show to whom the article was delivered and the date delivered.		I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.	
3. Article Addressed to: Walter P Bussels, MD Jacksonville Electric 21 West Church St. Jacksonville, FL 32202-3139		4a. Article Number P265 659 432	
5. Received By: (Print Name)		4b. Service Type <input type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail <input type="checkbox"/> Insured <input type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> COD	
6. Signature: (Addressee or Agent) X <i>J. Gross</i>		7. Date of Delivery 3-12-99	
PS Form 3811, December 1994		8. Addressee's Address (Only if requested and fee is paid)	

Thank you for using Return Receipt Service.

P 265 659 432

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

Sent to		<i>Walter Bussels</i>	
Street & Number		<i>SEA</i>	
Post Office, State, & ZIP Code		<i>Jacksonville, FL</i>	
Postage	\$		
Certified Fee			
Special Delivery Fee			
Restricted Delivery Fee			
Return Receipt Showing to Whom & Date Delivered			
Return Receipt Showing to Whom, Date, & Addressee's Address			
TOTAL Postage & Fees	\$		
Postmark or Date		<i>3-8-99</i>	
<i>0310047-002-AC</i>			

PS Form 3800, April 1995

al

THE STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**RECEIVED**

MAR 19 1999

BUREAU OF  
AIR REGULATION

In the Matter of an  
Application for Permit by:

OGC CASE NO.:  
FDEP Permit No.: 0310047-002-AC

JACKSONVILLE ELECTRIC AUTHORITY  
Kennedy Generating Station  
Duval County, Florida

**NOTICE OF WITHDRAWAL OF EXTENSION OF TIME**

The Jacksonville Electric Authority (JEA), by and through undersigned counsel, hereby withdraws its Request for Extension of Time to file a petition for formal administrative proceedings in accordance with Chapter 120, Florida Statutes in the above-referenced matter. The Department granted JEA's Request for Extension of Time until April 1, 1999, which JEA filed in response to the "Intent to Issue Air Construction Permit" (Draft Permit No.0310047-002-AC) for the JEA Kennedy Generating Station facility located in Duval County, Florida, to negotiate certain changes in the draft air construction permit with the Department of Environmental Protection (Department). The Department issued Permit No. 0310047-002-AC in final form on March 8, 1999. JEA has no further comments concerning the Draft Permit at this time, and therefore, JEA hereby withdraws its Request for Extension, *nunc pro tunc*.

Respectfully submitted this 17 day of March, 1999.

HOPPING GREEN SAMS & SMITH, P.A.

By: Robert A. Manning

James S. Alves

Florida Bar No. 443750

Robert A. Manning

Florida Bar No. 0035173

Post Office Box 6526

Tallahassee, FL 32314

(850) 222-7500

**ATTORNEYS FOR JACKSONVILLE  
ELECTRIC AUTHORITY**

**CERTIFICATE OF SERVICE**

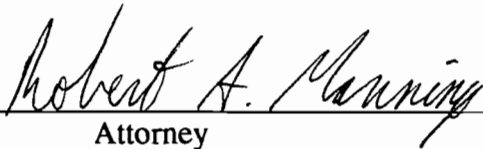
I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by

U.S. Mail on this 17 day of March, 1999:

Al Linero  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Jeff Brown, Esq.  
Department of Environmental Protection  
Room 669  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Teresa Heron  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

  
\_\_\_\_\_  
Attorney

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**NOTICE OF ADMINISTRATIVE PERMIT CORRECTION**

In a Matter of a Permit Correction Request by:

Mr. Walter P. Bussels, Managing Director & CEO  
Jacksonville Electric Authority  
21 West Church Street  
Jacksonville, Florida 32202-3139

DEP File No. 0310047-002-AC  
170 MW Combustion Turbine Project  
Simple Cycle Peaking Unit  
Duval County

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The Department has determined that certain corrections to information contained in Permit Number 0310047-002-AC are required. These corrections are to Specific Condition No.40 of the above-mentioned permit. These corrections are in reference to submission of data to EPA and other state and county agencies 45 days instead of 90 days.


Specific Condition No. 40, Continuous Monitoring System Reports, (page 12 of 13) of the referenced permit is hereby corrected as follows:

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 40CFR75. Data on CEM equipment specifications, manufacturer, type, calibration and maintenance needs, and its proposed location shall be provided to EPA Region IV, the Department's Bureau of Ambient Monitoring and Mobile Sources in Tallahassee, the Northeast District and Jacksonville RESD's Air & Water Quality Division Offices for review at least ~~90~~ 45 days prior to installation.

This administrative permit correction shall be attached to and is a part of Permit Number DEP File No. 0310047-002-AC. This administrative permit correction is issued pursuant to Rule 62-210.360, F.A.C and Chapter 403, Florida Statutes.

Any party to this order (permit correction) 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 Administrative Permit Correction was sent by certified mail (\*) and copies were mailed by U.S. Mail before the close of business on 5-22-00 to the person(s) listed:

Walter P. Bussels, JEA\*  
Bert Gianazza, JEA,  
Chris Kirts, DEP NED  
James L. Manning, RESD

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.

Kim Jones      5-22-00  
(Clerk)                      (Date)



SENDER: COMPLETE THIS SECTION	COMPLETE THIS SECTION ON DELIVERY
<ul style="list-style-type: none"> <li>Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.</li> <li>Print your name and address on the reverse so that we can return the card to you.</li> <li>Attach this card to the back of the mailpiece, or on the front if space permits.</li> </ul>	<p>A. Received by (Please Print Clearly) B. Date of Delivery  <span style="float: right;">5-24-00</span></p>
<p>1. Article Addressed to:  <i>Mr. Walter Bussels</i>  <i>JEA</i>  <i>21 W. Church St.</i>  <i>Jacksonville, FL</i>  <i>32202-3139</i></p>	<p>C. Signature  <input checked="" type="checkbox"/> <i>D. Bussels</i>      <input type="checkbox"/> Agent  <input type="checkbox"/> Addressee</p> <p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes  If YES, enter delivery address below: <input type="checkbox"/> No</p>
<p>2. Article Number (Copy from service label)  <i>7 341 355 295</i></p>	<p>3. Service Type  <input checked="" type="checkbox"/> Certified Mail      <input type="checkbox"/> Express Mail  <input type="checkbox"/> Registered      <input type="checkbox"/> Return Receipt for Merchandise  <input type="checkbox"/> Insured Mail      <input type="checkbox"/> C.O.D.</p> <p>4. Restricted Delivery? (Extra Fee) <input type="checkbox"/> Yes</p>

PS Form 3811, July 1999      Domestic Return Receipt      102595-99-M-1789

7 341 355 295

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

Sent to <i>Walter Bussels</i>	
Street & Number <i>JEA</i>	
Post Office, State, & ZIP Code <i>Jac FL</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	<i>7 of AC</i>
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	<i>5-22-00</i>
<i>0310047-002-AC</i>	

PS Form 3800, April 1995

Jeresa

THE STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**RECEIVED**

MAR 19 1999

BUREAU OF  
AIR REGULATION

In the Matter of an  
Application for Permit by:

OGC CASE NO.:  
FDEP Permit No.: 0310047-002-AC

JACKSONVILLE ELECTRIC AUTHORITY  
Kennedy Generating Station  
Duval County, Florida

---

**NOTICE OF WITHDRAWAL OF EXTENSION OF TIME**

The Jacksonville Electric Authority (JEA), by and through undersigned counsel, hereby withdraws its Request for Extension of Time to file a petition for formal administrative proceedings in accordance with Chapter 120, Florida Statutes in the above-referenced matter. The Department granted JEA's Request for Extension of Time until April 1, 1999, which JEA filed in response to the "Intent to Issue Air Construction Permit" (Draft Permit No.0310047-002-AC) for the JEA Kennedy Generating Station facility located in Duval County, Florida, to negotiate certain changes in the draft air construction permit with the Department of Environmental Protection (Department). The Department issued Permit No. 0310047-002-AC in final form on March 8, 1999. JEA has no further comments concerning the Draft Permit at this time, and therefore, JEA hereby withdraws its Request for Extension, *nunc pro tunc*.

Respectfully submitted this 17 day of March, 1999.

HOPPING GREEN SAMS & SMITH, P.A.

By: Robert A. Manning

James S. Alves

Florida Bar No. 443750

Robert A. Manning

Florida Bar No. 0035173

Post Office Box 6526

Tallahassee, FL 32314

(850) 222-7500

**ATTORNEYS FOR JACKSONVILLE  
ELECTRIC AUTHORITY**

**CERTIFICATE OF SERVICE**

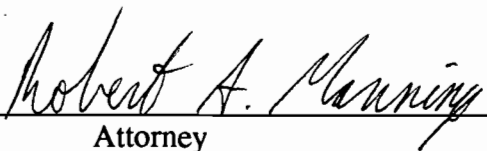
I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by

U.S. Mail on this 17 day of March, 1999:

Al Linero  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Jeff Brown, Esq.  
Department of Environmental Protection  
Room 669  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Teresa Heron  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

  
\_\_\_\_\_  
Attorney

TH

THE STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**RECEIVED**

FEB 15 1999

In the Matter of an  
Application for Permit by:

OGC CASE NO.:  
FDEP Permit No.: 0310047-002-AC

BUREAU OF  
AIR REGULATION

JACKSONVILLE ELECTRIC AUTHORITY  
Kennedy Generating Station  
Duval County, Florida

---

REQUEST FOR EXTENSION OF TIME

By and through undersigned counsel, the Jacksonville Electric Authority (JEA) hereby requests, pursuant to Florida Administrative Code Rule 62-110.106(4), an enlargement of time, to and including April 1, 1999, in which to file a Petition for Administrative Proceedings in the above-styled matter. As good cause for granting this request, JEA states the following:

1. The Department of Environmental Protection (Department) issued an "Intent to Issue Air Construction Permit" (Draft Permit No. 0310047-002-AC) for the JEA Kennedy Generation Station facility located in Duval County, Florida, dated January 29, 1999. Along with the Intent to Issue, the Department issued a Draft Air Construction Permit and "Public Notice of Intent to Issue Air Construction Permit Revision."

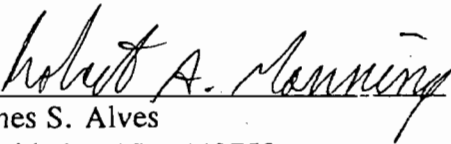
2. Based on JEA's review, the Draft Permit and associated documents contain several provisions that warrant clarification or correction.

3. This request is filed simply as a protective measure to avoid waiver of JEA's right to challenge certain conditions contained in the Draft Permit. Grant of this request will not prejudice either party, but will further their mutual interest and hopefully avoid the need to file

a petition and proceed to a formal administrative hearing. If the Department denies this request, JEA requests the opportunity to file a Petition for Administrative Proceeding within 10 days of such denial.

WHEREFORE, JEA respectfully requests that the time for filing of a Petition for Administrative Proceedings in regard to the Department's Intent to Issue Air Construction Permit for Draft Permit No. 0310047-002-AC be formally extended to and including April 1, 1999.

HOPPING GREEN SAMS & SMITH, P.A.

By: 

James S. Alves  
Florida Bar No. 443750  
Robert A. Manning  
Florida Bar No. 0035173  
Post Office Box 6526  
Tallahassee, FL 32314  
(850) 222-7500

**ATTORNEYS FOR JACKSONVILLE  
ELECTRIC AUTHORITY**

CERTIFICATE OF SERVICE

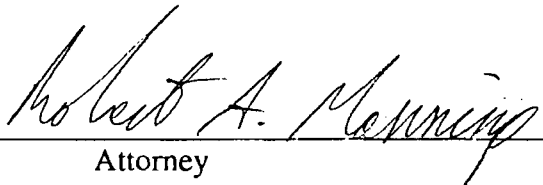
I HEREBY CERTIFY that a copy of the foregoing has been furnished to the following by

U.S. Mail on this 12 day of February, 1999:

Al Linero  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Jeff Brown, Esq.  
Department of Environmental Protection  
Room 669  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Teresa Heron  
Bureau of Air Regulation  
Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

  
\_\_\_\_\_  
Attorney

**RECEIVED**

**OCT 30 1998**

**BUREAU OF  
AIR REGULATION**

**Air Construction Permit Application  
for the  
Jacksonville Electric Authority  
Kennedy Generating Station**

**October 1998**



Fold at line over top of envelope to the right of the return address

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

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- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
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I also wish to receive the following services (for an extra fee):

- 1.  Addressee's Address
- 2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
 Walter P. Bussels  
 JEA  
 21 W. Church St.  
 Jacksonville, FL  
 32202-3139

4a. Article Number  
 Z 333 612 559

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

7. Date of Delivery  
 12-1-98

5. Received By: (Print Name)

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

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

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

Thank you for using Return Receipt Service.

Z 333 612 559

US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to		<i>Walter Bussels</i>	
Street & Number		<i>JE A</i>	
Post Office, State & ZIP Code		<i>Jacksonville FL</i>	
Postage	\$		
Certified Fee			
Special Delivery Fee			
Restricted Delivery Fee			
Return Receipt Showing to Whom & Date Delivered			
Return Receipt Showing to Whom, Date, & Addressee's Address			
TOTAL Postage & Fees	\$		
Postmark or Date		<i>11-25-98</i>	
<i>0310047-002 AC</i>			

PS Form 3800, April 1995

Is your RETURN ADDRESS completed on the reverse side?

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- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- 1.  Addressee's Address
- 2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
 Walter P. Bussels  
 JEA  
 Kennedy Generating S  
 21 West Church St.  
 Jacksonville, FL 32202-3139

4a. Article Number  
 Z 333 612 505

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

7. Date of Delivery  
 2-2-99

5. Received By: (Print Name)

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

6. Signature: (Addressee or Agent)  
 X S. [Signature]

Thank you for using Return Receipt Service.

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

Z 333 612 505

US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to	Walter P Bussels	
Street & Number	JEA	
Post Office, State, & ZIP Code	Jacksonville FL	
Postage	\$	
Certified Fee		
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to Whom & Date Delivered		
Return Receipt Showing to Whom, Date, & Addressee's Address		
TOTAL Postage & Fees	\$	
Postmark or Date	0310047-002-AC 1-29-99	

PS Form 3800, April 1995

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Give the following services (for an extra fee):  
 1.  Addressee's Address  
 2.  Restricted Delivery  
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3. Article Addressed to:  
 Mr. Doug Neeley, Chief  
 Air Branch  
 US EPA Region IV  
 61 Joseph St.  
 Atlanta, GA 30303

4a. Article Number  
 Z 333 612 509

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

7. Date of Delivery

5. Received By: (Print Name)  
 JOYCE EVANS

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

6. Signature: (Addressee or Agent)  
 X  
 FEB 04 1999

PS Form 3811, December 1994 102595-97-B-0179 Domestic Return Receipt

Thank you for using Return Receipt Service.

Z 333 612 509

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

Sent to Doug Neeley	
Street & Number US EPA	
Post Office, State, & ZIP Code Atlanta GA	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date JEA 2-2-99 0310047-002-AC	

PS Form 3800, April 1995

**PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT**

STATE OF FLORIDA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 DEP file No. 0310047-002-AC  
 Jacksonville Electric Authority Kennedy Generating Station  
 170 Megawatt Combustion Turbine-Electrical Generator  
 Duval County

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Jacksonville Electric Authority (JEA). The permit is to install a nominal 170 megawatt natural gas and No. 2 fuel oil-combustion turbine-electrical generator to replace a natural gas and fuel oil-fired steam electrical unit (KE10) at the Kennedy Generating Station in Jacksonville, Duval County. A Best Available Control Technology (BACT) determination was not required pursuant to Rule 62-212.400 F.A.C. The applicant's name and address are Jacksonville Electric Authority, 21 West Church Street Jacksonville, Florida 32202-3139.

The proposed unit is a nominal 170 megawatt General Electric PG7241FA gas and No. 2 fuel oil-fired combustion turbine-electrical generator and a 90 foot stack. The unit will operate a maximum of 4050 hours on natural gas or 1260 hours on No. 2 fuel oil with a maximum sulfur content of 0.05%. It will operate for various combinations of hours on either fuel such that the annual emissions increase in carbon monoxide (CO) and nitrogen oxides (NOx) remain at or below the values given below. The proposed unit will operate only in a simple cycle mode.

NOx emissions while firing natural gas, will be controlled by Dry Low NOx (DLN-2.6) combustors tuned to achieve emissions of 15 parts per million (ppm) by volume at 15 percent oxygen. During oil firing, NOx emissions will be 42 ppm and controlled by wet injection. Emissions of carbon monoxide (CO) for gas and oil firing will be controlled to 15 and 20 ppm, respectively. Emissions of volatile organic compounds (VOC) will be 1.4 and 3.5 ppm for gas and oil firing, respectively. Emissions of sulfur dioxide (SO2), sulfuric acid mist (SAM), and particulate matter (PM/PM10) will be very low because of the limited hours of operation and use of clean fuels.

The proven capabilities of the selected unit, together with the operational restrictions, will ensure that the annual emission levels required to avoid PSD Review are attained. There will be very small decreases in regulated air pollutants. However the unit will be able to produce substantially more electrical energy while maintaining maximum total annual emissions near past levels. Actual emissions will likely be substantially lower because the unit will primarily operate in intermittent duty. The maximum potential annual emissions in tons per year are summarized below along with the most recent annual emissions from Boiler KE10 (Unit 009) slated for retirement, the changes due to the project, and the PSD-significant levels.

Pollutants	KE10 Actual Emissions	CT Potential Emissions	Change	PSD Significant Levels
PM/PM10	21.7	18.2	-3.5	25/15
SAM	11.9	6.3	-5.6	7
SO2	266	62	-204	40
NOx	161.5	200.5	39	40
VOC	1.6	5.7	4.1	40
CO	14.5	97.2	82.7	100

An air quality impact analysis was not required or conducted. No significant impacts are due as a result of this project.

The Department will issue the FINAL permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of fourteen (14) days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station # 5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The JEA Kennedy Generating Station combustion turbine-electrical generator project is not subject to review under Section 403.506 F.S. (Power Plant Siting Act), because it provides for no expansion in steam generating capacity.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57 F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below. Mediation is not available in this proceeding.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station # 35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen (14) days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the applicant have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

A complete project file is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Dept. of Environmental Protection Bureau of Air Regulation	Regulatory & Environmental Services Dept. Air & Water Quality Division	Dept. of Environmental Protection Northeast District Office
111 S. Magnolia Drive, Suite 4 Tallahassee, Florida, 32301 Telephone: 850/488-0114 Fax: 850/922-6979	117 W. Duval Street, Suite 225, Jacksonville, Florida 32202 Telephone: 850/430-3484 Fax: 850/630-3638	7825 Baymeadows Way, Suite 2008 Jacksonville, Florida 32256-7590 Telephone: 850/448-4300 Fax: 850/448-4363

The complete project file includes the application, technical evaluations, Draft Permit, and the information submitted by the responsible official, exclusive of confidential records under Section 403.111, F.S. Interested persons may contact the Administrator, New Resource Review Section at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/488-0114, for additional information.

**FLORIDA PUBLISHING COMPANY**

Publisher

JACKSONVILLE, DUVAL COUNTY, FLORIDA

STATE OF FLORIDA }  
 COUNTY OF DUVAL }

Before the undersigned authority personally appeared \_\_\_\_\_

Steven L. Smith who on oath says that he is

Legal Advertising Representative of The Florida Times-Union,

a daily newspaper published at Jacksonville in Duval County, Florida; that the

attached copy of advertisement, being a Legal Advertisement

in the matter of Public Notice of Intent to Issue

in the \_\_\_\_\_ Court,

was published in THE FLORIDA TIMES-UNION in the issues of \_\_\_\_\_

February 4, 1999

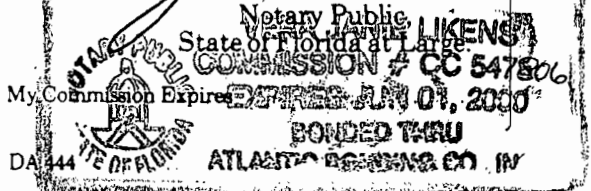
Affiant further says that the said The Florida Times-Union is a newspaper published at Jacksonville, in said Duval County, Florida, and that the said newspaper has heretofore been continuously published in said Duval County, Florida, The Florida Times-Union each day, has been entered as second class mail matter at the postoffice in Jacksonville, in said Duval County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Sworn to and subscribed before me

this . . . . 5th . . . . . day of

February, A.D. 19 99

*[Signatures]*



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- Write "Return Receipt Requested" on the mailpiece below the article number.
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I also wish to receive the following services (for an extra fee):

1.  Addressee's Address
2.  Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
 Walter P Bussels, MD  
 Jacksonville Electric  
 21 West Church St.  
 Jacksonville, FL  
 32202-3139

4a. Article Number  
 P265 659 432

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

7. Date of Delivery  
 3-12-99

5. Received By: (Print Name)

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

6. Signature: (Addressee or Agent)

X *[Signature]*

Thank you for using Return Receipt Service.

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

P 265 659 432

US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail. (See reverse)

Sent to		<i>Walter Bussels</i>	
Street & Number		<i>SEA</i>	
Post Office, State, & ZIP Code		<i>Jacksonville, FL</i>	
Postage	\$		
Certified Fee			
Special Delivery Fee			
Restricted Delivery Fee			
Return Receipt Showing to Whom & Date Delivered			
Return Receipt Showing to Whom, Date, & Addressee's Address			
TOTAL Postage & Fees	\$		
Postmark or Date		<i>3-8-99</i>	
<i>0310047-002-AR</i>			

PS Form 3800, April 1995

**SENDER: COMPLETE THIS SECTION**

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:  
 Mr. Walter Bussels  
 JEA  
 21 W. Church St.  
 Jacksonville, FL  
 32202-3139

2. Article Number (Copy from service label)

Z 341 355 295

PS Form 3811, July 1999

Domestic Return Receipt

102595-99-M-1789

**COMPLETE THIS SECTION ON DELIVERY**

A. Received by (Please Print Clearly) B. Date of Delivery  
 5-24-00

C. Signature  
 X *D. Bussels*  Agent  
 Addressee

D. Is delivery address different from item 1?  Yes  
 If YES, enter delivery address below:  No

3. Service Type  
 Certified Mail  Express Mail  
 Registered  Return Receipt for Merchandise  
 Insured Mail  C.O.D.

4. Restricted Delivery? (Extra Fee)  Yes

Z 341 355 295

US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to <i>Walter Bussels</i>	
Street & Number <i>JE A</i>	
Post Office, State, & ZIP Code <i>Jac FL</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	<i>n of AC</i>
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
<b>TOTAL Postage &amp; Fees</b>	<b>\$</b>
Postmark or Date <i>0310047-002-AC 5-22-00</i>	

PS Form 3800, April 1995

21 West Church Street  
Jacksonville, Florida 32202-3139

RECEIVED

DEC 23 1998

BUREAU OF  
AIR REGULATION



Jacksonville Electric Authority  
21 West Church Street  
Jacksonville, Florida 32202-3139

December 18, 1998

A. A. Linero, P.E. Administrator  
New Source Review Section  
Florida Department of Environmental Protection  
111 South Magnolia St., Suite 23  
Tallahassee, FL 32301

0310047-002-AC

Dear Mr. Linero:

In response to your letter of November 25, 1998 requesting additional information on the Jacksonville Electric Authority's Kennedy Generating Station construction permit application for a 170 MW simple cycle combustion turbine, we are providing the following information.

1. **Request:** Pursuant to Rule 62-212.400 (2)(e), F.A.C., please recalculate the net emission increases (sum of all 5 year contemporaneous source-wide creditable increases and decreases in the actual emissions of the facility) for all affected PSD pollutants listed in Table 62-212.400-2, F.A.C., to determine PSD applicability.

**Response:** The only contemporaneous source-wide emission increases and decreases result from the installation of the proposed combustion turbine (CT) and the retirement of the existing boiler KE-10. These emissions increases are detailed in Attachment 5 of the permit application. There are no other contemporaneous emission increases or decreases.

2. **Request:** Please provide technical information that will explain the simple cycle vs the combined cycle mechanism of fine tuning, etc., in relation to the NO<sub>x</sub> emission rate. What is the lowest NO<sub>x</sub> rate GE guarantees for this type of turbine operating in the simple cycle.

**Response:** Simple-cycle CTs are typically used to provide electricity to the grid in response to varying (peaking) electrical load demand. These CTs are generally cycled from a cold (off) condition to a low load or a base load condition several times a day. They may also cycle from low load to base load during an operating day in response to the demand placed on the grid. Base-load CTs are generally used to provide a more constant electrical supply based on the overall demand of the grid and are typically operated in a more steady-state mode of operation. Because combustion and burner conditions are more steady-state, burner performance is generally more constant and amenable to "tuning" as compared to that of a simple-cycle CT. It is this tuning of the combustion section of the CT that enables proper operation of the low-NO<sub>x</sub> burners. In simple-cycle (peaking) service, the number of "starts" determines the frequency of maintenance inspections, especially of the combustion section, rather than overall operating hours. This reflects the stress that multiple starts has on the combustion section and affects combustor performance, resulting in slightly increased NO<sub>x</sub> emissions.

As mentioned in a letter from GE dated December 8, 1998 (attached) the guarantee that GE provided with these CTs is currently 15 ppm of NO<sub>x</sub>, although they are investigating lower values. Note, however, that the guarantee is good only for the "new and clean test" immediately following installation of the unit. Long-term emissions are not guaranteed.

Note also that recent continuous emissions monitoring data (1997 - 1998, attached) from an existing facility utilizing GE 7FA CTs with DLN 2.6 combustors (Fort St. Vrain, Colorado), indicates that NO<sub>x</sub> emissions were greater than 9 ppm approximately 27 % of the time. A closer examination of the data reveals that while the CT can typically provide NO<sub>x</sub> emissions less than 9 ppm, occasional hourly NO<sub>x</sub> emissions can exceed that value. JEA believes the guaranteed NO<sub>x</sub> emission rate of 15 ppm is appropriate for this facility.

3. **Request:** Illustrate the emissions performance of the DLN-2.6 combustor employed in this application. Submit the NO<sub>x</sub> and CO graph figures (for oil and gas) that will show the GE DLN 2.6 system performance (load at a given temperature vs turbine configuration). Attached is an example of the characteristics of the DLN 2.0 that we wish to have updated for the DLN 2.6.

**Response:** GE has provided an updated table showing estimated emissions in relation to the CT load for the DLN 2.6 combustors when firing natural gas. This table is attached to this response. GE has indicated that performance of the DLN 2.6 combustors when firing fuel oil is identical to the earlier DLN 2.0 performance curves.

4. **Request:** Please explain why emissions of NO<sub>x</sub> are estimated to be 15 ppm. GE guaranteed a limit of 9 ppm at the City of Tallahassee Combined Cycle Project where similar turbine will be used.

**Response:** As mentioned in the response to Question 2, the proposed CT will be operated as a simple-cycle peaking unit rather than as a combined cycle CT. Combined cycle units typically operate in a more steady-state base-load mode of operation rather than cycling up and down in order to meet varying electrical demand during the day. This steady-state method of operation lends itself to additional tuning of the combustion system, and provides for greater maintenance intervals as well, because of the more constant conditions experienced in the combustion section. The combustion section in a simple-cycle peaking CT experiences a significantly greater variation in the overall method of operation resulting in greater and more frequent temperature swings and a slightly higher overall NO<sub>x</sub> emission rate. JEA believes the guaranteed NO<sub>x</sub> emission rate of 15 ppm is appropriate for this facility.

5. **Request:** If possible provide an 8 X 11' photo or drawing of this site.

**Response:** An 8.5 x 11 inch section of the two USGS quadrangles provided in the permit application in attached, detailing the location of the proposed project.

6. **Request:** Describe procedures used to startup and shutdown of this unit to minimize excess emissions.

**Response:** A description of the startup and shutdown procedures have been provided by GE and are attached to this response.

7. **Request:** Does this facility comply with the Jacksonville air pollution control regulations?

**Response:** Yes



Jacksonville Electric Authority

December 18, 1998

If you have any further questions on this permit application, please do not hesitate to contact me at (904) 665-6247.

Sincerely,

A handwritten signature in cursive script, appearing to read "N. Bert Gianazza".

N. Bert Gianazza, P.E.  
Environmental Group

Enclosure[s]

cc: Teresa Heron, (FDEP)  
Jim Connolly, P.E.

**GE Energy Services**

**Marvin V. Sindel Jr.**  
Sales Manager

GE Energy Services Sales  
General Electric International, Inc.  
10 Van Dyck Rd. Jacksonville, FL 32218  
Tel: 904-757-2620, Dial Comm: 87585-2620  
Fz: 904-757-2652  
Email: marvin.sindel@ps.ge.com

12/8/98

Subject: GE Frame 7FA Gas Turbine NOx Guarantee for JEA

Mr. Jim Connolly, P.E.  
JEA  
21 West Church Street  
Jacksonville, FL. 32202


Dear Jim,

Pursuant to your question on the NOx emission guarantee for the GE Frame 7FA units that JEA has purchased, the following information is offered:

1. The GE guarantee for the units purchased is 15 ppm NOx. GE will guarantee this level only for the "new and clean" test performed immediately after the installation of the unit is complete. This guarantee is similar to GE guaranteeing the performance of the unit at the "new and clean" condition.
2. The unit will operate at the 15 ppm level only for load conditions above 50% load. Should JEA use the units in their peaking mode for load control and operate the unit below this load point, the NOx level will exceed the 15 ppm .
3. The current NOx guarantee is for 15 ppm. However, with some additional modifications, GE is able to offer an improved guarantee of 9 ppm NOx. GE is working on providing an optional price to JEA to change the contractual guarantee to 9 ppm NOx.

I hope this answers your questions concerning the GE units contractual guarantee concerning NOx emissions. Should you have any further questions regarding the GE units, please contact me at your convenience.

Respectfully,

  
Marvin Sindel  
Sales Manager

cc: J. Grassman - GE Schenectady

Kennedy CT Project  
Rec'd 12/8/98 RCT  
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RCT

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1	1/13/97	7	0.25	0	0.1	0.2	0.1	20.7	6.74			
2	1/13/97	8	0									
3	1/13/97	9	0.25	0	0.5	0.2	0.1	20.7	6.74			
4	1/13/97	10	0.25	0	0.1	0.2	0.1	20.7	6.74			
5	1/13/97	11	0.5	1	380.5	12.4	1.5	18.3	27.86			
6	1/13/97	12	1	62	908.8		3.2	15.3		Yes	Yes	Yes
7	1/13/97	13	1	82	1070.4		4.1	13.7		Yes	Yes	Yes
8	1/13/97	14	1	82	1067.8		4.1	13.7		Yes	Yes	Yes
9	1/13/97	15	1	78	1040.8		4	13.9		Yes	Yes	Yes
10	1/13/97	16	1	84	1078		4	13.9		Yes	Yes	Yes
11	1/13/97	17	1	89	1114.4		4.1	13.7		Yes	Yes	Yes
12	1/13/97	18	1	88	1113.6		4.1	13.7		Yes	Yes	Yes
13	1/13/97	19	1	78	1042.5		4	13.9		Yes	Yes	Yes
14	1/13/97	20	1	79	1049.9		4	13.9		Yes	Yes	Yes
15	1/13/97	21	1	82	1072.6		4	13.9		Yes	Yes	Yes
16	1/13/97	22	1	81	1068.9		4	13.9		Yes	Yes	Yes
17	1/13/97	23	1	92	1138		4	13.9		Yes	Yes	Yes
18	1/14/97	0	1	94	1152.9		4	13.9		Yes	Yes	Yes
19	1/14/97	1	1	84	1080.8		4	13.9		Yes	Yes	Yes
20	1/14/97	2	1	77	1036.7		4	13.9		Yes	Yes	Yes
21	1/14/97	3	1	85	1089.7		4.1	13.7		Yes	Yes	Yes
22	1/14/97	4	1	97	1174.8		4.2	13.5		Yes	Yes	Yes
23	1/14/97	5	1	84	1085.4		4.2	13.5		Yes	Yes	Yes
24	1/14/97	6	1	109	1258.3		4.2	13.5		Yes	Yes	Yes
25	1/14/97	7	1	92	1139.3		4.2	13.5		Yes	Yes	Yes
26	1/14/97	8	1	76	1030		4.7	12.7		Yes	Yes	Yes
27	1/14/97	9	0.75	75	1018.7		4.7	12.7		Yes	Yes	Yes
28	1/14/97	10	0.75	63	899.1	29.3	2.6	16.3	37.99	Yes	**** No ****	**** No ****
29	1/14/97	11	0.75	57	829.8	11.7	3.3	15.1	11.95			
30	1/15/97	6	0.25	2	259.1	0.2	1.2	18.8	0.56			
31	1/15/97	7	0					20.9				
32	1/15/97	8	0.75	27	588	4	2.2	17.0	6.13			
33	1/15/97	9	1	113	1294.9	17.6	4.1	13.7	14.47	Yes	**** No ****	Yes
34	1/15/97	10	1	24	572	36.2	2.4	16.7	50.84			
35	1/15/97	11	0.75	3	356	36.6	1.9	17.6	64.93			
36	1/16/97	6	0.25	1	198.8	8.8	0.6	19.8	49.44			
37	1/17/97	6	0.25	0	154.3	1.4	0.9	19.3	5.24			
38	1/17/97	7	0.25	0	183.2	1.6	1	19.1	5.39			
39	1/17/97	15	0.5	21	557.9	21.3	1.6	18.1	44.87			
40	1/17/97	16	1	84	1094	10	4.2	13.5	8.03	Yes	Yes	Yes
41	1/17/97	17	1	85	1096.3	9.6	4.2	13.5	7.70	Yes	Yes	Yes
42	1/17/97	18	0.75	62	864	15.9	3.6	14.6	14.89	Yes	**** No ****	Yes
43	1/23/97	15	0.25	0	128	1.5	1	19.1	5.06			
44	1/23/97	16	0					20.9				
45	1/23/97	17	0.75	4	392	33.3	2	17.4	56.12			
46	1/24/97	7	0.5	7	412.4	20	2.2	17.0	30.64			
47	1/24/97	8	0.25	10	473	64.7	2.3	16.9	94.82			
48	1/25/97	10	0.25	3	359.8	23.7	1.8	17.7	44.38			
49	1/25/97	18	1	11	465	60.5	2.1	17.2	97.11			
50	1/25/97	19	1	13	484.9	43.9	2.4	16.7	61.66			
51	1/26/97	9	1	44	733.5	27.7	2.9	15.8	32.20			
52	1/26/97	10	0.75	97	1127.2	14.9	3.4	14.9	14.77	Yes	**** No ****	Yes
53	1/27/97	17	0.5	55	831.5	24.7	3.5	14.8	23.79			
54	1/27/97	18	1	72	1001	7.7	4.2	13.5	6.18	Yes	Yes	Yes
55	1/27/97	19	1	46	785	14.8	3.9	14.1	12.79			
56	1/27/97	20	0.5	5	434.5		3.3	15.1				
57	1/28/97	14	0.5	56	833.3	33	2.8	16.0	39.73			
58	1/28/97	15	1	73	1003.9	9.7	3.9	14.1	8.38	Yes	Yes	Yes
59	1/28/97	16	1	62	921.9	23.7	3.9	14.1	20.48	Yes	**** No ****	**** No ****
60	1/28/97	17	1	97	1158.8	12.6	3.8	14.2	11.18	Yes	**** No ****	Yes
61	1/29/97	7	0.5	51	781.6	33.3	2.8	16.0	40.09			
62	1/29/97	8	1	88	1108.5	8.8	4	13.9	7.42	Yes	Yes	Yes
63	1/29/97	9	0.25	4	265.7	25.4	1.9	17.6	45.06			
64	1/30/97	7	0.5	29	604.9	22.5	1.6	18.1	47.40			
65	1/30/97	8	1	74	1001.2	10.8	3.8	14.2	9.58	Yes	**** No ****	Yes
66	1/30/97	9	0.25	0	0.3	6.7	0	20.9				
67	2/11/97	16	0.25	0	150.1	3.1	1.2	18.8	8.71			
68	2/11/97	17	0.25	2	337.8	20.7	1.9	17.6	36.72			
69	2/11/97	18	0.25	1	226.3	4.6	1.6	18.1	9.69			
70	2/11/97	19	0.25	1	350.2	21	1.1	19.0	64.35			
71	2/24/97	8	1	62	909.2		3.4	14.9	0.00	Yes	Yes	Yes
72	2/24/97	9	1	76	1031.9	8	4	13.9	6.74	Yes	Yes	Yes
73	2/24/97	10	1	77	1031.4	8.1	4	13.9	6.83	Yes	Yes	Yes
74	2/24/97	11	1	80	1057.9	8.1	4	13.9	6.83	Yes	Yes	Yes
75	2/24/97	12	1	82	1068.4	8.1	4	13.9	6.83	Yes	Yes	Yes
76	2/24/97	13	1	88	1108.2	8.3	4	13.9	6.99	Yes	Yes	Yes
77	2/24/97	14	1	80	1047.9	8.3	3.9	14.1	7.17	Yes	Yes	Yes
78	2/24/97	15	1	76	1023.3	8.2	3.9	14.1	7.09	Yes	Yes	Yes
79	2/24/97	16	1	77	1028	8.1	3.9	14.1	7.00	Yes	Yes	Yes
80	2/24/97	17	1	77	1026.8	8.1	3.9	14.1	7.00	Yes	Yes	Yes
81	2/24/97	18	1	84	1077.3	8.1	3.9	14.1	7.00	Yes	Yes	Yes
82	2/24/97	19	1	75	987.2	9.9	3.8	14.2	8.78	Yes	Yes	Yes
83	2/24/97	20	0.25	0	0	5.4	3.2	15.3	5.69			
84	2/27/97	10	0.5	41	694	32.6	2.6	16.3	42.26			
85	2/27/97	11	1	60	896.9	6.9	3.9	14.1	5.96			
86	2/27/97	12	1	70	963.1	7.5	4	13.9	6.32	Yes	Yes	Yes
87	2/27/97	13	1	71	969.7	7.7	4	13.9	6.49	Yes	Yes	Yes
88	2/27/97	14	1	77	1008	7.4	4	13.9	6.24	Yes	Yes	Yes
89	2/27/97	15	1	66	932.5	7.5	3.9	14.1	6.48	Yes	Yes	Yes
90	2/27/97	16	1	64	915.3	7.4	3.9	14.1	6.40	Yes	Yes	Yes
91	2/27/97	17	1	67	940.3	10.4	3.9	14.1	8.99	Yes	Yes	Yes
92	2/27/97	18	1	110	1253.7	8.1	4	13.9	6.83	Yes	Yes	Yes
93	2/27/97	19	1	77	1007.5	7.6	4	13.9	6.40	Yes	Yes	Yes
94	2/27/97	20	1	68	946.8	8.5	4	13.9	7.16	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
95	2/27/97	21	0.5	59	878.9	1.2	3.9	14.1	1.04			
96	2/28/97	10	0.25	0	139.7		1.4	18.4	0.00			
97	2/28/97	11	1	59	891.2	17.1	3.9	14.1	14.78			
98	2/28/97	12	1	61	904.3	7	4	13.9	5.90	Yes	Yes	Yes
99	2/28/97	13	1	62	909.1	7.4	4	13.9	6.24	Yes	Yes	Yes
100	2/28/97	14	1	61	903.7	6.7	4	13.9	5.65	Yes	Yes	Yes
101	2/28/97	15	1	61	898.7	6.9	4	13.9	5.81	Yes	Yes	Yes
102	2/28/97	16	1	62	905.5	6.7	4	13.9	5.65	Yes	Yes	Yes
103	2/28/97	17	1	77	1017.8	6.9	4	13.9	5.81	Yes	Yes	Yes
104	2/28/97	18	1	64	923	10.5	4	13.9	8.85	Yes	Yes	Yes
105	2/28/97	19	0.5	44	714.5	14.9	3.5	14.8	14.35			
106	3/3/97	7	0.25	0	0	0.1	0.1	20.7	3.37			
107	3/3/97	8	1	54	839.6	15.9	3.2	15.3	16.75			
108	3/3/97	9	1	63	919.3	7.3	3.8	14.2	6.48	Yes	Yes	Yes
109	3/3/97	10	1	63	913.8	7.4	3.8	14.2	6.56	Yes	Yes	Yes
110	3/3/97	11	1	63	912.6	7.3	3.8	14.2	6.48	Yes	Yes	Yes
111	3/3/97	12	1	63	912.4	7.5	3.8	14.2	6.65	Yes	Yes	Yes
112	3/3/97	13	1	63	913.7	7.6	3.8	14.2	6.74	Yes	Yes	Yes
113	3/3/97	14	1	66	933.9	7.6	3.8	14.2	6.74	Yes	Yes	Yes
114	3/3/97	15	1	66	936.1	7.6	3.8	14.2	6.74	Yes	Yes	Yes
115	3/3/97	16	1	66	936.7	7.5	3.8	14.2	6.65	Yes	Yes	Yes
116	3/3/97	17	1	66	938.1	7.4	3.8	14.2	6.56	Yes	Yes	Yes
117	3/3/97	18	1	66	942	7.3	3.9	14.1	6.31	Yes	Yes	Yes
118	3/3/97	19	1	106	1229.9	9.6	3.9	14.1	8.30	Yes	Yes	Yes
119	3/3/97	20	1	139	1487.7	13	4	13.9	10.95	Yes	**** No ****	Yes
120	3/3/97	21	1	92	1126.6	8.8	3.9	14.1	7.61	Yes	Yes	Yes
121	3/3/97	22	1	70	963.3	10.6	3.9	14.1	9.18	Yes	**** No ****	Yes
122	3/4/97	6	0.5	53	806.7	34.5	2.8	16.0	41.53			
123	3/4/97	7	1	79	1038.8	7.2	4	13.9	6.07	Yes	Yes	Yes
124	3/4/97	8	1	80	1044.1	7	4	13.9	5.90	Yes	Yes	Yes
125	3/4/97	9	1	83	1069.2	7.1	4	13.9	5.98	Yes	Yes	Yes
126	3/4/97	10	1	81	1050.5	8.8	4	13.9	7.42	Yes	Yes	Yes
127	3/4/97	11	1	79	1036.6	7.1	4	13.9	5.98	Yes	Yes	Yes
128	3/4/97	12	1	79	1041.1	7.1	4	13.9	5.98	Yes	Yes	Yes
129	3/4/97	13	1	79	1040.4	7.2	4	13.9	6.07	Yes	Yes	Yes
130	3/4/97	14	1	79	1037.4	7.2	4	13.9	6.07	Yes	Yes	Yes
131	3/4/97	15	1	79	1037.3	7.1	4	13.9	5.98	Yes	Yes	Yes
132	3/4/97	16	1	77	1022	7.2	4	13.9	6.07	Yes	Yes	Yes
133	3/4/97	17	1	73	991.3	9.5	4	13.9	8.01	Yes	Yes	Yes
134	3/4/97	18	1	131	1408.4	10.4	4.1	13.7	8.55	Yes	Yes	Yes
135	3/4/97	19	1	132	1417.3	10.7	4.1	13.7	8.80	Yes	Yes	Yes
136	3/4/97	20	1	120	1326.4	10.2	4.1	13.7	8.39	Yes	Yes	Yes
137	3/4/97	21	1	76	1017.6	8.9	4	13.9	7.50	Yes	Yes	Yes
138	3/4/97	22	0.75	51	787.6	13.4	3.8	14.2	11.89			
139	3/5/97	6	1	57	868.7		3.2	15.3	0.00			
140	3/5/97	7	1	87	1109.5	11.4	3.9	14.1	9.85	Yes	**** No ****	Yes
141	3/5/97	8	1	71	988.7	9.8	3.9	14.1	8.47	Yes	Yes	Yes
142	3/5/97	9	1	115	1305.1	10.4	4	13.9	8.76	Yes	Yes	Yes
143	3/5/97	10	1	124	1367	10.4	4	13.9	8.76	Yes	Yes	Yes
144	3/5/97	11	1	72	991.7	8.5	3.9	14.1	7.35	Yes	Yes	Yes
145	3/5/97	12	1	69	966	8.2	3.9	14.1	7.09	Yes	Yes	Yes
146	3/5/97	13	1	65	938	7.1	3.8	14.2	6.30	Yes	Yes	Yes
147	3/5/97	14	1	63	925.6	7	3.8	14.2	6.21	Yes	Yes	Yes
148	3/5/97	15	1	63	920.5	7.1	3.8	14.2	6.30	Yes	Yes	Yes
149	3/5/97	16	1	63	920.4	7	3.8	14.2	6.21	Yes	Yes	Yes
150	3/5/97	17	1	71	977.4	6.9	3.9	14.1	5.96	Yes	Yes	Yes
151	3/5/97	18	1	120	1323.4	9.7	4	13.9	8.17	Yes	Yes	Yes
152	3/5/97	19	1	141	1498.4	12.2	4	13.9	10.28	Yes	**** No ****	Yes
153	3/5/97	20	1	104	1216.7	9.3	4	13.9	7.84	Yes	Yes	Yes
154	3/5/97	21	0.75	51	791.7	11.6	3.5	14.8	11.17			
155	3/6/97	6	1	82	904.2	16.1	3.6	14.6	15.07	Yes	**** No ****	**** No ****
156	3/6/97	7	1	66	951	9.4	3.9	14.1	8.12	Yes	Yes	Yes
157	3/6/97	8	1	69	965.6	8.9	3.9	14.1	7.69	Yes	Yes	Yes
158	3/6/97	9	1	69	969.7	8.1	3.9	14.1	7.00	Yes	Yes	Yes
159	3/6/97	10	1	104	1212.9	8.7	4	13.9	7.33	Yes	Yes	Yes
160	3/6/97	11	1	96	1157.6	9.2	3.9	14.1	7.95	Yes	Yes	Yes
161	3/6/97	12	1	73	988.6	7.5	3.9	14.1	6.48	Yes	Yes	Yes
162	3/6/97	13	1	67	946.6	7.5	3.8	14.2	6.65	Yes	Yes	Yes
163	3/6/97	14	1	64	922.1	7.8	3.8	14.2	6.92	Yes	Yes	Yes
164	3/6/97	15	1	68	946.6	7.9	3.8	14.2	7.01	Yes	Yes	Yes
165	3/6/97	16	1	78	1021.5	8.4	3.8	14.2	7.45	Yes	Yes	Yes
168	3/6/97	17	1	61	902	7.8	3.8	14.2	6.92	Yes	Yes	Yes
167	3/6/97	18	1	107	1233.3	11	3.9	14.1	9.51	Yes	**** No ****	Yes
168	3/6/97	19	1	135	1451	14.8	3.9	14.1	12.79	Yes	**** No ****	Yes
169	3/6/97	20	1	135	1456	14.6	3.9	14.1	12.62	Yes	**** No ****	Yes
170	3/6/97	21	1	92	1131.4	14.7	3.8	14.2	13.04	Yes	**** No ****	Yes
171	3/6/97	22	0.25	39	734.1	66.1	3.7	14.4	60.22			
172	3/7/97	10	0.75	56	833.5	26.4	3	15.6	29.66			
173	3/7/97	11	1	68	956.9	7.9	3.8	14.2	7.01	Yes	Yes	Yes
174	3/7/97	12	1	70	967.5	7.8	3.8	14.2	6.92	Yes	Yes	Yes
175	3/7/97	13	1	63	913	7.7	3.8	14.2	6.83	Yes	Yes	Yes
176	3/7/97	14	1	61	899.1	7.6	3.8	14.2	6.74	Yes	Yes	Yes
177	3/7/97	15	1	61	899.1	7.6	3.8	14.2	6.74	Yes	Yes	Yes
178	3/7/97	16	1	61	900	7.7	3.8	14.2	6.83	Yes	Yes	Yes
179	3/7/97	17	1	61	900.9	7.6	3.8	14.2	6.74	Yes	Yes	Yes
180	3/7/97	18	1	61	901.9	7.5	3.8	14.2	6.65	Yes	Yes	Yes
181	3/7/97	19	0.5	31	622.2	14.7	2.7	16.2	18.35			
182	3/18/97	10	0.25	0	0.2	0.1	0.1	20.7	3.37			
183	3/18/97	11	1	5	411.4	6.7	1.9	17.6	11.89			
184	3/18/97	12	1	32	664.2	11	3	15.6	12.36			
185	3/18/97	13	1	106	1240.2	41.2	3.9	14.1	35.61	Yes	**** No ****	**** No ****
186	3/18/97	14	1	83	1073.8	13.6	3.8	14.2	12.06	Yes	**** No ****	Yes
187	3/18/97	15	1	13	468	5.6	2.5	16.5	7.55			
188	3/20/97	12	1	54	832.9	6.5	3.5	14.8	6.26			

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7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
189	3/20/97	13	1	77	1032.2	5.8	3.8	14.2	5.14	Yes	Yes	Yes
190	3/20/97	14	1	71	981.2	6.1	3.8	14.2	5.41	Yes	Yes	Yes
191	3/20/97	15	1	73	983.2	6	3.8	14.2	5.32	Yes	Yes	Yes
192	3/20/97	16	1	63	917.2	9.5	3.8	14.2	8.43	Yes	Yes	Yes
193	3/20/97	17	1	65	929.8	31.9	3.8	14.2	28.30	Yes	**** No ****	**** No ****
194	3/20/97	18	0.5	43	677.5	4.7	3.2	15.3	4.95			
195	3/28/97	7	0.75	21	545.6			2.5	16.5			
196	3/28/97	8	1	57	881.3		3.9	14.1				
197	3/28/97	9	1	57	876.3	5.4	3.9	14.1	4.67			
198	3/28/97	10	1	57	872.8	5.3	3.8	14.2	4.70			
199	3/28/97	11	1	57	871.5	5.2	3.8	14.2	4.61			
200	3/28/97	12	1	57	869.7	5.2	3.8	14.2	4.61			
201	3/28/97	13	1	50	775.7	7	3.5	14.8	6.74			
202	3/31/97	15	0.75	53	806.6	22.2	3.2	15.3	23.38			
203	3/31/97	16	1	72	982.1	6.2	3.8	14.2	5.50	Yes	Yes	Yes
204	3/31/97	17	1	64	919.9	6.1	3.8	14.2	5.41	Yes	Yes	Yes
205	3/31/97	18	1	85	1071.4	6.2	3.9	14.1	5.36	Yes	Yes	Yes
206	3/31/97	19	1	87	1089.8	6.1	3.9	14.1	5.27	Yes	Yes	Yes
207	3/31/97	20	0.25	17	351.4	13.3	2.2	17.0	20.38			
208	4/8/97	7	0.25	1	212.2	6	1.5	18.3	13.48			
209	4/8/97	8	1	67	972.4	15.8	3.7	14.4	14.39	Yes	**** No ****	Yes
210	4/8/97	9	1	99	1195.2	5.9	4.1	13.7	4.85	Yes	Yes	Yes
211	4/8/97	10	1	88	1105.8	6.1	4	13.9	5.14	Yes	Yes	Yes
212	4/8/97	11	1	69	968.2	5.3	3.9	14.1	4.58	Yes	Yes	Yes
213	4/8/97	12	1	64	937.5	5	3.9	14.1	4.32	Yes	Yes	Yes
214	4/8/97	13	1	64	936.5	5.1	3.9	14.1	4.41	Yes	Yes	Yes
215	4/8/97	14	1	63	923.8	4.9	3.9	14.1	4.23	Yes	Yes	Yes
216	4/8/97	15	1	63	922.9	5	3.9	14.1	4.32	Yes	Yes	Yes
217	4/8/97	16	1	60	902.1	5.4	3.9	14.1	4.67			
218	4/8/97	17	0.25	1	108.1	17.7	1.1	19.0	54.24			
219	4/10/97	19	0.5	5	436.2	26.2	1.4	18.4	63.08			
220	4/10/97	20	0.25	2	289.9	15	1.6	18.1	31.60			
221	4/10/97	21	0.75	3	370.5	20.1	1.4	18.4	48.39			
222	4/11/97	7	0.5	2	276.2	18.2	1.2	18.8	51.12			
223	4/11/97	8	0.75	54	833	26.8	2.3	16.9	39.28			
224	4/11/97	9	0.5	2	236.7	21.7	1.2	18.8	60.95			
225	4/12/97	10	1	10	478.8	19.4	1.6	18.1	40.87			
226	4/12/97	11	1	74	1014	4.6	3.9	14.1	3.98	Yes	Yes	Yes
227	4/12/97	12	1	74	1006.7	4.7	3.9	14.1	4.06	Yes	Yes	Yes
228	4/12/97	13	1	72	995.9	4.8	3.9	14.1	4.15	Yes	Yes	Yes
229	4/12/97	14	1	72	994.8	4.7	3.9	14.1	4.06	Yes	Yes	Yes
230	4/12/97	15	0.5	37	664.2	13	2.7	16.2	16.23			
231	4/13/97	5	1	32	659.7	40.6	2.6	16.3	52.63			
232	4/13/97	6	0.75	47	778.7	25.5	3.3	15.1	26.05			
233	4/14/97	7	0.5	39	690.6	31.9	3	15.6	35.84			
234	4/14/97	8	1	77	1022.7	4.7	3.9	14.1	4.06	Yes	Yes	Yes
235	4/14/97	9	1	100	1190	5.1	4	13.9	4.30	Yes	Yes	Yes
236	4/14/97	10	1	77	1014	4.8	3.9	14.1	4.15	Yes	Yes	Yes
237	4/14/97	11	1	74	992.5	4.7	3.9	14.1	4.06	Yes	Yes	Yes
238	4/14/97	12	1	72	977.1	4.8	3.8	14.2	4.26	Yes	Yes	Yes
239	4/14/97	13	0.75	14	478.3	35.1	2.3	16.9	51.44			
240	4/14/97	14	0.75	57	824.1	18.6	3.4	14.9	18.44			
241	4/14/97	15	1	74	991.6	4.8	3.9	14.1	4.15	Yes	Yes	Yes
242	4/14/97	16	1	75	998.6	4.8	3.8	14.2	4.26	Yes	Yes	Yes
243	4/14/97	17	1	72	979.2	4.8	3.8	14.2	4.26	Yes	Yes	Yes
244	4/14/97	18	1	92	1130.3	5.1	3.9	14.1	4.41	Yes	Yes	Yes
245	4/14/97	19	1	105	1218.8	5.6	3.9	14.1	4.84	Yes	Yes	Yes
246	4/14/97	20	0.75	59	851.8	8.2	3.4	14.9	8.13			
247	4/16/97	11	0.25	10	356	25.4	2	17.4	42.81			
248	4/16/97	12	1	114	1305.1	12	4	13.9	10.11	Yes	**** No ****	Yes
249	4/16/97	13	1	117	1317.1	5.7	4	13.9	4.80	Yes	Yes	Yes
250	4/16/97	14	1	101	1188.6	5.3	4	13.9	4.47	Yes	Yes	Yes
251	4/16/97	15	1	84	1064.3	4.5	4	13.9	3.79	Yes	Yes	Yes
252	4/16/97	16	1	76	1010.3	4.4	3.9	14.1	3.80	Yes	Yes	Yes
253	4/16/97	17	0.5	36	658.2	11.1	2.8	16.0	13.36			
254	4/18/97	7	0.75	19	526.4	35.6	2.3	16.9	52.17			
255	4/18/97	8	0.5	15	452.3	42.8	2.4	16.7	60.11			
256	4/18/97	9	0.25	4	224.7	22.1	1.7	17.9	43.82			
257	4/19/97	17	0.75	55	818.8	16.4	3.1	15.5	17.83			
258	4/19/97	18	1	88	1101.9	6.7	3.8	14.2	5.94	Yes	Yes	Yes
259	4/19/97	19	1	127	1395.1	6.9	3.9	14.1	5.96	Yes	Yes	Yes
260	4/19/97	20	1	128	1402	6.8	3.9	14.1	5.88	Yes	Yes	Yes
261	4/19/97	21	0.75	88	1033.5	8.3	3.4	14.9	8.23	Yes	Yes	Yes
262	4/21/97	6	0.5	44	713.2	28.9	2.9	15.8	33.59			
263	4/21/97	7	1	88	1097.5	6.3	3.9	14.1	5.44	Yes	Yes	Yes
264	4/21/97	8	1	125	1369.6	6.4	3.9	14.1	5.53	Yes	Yes	Yes
265	4/21/97	9	1	88	1067.5	3.9	2.4	16.7	5.48	Yes	Yes	Yes
266	4/21/97	10	1	87	1067.1	6	3.8	14.2	5.32	Yes	Yes	Yes
267	4/21/97	11	1	81	1043	6.2	3.7	14.4	5.65	Yes	Yes	Yes
268	4/21/97	12	1	82	1043.7	6.3	3.9	14.1	5.44	Yes	Yes	Yes
269	4/21/97	13	1	77	1012.1	6.3	3.8	14.2	5.59	Yes	Yes	Yes
270	4/21/97	14	1	82	1045.3	6.1	3.8	14.2	5.41	Yes	Yes	Yes
271	4/21/97	15	1	75	1002.3	6.3	3.8	14.2	5.59	Yes	Yes	Yes
272	4/21/97	16	1	78	1019.4	6.3	3.8	14.2	5.59	Yes	Yes	Yes
273	4/21/97	17	1	81	1038.8	6.1	3.8	14.2	5.41	Yes	Yes	Yes
274	4/21/97	18	1	77	1023	6.4	3.8	14.2	5.68	Yes	Yes	Yes
275	4/21/97	19	1	84	1074.2	6.3	3.9	14.1	5.44	Yes	Yes	Yes
276	4/21/97	20	0.25	88	1095.9	6.3	3.9	14.1	5.44	Yes	Yes	Yes
277	4/21/97	22	0.25	0	175.2	11.2	1.7	17.9	22.21			
278	4/22/97	5	0.25	0	233.8	9	1.6	18.1	18.96			
279	4/22/97	6	0.5	0	270.7	19.9	1.5	18.3	44.72			
280	4/22/97	7	0.5	52	790.3		2.7	16.2	0.00			
281	4/22/97	8	1	75	1013.3	6.4	3.8	14.2	5.68	Yes	Yes	Yes
282	4/22/97	9	1	76	1014.7	6.3	3.8	14.2	5.59	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
283	4/22/97	10	1	81	1049	6.2	3.7	14.4	5.65	Yes	Yes	Yes
284	4/22/97	11	0.75	81	1038.9	7	3.6	14.6	6.55	Yes	Yes	Yes
285	4/22/97	14	0.25	0	14.6	2.3	0.8	19.5	9.69			
286	4/22/97	19	0.25	1	219.3	19.3	1.6	18.1	40.66			
287	4/28/97	8	0.5	1	246.8	22.4	1.3	18.6	58.08			
288	4/28/97	10	0.75	38	694.1	34.6	2.2	17.0	53.01			
289	4/28/97	11	1	65	940.1	6	3.7	14.4	5.47	Yes	Yes	Yes
290	4/28/97	12	1	65	938.8	5.9	3.8	14.2	5.23	Yes	Yes	Yes
291	4/28/97	13	0.5	48	768.6	11.8	3.4	14.9	11.70			
292	4/29/97	10	1	70	950.5	13.9	3.8	14.6	13.01	Yes	**** No ****	Yes
293	4/29/97	11	1	84	1069.3	6.2	3.7	14.4	5.65	Yes	Yes	Yes
294	4/29/97	12	1	105	1221.5	6.4	3.8	14.2	5.68	Yes	Yes	Yes
295	4/29/97	13	1	75	1002.4	6.8	3.8	14.2	6.03	Yes	Yes	Yes
296	4/29/97	14	1	74	993.5	6.7	3.7	14.4	6.10	Yes	Yes	Yes
297	4/29/97	15	1	81	1038.3	6.5	3.8	14.2	5.77	Yes	Yes	Yes
298	4/29/97	16	1	77	1011	6.7	3.8	14.2	5.94	Yes	Yes	Yes
299	4/29/97	17	1	86	1080.5	6.5	3.7	14.4	5.92	Yes	Yes	Yes
300	4/29/97	18	1	82	1049.3	6.6	3.8	14.2	5.85	Yes	Yes	Yes
301	4/29/97	19	1	80	1037.4	6.3	3.8	14.2	5.59	Yes	Yes	Yes
302	4/29/97	20	0.75	61	869.5	8.8	3.4	14.9	8.72	Yes	Yes	Yes
303	5/2/97	8	0.5	46	735.7	22.5	3.1	15.5	24.46			
304	5/2/97	9	1	78	1032.6	6.7	3.8	14.2	5.94	Yes	Yes	Yes
305	5/2/97	10	0.75	47	740.3	17.5	2.9	15.8	20.34			
306	5/5/97	14	0.75	66	907.6	3.2	3.2	15.3		Yes	Yes	Yes
307	5/5/97	15	1	78	1031.5	3.2	3.2	15.3		Yes	Yes	Yes
308	5/5/97	16	1	78	1025.9	3.2	3.2	15.3		Yes	Yes	Yes
309	5/5/97	17	1	74	1001.9	3.2	3.2	15.3		Yes	Yes	Yes
310	5/5/97	18	1	74	1001.9	3.2	3.2	15.3		Yes	Yes	Yes
311	5/5/97	19	1	75	1005.3	3.2	3.2	15.3		Yes	Yes	Yes
312	5/5/97	20	0.5	50	740.1	3.2	3.2	15.3				
313	5/6/97	10	0.25	1	219.5	3.2	3.2	15.3				
314	5/6/97	11	1	66	887.7	3.2	3.2	15.3		Yes	Yes	Yes
315	5/6/97	12	1	117	1324.8	3.2	3.2	15.3		Yes	Yes	Yes
316	5/6/97	13	1	121	1352.6	3.2	3.2	15.3		Yes	Yes	Yes
317	5/6/97	14	1	116	1306.7	6.3	3.6	14.6	5.90	Yes	Yes	Yes
318	5/6/97	15	1	77	1013.7	6.4	3.8	14.2	5.68	Yes	Yes	Yes
319	5/6/97	16	1	76	1003.2	6.5	3.8	14.2	5.77	Yes	Yes	Yes
320	5/6/97	17	1	74	993.2	6.5	3.7	14.4	5.92	Yes	Yes	Yes
321	5/6/97	18	1	74	994.2	6.4	3.7	14.4	5.83	Yes	Yes	Yes
322	5/6/97	19	1	74	995.4	6.5	3.8	14.2	5.77	Yes	Yes	Yes
323	5/6/97	20	1	68	934.1	7.9	3.6	14.6	7.40	Yes	Yes	Yes
324	5/7/97	9	0.75	56	826.5	19.4	3.9	14.1	16.77			
325	5/7/97	10	1	78	1027.7	6.7	4.2	13.5	5.38	Yes	Yes	Yes
326	5/7/97	11	1	78	1020	6.4	3.9	14.1	5.53	Yes	Yes	Yes
327	5/7/97	12	1	85	1071.4	6.1	3.8	14.2	5.41	Yes	Yes	Yes
328	5/7/97	13	1	87	1082.3	6	3.9	14.1	5.19	Yes	Yes	Yes
329	5/7/97	14	1	80	1034.1	5.9	3.7	14.4	5.37	Yes	Yes	Yes
330	5/7/97	15	1	82	1050.1	6.4	4	13.9	5.39	Yes	Yes	Yes
331	5/7/97	16	1	79	1027.2	6.8	4.1	13.7	5.59	Yes	Yes	Yes
332	5/7/97	17	1	77	1014.2	6.9	4.1	13.7	5.67	Yes	Yes	Yes
333	5/7/97	18	0.5	47	683	11.7	3.3	15.1	11.95			
334	5/8/97	7	0.5	42	701.6	0.1	0.1	20.7	3.37			
335	5/8/97	8	1	118	1337.4	5.3	3.7	14.4	4.83	Yes	Yes	Yes
336	5/8/97	9	1	118	1326.7	5.7	3.8	14.2	5.06	Yes	Yes	Yes
337	5/8/97	10	1	77	1026.3	5.8	3.7	14.4	5.28	Yes	Yes	Yes
338	5/8/97	11	1	81	1050	5.7	3.6	14.6	5.34	Yes	Yes	Yes
339	5/8/97	12	1	78	1027.7	5.8	3.7	14.4	5.28	Yes	Yes	Yes
340	5/8/97	13	1	80	1045.6	5.7	3.7	14.4	5.19	Yes	Yes	Yes
341	5/8/97	14	1	82	1058.9	5.6	3.6	14.6	5.24	Yes	Yes	Yes
342	5/8/97	15	1	76	1016	5.7	3.6	14.6	5.34	Yes	Yes	Yes
343	5/8/97	16	1	73	996.8	5.7	3.6	14.6	5.34	Yes	Yes	Yes
344	5/8/97	17	1	73	997.7	5.5	3.5	14.8	5.30	Yes	Yes	Yes
345	5/8/97	18	1	73	999.4	5.6	3.6	14.6	5.24	Yes	Yes	Yes
346	5/8/97	19	0.75	59	843.7	7.6	3.2	15.3	8.01			
347	5/9/97	13	1	67	923.3	2.9	2.9	15.8		Yes	Yes	Yes
348	5/9/97	14	1	98	1174.9	5.1	3.4	14.9	5.06	Yes	Yes	Yes
349	5/9/97	15	1	81	1044.9	5.6	3.5	14.8	5.39	Yes	Yes	Yes
350	5/9/97	16	1	75	1002.6	6	3.4	14.9	5.95	Yes	Yes	Yes
351	5/9/97	17	1	75	1001.8	5.8	3.4	14.9	5.75	Yes	Yes	Yes
352	5/9/97	18	1	75	1000.3	6.1	3.4	14.9	6.05	Yes	Yes	Yes
353	5/9/97	19	1	74	1002.5	5.9	3.4	14.9	5.85	Yes	Yes	Yes
354	5/9/97	20	0.5	54	783.4	8.7	2.9	15.8	10.11			
355	5/13/97	9	0.5	45	723.7	23.4	2.3	16.9	34.29			
356	5/13/97	10	1	75	1006.2	5.2	3	15.6	5.84	Yes	Yes	Yes
357	5/13/97	11	1	106	1231	5	3	15.6	5.62	Yes	Yes	Yes
358	5/13/97	12	1	100	1179	4.8	3.1	15.5	5.22	Yes	Yes	Yes
359	5/13/97	13	1	126	1392.5	5.1	3.1	15.5	5.55	Yes	Yes	Yes
360	5/13/97	14	1	131	1433.1	5.1	3	15.6	5.73	Yes	Yes	Yes
361	5/13/97	15	1	132	1435.8	5.4	3.1	15.5	5.87	Yes	Yes	Yes
362	5/13/97	16	1	112	1284.4	5.1	3.1	15.5	5.55	Yes	Yes	Yes
363	5/13/97	17	1	79	1027.4	5.1	3	15.6	5.73	Yes	Yes	Yes
364	5/13/97	18	1	74	993	5.3	3.1	15.5	5.76	Yes	Yes	Yes
365	5/13/97	19	1	76	1005.6	5.3	3.1	15.5	5.76	Yes	Yes	Yes
366	5/13/97	20	1	67	922.7	6.8	2.9	15.8	7.90	Yes	Yes	Yes
367	5/14/97	9	0.5	1	182.7	8.3	1.2	18.8	23.31			
368	5/14/97	10	1	71	981.2	10.6	3.1	15.5	11.53	Yes	**** No ****	Yes
369	5/14/97	11	1	74	1002.7	5	3.1	15.5	5.44	Yes	Yes	Yes
370	5/14/97	12	1	118	1322	4.6	3.2	15.3	4.85	Yes	Yes	Yes
371	5/14/97	13	1	119	1323.1	4.5	3.2	15.3	4.74	Yes	Yes	Yes
372	5/14/97	14	1	122	1350.8	4.4	3.2	15.3	4.63	Yes	Yes	Yes
373	5/14/97	15	1	112	1273	4.6	3.3	15.1	4.70	Yes	Yes	Yes
374	5/14/97	16	1	96	1158.7	4.7	3.2	15.3	4.95	Yes	Yes	Yes
375	5/14/97	17	1	79	1031.2	4.8	3.2	15.3	5.06	Yes	Yes	Yes
376	5/14/97	18	1	75	1004.5	4.9	3.2	15.3	5.16	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
377	5/14/97	19	1	122	1346.8	4.7	3.3	15.1	4.80	Yes	Yes	Yes
378	5/14/97	20	0.75	85	1049.4	6.5	3.1	15.5	7.07	Yes	Yes	Yes
379	5/15/97	10	0.5	72	936.2	14.1	2.8	16.0	16.97	Yes	**** No ****	**** No ****
380	5/15/97	11	1	115	1297.3	4.7	3.2	15.3	4.95	Yes	Yes	Yes
381	5/15/97	12	1	125	1372.4	4.4	3.2	15.3	4.63	Yes	Yes	Yes
382	5/15/97	13	1	122	1352.5	4.5	3.3	15.1	4.60	Yes	Yes	Yes
383	5/15/97	14	1	126	1389	4.5	3.2	15.3	4.74	Yes	Yes	Yes
384	5/15/97	15	1	125	1373.6	4.6	3.2	15.3	4.85	Yes	Yes	Yes
385	5/15/97	16	1	110	1258.9	4.6	3.2	15.3	4.85	Yes	Yes	Yes
386	5/15/97	17	1	76	1008	5.1	3.1	15.5	5.55	Yes	Yes	Yes
387	5/15/97	18	1	79	1032.4	5.1	3.2	15.3	5.37	Yes	Yes	Yes
388	5/15/97	19	1	104	1206.1	4.7	3.2	15.3	4.95	Yes	Yes	Yes
389	5/15/97	20	1	86	1076.2	4.9	3.2	15.3	5.16	Yes	Yes	Yes
390	5/15/97	21	0.75	66	918	7	3.1	15.5	7.61	Yes	Yes	Yes
391	5/16/97	8	0.5	52	765.2	16.6	2.7	16.2	20.72			
392	5/16/97	9	1	124	1375.2	4.9	3.3	15.1	5.00	Yes	Yes	Yes
393	5/16/97	10	1	131	1430.9	5.2	3.3	15.1	5.31	Yes	Yes	Yes
394	5/16/97	11	1	131	1432	5.2	3.2	15.3	5.48	Yes	Yes	Yes
395	5/16/97	12	1	131	1431.1	5.3	3.3	15.1	5.41	Yes	Yes	Yes
396	5/16/97	13	1	130	1426.3	5.3	3.3	15.1	5.41	Yes	Yes	Yes
397	5/16/97	14	1	130	1424.4	5.2	3.2	15.3	5.48	Yes	Yes	Yes
398	5/16/97	15	1	131	1430.6	5.3	3.3	15.1	5.41	Yes	Yes	Yes
399	5/16/97	16	1	92	1129.9	5.1	3.2	15.3	5.37	Yes	Yes	Yes
400	5/16/97	17	1	81	1046.1	4.9	3.2	15.3	5.16	Yes	Yes	Yes
401	5/16/97	18	1	83	1056.8	5	3.2	15.3	5.27	Yes	Yes	Yes
402	5/16/97	19	1	116	1310.9	5	3.3	15.1	5.11	Yes	Yes	Yes
403	5/16/97	20	1	103	1218.9	5	3.2	15.3	5.27	Yes	Yes	Yes
404	5/16/97	21	1	95	1149.9	4.9	3.3	15.1	5.00	Yes	Yes	Yes
405	5/16/97	22	0.5	58	833.6	8.8	3	15.6	9.89			
406	5/17/97	6	0.5	57	835.4		3.2	15.3				
407	5/17/97	7	1	91	1115.6	4.8	3.3	15.1	4.90	Yes	Yes	Yes
408	5/17/97	8	1	121	1351.1	5	3.2	15.3	5.27	Yes	Yes	Yes
409	5/17/97	9	1	131	1430.1	5.3	3.3	15.1	5.41	Yes	Yes	Yes
410	5/17/97	10	1	130	1424.3	5.3	3.3	15.1	5.41	Yes	Yes	Yes
411	5/17/97	11	1	129	1418.4	5.2	3.2	15.3	5.48	Yes	Yes	Yes
412	5/17/97	12	1	129	1414	5.3	3.2	15.3	5.58	Yes	Yes	Yes
413	5/17/97	13	1	129	1412.3	5.3	3.2	15.3	5.58	Yes	Yes	Yes
414	5/17/97	14	1	130	1417.4	5.2	3.2	15.3	5.48	Yes	Yes	Yes
415	5/17/97	15	1	130	1419	5.3	3.2	15.3	5.58	Yes	Yes	Yes
416	5/17/97	16	1	130	1420	5.3	3.3	15.1	5.41	Yes	Yes	Yes
417	5/17/97	17	1	130	1419.1	5.2	3.2	15.3	5.48	Yes	Yes	Yes
418	5/17/97	18	1	130	1419.5	5.2	3.3	15.1	5.31	Yes	Yes	Yes
419	5/17/97	19	1	130	1425.3	5.3	3.3	15.1	5.41	Yes	Yes	Yes
420	5/17/97	20	1	131	1428.8	5.2	3.2	15.3	5.48	Yes	Yes	Yes
421	5/17/97	21	0.5	87	1062.1	7.8	3	15.6	8.76	Yes	Yes	Yes
422						19	2.8	16.0	22.87			
423	5/19/97	7	1	102	1201.2	4.8	3.4	14.9	4.76	Yes	Yes	Yes
424	5/19/97	8	1	121	1345.3	4.8	3.3	15.1	4.90	Yes	Yes	Yes
425	5/19/97	9	1	118	1322.6	4.8	3.4	14.9	4.76	Yes	Yes	Yes
426	5/19/97	10	1	126	1385.3	4.9	3.3	15.1	5.00	Yes	Yes	Yes
427	5/19/97	11	1	134	1452.2	5	3.3	15.1	5.11	Yes	Yes	Yes
428	5/19/97	12	1	133	1449.9	5.2	3.3	15.1	5.31	Yes	Yes	Yes
429	5/19/97	13	1	132	1442	5.2	3.3	15.1	5.31	Yes	Yes	Yes
430	5/19/97	14	1	126	1383.1	4.9	3.3	15.1	5.00	Yes	Yes	Yes
431	5/19/97	15	1	102	1193.9	4.8	3.3	15.1	4.90	Yes	Yes	Yes
432	5/19/97	16	1	95	1143.9	4.8	3.3	15.1	4.90	Yes	Yes	Yes
433	5/19/97	17	1	78	1021.2	5.1	3.2	15.3	5.37	Yes	Yes	Yes
434	5/19/97	18	0.5	59	841.6	8.2	3	15.6	9.21			
435	5/20/97	8	0.5	23	483.1	19.3	2	17.4	32.53			
436	5/20/97	9	1	87	1095	5	3.2	15.3	5.27	Yes	Yes	Yes
437	5/20/97	10	1	97	1164.8	4.8	3.3	15.1	4.90	Yes	Yes	Yes
438	5/20/97	11	1	131	1435.6	5.6	3.3	15.1	5.72	Yes	Yes	Yes
439	5/20/97	12	1	111	1266.5	5.3	3.3	15.1	5.41	Yes	Yes	Yes
440	5/20/97	13	1	81	1040.8	5.3	3.3	15.1	5.41	Yes	Yes	Yes
441	5/20/97	14	1	83	1057.6	5.4	3.2	15.3	5.69	Yes	Yes	Yes
442	5/20/97	15	1	79	1029.6	5.6	3.3	15.1	5.72	Yes	Yes	Yes
443	5/20/97	16	0.75	67	920.1	7.3	3.1	15.5	7.94	Yes	Yes	Yes
444	5/21/97	8	0.5	40	858.4	15.1	2.5	16.5	20.36			
445	5/21/97	9	1	73	1001.1	5	3.4	14.9	4.96	Yes	Yes	Yes
446	5/21/97	10	1	69	965	5.5	3.3	15.1	5.62	Yes	Yes	Yes
447	5/21/97	11	0.25	2	217.6	21.3	1.9	17.6	37.79			
448	5/22/97	10	0.25	1	52	0.2	0.4	20.2	1.69			
449	5/22/97	11	0.75	61	909.3	18.3	2.7	16.2	22.85	Yes	**** No ****	**** No ****
450	5/23/97	9	0.75	53	802.5	22.8	2.5	16.5	30.74			
451	5/23/97	10	1	65	912.4	6.2	3.3	15.1	6.33	Yes	Yes	Yes
452	5/28/97	15	0.25	7	330.8	18.8	1.7	17.9	37.28			
453	5/28/97	16	1	81	1060	8	3.5	14.8	7.70	Yes	Yes	Yes
454	5/28/97	17	1	72	985	5.2	3.4	14.9	5.16	Yes	Yes	Yes
455	5/29/97	7	0.75	63	891.8	14.4	3.1	15.5	15.66	Yes	**** No ****	**** No ****
456	5/29/97	8	1	79	1042.3	3.5	3.5	14.8	3.37	Yes	Yes	Yes
457	5/29/97	9	1	83	1059.4	3.6	3.5	14.8	3.47	Yes	Yes	Yes
458	5/29/97	10	1	82	1052.2	3.6	3.5	14.8	3.47	Yes	Yes	Yes
459	5/29/97	11	1	76	1011.1	4.8	3.4	14.9	4.76	Yes	Yes	Yes
460	6/2/97	8	0.75	65	898.1	15	3	15.6	16.85	Yes	**** No ****	**** No ****
461	6/2/97	9	1	97	1167.3	2.6	3.5	14.8	2.50	Yes	Yes	Yes
462	6/2/97	10	1	98	1184.4	4	3.5	14.8	3.85	Yes	Yes	Yes
463	6/2/97	11	1	82	1052.5	3.3	3.4	14.9	3.27	Yes	Yes	Yes
464	6/2/97	12	1	112	1284.1	4.5	3.5	14.8	4.33	Yes	Yes	Yes
465	6/2/97	13	1	117	1313.5	4.8	3.5	14.8	4.62	Yes	Yes	Yes
466	6/2/97	14	1	126	1395.4	5.2	3.5	14.8	5.01	Yes	Yes	Yes
467	6/2/97	15	1	127	1402	5.4	3.5	14.8	5.20	Yes	Yes	Yes
468	6/2/97	16	1	127	1397.4	5.4	3.5	14.8	5.20	Yes	Yes	Yes
469	6/2/97	17	1	93	1132.2	3.7	3.4	14.9	3.67	Yes	Yes	Yes
470	6/2/97	18	1	85	1072.5	3.5	3.5	14.8	3.37	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
471	6/2/97	19	1	86	1083.8	3.4	3.5	14.8	3.27	Yes	Yes	Yes
472	6/2/97	20	1	81	1044.8	4.3	3.4	14.9	4.26	Yes	Yes	Yes
473	6/3/97	8	1	68	937.3	12.8	3.1	15.5	13.92	Yes	**** No ****	Yes
474	6/3/97	9	1	81	1049.6	3.5	3.6	14.6	3.28	Yes	Yes	Yes
475	6/3/97	10	1	83	1060.6	3.4	3.6	14.6	3.18	Yes	Yes	Yes
476	6/3/97	11	1	82	1058.2	3.3	3.5	14.8	3.18	Yes	Yes	Yes
477	6/3/97	12	1	83	1061.2	3.4	3.6	14.6	3.18	Yes	Yes	Yes
478	6/3/97	13	1	83	1061.9	3.4	3.5	14.8	3.27	Yes	Yes	Yes
479	6/3/97	14	1	83	1060	3.3	3.5	14.8	3.18	Yes	Yes	Yes
480	6/3/97	15	1	83	1061.2	3.4	3.5	14.8	3.27	Yes	Yes	Yes
481	6/3/97	16	1	79	1038.6	3.4	3.5	14.8	3.27	Yes	Yes	Yes
482	6/3/97	17	1	81	1051.2	3.4	3.5	14.8	3.27	Yes	Yes	Yes
483	6/3/97	18	1	75	1007.7	3.4	3.5	14.8	3.27	Yes	Yes	Yes
484	6/3/97	19	1	79	1039.2	3.4	3.5	14.8	3.27	Yes	Yes	Yes
485	6/3/97	20	1	74	1004.2	3.3	3.5	14.8	3.18	Yes	Yes	Yes
486	6/3/97	21	0.25	16	522.8	35	3.2	15.3	36.87			
487	6/4/97	7	0.25	16	444.5	28	2.2	17.0	42.90			
488	6/4/97	8	1	83	1066.2	5.7	3.8	14.6	5.34	Yes	Yes	Yes
489	6/4/97	9	1	92	1126	3.9	3.5	14.8	3.76	Yes	Yes	Yes
490	6/4/97	10	1	83	1060.6	3.6	3.5	14.8	3.47	Yes	Yes	Yes
491	6/4/97	11	1	89	1101.2	3.6	3.4	14.9	3.57	Yes	Yes	Yes
492	6/4/97	12	1	87	1088.3	3.6	3.5	14.8	3.47	Yes	Yes	Yes
493	6/4/97	13	1	127	1406	5.3	3.5	14.8	5.10	Yes	Yes	Yes
494	6/4/97	14	1	129	1415.7	5.3	3.5	14.8	5.10	Yes	Yes	Yes
495	6/4/97	15	1	128	1413	5.3	3.5	14.8	5.10	Yes	Yes	Yes
496	6/4/97	16	1	128	1407.8	5.3	3.5	14.8	5.10	Yes	Yes	Yes
497	6/4/97	17	1	109	1256.5	4.5	3.4	14.9	4.46	Yes	Yes	Yes
498	6/4/97	18	1	86	1074.7	3.6	3.4	14.9	3.57	Yes	Yes	Yes
499	6/4/97	19	1	83	1058.4	3.2	3.2	15.3		Yes	Yes	Yes
500	6/4/97	20	1	88	1094.2	3.2	3.2	15.3		Yes	Yes	Yes
501	6/4/97	21	0.25	55	818		3.2	15.3				
502	6/5/97	9	0.75	59	848.4	14.9	3	15.6	16.74			
503	6/5/97	10	1	82	1054.4	3.5	3.5	14.8	3.37	Yes	Yes	Yes
504	6/5/97	11	1	105	1225.3	4.2	3.4	14.9	4.16	Yes	Yes	Yes
505	6/5/97	12	1	96	1168.4	3.9	3.4	14.9	3.87	Yes	Yes	Yes
506	6/5/97	13	1	125	1393.4	5.4	3.5	14.8	5.20	Yes	Yes	Yes
507	6/5/97	14	1	125	1393.2	5.4	3.4	14.9	5.35	Yes	Yes	Yes
508	6/5/97	15	1	77	1020.2	3.6	3.4	14.9	3.57	Yes	Yes	Yes
509	6/5/97	16	1	74	996.7	3.3	3.4	14.9	3.27	Yes	Yes	Yes
510	6/5/97	17	1	74	994.8	3.3	3.3	15.1	3.37	Yes	Yes	Yes
511	6/5/97	18	1	74	992.7	3.3	3.4	14.9	3.27	Yes	Yes	Yes
512	6/5/97	19	1	80	1041	3.4	3.4	14.9	3.37	Yes	Yes	Yes
513	6/5/97	20	0.5	68	946.5	5.5	3.4	14.9	5.45	Yes	Yes	Yes
514	6/9/97	8	0.75	58	854.5	16.9	2.4	16.7	23.74			
515	6/9/97	9	1	82	1067.8	3.6	3.5	14.8	3.47	Yes	Yes	Yes
516	6/9/97	10	1	82	1063.3	3.5	3.5	14.8	3.37	Yes	Yes	Yes
517	6/9/97	11	1	75	1010.9	3.4	3.4	14.9	3.37	Yes	Yes	Yes
518	6/9/97	12	1	74	1009	3.6	3.5	14.8	3.47	Yes	Yes	Yes
519	6/9/97	13	1	74	1004	3.7	3.5	14.8	3.56	Yes	Yes	Yes
520	6/9/97	14	1	74	1001.5	3.6	3.5	14.8	3.47	Yes	Yes	Yes
521	6/9/97	15	0.75	68	952.5	5.8	3.5	14.8	5.59	Yes	Yes	Yes
522	6/10/97	8	0.25	18	447.3	25.6	2.1	17.2	41.09			
523	6/10/97	9	1	74	1006.3	5.6	3.6	14.6	5.24	Yes	Yes	Yes
524	6/10/97	10	1	74	1000.9	3.6	3.5	14.8	3.47	Yes	Yes	Yes
525	6/10/97	11	1	79	1032.9	3.6	3.5	14.8	3.47	Yes	Yes	Yes
526	6/10/97	12	1	95	1147.5	3.8	3.5	14.8	3.66	Yes	Yes	Yes
527	6/10/97	13	1	107	1240.6	4.5	3.6	14.6	4.21	Yes	Yes	Yes
528	6/10/97	14	1	74	996.8	3.5	3.4	14.9	3.47	Yes	Yes	Yes
529	6/10/97	15	0.5	62	895.2	6.8	3.3	15.1	6.95	Yes	Yes	Yes
530	6/18/97	14	0.25	21	483.4	40.2	3	15.6	45.17			
531	6/18/97	15	1	75	1011.8	5.2	4.2	13.5	4.17	Yes	Yes	Yes
532	6/18/97	16	1	85	1081.8	4.3	3.9	14.1	3.72	Yes	Yes	Yes
533	6/18/97	17	0.25	28	602.4	18.6	3.3	15.1	19.00			
534	6/19/97	8	0.25	27	529.4	29.6	2.6	16.3	38.37			
535	6/19/97	9	1	85	1090	4.2	3.9	14.1	3.63	Yes	Yes	Yes
536	6/19/97	10	1	126	1401.6	5.5	4.1	13.7	4.52	Yes	Yes	Yes
537	6/19/97	11	1	127	1403.2	6	3.9	14.1	5.19	Yes	Yes	Yes
538	6/19/97	12	1	127	1404.9	6.1	4.1	13.7	5.01	Yes	Yes	Yes
539	6/19/97	13	1	105	1232.3	4.7	4	13.9	3.96	Yes	Yes	Yes
540	6/19/97	14	1	80	1038.8	3.8	3.8	14.2	3.37	Yes	Yes	Yes
541	6/19/97	15	1	78	1020.6	3.8	3.9	14.1	3.28	Yes	Yes	Yes
542	6/19/97	16	1	79	1028.3	3.9	3.9	14.1	3.37	Yes	Yes	Yes
543	6/19/97	17	1	77	1015.7	3.7	3.8	14.2	3.28	Yes	Yes	Yes
544	6/19/97	18	1	75	1001.6	3.8	3.9	14.1	3.28	Yes	Yes	Yes
545	6/19/97	19	1	78	1023.1	3.7	3.9	14.1	3.20	Yes	Yes	Yes
546	6/19/97	20	1	78	1026.8	3.7	3.8	14.2	3.28	Yes	Yes	Yes
547	6/19/97	21	0.5	56	826.9	9.6	3.6	14.6	8.99			
548	6/20/97	7	0.5	40	665.3	22.3	3	15.6	25.06			
549	6/20/97	8	1	87	1089.8	4.3	3.9	14.1	3.72	Yes	Yes	Yes
550	6/20/97	9	1	123	1375.7	5.7	3.9	14.1	4.93	Yes	Yes	Yes
551	6/20/97	10	1	93	1134.3	4.5	3.9	14.1	3.89	Yes	Yes	Yes
552	6/20/97	11	1	94	1140	4.6	3.8	14.2	4.08	Yes	Yes	Yes
553	6/20/97	12	1	111	1278	5.3	3.9	14.1	4.58	Yes	Yes	Yes
554	6/20/97	13	1	82	1048.2	4.1	3.8	14.2	3.64	Yes	Yes	Yes
555	6/20/97	14	1	77	1014.4	3.9	3.7	14.4	3.55	Yes	Yes	Yes
556	6/20/97	15	1	69	943.7	5.8	3.7	14.4	5.28	Yes	Yes	Yes
557	6/23/97	8	1	94	1135	13	3.5	14.8	12.52	Yes	**** No ****	Yes
558	6/23/97	9	1	127	1414.2	5.9	4	13.9	4.97	Yes	Yes	Yes
559	6/23/97	10	1	127	1409.2	5.7	4	13.9	4.80	Yes	Yes	Yes
560	6/23/97	11	1	127	1407.7	5.7	3.9	14.1	4.93	Yes	Yes	Yes
561	6/23/97	12	1	93	1137.2	4.3	3.9	14.1	3.72	Yes	Yes	Yes
562	6/23/97	13	1	87	1088.9	3.9	3.9	14.1	3.37	Yes	Yes	Yes
563	6/23/97	14	1	76	1009.2	3.7	3.8	14.2	3.28	Yes	Yes	Yes
564	6/23/97	15	1	75	999.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes



1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
565	6/23/97	16	0.75	70	961	5.2	3.8	14.2	4.61	Yes	Yes	Yes
566	6/26/97	15	0.75	77	985.4	25.2	3	15.6	28.31	Yes	**** No ****	**** No ****
567	6/26/97	16	1	118	1329.1	5.2	3.9	14.1	4.49	Yes	Yes	Yes
568	6/26/97	17	1	129	1418.9	5.9	3.9	14.1	5.10	Yes	Yes	Yes
569	6/26/97	18	0.75	95	1144	8.6	3.7	14.4	7.83	Yes	Yes	Yes
570	6/27/97	9	0.25	0	0	0.2	0	20.9				
571	6/27/97	10	1	64	907.5	10.6	3.6	14.6	9.92	Yes	**** No ****	Yes
572	6/27/97	11	1	74	996.4	3.9	3.7	14.4	3.55	Yes	Yes	Yes
573	6/27/97	12	1	74	996.4	3.9	3.8	14.2	3.46	Yes	Yes	Yes
574	6/27/97	13	1	80	1039	4.2	3.8	14.2	3.73	Yes	Yes	Yes
575	6/27/97	14	1	74	1000.4	4	3.7	14.4	3.64	Yes	Yes	Yes
576	6/27/97	15	1	81	1046.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
577	6/27/97	16	1	75	1004.7	4	3.8	14.2	3.55	Yes	Yes	Yes
578	6/27/97	17	0.75	66	921.4	6.1	3.6	14.6	5.71	Yes	Yes	Yes
579	6/30/97	10	0.75	60	872.3	16	3.3	15.1	16.34			
580	6/30/97	11	1	80	1039.9	3.9	3.7	14.4	3.55	Yes	Yes	Yes
581	6/30/97	12	1	89	1101.8	4.6	3.8	14.2	4.08	Yes	Yes	Yes
582	6/30/97	13	1	113	1293	5.1	3.8	14.2	4.52	Yes	Yes	Yes
583	6/30/97	14	1	121	1343.3	5.1	3.8	14.2	4.52	Yes	Yes	Yes
584	6/30/97	15	1	122	1358.8	5.2	3.9	14.1	4.49	Yes	Yes	Yes
585	6/30/97	16	1	90	1104.6	4.5	3.8	14.2	3.99	Yes	Yes	Yes
586	6/30/97	17	1	79	1023.9	4	3.7	14.4	3.64	Yes	Yes	Yes
587	6/30/97	18	1	75	1002.4	3.9	3.8	14.2	3.46	Yes	Yes	Yes
588	6/30/97	19	1	82	1049.5	3.9	3.8	14.2	3.46	Yes	Yes	Yes
589	6/30/97	20	1	75	1000.3	4	3.7	14.4	3.64	Yes	Yes	Yes
590	6/30/97	21	0.25	12	339.2	29.5	1.9	17.6	52.33			
591	7/7/97	12	0.25	14	393.1	30.5	2.2	17.0	46.73			
592	7/7/97	13	1	65	942	8.5	3.8	14.2	7.54	Yes	Yes	Yes
593	7/7/97	14	1	79	1034.9	3.9	3.7	14.4	3.55	Yes	Yes	Yes
594	7/7/97	15	1	87	1090.1	4.4	3.8	14.2	3.90	Yes	Yes	Yes
595	7/7/97	16	1	78	1023.3	4	3.8	14.2	3.55	Yes	Yes	Yes
596	7/7/97	17	1	79	1033.4	3.9	3.7	14.4	3.55	Yes	Yes	Yes
597	7/7/97	18	0.25	22	404.3	18.7	2	17.4	31.52			
598	7/8/97	9	0.25	9	343.1	17.4	2	17.4	29.33			
599	7/8/97	10	1	92	1141.8	8	3.9	14.1	6.91	Yes	Yes	Yes
600	7/8/97	11	1	117	1319.7	4.9	3.9	14.1	4.23	Yes	Yes	Yes
601	7/8/97	12	1	124	1379.9	5	3.9	14.1	4.32	Yes	Yes	Yes
602	7/8/97	13	1	121	1349.9	5.1	3.9	14.1	4.41	Yes	Yes	Yes
603	7/8/97	14	1	123	1370.2	5.1	3.8	14.2	4.52	Yes	Yes	Yes
604	7/8/97	15	1	123	1363.8	5.2	3.9	14.1	4.49	Yes	Yes	Yes
605	7/8/97	16	1	120	1341.6	5.2	3.9	14.1	4.49	Yes	Yes	Yes
606	7/8/97	17	0.5	67	874.7	9	3.2	15.3	9.48	Yes	**** No ****	Yes
607	7/9/97	13	1	60	857.9	20.4	3.1	15.5	22.18			
608	7/9/97	14	1	79	1028.5	4.2	3.7	14.4	3.83	Yes	Yes	Yes
609	7/9/97	15	1	81	1040.6	4.2	3.7	14.4	3.83	Yes	Yes	Yes
610	7/9/97	16	1	75	997.7	4	3.7	14.4	3.64	Yes	Yes	Yes
611	7/9/97	17	1	67	913	6.1	3.4	14.9	6.05	Yes	Yes	Yes
612	7/9/97	18	0.25	0	0.2	2.1	0.1	20.7	70.78			
613	7/10/97	8	0.25	9	349.3	21.3	1.9	17.6	37.79			
614	7/10/97	9	1	74	1006.4	7.8	3.8	14.2	6.92	Yes	Yes	Yes
615	7/10/97	10	1	74	1002.5	3.9	3.8	14.2	3.46	Yes	Yes	Yes
616	7/10/97	11	1	74	999.3	3.7	3.7	14.4	3.37	Yes	Yes	Yes
617	7/10/97	12	1	92	1135.5	4.5	3.8	14.2	3.99	Yes	Yes	Yes
618	7/10/97	13	1	118	1326.7	5.3	3.9	14.1	4.58	Yes	Yes	Yes
619	7/10/97	14	1	111	1270	5	3.8	14.2	4.44	Yes	Yes	Yes
620	7/10/97	15	1	121	1350.4	5.5	3.9	14.1	4.75	Yes	Yes	Yes
621	7/10/97	16	1	74	992.4	3.9	3.8	14.2	3.46	Yes	Yes	Yes
622	7/10/97	17	0.75	61	850.1	7.6	3.2	15.3	8.01	Yes	Yes	Yes
623	7/11/97	8	0.5	45	718.4	21.2	3	15.6	23.82			
624	7/11/97	9	1	76	1014.9	4.1	3.8	14.2	3.64	Yes	Yes	Yes
625	7/11/97	10	1	75	1004.2	3.9	3.8	14.2	3.46	Yes	Yes	Yes
626	7/11/97	11	1	75	1003.1	3.8	3.7	14.4	3.46	Yes	Yes	Yes
627	7/11/97	12	1	75	1002.7	3.8	3.7	14.4	3.46	Yes	Yes	Yes
628	7/11/97	13	0.25	73	984.5	3.8	3.7	14.4	3.46	Yes	Yes	Yes
629	7/14/97	8	0.25	10	360	24.2	2	17.4	40.79			
630	7/14/97	9	1	94	1162.9	8.3	3.9	14.1	7.17	Yes	Yes	Yes
631	7/14/97	10	1	123	1373.9	5.2	3.9	14.1	4.49	Yes	Yes	Yes
632	7/14/97	11	1	124	1380.8	4.8	3.8	14.2	4.26	Yes	Yes	Yes
633	7/14/97	12	1	123	1367.4	5.2	3.9	14.1	4.49	Yes	Yes	Yes
634	7/14/97	13	1	122	1353.9	5.2	3.9	14.1	4.49	Yes	Yes	Yes
635	7/14/97	14	1	124	1375.6	5.1	3.8	14.2	4.52	Yes	Yes	Yes
636	7/14/97	15	1	122	1355.5	5.1	3.9	14.1	4.41	Yes	Yes	Yes
637	7/14/97	16	1	103	1203.7	5	3.8	14.2	4.44	Yes	Yes	Yes
638	7/14/97	17	1	76	1009.4	3.9	3.7	14.4	3.55	Yes	Yes	Yes
639	7/14/97	18	1	76	1013.3	3.8	3.8	14.2	3.37	Yes	Yes	Yes
640	7/14/97	19	1	92	1126.7	4.2	3.8	14.2	3.73	Yes	Yes	Yes
641	7/14/97	20	1	99	1186.3	4.5	3.8	14.2	3.99	Yes	Yes	Yes
642	7/14/97	21	0.25	38	592.5	14.1	2.5	16.5	19.01			
643	7/15/97	7	0.25	0	257.3	10.8	1.7	17.9	21.41			
644	7/15/97	8	0.25	0	205.8	13.1	1.1	19.0	40.14			
645	7/15/97	12	0.25	0	187.2	9.5	1.7	17.9	18.84			
646	7/15/97	13	1	71	986.4	13.7	3.7	14.4	12.48	Yes	**** No ****	Yes
647	7/15/97	14	1	75	1004.9	4	3.6	14.6	3.75	Yes	Yes	Yes
648	7/15/97	15	1	75	1005.4	4.1	3.7	14.4	3.74	Yes	Yes	Yes
649	7/15/97	16	1	74	1001.5	4.1	3.7	14.4	3.74	Yes	Yes	Yes
650	7/15/97	17	1	74	1000.2	3.9	3.6	14.6	3.65	Yes	Yes	Yes
651	7/15/97	18	1	74	1002.2	4	3.7	14.4	3.64	Yes	Yes	Yes
652	7/15/97	19	1	74	1003.1	4	3.8	14.2	3.55	Yes	Yes	Yes
653	7/15/97	20	0.75	63	868.1	7.2	3.2	15.3	7.58	Yes	Yes	Yes
654	7/16/97	7	0.5	53	798.8	25	3	15.6	28.09			
655	7/16/97	8	1	94	1146.9	4.4	3.7	14.4	4.01	Yes	Yes	Yes
656	7/16/97	9	1	121	1354.5	5.2	3.9	14.1	4.49	Yes	Yes	Yes
657	7/16/97	10	1	93	1129.9	4.5	3.8	14.2	3.99	Yes	Yes	Yes
658	7/16/97	11	1	111	1273.4	5	3.8	14.2	4.44	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
659	7/16/97	12	1	123	1366.9	5.4	3.9	14.1	4.67	Yes	Yes	Yes
660	7/16/97	13	1	122	1357	5.4	3.8	14.2	4.79	Yes	Yes	Yes
661	7/16/97	14	1	118	1330.4	5.4	3.8	14.2	4.79	Yes	Yes	Yes
662	7/16/97	15	1	117	1326.1	5.3	3.9	14.1	4.58	Yes	Yes	Yes
663	7/16/97	16	1	105	1224.1	4.9	3.9	14.1	4.23	Yes	Yes	Yes
664	7/16/97	17	1	94	1143.1	4.6	3.7	14.4	4.19	Yes	Yes	Yes
665	7/16/97	18	1	101	1197.3	4.6	3.8	14.2	4.08	Yes	Yes	Yes
666	7/16/97	19	1	100	1187.6	4.8	3.8	14.2	4.26	Yes	Yes	Yes
667	7/16/97	20	0.5	52	735.6	9.8	2.9	15.8	11.39			
668	7/17/97	7	0.25	0	112.9	1.5	1.4	18.4	3.61			
669	7/17/97	8	1	70	972.9	14.3	3.8	14.6	13.39	Yes	**** No ****	Yes
670	7/17/97	9	1	74	1000.5	4.1	3.7	14.4	3.74	Yes	Yes	Yes
671	7/17/97	10	0.25	73	997.2	4.1	3.7	14.4	3.74	Yes	Yes	Yes
672	7/17/97	13	0.25	0	89	3.1	1.2	18.8	8.71			
673	7/17/97	14	1	69	955.3	11.7	3.5	14.8	11.27	Yes	**** No ****	Yes
674	7/17/97	15	1	74	1000.2	4.2	3.7	14.4	3.83	Yes	Yes	Yes
675	7/17/97	16	1	74	1001.5	4.1	3.7	14.4	3.74	Yes	Yes	Yes
676	7/17/97	17	1	74	1000.6	4	3.6	14.6	3.75	Yes	Yes	Yes
677	7/17/97	18	0.5	54	766.1	10	3	15.6	11.24			
678	7/18/97	9	1	61	867.1	12.7	3.4	14.9	12.59	Yes	**** No ****	Yes
679	7/18/97	10	1	77	1020.3	4.2	3.8	14.2	3.73	Yes	Yes	Yes
680	7/18/97	11	1	97	1167.4	4.4	3.7	14.4	4.01	Yes	Yes	Yes
681	7/18/97	12	1	118	1328.8	5.3	3.9	14.1	4.58	Yes	Yes	Yes
682	7/18/97	13	1	123	1379.5	5.9	3.9	14.1	5.10	Yes	Yes	Yes
683	7/18/97	14	1	107	1244.8	5.4	3.7	14.4	4.92	Yes	Yes	Yes
684	7/18/97	15	1	122	1364.5	5.9	3.9	14.1	5.10	Yes	Yes	Yes
685	7/18/97	16	1	76	1013.1	4.2	3.7	14.4	3.83	Yes	Yes	Yes
686	7/18/97	17	0.5	51	733.6	10	2.9	15.8	11.62			
687	7/21/97	10	1	78	1009.3	15.2	3.2	15.3	16.01	Yes	**** No ****	**** No ****
688	7/21/97	11	1	126	1403.4	6.1	3.9	14.1	5.27	Yes	Yes	Yes
689	7/21/97	12	1	127	1405.1	6.3	4	13.9	5.31	Yes	Yes	Yes
690	7/21/97	13	1	78	1025.5	4.3	3.8	14.2	3.81	Yes	Yes	Yes
691	7/21/97	14	1	75	997.4	4	3.7	14.4	3.64	Yes	Yes	Yes
692	7/21/97	15	1	78	1023.2	4.2	3.8	14.2	3.73	Yes	Yes	Yes
693	7/21/97	16	1	78	1022.8	4.1	3.8	14.2	3.64	Yes	Yes	Yes
694	7/21/97	17	1	75	1005.7	3.8	3.7	14.4	3.46	Yes	Yes	Yes
695	7/21/97	18	1	75	1006.3	4	3.8	14.2	3.55	Yes	Yes	Yes
696	7/21/97	19	1	85	1078	4.3	3.8	14.2	3.81	Yes	Yes	Yes
697	7/21/97	20	1	90	1119.4	4.3	3.8	14.2	3.81	Yes	Yes	Yes
698	7/21/97	21	1	85	1081.2	4.1	3.8	14.2	3.64	Yes	Yes	Yes
699	7/21/97	22	0.5	47	693.4	10.1	2.8	16.0	12.16			
700	7/22/97	6	0.5	41	665.8	25.9	2.6	16.3	33.58			
701	7/22/97	7	1	79	1031.1	4.1	3.8	14.2	3.64	Yes	Yes	Yes
702	7/22/97	8	1	75	1001.9	3.6	3.7	14.4	3.28	Yes	Yes	Yes
703	7/22/97	9	1	86	1082.3	4	3.8	14.2	3.55	Yes	Yes	Yes
704	7/22/97	10	1	107	1250	4.9	3.8	14.2	4.35	Yes	Yes	Yes
705	7/22/97	11	1	114	1297.1	5.1	3.8	14.2	4.52	Yes	Yes	Yes
706	7/22/97	12	1	113	1288	5.3	3.9	14.1	4.58	Yes	Yes	Yes
707	7/22/97	13	1	78	1015.2	4.2	3.8	14.2	3.73	Yes	Yes	Yes
708	7/22/97	14	1	102	1198.7	4.8	3.7	14.4	4.37	Yes	Yes	Yes
709	7/22/97	15	1	126	1388.1	5.9	3.9	14.1	5.10	Yes	Yes	Yes
710	7/22/97	16	1	76	1001.7	4.1	3.8	14.2	3.64	Yes	Yes	Yes
711	7/22/97	17	1	76	998	3.8	3.6	14.6	3.56	Yes	Yes	Yes
712	7/22/97	18	1	80	1027.1	4.1	3.8	14.2	3.64	Yes	Yes	Yes
713	7/22/97	19	1	107	1232.3	5	3.9	14.1	4.32	Yes	Yes	Yes
714	7/22/97	20	1	86	1073.1	4.2	3.8	14.2	3.73	Yes	Yes	Yes
715	7/22/97	21	1	68	920.8	6.3	3.6	14.6	5.90	Yes	Yes	Yes
716	7/22/97	22	0.25	0	0.2	1.7	0	20.9				
717	7/23/97	8	0.75	62	872.9	8.2	3.3	15.1	8.38	Yes	Yes	Yes
718	7/23/97	9	1	79	1035.9	4.1	3.8	14.2	3.64	Yes	Yes	Yes
719	7/23/97	10	1	95	1152.6	4.7	3.9	14.1	4.06	Yes	Yes	Yes
720	7/23/97	11	1	97	1161.7	4.4	3.8	14.2	3.90	Yes	Yes	Yes
721	7/23/97	12	1	94	1136	4.5	3.8	14.2	3.99	Yes	Yes	Yes
722	7/23/97	13	1	114	1292.5	5.5	3.9	14.1	4.75	Yes	Yes	Yes
723	7/23/97	14	1	122	1356.8	5.8	3.9	14.1	5.01	Yes	Yes	Yes
724	7/23/97	15	1	114	1283.2	5.2	3.9	14.1	4.49	Yes	Yes	Yes
725	7/23/97	16	1	100	1185.9	4.8	3.8	14.2	4.26	Yes	Yes	Yes
726	7/23/97	17	1	77	1014.8	3.9	3.8	14.2	3.46	Yes	Yes	Yes
727	7/23/97	18	1	79	1034.9	3.8	3.8	14.2	3.37	Yes	Yes	Yes
728	7/23/97	19	1	90	1113.3	3.9	3.9	14.1	3.37	Yes	Yes	Yes
729	7/23/97	20	0.75	61	858.2	5.1	3.3	15.1	5.21	Yes	Yes	Yes
730	7/24/97	7	0.25	30	556.6	24.6	2.7	16.2	30.71			
731	7/24/97	8	1	80	1045.8	4.3	4	13.9	3.62	Yes	Yes	Yes
732	7/24/97	9	1	98	1175	4.6	4	13.9	3.88	Yes	Yes	Yes
733	7/24/97	10	1	107	1239	4.9	4	13.9	4.13	Yes	Yes	Yes
734	7/24/97	11	1	117	1319.6	5.2	4	13.9	4.38	Yes	Yes	Yes
735	7/24/97	12	1	124	1376.6	5.6	4.1	13.7	4.60	Yes	Yes	Yes
736	7/24/97	13	1	122	1353.7	5.5	4.1	13.7	4.52	Yes	Yes	Yes
737	7/24/97	14	1	121	1344.8	5.1	4	13.9	4.30	Yes	Yes	Yes
738	7/24/97	15	1	121	1345.2	5.1	4	13.9	4.30	Yes	Yes	Yes
739	7/24/97	16	1	121	1347.1	5.1	4	13.9	4.30	Yes	Yes	Yes
740	7/24/97	17	1	112	1277.5	4.8	4	13.9	4.04	Yes	Yes	Yes
741	7/24/97	18	1	112	1277	5.2	4.1	13.7	4.28	Yes	Yes	Yes
742	7/24/97	19	1	96	1149.2	4.5	4	13.9	3.79	Yes	Yes	Yes
743	7/24/97	20	1	80	1029.2	3.9	3.9	14.1	3.37	Yes	Yes	Yes
744	7/24/97	21	0.25	32	524.4	11.9	2.6	16.3	15.43			
745	7/25/97	6	0.25	34	603.8	27.4	2.9	15.8	31.85			
746	7/25/97	7	1	74	1003.4	3.9	4	13.9	3.29	Yes	Yes	Yes
747	7/25/97	8	1	80	1038.5	3.9	3.9	14.1	3.37	Yes	Yes	Yes
748	7/25/97	9	1	81	1042.7	3.9	4	13.9	3.29	Yes	Yes	Yes
749	7/25/97	10	1	88	1091.4	4.1	3.9	14.1	3.54	Yes	Yes	Yes
750	7/25/97	11	1	109	1258.8	4.8	3.9	14.1	4.15	Yes	Yes	Yes
751	7/25/97	12	1	104	1217.7	4.9	4	13.9	4.13	Yes	Yes	Yes
752	7/25/97	13	1	78	1020.8	3.8	4	13.9	3.20	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
753	7/25/97	14	1	75	1005.1	3.7	3.9	14.1	3.20	Yes	Yes	Yes
754	7/25/97	15	1	75	1004.9	3.8	3.9	14.1	3.28	Yes	Yes	Yes
755	7/25/97	16	1	75	1003.7	3.8	3.9	14.1	3.28	Yes	Yes	Yes
756	7/25/97	17	0.5	55	773.4	8.9	3.2	15.3	9.37			
757	7/29/97	7	0.25	24	500.6	29.4	2.6	16.3	38.11			
758	7/29/97	8	1	73	1004.4	4.3	4	13.9	3.62	Yes	Yes	Yes
759	7/29/97	9	1	113	1296.6	5.1	4.2	13.5	4.09	Yes	Yes	Yes
760	7/29/97	10	1	122	1356.9	5.1	4.1	13.7	4.19	Yes	Yes	Yes
761	7/29/97	11	1	125	1383.7	5.2	4.1	13.7	4.28	Yes	Yes	Yes
762	7/29/97	12	1	126	1391.8	5.7	4.2	13.5	4.57	Yes	Yes	Yes
763	7/29/97	13	1	107	1248.3	5	4.1	13.7	4.11	Yes	Yes	Yes
764	7/29/97	14	1	74	998.4	3.7	4	13.9	3.12	Yes	Yes	Yes
765	7/29/97	15	1	74	998.2	3.7	4	13.9	3.12	Yes	Yes	Yes
766	7/29/97	16	1	74	996.8	3.7	4	13.9	3.12	Yes	Yes	Yes
767	7/29/97	17	1	74	997.8	3.5	4	13.9	2.95	Yes	Yes	Yes
768	7/29/97	18	0.5	49	711.5	9.2	3.1	15.5	10.00			
769	7/30/97	10	1	60	880	11.5	3.7	14.4	10.48			
770	7/30/97	11	1	74	1000.8	3.7	3.9	14.1	3.20	Yes	Yes	Yes
771	7/30/97	12	1	87	1090.5	3.9	4.1	13.7	3.21	Yes	Yes	Yes
772	7/30/97	13	1	98	1165.7	4.2	4.1	13.7	3.45	Yes	Yes	Yes
773	7/30/97	14	1	87	1087.2	3.9	4	13.9	3.29	Yes	Yes	Yes
774	7/30/97	15	1	81	1049.2	3.7	4	13.9	3.12	Yes	Yes	Yes
775	7/30/97	16	1	79	1035.4	3.7	4	13.9	3.12	Yes	Yes	Yes
776	7/30/97	17	1	69	913.4	6.2	3.5	14.8	5.97	Yes	Yes	Yes
777	7/31/97	7	0.25	28	549.3	28	2.8	16.0	31.30			
778	7/31/97	8	1	74	1001.8	4.2	3.9	14.1	3.63	Yes	Yes	Yes
779	7/31/97	9	1	74	999.3	3.7	4	13.9	3.12	Yes	Yes	Yes
780	7/31/97	10	1	78	1024.5	3.9	4	13.9	3.29	Yes	Yes	Yes
781	7/31/97	11	1	84	1074.7	3.7	3.9	14.1	3.20	Yes	Yes	Yes
782	7/31/97	12	1	92	1129.7	4.2	4	13.9	3.54	Yes	Yes	Yes
783	7/31/97	13	1	120	1349.5	5.5	4.1	13.7	4.52	Yes	Yes	Yes
784	7/31/97	14	1	126	1394.4	5.9	4.1	13.7	4.85	Yes	Yes	Yes
785	7/31/97	15	1	89	922.3	6	3.8	14.2	5.32	Yes	Yes	Yes
786	8/1/97	8	0.5	59	823.9	27	2.8	16.0	32.50			
787	8/1/97	9	1	78	1024.6	4	4	13.9	3.37	Yes	Yes	Yes
788	8/1/97	10	1	82	1051.4	4	4	13.9	3.37	Yes	Yes	Yes
789	8/1/97	11	1	110	1258.9	4.8	4	13.9	4.04	Yes	Yes	Yes
790	8/1/97	12	1	118	1320.1	5.3	4.1	13.7	4.36	Yes	Yes	Yes
791	8/1/97	13	1	128	1412.1	6.2	4.1	13.7	5.10	Yes	Yes	Yes
792	8/1/97	14	1	128	1414.7	6.1	4.1	13.7	5.01	Yes	Yes	Yes
793	8/1/97	15	1	127	1415.2	6.1	4.2	13.5	4.90	Yes	Yes	Yes
794	8/1/97	16	1	127	1416.8	6.1	4.2	13.5	4.90	Yes	Yes	Yes
795	8/1/97	17	1	97	1174.1	4.6	4	13.9	3.88	Yes	Yes	Yes
796	8/1/97	18	1	77	1024.5	3.6	4	13.9	3.03	Yes	Yes	Yes
797	8/1/97	19	1	99	1186.3	4.2	4.1	13.7	3.45	Yes	Yes	Yes
798	8/1/97	20	1	80	1042.7	3.8	3.9	14.1	3.28	Yes	Yes	Yes
799	8/1/97	21	0.5	46	691.7	8.6	3.1	15.5	9.35			
800	8/4/97	9	0.5	42	686.4	22.3	3.1	15.5	24.25			
801	8/4/97	10	1	76	1026	3.9	4	13.9	3.29	Yes	Yes	Yes
802	8/4/97	11	1	108	1255	4.6	4	13.9	3.88	Yes	Yes	Yes
803	8/4/97	12	1	96	1166.6	4.3	4	13.9	3.62	Yes	Yes	Yes
804	8/4/97	13	1	78	1031.2	3.7	4	13.9	3.12	Yes	Yes	Yes
805	8/4/97	14	1	75	1011.5	3.5	3.9	14.1	3.02	Yes	Yes	Yes
806	8/4/97	15	1	75	1006.9	3.6	4	13.9	3.03	Yes	Yes	Yes
807	8/4/97	16	1	75	1009.5	3.6	4	13.9	3.03	Yes	Yes	Yes
808	8/4/97	17	1	66	923.2	5.3	3.7	14.4	4.83	Yes	Yes	Yes
809	8/8/97	9	0.25	5	295.5	15.3	2	17.4	25.79			
810	8/8/97	10	1	69	969.9	9.5	4	13.9	8.01	Yes	Yes	Yes
811	8/8/97	11	1	74	999.3	3.9	3.7	14.4	3.55	Yes	Yes	Yes
812	8/8/97	12	1	123	1376.7	5.9	4	13.9	4.97	Yes	Yes	Yes
813	8/8/97	13	1	125	1384.9	6	4	13.9	5.06	Yes	Yes	Yes
814	8/8/97	14	1	124	1377.4	5.9	3.9	14.1	5.10	Yes	Yes	Yes
815	8/8/97	15	1	110	1268.1	5.3	4	13.9	4.47	Yes	Yes	Yes
816	8/8/97	16	1	80	1038.7	4	3.9	14.1	3.46	Yes	Yes	Yes
817	8/8/97	17	1	77	1014.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes
818	8/8/97	18	1	76	1009.6	3.9	3.9	14.1	3.37	Yes	Yes	Yes
819	8/8/97	19	1	75	1005.4	3.9	3.9	14.1	3.37	Yes	Yes	Yes
820	8/8/97	20	0.75	65	886.5	6.3	3.5	14.8	6.07	Yes	Yes	Yes
821	8/12/97	8	1	101	1191	14.8	3.2	15.3	15.59	Yes	**** No ****	**** No ****
822	8/12/97	9	1	125	1394.3	5.3	3.9	14.1	4.58	Yes	Yes	Yes
823	8/12/97	10	1	125	1393.7	5.3	3.9	14.1	4.58	Yes	Yes	Yes
824	8/12/97	11	1	125	1389.9	5.2	3.8	14.2	4.61	Yes	Yes	Yes
825	8/12/97	12	1	125	1389.5	5.3	3.9	14.1	4.58	Yes	Yes	Yes
826	8/12/97	13	1	125	1387.1	5.3	3.9	14.1	4.58	Yes	Yes	Yes
827	8/12/97	14	1	125	1391.3	5.2	3.8	14.2	4.61	Yes	Yes	Yes
828	8/12/97	15	1	125	1391.7	5.3	3.9	14.1	4.58	Yes	Yes	Yes
829	8/12/97	16	1	125	1391.4	5.2	3.9	14.1	4.49	Yes	Yes	Yes
830	8/12/97	17	1	117	1329.2	5	3.8	14.2	4.44	Yes	Yes	Yes
831	8/12/97	18	1	75	1008.6	4	3.9	14.1	3.46	Yes	Yes	Yes
832	8/12/97	19	1	76	1021.6	4	3.9	14.1	3.46	Yes	Yes	Yes
833	8/12/97	20	0.25	43	667.3	11.2	2.9	15.8	13.02			
834	8/13/97	5	0.75	86	1050.9	25	2.9	15.8	29.06	Yes	**** No ****	**** No ****
835	8/13/97	6	1	125	1387.5	5.4	3.9	14.1	4.67	Yes	Yes	Yes
836	8/13/97	7	1	125	1387.9	5.4	3.9	14.1	4.67	Yes	Yes	Yes
837	8/13/97	8	1	126	1393.8	5.2	3.8	14.2	4.61	Yes	Yes	Yes
838	8/13/97	9	1	125	1390	5.3	3.9	14.1	4.58	Yes	Yes	Yes
839	8/13/97	10	1	125	1386.4	5.4	3.8	14.2	4.79	Yes	Yes	Yes
840	8/13/97	11	1	125	1390.6	5.4	3.8	14.2	4.79	Yes	Yes	Yes
841	8/13/97	12	1	125	1391.3	5.5	3.8	14.2	4.88	Yes	Yes	Yes
842	8/13/97	13	1	125	1386.4	5.5	3.8	14.2	4.88	Yes	Yes	Yes
843	8/13/97	14	1	125	1384.6	5.4	3.8	14.2	4.79	Yes	Yes	Yes
844	8/13/97	15	1	125	1386	5.5	3.8	14.2	4.88	Yes	Yes	Yes
845	8/13/97	16	1	125	1385.4	5.4	3.8	14.2	4.79	Yes	Yes	Yes
846	8/13/97	17	1	125	1385.9	5.3	3.7	14.4	4.83	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
847	8/13/97	18	1	125	1387.7	5.4	3.8	14.2	4.79	Yes	Yes	Yes
848	8/13/97	19	1	121	1353.9	5.2	3.8	14.2	4.61	Yes	Yes	Yes
849	8/13/97	20	1	86	1055.6	6.5	3.5	14.8	6.26	Yes	Yes	Yes
850	8/14/97	5	0.25	37	644.4	34	2.8	16.0	40.93			
851	8/14/97	6	1	125	1387.1	6	3.9	14.1	5.19	Yes	Yes	Yes
852	8/14/97	7	1	125	1386.4	4.8	4.1	13.7	3.95	Yes	Yes	Yes
853	8/14/97	8	1	125	1385	5.2	4	13.9	4.38	Yes	Yes	Yes
854	8/14/97	9	1	125	1380.2	5.4	4.1	13.7	4.44	Yes	Yes	Yes
855	8/14/97	10	1	125	1377	5.3	4.1	13.7	4.36	Yes	Yes	Yes
856	8/14/97	11	1	125	1380	5.2	4	13.9	4.38	Yes	Yes	Yes
857	8/14/97	12	1	125	1384.3	5.3	4.1	13.7	4.36	Yes	Yes	Yes
858	8/14/97	13	1	125	1386.6	5.3	4.1	13.7	4.36	Yes	Yes	Yes
859	8/14/97	14	1	125	1387.5	5.3	4.1	13.7	4.36	Yes	Yes	Yes
860	8/14/97	15	1	125	1388.7	4.7	4	13.9	3.96	Yes	Yes	Yes
861	8/14/97	16	1	122	1364.4	5.4	4	13.9	4.55	Yes	Yes	Yes
862	8/14/97	17	0.5	58	814	7.6	3.5	14.8	7.32			
863	8/15/97	5	0.5	51	736.5	25.9	3	15.6	29.10			
864	8/15/97	6	1	125	1390.3	5.3	4.1	13.7	4.36	Yes	Yes	Yes
865	8/15/97	7	1	125	1392.8	5	4	13.9	4.21	Yes	Yes	Yes
866	8/15/97	8	1	126	1393.1	5.3	4	13.9	4.47	Yes	Yes	Yes
867	8/15/97	9	1	125	1393.6	5.7	4	13.9	4.80	Yes	Yes	Yes
868	8/15/97	10	1	125	1391.3	5.7	4	13.9	4.80	Yes	Yes	Yes
869	8/15/97	11	1	125	1391.6	5.8	4	13.9	4.89	Yes	Yes	Yes
870	8/15/97	12	1	125	1394.5	6.1	4	13.9	5.14	Yes	Yes	Yes
871	8/15/97	13	1	125	1389.5	6.2	4	13.9	5.22	Yes	Yes	Yes
872	8/15/97	14	1	125	1387.3	6.2	4	13.9	5.22	Yes	Yes	Yes
873	8/15/97	15	1	124	1375.1	6.2	4	13.9	5.22	Yes	Yes	Yes
874	8/15/97	16	1	121	1350.1	5.9	4	13.9	4.97	Yes	Yes	Yes
875	8/15/97	17	1	81	1017.3	6.5	3.7	14.4	5.92	Yes	Yes	Yes
876	8/15/97	18	0.25	0	0.1	1.9	0.3	20.4	21.35			
877	8/19/97	9	0.25	0	140.6	6.6	2.3	16.9	9.67			
878	8/19/97	10	1	70	982.2	12.7	3.9	14.1	10.98	Yes	**** No ****	Yes
879	8/19/97	11	1	74	1004.5	3.7	3.9	14.1	3.20	Yes	Yes	Yes
880	8/19/97	12	1	75	1004.4	3.8	4	13.9	3.20	Yes	Yes	Yes
881	8/19/97	13	1	74	1001.8	3.8	4	13.9	3.20	Yes	Yes	Yes
882	8/19/97	14	1	74	999.4	3.7	3.9	14.1	3.20	Yes	Yes	Yes
883	8/19/97	15	1	74	999.8	3.8	4	13.9	3.20	Yes	Yes	Yes
884	8/19/97	16	0.5	44	670.2	10.1	3	15.6	11.35			
885	8/20/97	7	0.5	45	723.5	31	2.8	16.0	37.32			
886	8/20/97	8	1	76	1017.1	3.8	3.9	14.1	3.28	Yes	Yes	Yes
887	8/20/97	9	1	75	1010	3.9	3.9	14.1	3.37	Yes	Yes	Yes
888	8/20/97	10	1	76	1014.3	3.9	3.9	14.1	3.37	Yes	Yes	Yes
889	8/20/97	11	1	76	1012.6	3.8	3.9	14.1	3.28	Yes	Yes	Yes
890	8/20/97	12	1	75	1005.4	3.9	3.9	14.1	3.37	Yes	Yes	Yes
891	8/20/97	13	1	104	1225.1	4.8	4	13.9	4.04	Yes	Yes	Yes
892	8/20/97	14	1	112	1284.1	5	3.9	14.1	4.32	Yes	Yes	Yes
893	8/20/97	15	1	103	1212.2	4.8	4	13.9	4.04	Yes	Yes	Yes
894	8/20/97	16	1	109	1252.3	4.9	4	13.9	4.13	Yes	Yes	Yes
895	8/20/97	17	1	75	1009.5	3.7	3.8	14.2	3.28	Yes	Yes	Yes
896	8/20/97	18	1	75	1008.2	3.7	3.9	14.1	3.20	Yes	Yes	Yes
897	8/20/97	19	1	96	1160.2	4.3	4	13.9	3.62	Yes	Yes	Yes
898	8/20/97	20	0.5	54	776	7.7	3.3	15.1	7.86			
899	8/21/97	7	0.75	60	864.2	17.2	3.4	14.9	17.05			
900	8/21/97	8	1	76	1017.9	3.9	3.9	14.1	3.37	Yes	Yes	Yes
901	8/21/97	9	1	93	1140.2	3.8	4	13.9	3.20	Yes	Yes	Yes
902	8/21/97	10	1	108	1253.1	5.1	4	13.9	4.30	Yes	Yes	Yes
903	8/21/97	11	1	97	1168.2	4.6	3.9	14.1	3.98	Yes	Yes	Yes
904	8/21/97	12	1	97	1166.9	4.7	4	13.9	3.96	Yes	Yes	Yes
905	8/21/97	13	1	114	1289.2	5.1	4	13.9	4.30	Yes	Yes	Yes
906	8/21/97	14	1	109	1253.7	5	3.9	14.1	4.32	Yes	Yes	Yes
907	8/21/97	15	1	92	1129.4	4.5	4	13.9	3.79	Yes	Yes	Yes
908	8/21/97	16	1	77	1021.1	4	3.9	14.1	3.46	Yes	Yes	Yes
909	8/21/97	17	1	74	998	3.8	3.9	14.1	3.28	Yes	Yes	Yes
910	8/21/97	18	1	75	1002.9	3.9	3.9	14.1	3.37	Yes	Yes	Yes
911	8/21/97	19	1	92	1126.6	4.3	4	13.9	3.62	Yes	Yes	Yes
912	8/21/97	20	0.5	60	828.5	7.5	3.5	14.8	7.22			
913	8/22/97	10	0.5	49	748.3	19.6	3.3	15.1	20.02			
914	8/22/97	13	0.75	63	873.4	11.5	3.1	15.5	12.50	Yes	**** No ****	Yes
915	8/22/97	14	1	79	1029.8	4.2	3.9	14.1	3.63	Yes	Yes	Yes
916	8/22/97	15	1	75	1004.9	4	3.9	14.1	3.46	Yes	Yes	Yes
917	8/22/97	16	1	74	998.4	4.1	3.9	14.1	3.54	Yes	Yes	Yes
918	8/22/97	17	0.5	54	775.4	8.1	3.3	15.1	8.27			
919	8/23/97	11	0.25	0	167	6.8	1.6	18.1	14.33			
920	8/23/97	12	1	72	982.1	12.7	3.8	14.2	11.27	Yes	**** No ****	Yes
921	8/23/97	13	1	76	1006.8	4.1	3.9	14.1	3.54	Yes	Yes	Yes
922	8/23/97	14	1	81	1038.7	4.9	3.8	14.2	4.35	Yes	Yes	Yes
923	8/23/97	15	0.25	1	71.6	17.5	1	19.1	58.99			
924	8/25/97	7	0.25	6	286.7	14.5	1.8	17.7	27.15			
925	8/25/97	8	1	75	1012.3	9.4	3.9	14.1	8.12	Yes	Yes	Yes
926	8/25/97	9	1	93	1136.3	4.5	4	13.9	3.79	Yes	Yes	Yes
927	8/25/97	10	1	110	1263.5	5	4	13.9	4.21	Yes	Yes	Yes
928	8/25/97	11	1	105	1228.9	5	3.9	14.1	4.32	Yes	Yes	Yes
929	8/25/97	12	1	123	1366.2	5.8	4	13.9	4.89	Yes	Yes	Yes
930	8/25/97	13	1	123	1368.4	5.8	4	13.9	4.89	Yes	Yes	Yes
931	8/25/97	14	1	101	1193	4.8	3.9	14.1	4.15	Yes	Yes	Yes
932	8/25/97	15	1	75	997.2	3.9	3.9	14.1	3.37	Yes	Yes	Yes
933	8/25/97	16	1	74	997.7	3.9	3.9	14.1	3.37	Yes	Yes	Yes
934	8/25/97	17	1	74	997.7	3.7	3.8	14.2	3.28	Yes	Yes	Yes
935	8/25/97	18	1	74	996.8	3.7	3.9	14.1	3.20	Yes	Yes	Yes
936	8/25/97	19	1	74	998.7	3.7	3.9	14.1	3.20	Yes	Yes	Yes
937	8/25/97	20	0.5	56	791.7	7.2	3.3	15.1	7.35			
938	8/26/97	8	1	63	889.3	3.6	14.6			Yes	Yes	Yes
939	8/26/97	9	1	76	1010.6	3.6	14.6			Yes	Yes	Yes
940	8/26/97	10	1	94	1145.8	4.5	3.9	14.1	3.89	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
941	8/26/97	11	1	92	1124	4.4	3.9	14.1	3.80	Yes	Yes	Yes
942	8/26/97	12	1	98	1172.9	4.7	3.9	14.1	4.06	Yes	Yes	Yes
943	8/26/97	13	1	115	1303.8	5.5	4	13.9	4.63	Yes	Yes	Yes
944	8/26/97	14	1	101	1195.3	5.1	3.9	14.1	4.41	Yes	Yes	Yes
945	8/26/97	15	1	75	999.3	4.1	3.9	14.1	3.54	Yes	Yes	Yes
946	8/26/97	16	1	74	992	4	3.9	14.1	3.46	Yes	Yes	Yes
947	8/26/97	17	1	73	992.5	3.9	3.8	14.2	3.46	Yes	Yes	Yes
948	8/26/97	18	1	73	993	4	3.9	14.1	3.46	Yes	Yes	Yes
949	8/26/97	19	1	74	996.8	3.9	3.9	14.1	3.37	Yes	Yes	Yes
950	8/26/97	20	0.75	60	849.3	6.3	3.4	14.9	6.25			
951	8/27/97	4	0.25	0	0	0	0	20.9				
952	8/27/97	5	0.25	24	0	38.5	2.3	16.9	56.42			
953	8/27/97	6	1	75	0	5.6	4	13.9	4.72	Yes	Yes	Yes
954	8/27/97	7	1	75	110.8	4	3.8	14.2	3.55	Yes	Yes	Yes
955	8/27/97	8	1	75	1008.8	4	3.8	14.2	3.55	Yes	Yes	Yes
956	8/27/97	9	1	74	999.2	4.1	3.9	14.1	3.54	Yes	Yes	Yes
957	8/27/97	10	1	73	995.8	4	3.9	14.1	3.46	Yes	Yes	Yes
958	8/27/97	11	1	73	992.5	4	3.8	14.2	3.55	Yes	Yes	Yes
959	8/27/97	12	1	78	1018.5	4.2	3.8	14.2	3.73	Yes	Yes	Yes
960	8/27/97	13	1	91	1115.3	4.6	3.9	14.1	3.98	Yes	Yes	Yes
961	8/27/97	14	1	126	1392	6.5	3.9	14.1	5.62	Yes	Yes	Yes
962	8/27/97	15	1	126	1389.5	6.6	4	13.9	5.56	Yes	Yes	Yes
963	8/27/97	16	1	126	1389.9	6.6	4	13.9	5.56	Yes	Yes	Yes
964	8/27/97	17	1	126	1389.2	6.6	3.9	14.1	5.70	Yes	Yes	Yes
965	8/27/97	18	1	84	1066.4	4.4	3.9	14.1	3.80	Yes	Yes	Yes
966	8/27/97	19	1	77	1019.8	4.3	3.9	14.1	3.72	Yes	Yes	Yes
967	8/27/97	20	1	74	990.7	4.7	3.8	14.2	4.17	Yes	Yes	Yes
968	8/27/97	21	0.25	1	85.7	16.8	0.9	19.3	62.92			
969	8/28/97	7	0.75	61	873	19.4	3.2	15.3	20.43	Yes	**** No ****	**** No ****
970	8/28/97	8	1	78	1028	4.1	3.8	14.2	3.64	Yes	Yes	Yes
971	8/28/97	9	1	99	1179	4.6	3.9	14.1	3.98	Yes	Yes	Yes
972	8/28/97	10	1	108	1244.8	4.9	3.9	14.1	4.23	Yes	Yes	Yes
973	8/28/97	11	1	102	1194.4	4.9	3.8	14.2	4.35	Yes	Yes	Yes
974	8/28/97	12	1	120	1336.2	5.5	3.9	14.1	4.75	Yes	Yes	Yes
975	8/28/97	13	1	113	1280	5.2	3.9	14.1	4.49	Yes	Yes	Yes
976	8/28/97	14	1	119	1330.3	5.5	3.8	14.2	4.88	Yes	Yes	Yes
977	8/28/97	15	1	93	1130.7	4.7	3.9	14.1	4.06	Yes	Yes	Yes
978	8/28/97	16	1	75	1000.5	4	3.8	14.2	3.55	Yes	Yes	Yes
979	8/28/97	17	1	74	995.2	3.9	3.7	14.4	3.55	Yes	Yes	Yes
980	8/28/97	18	1	88	1099.5	4.3	3.9	14.1	3.72	Yes	Yes	Yes
981	8/28/97	19	1	86	1084	4.3	3.9	14.1	3.72	Yes	Yes	Yes
982	8/28/97	20	1	69	922.7	5.9	3.5	14.8	5.68	Yes	Yes	Yes
983	8/29/97	9	1	64	892	16.9	3.3	15.1	17.26	Yes	**** No ****	**** No ****
984	8/29/97	10	1	75	1002.5	4.1	3.8	14.2	3.64	Yes	Yes	Yes
985	8/29/97	11	1	79	1030.4	4.1	3.7	14.4	3.74	Yes	Yes	Yes
986	8/29/97	12	1	101	1193.5	4.9	3.9	14.1	4.23	Yes	Yes	Yes
987	8/29/97	13	1	79	1024.9	4.1	3.8	14.2	3.64	Yes	Yes	Yes
988	8/29/97	14	1	78	1016.6	4	3.7	14.4	3.64	Yes	Yes	Yes
989	8/29/97	15	1	77	1011.7	4	3.8	14.2	3.55	Yes	Yes	Yes
990	8/29/97	16	1	79	1023.8	4	3.8	14.2	3.55	Yes	Yes	Yes
991	8/29/97	17	1	78	1019.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes
992	8/29/97	18	1	85	1071.2	4.1	3.8	14.2	3.64	Yes	Yes	Yes
993	8/29/97	19	1	92	1125.1	4.3	3.9	14.1	3.72	Yes	Yes	Yes
994	8/29/97	20	0.75	68	902.3	6.8	3.4	14.9	6.74	Yes	Yes	Yes
995	9/2/97	7	0.25	20	472.4	28.3	2.4	16.7	39.75			
996	9/2/97	8	1	75	1018.7	4.9	3.9	14.1	4.23	Yes	Yes	Yes
997	9/2/97	9	1	74	1010.2	3.9	3.9	14.1	3.37	Yes	Yes	Yes
998	9/2/97	10	1	75	1010.4	3.7	3.9	14.1	3.20	Yes	Yes	Yes
999	9/2/97	11	1	74	1009.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1000	9/2/97	12	1	75	1010	3.8	3.9	14.1	3.28	Yes	Yes	Yes
1001	9/2/97	13	1	74	1006.7	3.8	3.9	14.1	3.28	Yes	Yes	Yes
1002	9/2/97	14	0.5	48	715.3	8.7	3.1	15.5	9.46			
1003	9/3/97	12	0.75	60	868.3	15.8	3.4	14.9	15.66			
1004	9/3/97	13	1	75	1011.7	3.8	3.9	14.1	3.28	Yes	Yes	Yes
1005	9/3/97	14	1	102	1211.1	4.6	3.9	14.1	3.98	Yes	Yes	Yes
1006	9/3/97	15	1	105	1228.6	4.9	4	13.9	4.13	Yes	Yes	Yes
1007	9/3/97	16	1	76	1010.2	3.8	3.9	14.1	3.28	Yes	Yes	Yes
1008	9/3/97	17	1	77	1020.3	3.7	3.8	14.2	3.28	Yes	Yes	Yes
1009	9/3/97	18	1	77	1022.2	3.6	3.8	14.2	3.19	Yes	Yes	Yes
1010	9/3/97	19	1	77	1025.5	3.8	3.9	14.1	3.28	Yes	Yes	Yes
1011	9/3/97	20	0.5	56	793.3	7.8	3.3	15.1	7.97			
1012	9/4/97	5	0.25	3	284.4	11.4	1.8	17.7	21.35			
1013	9/4/97	6	1	74	1004	11.8	3.9	14.1	10.20	Yes	**** No ****	Yes
1014	9/4/97	7	1	81	1053	4	3.9	14.1	3.46	Yes	Yes	Yes
1015	9/4/97	8	1	105	1228.6	4.5	3.9	14.1	3.89	Yes	Yes	Yes
1016	9/4/97	9	1	127	1402.2	5.8	4	13.9	4.89	Yes	Yes	Yes
1017	9/4/97	10	1	92	1130	4.6	3.9	14.1	3.98	Yes	Yes	Yes
1018	9/4/97	11	1	92	1127.4	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1019	9/4/97	12	1	113	1287.3	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1020	9/4/97	13	1	76	1016.4	4	3.9	14.1	3.46	Yes	Yes	Yes
1021	9/4/97	14	1	74	1001.7	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1022	9/4/97	15	1	74	997.7	4	3.8	14.2	3.55	Yes	Yes	Yes
1023	9/4/97	16	1	75	1004.9	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1024	9/4/97	17	1	96	1158.1	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1025	9/4/97	18	1	122	1364.7	5.3	4	13.9	4.47	Yes	Yes	Yes
1026	9/4/97	19	1	113	1291	4.8	4	13.9	4.04	Yes	Yes	Yes
1027	9/4/97	20	1	78	1032.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1028	9/4/97	21	1	84	1078.3	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1029	9/4/97	22	0.25	21	421.4	14.8	2.3	16.9	21.69			
1030	9/5/97	7	1	60	869.7	11.7	3.5	14.8	11.27			
1031	9/5/97	8	1	118	1337.7	5	3.9	14.1	4.32	Yes	Yes	Yes
1032	9/5/97	9	1	122	1367.3	5.8	4	13.9	4.89	Yes	Yes	Yes
1033	9/5/97	10	1	128	1416.2	6.3	4	13.9	5.31	Yes	Yes	Yes
1034	9/5/97	11	1	128	1415.8	6.2	3.9	14.1	5.36	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1035	9/5/97	12	1	98	1186.6	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1036	9/5/97	13	1	76	1012.7	4	3.8	14.2	3.55	Yes	Yes	Yes
1037	9/5/97	14	1	87	1090.2	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1038	9/5/97	15	1	90	1110.5	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1039	9/5/97	16	1	84	1068.2	4	3.8	14.2	3.55	Yes	Yes	Yes
1040	9/5/97	17	1	77	1018.8	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1041	9/5/97	18	1	91	1124.8	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1042	9/5/97	19	1	96	1164.8	4.4	3.9	14.1	3.80	Yes	Yes	Yes
1043	9/5/97	20	1	78	1029.4	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1044	9/5/97	21	0.75	61	859.3	6.6	3.4	14.9	6.54	Yes	Yes	Yes
1045	9/6/97	10	1	83	1044.4	14.3	3.4	14.9	14.18	Yes	**** No ****	Yes
1046	9/6/97	11	1	112	1288.5	5.4	3.9	14.1	4.67	Yes	Yes	Yes
1047	9/6/97	12	1	121	1358.1	5.5	3.9	14.1	4.75	Yes	Yes	Yes
1048	9/6/97	13	1	119	1341.9	5.3	3.9	14.1	4.58	Yes	Yes	Yes
1049	9/6/97	14	1	99	1177.9	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1050	9/6/97	15	0.5	82	1054.6	4	3.8	14.2	3.55	Yes	Yes	Yes
1051	9/6/97	16	1	0	348.6	17.1	1.9	17.6	30.34			
1052	9/6/97	17	1	0	372.4	17.3	1.9	17.6	30.69			
1053	9/6/97	18	1	44	752.9	15.3	3.1	15.5	16.64			
1054	9/6/97	19	1	75	1013.2	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1055	9/6/97	20	0.5	54	776.6	8.1	3.2	15.3	8.53			
1056	9/7/97	11	0.75	55	804.9	24.2	3.2	15.3	25.49			
1057	9/7/97	12	1	78	1026.8	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1058	9/7/97	13	1	93	1135.2	4.7	3.8	14.2	4.17	Yes	Yes	Yes
1059	9/7/97	14	1	86	1083.1	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1060	9/7/97	15	1	78	1025.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1061	9/7/97	16	1	77	1020.2	4	3.8	14.2	3.55	Yes	Yes	Yes
1062	9/7/97	17	1	69	945	5.8	3.6	14.6	5.43	Yes	Yes	Yes
1063	9/7/97	18	0.25	0	0.1	1.7	0.1	20.7	57.30			
1064	9/8/97	7	0.75	55	830.7	18.7	3.3	15.1	19.10			
1065	9/8/97	8	1	72	993.2	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1066	9/8/97	9	1	72	988.8	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1067	9/8/97	10	1	72	986.5	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1068	9/8/97	11	1	77	1019.3	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1069	9/8/97	12	1	112	1278.4	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1070	9/8/97	13	1	82	1051	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1071	9/8/97	14	1	94	1140.1	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1072	9/8/97	15	1	94	1142.9	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1073	9/8/97	16	1	77	1018.5	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1074	9/8/97	17	1	75	959	6	3.5	14.8	5.78	Yes	Yes	Yes
1075	9/9/97	5	0.5	52	786.2	32.5	2.8	16.0	39.12			
1076	9/9/97	6	1	75	1009.2	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1077	9/9/97	7	1	74	1005.7	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1078	9/9/97	8	1	75	1006.8	4	3.7	14.4	3.64	Yes	Yes	Yes
1079	9/9/97	9	1	75	1005.9	4	3.8	14.2	3.55	Yes	Yes	Yes
1080	9/9/97	10	1	75	1007	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1081	9/9/97	11	1	75	1006	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1082	9/9/97	12	1	75	1003.6	4	3.8	14.2	3.55	Yes	Yes	Yes
1083	9/9/97	13	1	74	1002.5	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1084	9/9/97	14	1	77	1022.5	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1085	9/9/97	15	1	82	1056.6	4	3.8	14.2	3.55	Yes	Yes	Yes
1086	9/9/97	16	1	77	1018	4	3.8	14.2	3.55	Yes	Yes	Yes
1087	9/9/97	17	0.75	63	872.8	6.6	3.3	15.1	6.74	Yes	Yes	Yes
1088	9/10/97	7	1	63	897.9	16.1	3.3	15.1	16.44	Yes	**** No ****	**** No ****
1089	9/10/97	8	1	75	1011.1	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1090	9/10/97	9	1	76	1015.8	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1091	9/10/97	10	1	80	1044.7	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1092	9/10/97	11	1	75	1002.2	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1093	9/10/97	12	1	92	1127.8	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1094	9/10/97	13	1	111	1268.5	5.3	3.9	14.1	4.58	Yes	Yes	Yes
1095	9/10/97	14	1	108	1238	5.1	3.8	14.2	4.52	Yes	Yes	Yes
1096	9/10/97	15	1	87	1084.8	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1097	9/10/97	16	1	78	1017.8	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1098	9/10/97	17	1	78	1018.6	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1099	9/10/97	18	1	76	1003	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1100	9/10/97	19	1	77	1008.5	4	3.7	14.4	3.64	Yes	Yes	Yes
1101	9/10/97	20	0.25	32	534.5	13.2	2.6	16.3	17.11			
1102	9/11/97	7	0.75	59	846.4	14.2	3.4	14.9	14.08			
1103	9/11/97	8	1	81	1045.6	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1104	9/11/97	9	1	76	1011.5	4	3.7	14.4	3.64	Yes	Yes	Yes
1105	9/11/97	10	1	79	1031.4	4	3.7	14.4	3.64	Yes	Yes	Yes
1106	9/11/97	11	1	77	1016.2	4	3.7	14.4	3.64	Yes	Yes	Yes
1107	9/11/97	12	1	83	1051.1	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1108	9/11/97	13	1	78	1016.2	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1109	9/11/97	14	1	80	1030.7	4	3.7	14.4	3.64	Yes	Yes	Yes
1110	9/11/97	15	1	81	1043.7	4	3.7	14.4	3.64	Yes	Yes	Yes
1111	9/11/97	16	1	78	1018.7	4	3.7	14.4	3.64	Yes	Yes	Yes
1112	9/11/97	17	1	87	1083.4	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1113	9/11/97	18	1	94	1135.6	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1114	9/11/97	19	1	83	1054.4	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1115	9/11/97	20	0.75	68	946.5	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1116	9/12/97	7	0.25	29	547.5	27.5	2.5	16.5	37.08			
1117	9/12/97	8	1	72	984.1	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1118	9/12/97	9	1	72	978.2	4	3.7	14.4	3.64	Yes	Yes	Yes
1119	9/12/97	10	1	72	978	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1120	9/12/97	11	1	72	980.6	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1121	9/12/97	12	1	108	1244.9	5	3.8	14.2	4.44	Yes	Yes	Yes
1122	9/12/97	13	1	125	1383.6	5.5	3.8	14.2	4.88	Yes	Yes	Yes
1123	9/12/97	14	1	126	1396.4	5.7	3.8	14.2	5.06	Yes	Yes	Yes
1124	9/12/97	15	1	126	1394.4	5.8	3.9	14.1	5.01	Yes	Yes	Yes
1125	9/12/97	16	1	105	1229.6	5.1	3.8	14.2	4.52	Yes	Yes	Yes
1126	9/12/97	17	1	76	1006.3	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1127	9/12/97	18	0.5	57	801.8	7.4	3.2	15.3	7.79			
1128	9/13/97	7	0.25	2	0.3	0.2	0.5	20.0	1.35			

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1129	9/13/97	8	1	85	1076	12.5	3.5	14.8	12.04	Yes	**** No ****	Yes
1130	9/13/97	9	1	126	1393.5	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1131	9/13/97	10	1	127	1399.6	5.3	3.9	14.1	4.58	Yes	Yes	Yes
1132	9/13/97	11	1	127	1399.9	5.2	3.8	14.2	4.61	Yes	Yes	Yes
1133	9/13/97	12	1	88	1102.5	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1134	9/13/97	13	1	109	1255.3	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1135	9/13/97	14	1	125	1381.8	5	3.8	14.2	4.44	Yes	Yes	Yes
1136	9/13/97	15	1	125	1385.7	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1137	9/13/97	16	1	125	1386.7	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1138	9/13/97	17	1	108	1254.5	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1139	9/13/97	18	1	113	1285.6	4.8	3.9	14.1	4.15	Yes	Yes	Yes
1140	9/13/97	19	1	94	1141.3	4.4	3.9	14.1	3.80	Yes	Yes	Yes
1141	9/13/97	20	1	76	1010.5	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1142	9/13/97	21	0.75	60	850.5	6.6	3.4	14.9	6.54			
1143	9/14/97	8	0.25	20	457.5	27.1	2.3	16.9	39.72			
1144	9/14/97	9	1	81	1052	5.2	3.9	14.1	4.49	Yes	Yes	Yes
1145	9/14/97	10	1	108	1250.6	4.9	3.9	14.1	4.23	Yes	Yes	Yes
1146	9/14/97	11	1	86	1080	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1147	9/14/97	12	1	103	1212.9	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1148	9/14/97	13	1	102	1196.7	4.7	3.8	14.2	4.17	Yes	Yes	Yes
1149	9/14/97	14	1	101	1190.6	4.7	3.8	14.2	4.17	Yes	Yes	Yes
1150	9/14/97	15	1	111	1271.3	5	3.8	14.2	4.44	Yes	Yes	Yes
1151	9/14/97	16	1	125	1384	5	3.9	14.1	4.32	Yes	Yes	Yes
1152	9/14/97	17	1	102	1200.2	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1153	9/14/97	18	1	121	1349.4	5.1	3.9	14.1	4.41	Yes	Yes	Yes
1154	9/14/97	19	1	99	1179.6	4.5	3.9	14.1	3.89	Yes	Yes	Yes
1155	9/14/97	20	1	92	1125.6	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1156	9/14/97	21	1	76	1012.1	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1157	9/14/97	22	1	75	964.2	6.1	3.5	14.8	5.87	Yes	Yes	Yes
1158	9/15/97	5	0.5	45	727.5	26.3	2.2	17.0	40.30			
1159	9/15/97	6	1	74	1004.7	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1160	9/15/97	7	1	78	1032.7	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1161	9/15/97	8	1	78	1026.7	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1162	9/15/97	9	1	77	1021.2	4	3.7	14.4	3.64	Yes	Yes	Yes
1163	9/15/97	10	1	78	1023.6	4	3.7	14.4	3.64	Yes	Yes	Yes
1164	9/15/97	11	1	79	1030.1	4	3.7	14.4	3.64	Yes	Yes	Yes
1165	9/15/97	12	1	77	1016.6	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1166	9/15/97	13	1	85	1068.5	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1167	9/15/97	14	1	78	1019.2	4	3.6	14.6	3.75	Yes	Yes	Yes
1168	9/15/97	15	1	79	1027	4	3.7	14.4	3.64	Yes	Yes	Yes
1169	9/15/97	16	1	80	1039	4	3.7	14.4	3.64	Yes	Yes	Yes
1170	9/15/97	17	1	85	1072.3	4	3.7	14.4	3.64	Yes	Yes	Yes
1171	9/15/97	18	1	98	1152.7	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1172	9/15/97	19	1	93	1128.2	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1173	9/15/97	20	1	89	1103.4	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1174	9/15/97	21	1	113	1282.3	4.9	3.8	14.2	4.35	Yes	Yes	Yes
1175	9/15/97	22	0.75	78	966.8	7.9	3.4	14.9	7.83	Yes	Yes	Yes
1176	9/16/97	5	0.75	58	842.7	15.6	3.1	15.5	16.96			
1177	9/16/97	8	1	76	1015.5	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1178	9/16/97	7	1	74	1001.5	4	3.7	14.4	3.64	Yes	Yes	Yes
1179	9/16/97	8	1	75	1004.5	4	3.6	14.6	3.75	Yes	Yes	Yes
1180	9/16/97	9	1	82	1052.1	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1181	9/16/97	10	1	93	1132.2	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1182	9/16/97	11	1	101	1194.9	4.6	3.7	14.4	4.19	Yes	Yes	Yes
1183	9/16/97	12	1	77	1018.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1184	9/16/97	13	1	75	1007.4	4	3.7	14.4	3.64	Yes	Yes	Yes
1185	9/16/97	14	1	76	1011.1	4	3.6	14.6	3.75	Yes	Yes	Yes
1186	9/16/97	15	1	97	1159.9	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1187	9/16/97	16	1	92	1127.5	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1188	9/16/97	17	1	64	887.4	6.1	3.3	15.1	6.23	Yes	Yes	Yes
1189	9/17/97	9	0.5	41	679.8	24.6	2.9	15.8	28.59			
1190	9/17/97	10	1	80	1045.4	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1191	9/17/97	11	1	103	1212.7	5	3.7	14.4	4.56	Yes	Yes	Yes
1192	9/17/97	12	1	82	1052.3	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1193	9/17/97	13	1	84	1065.9	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1194	9/17/97	14	1	85	1069.8	4.4	3.6	14.8	4.12	Yes	Yes	Yes
1195	9/17/97	15	1	82	1049	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1196	9/17/97	16	1	80	1036.2	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1197	9/17/97	17	1	78	1024.9	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1198	9/17/97	18	1	98	1180.1	4.8	3.7	14.4	4.37	Yes	Yes	Yes
1199	9/17/97	19	1	87	1087.9	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1200	9/17/97	20	0.25	25	443.3	14.7	2.2	17.0	22.52			
1201	9/18/97	6	0.5	48	745.8	30.9	2.4	16.7	43.40			
1202	9/18/97	7	1	83	1061.4	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1203	9/18/97	8	1	108	1253.4	5	3.8	14.2	4.44	Yes	Yes	Yes
1204	9/18/97	9	1	117	1323	5.3	3.8	14.2	4.70	Yes	Yes	Yes
1205	9/18/97	10	1	114	1294.1	5.2	3.8	14.2	4.61	Yes	Yes	Yes
1206	9/18/97	11	1	78	1026.5	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1207	9/18/97	12	1	92	1123.8	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1208	9/18/97	13	1	75	1008.5	4	3.7	14.4	3.64	Yes	Yes	Yes
1209	9/18/97	14	1	84	1067.3	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1210	9/18/97	15	1	76	1009.1	4	3.7	14.4	3.64	Yes	Yes	Yes
1211	9/18/97	16	1	76	1008.1	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1212	9/18/97	17	1	76	1013.7	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1213	9/18/97	18	1	88	1094.3	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1214	9/18/97	19	1	80	1041.8	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1215	9/18/97	20	0.75	59	822.9	7.2	3.4	14.9	7.14			
1216	9/22/97	6	0.5	33	624.4	29.8	2.7	16.2	37.20			
1217	9/22/97	7	1	76	1021.4	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1218	9/22/97	8	1	75	1016.1	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1219	9/22/97	9	1	76	1014.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1220	9/22/97	10	1	75	1013.2	4	3.9	14.1	3.46	Yes	Yes	Yes
1221	9/22/97	11	1	75	1010.8	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1222	9/22/97	12	1	75	1013	4	3.9	14.1	3.46	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1223	9/22/97	13	1	75	1012.4	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1224	9/22/97	14	1	76	1013.6	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1225	9/22/97	15	1	75	1010.5	4	3.9	14.1	3.46	Yes	Yes	Yes
1226	9/22/97	16	1	75	1012.1	4	3.9	14.1	3.46	Yes	Yes	Yes
1227	9/22/97	17	1	75	1012.1	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1228	9/22/97	18	1	78	1031.2	3.9	3.9	14.1	3.37	Yes	Yes	Yes
1229	9/22/97	19	0.5	53	771.4	8.5	3.2	15.3	8.95			
1230	9/26/97	10	0.5	38	645.7	27.9	2.8	16.0	33.59			
1231	9/26/97	11	1	127	1417.3	6	3.8	14.2	5.32	Yes	Yes	Yes
1232	9/26/97	12	1	119	1338.6	5.7	3.9	14.1	4.93	Yes	Yes	Yes
1233	9/26/97	13	1	83	1061.6	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1234	9/26/97	14	1	69	953.4	5.8	3.6	14.6	5.43	Yes	Yes	Yes
1235	9/26/97	15	0.25	0	0.3	4.6	0.1	20.7				
1236	9/27/97	9	1	69	936.6	10.2	3.6	14.6	9.55	Yes	**** No ****	Yes
1237	9/27/97	10	1	91	1115.8	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1238	9/27/97	11	1	78	1023.9	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1239	9/27/97	12	1	78	1019.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1240	9/27/97	13	1	77	1011.9	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1241	9/27/97	14	1	77	1010.7	4.2	3.6	14.6	3.93	Yes	Yes	Yes
1242	9/27/97	15	1	75	1002.5	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1243	9/27/97	16	1	77	1013.2	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1244	9/27/97	17	0.25	31	517.7	14.2	2.5	18.5	19.15			
1245	9/29/97	11	1	64	903.8	15.3	3.1	15.5	16.64	Yes	**** No ****	**** No ****
1246	9/29/97	12	1	75	1004.5	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1247	9/29/97	13	0.5	44	655.5	10.7	2.8	16.0	12.88			
1248	9/30/97	9	0.75	57	839.9	25.1	2.8	16.0	30.22			
1249	9/30/97	10	1	75	1006.3	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1250	9/30/97	11	1	75	1000.8	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1251	9/30/97	12	1	97	1164.6	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1252	9/30/97	13	1	79	1031.9	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1253	9/30/97	14	1	89	1104.3	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1254	9/30/97	15	1	81	1047	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1255	9/30/97	16	1	81	1049	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1256	9/30/97	17	1	98	1174.8	4.7	3.7	14.4	4.28	Yes	Yes	Yes
1257	9/30/97	18	1	111	1271.8	5.3	3.8	14.2	4.70	Yes	Yes	Yes
1258	9/30/97	19	1	124	1377.4	5.5	3.9	14.1	4.75	Yes	Yes	Yes
1259	9/30/97	20	0.75	70	919.1	6.1	3.3	15.1	6.23	Yes	Yes	Yes
1260	10/1/97	5	0.25	19	447.6	32.7	2.2	17.0	50.10			
1261	10/1/97	6	1	78	1040	7.6	3.9	14.1	6.57	Yes	Yes	Yes
1262	10/1/97	7	1	93	1143.8	4.6	3.9	14.1	3.98	Yes	Yes	Yes
1263	10/1/97	8	1	89	1108.2	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1264	10/1/97	9	1	90	1111.9	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1265	10/1/97	10	1	85	1079.9	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1266	10/1/97	11	1	82	1053.7	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1267	10/1/97	12	1	107	1247.1	4.9	3.8	14.2	4.35	Yes	Yes	Yes
1268	10/1/97	13	1	108	1255.8	5.2	3.8	14.2	4.61	Yes	Yes	Yes
1269	10/1/97	14	1	126	1397.9	6.1	3.8	14.2	5.41	Yes	Yes	Yes
1270	10/1/97	15	1	128	1421.9	6.4	3.9	14.1	5.53	Yes	Yes	Yes
1271	10/1/97	16	1	128	1417.5	6.4	3.9	14.1	5.53	Yes	Yes	Yes
1272	10/1/97	17	1	112	1278.8	5.1	3.8	14.2	4.52	Yes	Yes	Yes
1273	10/1/97	18	1	129	1421.9	6.2	3.9	14.1	5.36	Yes	Yes	Yes
1274	10/1/97	19	1	94	1152.2	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1275	10/1/97	20	0.5	46	694.9	11.1	3	15.6	12.47			
1276	10/2/97	8	0.75	56	839	20.5	2.6	16.3	26.58			
1277	10/2/97	9	1	90	1127.1	4.9	3.8	14.2	4.35	Yes	Yes	Yes
1278	10/2/97	10	1	95	1154.3	4.9	3.8	14.2	4.35	Yes	Yes	Yes
1279	10/2/97	11	1	95	1159.6	4.7	3.7	14.4	4.28	Yes	Yes	Yes
1280	10/2/97	12	1	128	1413.1	6.5	3.9	14.1	5.62	Yes	Yes	Yes
1281	10/2/97	13	1	128	1412.6	6.5	3.9	14.1	5.62	Yes	Yes	Yes
1282	10/2/97	14	1	128	1412.7	6.3	3.8	14.2	5.59	Yes	Yes	Yes
1283	10/2/97	15	1	100	1191.5	5.2	3.8	14.2	4.61	Yes	Yes	Yes
1284	10/2/97	16	1	87	1090.5	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1285	10/2/97	17	1	98	1177.2	4.8	3.7	14.4	4.37	Yes	Yes	Yes
1286	10/2/97	18	1	124	1380.2	5.9	3.8	14.2	5.23	Yes	Yes	Yes
1287	10/2/97	19	1	113	1298.8	5.9	3.8	14.2	5.23	Yes	Yes	Yes
1288	10/2/97	20	0.75	63	875.3	6.9	3.3	15.1	7.05	Yes	Yes	Yes
1289	10/3/97	7	0.25	17	430.1	30.8	2.1	17.2	49.44			
1290	10/3/97	8	1	87	1096	6.9	3.6	14.6	6.46	Yes	Yes	Yes
1291	10/3/97	9	1	81	1047.2	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1292	10/3/97	10	1	75	1011.5	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1293	10/3/97	11	1	74	1005.2	4	3.6	14.6	3.75	Yes	Yes	Yes
1294	10/3/97	12	1	75	1005.3	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1295	10/3/97	13	1	85	1075.8	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1296	10/3/97	14	1	76	1016.2	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1297	10/3/97	15	1	74	998.7	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1298	10/3/97	16	1	74	999.2	4.3	3.6	14.6	4.03	Yes	Yes	Yes
1299	10/3/97	17	1	74	1002	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1300	10/3/97	18	1	74	1004.7	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1301	10/3/97	19	0.25	26	481.7	15.5	2.4	16.7	21.77			
1302	10/8/97	9	1	64	911.7	12.8	3.4	14.9	12.69	Yes	**** No ****	Yes
1303	10/8/97	10	1	76	1018.7	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1304	10/8/97	11	1	75	1013.3	4.2	3.6	14.6	3.93	Yes	Yes	Yes
1305	10/8/97	12	1	89	1111.9	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1306	10/8/97	13	1	94	1142.8	4.7	3.7	14.4	4.28	Yes	Yes	Yes
1307	10/8/97	14	1	111	1280.1	5.2	3.7	14.4	4.74	Yes	Yes	Yes
1308	10/8/97	15	1	132	1452.2	6.1	3.8	14.2	5.41	Yes	Yes	Yes
1309	10/8/97	16	1	124	1375.3	5.4	3.7	14.4	4.92	Yes	Yes	Yes
1310	10/8/97	17	1	119	1340.1	5.1	3.7	14.4	4.65	Yes	Yes	Yes
1311	10/8/97	18	1	135	1474.3	6.2	3.8	14.2	5.50	Yes	Yes	Yes
1312	10/8/97	19	1	98	1170.8	4.9	3.7	14.4	4.46	Yes	Yes	Yes
1313	10/8/97	20	1	101	1212.5	4.9	3.7	14.4	4.46	Yes	Yes	Yes
1314	10/8/97	21	0.75	63	868.6	7.8	3.2	15.3	8.22	Yes	Yes	Yes
1315	10/9/97	5	0.5	38	686.7	29.5	2.8	16.0	35.51			
1316	10/9/97	6	1	76	1032.8	4.8	3.7	14.4	4.19	Yes	Yes	Yes



1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1317	10/9/97	7	1	78	1041.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1318	10/9/97	8	1	106	1243.6	4.6	3.7	14.4	4.19	Yes	Yes	Yes
1319	10/9/97	9	1	83	1077.8	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1320	10/9/97	10	1	77	1029.3	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1321	10/9/97	11	1	79	1043.7	4	3.6	14.6	3.75	Yes	Yes	Yes
1322	10/9/97	12	1	107	1254.8	4.9	3.7	14.4	4.46	Yes	Yes	Yes
1323	10/9/97	13	1	133	1457.3	6.1	3.8	14.2	5.41	Yes	Yes	Yes
1324	10/9/97	14	1	114	1311.6	5.5	3.7	14.4	5.01	Yes	Yes	Yes
1325	10/9/97	15	1	83	1064.2	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1326	10/9/97	16	1	75	1009.4	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1327	10/9/97	17	1	97	1174.7	4.8	3.7	14.4	4.37	Yes	Yes	Yes
1328	10/9/97	18	1	81	1054	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1329	10/9/97	19	0.75	60	849.7	7.8	3.3	15.1	7.97			
1330	10/10/97	6	0.75	58	856.4	27.1	2.8	16.0	32.62			
1331	10/10/97	7	1	72	999.1	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1332	10/10/97	8	1	71	990.5	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1333	10/10/97	9	1	71	988	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1334	10/10/97	10	1	71	982.6	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1335	10/10/97	11	1	72	987.8	4.1	3.6	14.6	3.75	Yes	Yes	Yes
1336	10/10/97	12	1	72	987.8	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1337	10/10/97	13	1	72	985.1	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1338	10/10/97	14	1	72	987.2	4	3.6	14.6	3.75	Yes	Yes	Yes
1339	10/10/97	15	1	72	989.4	4	3.6	14.6	3.75	Yes	Yes	Yes
1340	10/10/97	16	1	72	989.2	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1341	10/10/97	17	1	72	990.2	4	3.5	14.8	3.85	Yes	Yes	Yes
1342	10/10/97	18	0.75	59	845.3	6.8	3.2	15.3	7.16			
1343	10/11/97	4	0.75	66	911.4	20.7	3	15.6	23.26	Yes	**** No ****	**** No ****
1344	10/11/97	5	1	92	1132.9	4.5	3.6	14.6	4.21	Yes	Yes	Yes
1345	10/11/97	6	1	76	1018.7	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1346	10/11/97	7	1	75	1007.3	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1347	10/11/97	8	1	87	1096.6	4.2	3.6	14.6	3.93	Yes	Yes	Yes
1348	10/11/97	9	1	127	1413.8	6.2	3.8	14.2	5.50	Yes	Yes	Yes
1349	10/11/97	10	1	94	1145.3	4.8	3.7	14.4	4.37	Yes	Yes	Yes
1350	10/11/97	11	1	75	998.2	4	3.5	14.8	3.85	Yes	Yes	Yes
1351	10/11/97	12	1	79	1028.6	4.1	3.5	14.8	3.95	Yes	Yes	Yes
1352	10/11/97	13	1	80	1034.5	4.1	3.5	14.8	3.95	Yes	Yes	Yes
1353	10/11/97	14	1	76	1003.3	4	3.5	14.8	3.85	Yes	Yes	Yes
1354	10/11/97	15	1	75	1003	4.1	3.5	14.8	3.95	Yes	Yes	Yes
1355	10/11/97	16	0.75	57	803.4	7.3	3	15.6	8.20			
1356	10/13/97	5	0.25	15	435.2	26.3	1.6	18.1	55.41			
1357	10/13/97	6	0.75	62	904.4	20.7	3	15.6	23.26	Yes	**** No ****	**** No ****
1358	10/13/97	7	1	75	1022.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1359	10/13/97	8	1	74	1015.3	4	3.6	14.6	3.75	Yes	Yes	Yes
1360	10/13/97	9	1	73	1009.6	4	3.6	14.6	3.75	Yes	Yes	Yes
1361	10/13/97	10	0.25	36	597.9	13.6	2.6	16.3	17.63			
1362	10/14/97	4	1	65	928	16.9	3.3	15.1	17.26	Yes	**** No ****	**** No ****
1363	10/14/97	5	1	75	1022.6	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1364	10/14/97	6	1	74	1017.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1365	10/14/97	7	0.5	48	719.9	18.1	1.9	17.6	32.11			
1366	10/15/97	7	0.25	0	0.3	0.4	0.8	19.5	1.69			
1367	10/15/97	8	1	66	958.9	15.7	3.5	14.8	15.12	Yes	**** No ****	**** No ****
1368	10/15/97	9	1	80	1057.5	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1369	10/15/97	10	1	84	1082.1	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1370	10/15/97	11	1	78	1038.6	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1371	10/15/97	12	1	82	1070.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1372	10/15/97	13	1	75	1016.4	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1373	10/15/97	14	1	74	1010.5	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1374	10/15/97	15	1	61	873.7	6.4	3.4	14.9	6.34	Yes	Yes	Yes
1375	10/16/97	7	0.5	58	868.1	29.1	3.1	15.5	31.64			
1376	10/16/97	8	1	78	1052.4	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1377	10/16/97	9	1	77	1041.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1378	10/16/97	10	1	76	1024.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1379	10/16/97	11	1	75	1022.4	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1380	10/16/97	12	1	79	1043.1	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1381	10/16/97	13	1	81	1056.6	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1382	10/16/97	14	1	85	1084.2	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1383	10/16/97	15	1	81	1057	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1384	10/16/97	16	1	73	999.2	4.6	3.7	14.4	4.19	Yes	Yes	Yes
1385	10/16/97	17	0.25	2	140.6	22.3	1.2	18.8	62.64			
1386	10/20/97	5	0.5	37	644.7	29.9	2.7	16.2	37.33			
1387	10/20/97	6	1	77	1041	4.9	3.8	14.2	4.35	Yes	Yes	Yes
1388	10/20/97	7	1	75	1022.5	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1389	10/20/97	8	1	75	1021.2	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1390	10/20/97	9	1	75	1028.4	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1391	10/20/97	10	1	77	1039.8	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1392	10/20/97	11	1	76	1031.9	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1393	10/20/97	12	1	79	1050.8	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1394	10/20/97	13	1	84	1084	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1395	10/20/97	14	1	77	1036.9	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1396	10/20/97	15	1	77	1038.1	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1397	10/20/97	16	1	82	1071	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1398	10/20/97	17	1	100	1202.5	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1399	10/20/97	18	0.75	65	886.2	7.7	3.4	14.9	7.63	Yes	Yes	Yes
1400	10/21/97	5	0.25	3	257.8	8.6	1.7	17.9	17.05			
1401	10/21/97	6	1	76	1035.3	13.9	3.8	14.2	12.33	Yes	**** No ****	Yes
1402	10/21/97	7	1	95	1157.2	4.6	3.9	14.1	3.98	Yes	Yes	Yes
1403	10/21/97	8	1	83	1076.3	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1404	10/21/97	9	1	85	1088.9	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1405	10/21/97	10	1	87	1103	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1406	10/21/97	11	1	85	1090.2	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1407	10/21/97	12	0.75	65	896.6	7.4	3.3	15.1	7.56	Yes	Yes	Yes
1408	10/24/97	7	0.5	45	732.2	30.8	2.9	15.8	35.80			
1409	10/24/97	8	1	134	1474.3	6.2	3.8	14.2	5.50	Yes	Yes	Yes
1410	10/24/97	9	1	134	1469.3	6.3	3.8	14.2	5.59	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1411	10/24/97	10	1	105	1233.4	4.7	3.8	14.2	4.17	Yes	Yes	Yes
1412	10/24/97	11	0.5	55	798.3	9.1	3.2	15.3	9.59			
1413	10/25/97	16	0.5	1	287.2	8.8	1.2	18.8	24.72			
1414	10/25/97	17	1	105	1250.6	17.9	3.4	14.9	17.75	Yes	**** No ****	**** No ****
1415	10/25/97	18	1	98	1196.6	4.8	3.8	14.2	4.26	Yes	Yes	Yes
1416	10/25/97	19	1	76	1036.5	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1417	10/25/97	20	1	77	1041.1	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1418	10/25/97	21	0.5	56	820.9	9	3.1	15.5	9.79			
1419	10/26/97	16	0.75	59	860.8	17.8	3.1	15.5	19.35			
1420	10/26/97	17	1	95	1175.7	4.4	3.6	14.6	4.12	Yes	Yes	Yes
1421	10/26/97	18	1	91	1138.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1422	10/26/97	19	1	95	1159.7	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1423	10/28/97	20	1	82	1071	4	3.6	14.6	3.75	Yes	Yes	Yes
1424	10/26/97	21	0.75	64	892.2	8.2	3.2	15.3	8.64	Yes	Yes	Yes
1425	10/28/97	10	1	65	922.1	19.1	3.1	15.5	20.77	Yes	**** No ****	**** No ****
1426	10/28/97	11	1	78	1044	4.3	3.6	14.6	4.03	Yes	Yes	Yes
1427	10/28/97	12	1	79	1044.4	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1428	10/28/97	13	1	79	1040.9	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1429	10/28/97	14	1	79	1041.4	4.4	3.6	14.6	4.12	Yes	Yes	Yes
1430	10/28/97	15	1	79	1042.1	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1431	10/28/97	16	1	79	1043.5	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1432	10/28/97	17	1	79	1045.3	4.3	3.6	14.6	4.03	Yes	Yes	Yes
1433	10/28/97	18	1	79	1046.9	4.4	3.7	14.4	4.01	Yes	Yes	Yes
1434	10/28/97	19	0.75	80	846	8.1	3.2	15.3	8.53			
1435	10/30/97	17	1	80	1019.2	14.2	3.3	15.1	14.50	Yes	**** No ****	Yes
1436	10/30/97	18	1	104	1225.6	5.2	3.8	14.2	4.61	Yes	Yes	Yes
1437	10/30/97	19	1	92	1130.5	4.6	3.8	14.2	4.08	Yes	Yes	Yes
1438	10/30/97	20	1	69	935.7	8.3	3.1	15.5	9.02	Yes	**** No ****	Yes
1439	11/5/97	13	0.25	0	244.2	11.2	1.5	18.3	25.17			
1440	11/5/97	14	1	14	489	34.2	2.3	16.9	50.12			
1441	11/5/97	15	0.75	33	650	63.8	3.1	15.5	69.37			
1442	11/5/97	16	1	70	979.2	14.1	3.6	14.6	13.20	Yes	**** No ****	Yes
1443	11/5/97	17	1	119	1342	4.9	3.7	14.4	4.46	Yes	Yes	Yes
1444	11/5/97	18	0.75	97	1131.6	9.3	3.3	15.1	9.50	Yes	**** No ****	Yes
1445	11/6/97	8	0.25	18	453.4	29.2	2.1	17.2	46.87			
1446	11/6/97	9	1	76	1026	8.3	3.5	14.8	7.99	Yes	Yes	Yes
1447	11/6/97	10	1	76	1019.5	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1448	11/6/97	11	1	75	1012.4	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1449	11/6/97	12	0.75	63	878.2	6.8	3.3	15.1	6.95	Yes	Yes	Yes
1450	11/9/97	15	0.25	0	0	0.2	0.3	20.4	2.25			
1451	11/9/97	16	1	76	1020.9	26.1	3.1	15.5	28.38	Yes	**** No ****	**** No ****
1452	11/9/97	17	1	140	1519.9	5.1	3.6	14.6	4.78	Yes	Yes	Yes
1453	11/9/97	18	1	87	1106.2	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1454	11/9/97	19	1	80	1057.7	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1455	11/9/97	20	1	81	1062.3	3.8	3.7	14.4	3.46	Yes	Yes	Yes
1456	11/9/97	21	0.25	16	370.7	19.1	2	17.4	32.19			
1457	11/10/97	7	0.5	57	846.4	24.7	3.1	15.5	26.86			
1458	11/10/97	8	1	87	1102.5	3.6	3.5	14.8	3.47	Yes	Yes	Yes
1459	11/10/97	9	1	84	1081	3.8	3.7	14.4	3.46	Yes	Yes	Yes
1460	11/10/97	10	1	86	1092	4	3.8	14.2	3.55	Yes	Yes	Yes
1461	11/10/97	11	1	87	1100.8	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1462	11/10/97	12	0.75	65	894.4	7.4	3.3	15.1	7.56	Yes	Yes	Yes
1463	11/11/97	8	0.75	47	704.2	16.3	2.3	16.9	23.89			
1464	11/11/97	9	1	82	1069.7	3.6	3.6	14.6	3.37	Yes	Yes	Yes
1465	11/11/97	10	1	80	1053.9	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1466	11/11/97	11	1	80	1052.9	3.8	3.6	14.6	3.56	Yes	Yes	Yes
1467	11/11/97	12	1	68	924.8	6.9	3.3	15.1	7.05	Yes	Yes	Yes
1468	11/11/97	16	0.25	15	432.9	26.6	2	17.4	44.83			
1469	11/11/97	17	1	110	1282.9	8.1	3.7	14.4	7.38	Yes	Yes	Yes
1470	11/11/97	18	1	120	1358.5	5	3.8	14.2	4.44	Yes	Yes	Yes
1471	11/11/97	19	1	80	1054.8	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1472	11/11/97	20	0.5	59	826.4	8.8	3.1	15.5	9.57			
1473	11/12/97	6	0.75	62	878	29.1	2.5	16.5	39.24	Yes	**** No ****	**** No ****
1474	11/12/97	7	1	86	1091.9	4	3.6	14.6	3.75	Yes	Yes	Yes
1475	11/12/97	8	1	82	1065.7	3.8	3.6	14.6	3.56	Yes	Yes	Yes
1476	11/12/97	9	1	82	1059.8	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1477	11/12/97	10	1	81	1055.5	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1478	11/12/97	11	1	82	1060.3	3.8	3.5	14.8	3.66	Yes	Yes	Yes
1479	11/12/97	12	1	80	1046	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1480	11/12/97	13	1	79	1039.4	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1481	11/12/97	14	1	79	1037.7	3.8	3.5	14.8	3.66	Yes	Yes	Yes
1482	11/12/97	15	1	78	1036.2	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1483	11/12/97	16	1	84	1074	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1484	11/12/97	17	1	86	1090.8	3.8	3.6	14.6	3.56	Yes	Yes	Yes
1485	11/12/97	18	1	80	1046.8	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1486	11/12/97	19	0.25	32	548.1	15.1	2.4	16.7	21.21			
1487	11/13/97	7	0.5	46	725.6	24.5	2.3	16.9	35.91			
1488	11/13/97	8	1	80	1055.7	3.9	3.5	14.8	3.76	Yes	Yes	Yes
1489	11/13/97	9	1	81	1056.2	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1490	11/13/97	10	1	80	1046.5	3.9	3.8	14.6	3.65	Yes	Yes	Yes
1491	11/13/97	11	1	80	1046.8	3.8	3.5	14.8	3.66	Yes	Yes	Yes
1492	11/13/97	12	1	80	1045.6	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1493	11/13/97	13	1	80	1043.5	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1494	11/13/97	14	1	80	1045.7	3.8	3.5	14.8	3.66	Yes	Yes	Yes
1495	11/13/97	15	1	80	1044.6	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1496	11/13/97	16	1	80	1048	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1497	11/13/97	17	1	97	1177	4.1	3.6	14.6	3.84	Yes	Yes	Yes
1498	11/13/97	18	1	100	1199.8	4.5	3.7	14.4	4.10	Yes	Yes	Yes
1499	11/13/97	19	1	80	1046.9	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1500	11/13/97	20	0.75	64	887.3	7.2	3.2	15.3	7.58	Yes	Yes	Yes
1501	11/14/97	5	0.25	0	0	0	0	20.9				
1502	11/14/97	6	0.25	0	201	2.1	1.4	18.4	5.06			
1503	11/14/97	7	1	74	1019.6	14.8	3.5	14.8	14.25	Yes	**** No ****	Yes
1504	11/14/97	8	1	80	1061.2	3.9	3.8	14.2	3.46	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1505	11/14/97	9	1	101	1209.8	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1506	11/14/97	10	1	79	1052.6	4	3.8	14.2	3.55	Yes	Yes	Yes
1507	11/14/97	11	1	79	1050.5	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1508	11/14/97	12	1	79	1048.3	4	3.8	14.2	3.55	Yes	Yes	Yes
1509	11/14/97	13	1	80	1055.7	4	3.8	14.2	3.55	Yes	Yes	Yes
1510	11/14/97	14	1	80	1057.7	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1511	11/14/97	15	1	80	1055.8	4	3.8	14.2	3.55	Yes	Yes	Yes
1512	11/14/97	16	1	80	1057.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1513	11/14/97	17	1	76	1013.9	3.9	3.6	14.6	3.65	Yes	Yes	Yes
1514	11/14/97	18	1	72	999.2	11.4	3.7	14.4	10.39	Yes	**** No ****	Yes
1515	11/14/97	19	1	80	1061.2	4	3.8	14.2	3.55	Yes	Yes	Yes
1516	11/14/97	20	0.25	14	335.3	20.6	1.8	17.7	38.58			
1517	11/15/97	16	0.25	35	635.3	33.4	2.6	16.3	43.30			
1518	11/15/97	17	1	81	1068	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1519	11/15/97	18	1	79	1048.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1520	11/15/97	19	0.25	40	624.9	13.7	2.7	16.2	17.10			
1521	11/16/97	18	0.75	85	1058.4	18.6	3.3	15.1	19.00	Yes	**** No ****	**** No ****
1522	11/16/97	19	1	83	1080.8	4.4	3.9	14.1	3.80	Yes	Yes	Yes
1523	11/16/97	20	1	74	1004	7.4	3.6	14.6	6.93	Yes	Yes	Yes
1524	11/16/97	21	0.25	0	0.1	5.4	0.2	20.5				
1525	11/17/97	6	1	69	959.5	18.1	3.4	14.9	17.94	Yes	**** No ****	**** No ****
1526	11/17/97	7	1	84	1084.6	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1527	11/17/97	8	1	90	1120.9	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1528	11/17/97	9	1	80	1054.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1529	11/17/97	10	1	78	1037.1	4	3.8	14.2	3.55	Yes	Yes	Yes
1530	11/17/97	11	0.75	64	878.2	7.5	3.3	15.1	7.66	Yes	Yes	Yes
1531	11/17/97	16	0.25	2	0.2	0.2	0.4	20.2	1.69			
1532	11/17/97	17	1	117	1321.8	13.6	3.7	14.4	12.39	Yes	**** No ****	Yes
1533	11/17/97	18	1	139	1504.7	6.7	4	13.9	5.65	Yes	Yes	Yes
1534	11/17/97	19	1	138	1492.8	6.4	4	13.9	5.39	Yes	Yes	Yes
1535	11/17/97	20	1	85	1056.7	7.7	3.5	14.8	7.42	Yes	Yes	Yes
1536	11/18/97	6	0.25	15	431.8	27.2	2.1	17.2	43.66			
1537	11/18/97	7	1	80	1061.9	10.8	3.9	14.1	9.33	Yes	**** No ****	Yes
1538	11/18/97	8	1	80	1056.4	4	3.8	14.2	3.55	Yes	Yes	Yes
1539	11/18/97	9	1	80	1053.8	4	3.8	14.2	3.55	Yes	Yes	Yes
1540	11/18/97	10	1	87	1103.2	4	3.9	14.1	3.46	Yes	Yes	Yes
1541	11/18/97	11	1	84	1076.3	4	3.8	14.2	3.55	Yes	Yes	Yes
1542	11/18/97	12	0.75	66	902	7.8	3.5	14.8	7.51	Yes	Yes	Yes
1543	11/18/97	16	0.5	42	688.5	32.5	2.9	15.8	37.78			
1544	11/18/97	17	1	84	1084.8	4.5	3.8	14.2	3.99	Yes	Yes	Yes
1545	11/18/97	18	0.5	61	841.4	9.3	3.2	15.3	9.80	Yes	**** No ****	Yes
1546	11/19/97	7	0.5	54	797.9	29.5	2.9	15.8	34.29			
1547	11/19/97	8	1	84	1091.6	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1548	11/19/97	9	1	84	1085.2	3.8	3.8	14.2	3.37	Yes	Yes	Yes
1549	11/19/97	10	1	84	1083.5	3.9	3.8	14.2	3.46	Yes	Yes	Yes
1550	11/19/97	11	1	84	1078.2	3.8	3.7	14.4	3.46	Yes	Yes	Yes
1551	11/19/97	12	0.75	67	896.9	7.5	3.4	14.9	7.44	Yes	Yes	Yes
1552	11/20/97	6	0.5	58	856.2	34	2.8	16.0	40.93			
1553	11/20/97	7	1	84	1081.6	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1554	11/20/97	8	1	94	1147.9	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1555	11/20/97	9	1	92	1134.5	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1556	11/20/97	10	1	95	1159.7	4.4	3.8	14.2	3.90	Yes	Yes	Yes
1557	11/20/97	11	1	92	1128.4	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1558	11/20/97	12	1	89	1112.6	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1559	11/20/97	13	1	86	1091.7	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1560	11/20/97	14	1	87	1098.9	4.1	3.7	14.4	3.74	Yes	Yes	Yes
1561	11/20/97	15	1	91	1126.5	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1562	11/20/97	16	1	103	1219.3	4.7	3.8	14.2	4.17	Yes	Yes	Yes
1563	11/20/97	17	1	130	1427.1	5.8	3.9	14.1	5.01	Yes	Yes	Yes
1564	11/20/97	18	1	133	1452.7	6.2	3.9	14.1	5.36	Yes	Yes	Yes
1565	11/20/97	19	1	84	1080.9	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1566	11/20/97	20	1	82	1068.5	4	3.8	14.2	3.55	Yes	Yes	Yes
1567	11/20/97	21	0.75	64	874.8	8.2	3.3	15.1	8.38	Yes	Yes	Yes
1568	11/21/97	5	1	66	920.7	14.3	3.3	15.1	14.61	Yes	**** No ****	Yes
1569	11/21/97	6	1	87	1102.2	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1570	11/21/97	7	1	91	1126.5	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1571	11/21/97	8	1	89	1118.5	4.2	3.7	14.4	3.83	Yes	Yes	Yes
1572	11/21/97	9	1	89	1114.6	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1573	11/21/97	10	1	86	1094.4	4	3.8	14.2	3.55	Yes	Yes	Yes
1574	11/21/97	11	1	86	1095.2	3.9	3.7	14.4	3.55	Yes	Yes	Yes
1575	11/21/97	12	0.5	56	785.3	10.7	3.1	15.5	11.63			
1576	11/21/97	16	0.5	55	824.9	20.5	3.3	15.1	20.94			
1577	11/21/97	17	1	79	1047.8	4.3	3.7	14.4	3.92	Yes	Yes	Yes
1578	11/21/97	18	1	78	1037.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1579	11/21/97	19	0.25	5	197.4	25.8	1.5	18.3	57.98			
1580	11/22/97	16	0.25	0	0.3	0.4	0.2	20.5	6.74			
1581	11/22/97	17	1	64	914.2	18.9	3.2	15.3	19.91	Yes	**** No ****	**** No ****
1582	11/22/97	18	1	75	1021.4	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1583	11/22/97	19	1	76	1022.9	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1584	11/22/97	20	1	135	1472.1	5.5	3.9	14.1	4.75	Yes	Yes	Yes
1585	11/22/97	21	1	129	1424.2	5.5	4	13.9	4.63	Yes	Yes	Yes
1586	11/22/97	22	0.75	62	855.3	8.3	3.4	14.9	8.23	Yes	Yes	Yes
1587	11/23/97	16	0.25	0	201.5	5.4	0.4	20.2	45.50			
1588	11/23/97	17	0.5	45	735.7	26.7	3	15.6	30.00			
1589	11/23/97	18	1	85	1092.1	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1590	11/23/97	19	1	89	1114.5	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1591	11/23/97	20	1	81	1053.4	5.8	3.8	14.2	5.14	Yes	Yes	Yes
1592	11/23/97	21	0.25	0	29.9	12.5	0.5	20.0	84.27			
1593	11/24/97	6	1	71	967.6	19.8	3.4	14.9	19.63	Yes	**** No ****	**** No ****
1594	11/24/97	7	1	83	1079.4	4.2	4	13.9	3.54	Yes	Yes	Yes
1595	11/24/97	8	1	82	1069.8	4	3.9	14.1	3.46	Yes	Yes	Yes
1596	11/24/97	9	1	83	1076.4	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1597	11/24/97	10	1	85	1087.3	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1598	11/24/97	11	1	88	1109	4	3.9	14.1	3.46	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1599	11/24/97	12	1	86	1090.7	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1600	11/24/97	13	0.75	65	885	8	3.5	14.8	7.70	Yes	Yes	Yes
1601	11/25/97	15	0.25	0	0.2	0.3	0.7	19.7	1.44			
1602	11/25/97	16	1	72	990.1	16.1	3.6	14.6	15.07	Yes	**** No ****	**** No ****
1603	11/25/97	17	1	84	1079.1	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1604	11/25/97	18	1	84	1077.9	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1605	11/25/97	19	0.25	38	606.4	14.4	2.8	16.0	17.34			
1606	11/28/97	16	1	89	1094.3	19.8	3.2	15.3	20.86	Yes	**** No ****	**** No ****
1607	11/28/97	17	1	134	1470.3	5.9	3.9	14.1	5.10	Yes	Yes	Yes
1608	11/28/97	18	0.5	58	777.6	13.6	3	15.6	15.28			
1609	12/1/97	7	0.5	60	873		3.4	14.9	0.00			
1610	12/1/97	8	1	84	1083.3	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1611	12/1/97	9	0.75	63	861.5	8.6	3.4	14.9	8.53	Yes	Yes	Yes
1612	12/1/97	17	0.5	56	821.3	19.7	3.3	15.1	20.12			
1613	12/1/97	18	1	89	1114.6	4.4	3.9	14.1	3.80	Yes	Yes	Yes
1614	12/1/97	19	1	88	1105.5	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1615	12/1/97	20	1	70	938	6.9	3.5	14.8	6.65	Yes	Yes	Yes
1616	12/2/97	7	0.75	64	902.6	23.1	3.2	15.3	24.33	Yes	**** No ****	**** No ****
1617	12/2/97	8	1	80	1057.1	3.5	3.6	14.6	3.28	Yes	Yes	Yes
1618	12/2/97	9	1	88	1112.4	3.9	4	13.9	3.29	Yes	Yes	Yes
1619	12/2/97	10	1	90	1124.6	3.7	3.9	14.1	3.20	Yes	Yes	Yes
1620	12/2/97	11	1	77	991.2	6.4	3.6	14.6	5.99	Yes	Yes	Yes
1621	12/2/97	16	0.75	69	929.7	15.6	3.5	14.8	15.02	Yes	**** No ****	**** No ****
1622	12/2/97	17	1	90	1123.3	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1623	12/2/97	18	1	87	1103.2	3.9	4	13.9	3.29	Yes	Yes	Yes
1624	12/2/97	19	1	82	1073.1	4	3.9	14.1	3.46	Yes	Yes	Yes
1625	12/2/97	20	0.5	60	835.1	8.5	3.3	15.1	8.68			
1626	12/3/97	6	0.5	59	851.1	28.7	2.8	16.0	34.55			
1627	12/3/97	7	1	87	1111.1	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1628	12/3/97	8	1	87	1107.2	4	3.9	14.1	3.46	Yes	Yes	Yes
1629	12/3/97	9	0.5	52	753.2	11.9	3.1	15.5	12.94			
1630	12/4/97	6	0.5	77	979.6	25.1	3	15.6	28.20	Yes	**** No ****	**** No ****
1631	12/4/97	7	1	86	1103.7	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1632	12/4/97	8	1	83	1076.8	4.1	3.8	14.2	3.64	Yes	Yes	Yes
1633	12/4/97	9	1	83	1077.6	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1634	12/4/97	10	1	83	1077.7	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1635	12/4/97	11	1	70	941.5	6.8	3.5	14.8	6.55	Yes	Yes	Yes
1636	12/4/97	16	0.75	62	872	18.7	3.3	15.1	19.10	Yes	**** No ****	**** No ****
1637	12/4/97	17	1	99	1184.6	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1638	12/4/97	18	1	127	1410.4	5.2	3.9	14.1	4.49	Yes	Yes	Yes
1639	12/4/97	19	1	140	1516.7	5.7	3.9	14.1	4.93	Yes	Yes	Yes
1640	12/4/97	20	1	141	1517.6	5.6	3.9	14.1	4.84	Yes	Yes	Yes
1641	12/4/97	21	0.5	62	800.4	12.6	3	15.6	14.16	Yes	**** No ****	**** No ****
1642	12/5/97	6	0.5	41	677.7	33.3	2.7	16.2	41.57			
1643	12/5/97	7	1	88	1116.9	4.6	4	13.9	3.88	Yes	Yes	Yes
1644	12/5/97	8	1	85	1094.4	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1645	12/5/97	9	1	82	1072.6	4.2	4	13.9	3.54	Yes	Yes	Yes
1646	12/5/97	10	1	82	1074.1	4.2	4	13.9	3.54	Yes	Yes	Yes
1647	12/5/97	11	1	82	1073.7	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1648	12/5/97	12	1	82	1073.3	4.2	4	13.9	3.54	Yes	Yes	Yes
1649	12/5/97	13	1	82	1070.9	4.2	4	13.9	3.54	Yes	Yes	Yes
1650	12/5/97	14	1	82	1071.1	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1651	12/5/97	15	1	82	1070.8	4.2	4	13.9	3.54	Yes	Yes	Yes
1652	12/5/97	16	1	104	1239.3	4.7	4	13.9	3.96	Yes	Yes	Yes
1653	12/5/97	17	1	99	1196.2	4.7	3.9	14.1	4.06	Yes	Yes	Yes
1654	12/5/97	18	1	83	1081.7	4.2	4	13.9	3.54	Yes	Yes	Yes
1655	12/5/97	19	0.5	59	828.9	10.3	3.3	15.1	10.52			
1656	12/7/97	15	0.25	14	419.7	27.1	2	17.4	45.67			
1657	12/7/97	16	1	96	1173.5	7.7	4	13.9	6.49	Yes	Yes	Yes
1658	12/7/97	17	1	86	1091.4	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1659	12/7/97	18	1	91	1124.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1660	12/7/97	19	0.5	61	843.8	9.2	3.3	15.1	9.40	Yes	**** No ****	**** No ****
1661	12/8/97	9	0.5	46	706.9	21.9	2.9	15.8	25.45			
1662	12/8/97	10	1	79	1048	4.7	3.9	14.1	4.06	Yes	Yes	Yes
1663	12/8/97	11	1	79	1042.7	4	3.8	14.2	3.55	Yes	Yes	Yes
1664	12/8/97	12	1	79	1038.8	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1665	12/8/97	13	1	80	1040.7	4.3	3.8	14.2	3.81	Yes	Yes	Yes
1666	12/8/97	14	1	80	1040	4.2	3.8	14.2	3.73	Yes	Yes	Yes
1667	12/8/97	15	1	80	1039.9	4.4	3.9	14.1	3.80	Yes	Yes	Yes
1668	12/8/97	16	1	100	1192.7	5	3.9	14.1	4.32	Yes	Yes	Yes
1669	12/8/97	17	1	128	1406.5	6	3.8	14.2	5.32	Yes	Yes	Yes
1670	12/8/97	18	1	135	1462.7	6.3	3.9	14.1	5.44	Yes	Yes	Yes
1671	12/8/97	19	1	135	1466.3	6.3	3.9	14.1	5.44	Yes	Yes	Yes
1672	12/8/97	20	1	135	1468.9	6	3.8	14.2	5.32	Yes	Yes	Yes
1673	12/8/97	21	1	115	1311.5	5.6	3.9	14.1	4.84	Yes	Yes	Yes
1674	12/8/97	22	0.5	42	626.9	12.9	2.8	16.0	15.53			
1675	12/9/97	14	0.75	67	931.8	24.1	3.4	14.9	23.89	Yes	**** No ****	**** No ****
1676	12/9/97	15	1	131	1444.3	5.8	4.1	13.7	4.77	Yes	Yes	Yes
1677	12/9/97	16	1	136	1485.6	5.9	4.1	13.7	4.85	Yes	Yes	Yes
1678	12/9/97	17	1	137	1495.2	5.7	4	13.9	4.80	Yes	Yes	Yes
1679	12/9/97	18	1	138	1499	5.7	4.1	13.7	4.69	Yes	Yes	Yes
1680	12/9/97	19	1	110	1281.2	4.9	4.1	13.7	4.03	Yes	Yes	Yes
1681	12/9/97	20	0.25	20	411.4	17.7	2.3	16.9	25.94			
1682	12/10/97	7	0.5	55	800.4	30.3	2.5	16.5	40.85			
1683	12/10/97	8	1	92	1145.7	4.2	3.9	14.1	3.63	Yes	Yes	Yes
1684	12/10/97	9	1	89	1121.6	4.1	4	13.9	3.45	Yes	Yes	Yes
1685	12/10/97	10	1	87	1109.4	4	4	13.9	3.37	Yes	Yes	Yes
1686	12/10/97	11	1	86	1099.3	3.9	3.9	14.1	3.37	Yes	Yes	Yes
1687	12/10/97	12	1	82	1071.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1688	12/10/97	13	1	82	1071	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1689	12/10/97	14	1	82	1071.4	4	3.9	14.1	3.46	Yes	Yes	Yes
1690	12/10/97	15	1	82	1071.2	4.1	4	13.9	3.45	Yes	Yes	Yes
1691	12/10/97	16	1	105	1241.2	4.4	4	13.9	3.71	Yes	Yes	Yes
1692	12/10/97	17	1	117	1339.7	5.2	3.9	14.1	4.49	Yes	Yes	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1693	12/10/97	18	1	84	1092.5	4.1	4	13.9	3.45	Yes	Yes	Yes
1694	12/10/97	19	1	83	1085.7	4.1	4	13.9	3.45	Yes	Yes	Yes
1695	12/10/97	20	1	84	1089.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1696	12/10/97	21	0.75	68	916.4	7.8	3.5	14.8	7.51	Yes	Yes	Yes
1697	12/11/97	17	0.25	0	174	1.9	1.3	18.6	4.93			
1698	12/11/97	18	1	80	1067.2	16.4	3.8	14.2	14.55	Yes	**** No ****	Yes
1699	12/11/97	19	1	78	1030.4	6.7	3.8	14.2	5.94	Yes	Yes	Yes
1700	12/11/97	20	0.25	0	0.2	3.8	0	20.9				
1701	12/20/97	17	0.75	64	917.8	0.1	3.3	15.1		Yes	Yes	Yes
1702	12/20/97	18	1	79	1053.8		3.9	14.1		Yes	Yes	Yes
1703	12/20/97	19	1	81	1062.8		3.9	14.1		Yes	Yes	Yes
1704	12/20/97	20	1	85	1090.2		3.9	14.1		Yes	Yes	Yes
1705	12/20/97	21	1	83	1078.4		3.9	14.1		Yes	Yes	Yes
1706	12/20/97	22	0.5	51	740.1		3	15.6				
1707	12/21/97	16	1	75	991.9	16.5	3.5	14.8	15.89	Yes	**** No ****	**** No ****
1708	12/21/97	17	1	113	1308.8	4.9	4	13.9	4.13	Yes	Yes	Yes
1709	12/21/97	18	1	139	1510.3	5.4	4	13.9	4.55	Yes	Yes	Yes
1710	12/21/97	19	1	136	1475.9	5	4	13.9	4.21	Yes	Yes	Yes
1711	12/21/97	20	1	129	1416.6	4.8	4	13.9	4.04	Yes	Yes	Yes
1712	12/21/97	21	1	82	1071.9	4.1	4	13.9	3.45	Yes	Yes	Yes
1713	12/21/97	22	1	83	1077.3	4.1	4	13.9	3.45	Yes	Yes	Yes
1714	12/21/97	23	0.25	23	454.7	18.2	2.4	16.7	25.56			
1715	12/22/97	6	0.5	46	730.1	24.6	3.1	15.5	26.75			
1716	12/22/97	7	1	85	1095.7	4.4	4.1	13.7	3.62	Yes	Yes	Yes
1717	12/22/97	8	1	86	1100	3.6	4	13.9	3.03	Yes	Yes	Yes
1718	12/22/97	9	1	86	1101.3	4	4.1	13.7	3.29	Yes	Yes	Yes
1719	12/22/97	10	1	85	1091.2	3.9	4.1	13.7	3.21	Yes	Yes	Yes
1720	12/22/97	11	1	82	1071.8	3.9	3.9	14.1	3.37	Yes	Yes	Yes
1721	12/22/97	12	1	82	1071.2	4.1	4	13.9	3.45	Yes	Yes	Yes
1722	12/22/97	13	1	82	1068.3	4.1	4	13.9	3.45	Yes	Yes	Yes
1723	12/22/97	14	1	82	1066.6	4	3.9	14.1	3.45	Yes	Yes	Yes
1724	12/22/97	15	1	82	1067.2	4.1	4	13.9	3.45	Yes	Yes	Yes
1725	12/22/97	16	1	82	1069.8	4.1	4	13.9	3.45	Yes	Yes	Yes
1726	12/22/97	17	1	108	1258.1	4.5	4	13.9	3.79	Yes	Yes	Yes
1727	12/22/97	18	1	122	1362	5.1	4.1	13.7	4.19	Yes	Yes	Yes
1728	12/22/97	19	1	101	1204.2	4.4	4.1	13.7	3.62	Yes	Yes	Yes
1729	12/22/97	20	1	134	1458.5	5.2	4	13.9	4.38	Yes	Yes	Yes
1730	12/22/97	21	1	91	1137.4	4.4	4.1	13.7	3.62	Yes	Yes	Yes
1731	12/22/97	22	0.5	55	787.9	11.2	3.3	15.1	11.44			
1732	12/24/97	9	1	104	1218.8	20.5	3.4	14.9	20.32	Yes	**** No ****	**** No ****
1733	12/24/97	10	1	86	1101.2	4.2	4	13.9	3.54	Yes	Yes	Yes
1734	12/24/97	11	1	84	1081.5	3.9	3.9	14.1	3.37	Yes	Yes	Yes
1735	12/24/97	12	0.75	65	886.4	7.9	3.5	14.8	7.61	Yes	Yes	Yes
1736	12/28/97	14	0.25	24	526	37.5	2.4	16.7	52.67			
1737	12/28/97	15	1	78	1048.6	5.1	4	13.9	4.30	Yes	Yes	Yes
1738	12/28/97	16	1	78	1043.3	4	4	13.9	3.37	Yes	Yes	Yes
1739	12/28/97	17	1	86	1097	4	4	13.9	3.37	Yes	Yes	Yes
1740	12/28/97	18	1	83	1073.4	4.1	4	13.9	3.45	Yes	Yes	Yes
1741	12/28/97	19	0.5	54	770.5	11.2	3.2	15.3	11.80			
1742	12/30/97	15	0.25	20	490.5	38	2.5	16.5	51.23			
1743	12/30/97	16	1	79	1052.7	34.1	4.1	13.7	28.03	Yes	**** No ****	**** No ****
1744	12/30/97	17	1	97	1134.4	7.5	3.6	14.6	7.02	Yes	Yes	Yes

**1998 CEMS Data**

1745	1/5/98	6	0.5	46	736.6	27.4	3.1	15.5	29.79			
1746	1/5/98	7	1	83	1080.4	4.5	4	13.9	3.79	Yes	Yes	Yes
1747	1/5/98	8	1	121	1354.8	4.8	4	13.9	4.04	Yes	Yes	Yes
1748	1/5/98	9	1	133	1450.6	5.4	4.1	13.7	4.44	Yes	Yes	Yes
1749	1/5/98	10	1	137	1491.7	6.1	4.1	13.7	5.01	Yes	Yes	Yes
1750	1/5/98	11	1	89	1110.6	4.2	4	13.9	3.54	Yes	Yes	Yes
1751	1/5/98	12	1	83	1064.7	3.8	4	13.9	3.20	Yes	Yes	Yes
1752	1/5/98	13	1	84	1064.1	3.9	4	13.9	3.29	Yes	Yes	Yes
1753	1/5/98	14	1	83	1062.5	3.9	3.9	14.1	3.37	Yes	Yes	Yes
1754	1/5/98	15	1	83	1063.9	3.8	4	13.9	3.20	Yes	Yes	Yes
1755	1/5/98	16	1	83	1063.2	3.8	4	13.9	3.20	Yes	Yes	Yes
1756	1/5/98	17	1	95	1150.1	4	4	13.9	3.37	Yes	Yes	Yes
1757	1/5/98	18	1	89	1104.2	4.2	4	13.9	3.54	Yes	Yes	Yes
1758	1/5/98	19	1	99	1179.7	4.3	4.1	13.7	3.54	Yes	Yes	Yes
1759	1/5/98	20	1	83	1067.9	3.7	4	13.9	3.12	Yes	Yes	Yes
1760	1/5/98	21	0.75	67	896.7	7	3.6	14.6	6.55	Yes	Yes	Yes
1761	1/6/98	17	1	69	958.9	16	3.5	14.8	15.41	Yes	**** No ****	**** No ****
1762	1/6/98	18	1	106	1242.2	4.7	4.1	13.7	3.86	Yes	Yes	Yes
1763	1/6/98	19	1	106	1240.9	4.7	4.1	13.7	3.86	Yes	Yes	Yes
1764	1/6/98	20	0.75	66	895.1	8.5	3.5	14.8	8.19	Yes	Yes	Yes
1765	1/7/98	5	0.75	71	953.8	24.9	3.2	15.3	26.23	Yes	**** No ****	**** No ****
1766	1/7/98	6	1	82	1077.3	4.4	4	13.9	3.71	Yes	Yes	Yes
1767	1/7/98	7	1	82	1072.5	4.1	4	13.9	3.45	Yes	Yes	Yes
1768	1/7/98	8	1	81	1062.4	4.2	4	13.9	3.54	Yes	Yes	Yes
1769	1/7/98	9	1	81	1064.8	4.2	4	13.9	3.54	Yes	Yes	Yes
1770	1/7/98	10	1	82	1066.1	4.1	4	13.9	3.45	Yes	Yes	Yes
1771	1/7/98	11	0.25	35	571.7	15.8	2.7	16.2	19.72			
1772	1/7/98	18	1	75	991.3	12.1	3.8	14.2	10.73	Yes	**** No ****	Yes
1773	1/7/98	19	1	82	1071.4	4.1	4	13.9	3.45	Yes	Yes	Yes
1774	1/7/98	20	1	96	1169.3	4.5	4.1	13.7	3.70	Yes	Yes	Yes
1775	1/7/98	21	0.5	59	826.5	10.4	3.4	14.9	10.31			
1776	1/8/98	6	0.5	65	898.5	33.9	2.9	15.8	39.40	Yes	**** No ****	**** No ****
1777	1/8/98	7	1	87	1104.1	4.6	4	13.9	3.88	Yes	Yes	Yes
1778	1/8/98	8	1	87	1102.6	4.5	4	13.9	3.79	Yes	Yes	Yes
1779	1/8/98	9	1	87	1101.8	4.5	4	13.9	3.79	Yes	Yes	Yes
1780	1/8/98	10	1	95	1150.6	4.4	4	13.9	3.71	Yes	Yes	Yes
1781	1/8/98	11	1	86	1087.6	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1782	1/8/98	12	1	87	1092.9	4.3	4	13.9	3.62	Yes	Yes	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1783	1/8/98	13	1	85	1090.7	4.3	4	13.9	3.62	Yes	Yes	Yes
1784	1/8/98	14	1	92	1130.2	4.4	4	13.9	3.71	Yes	Yes	Yes
1785	1/8/98	15	1	117	1317.6	5.2	4	13.9	4.38	Yes	Yes	Yes
1786	1/8/98	16	1	95	1148.8	4.4	4	13.9	3.71	Yes	Yes	Yes
1787	1/8/98	17	1	130	1423.6	5.4	4	13.9	4.55	Yes	Yes	Yes
1788	1/8/98	18	1	130	1418.4	5.2	4	13.9	4.38	Yes	Yes	Yes
1789	1/8/98	19	1	104	1212.4	4.7	4	13.9	3.96	Yes	Yes	Yes
1790	1/8/98	20	1	82	1057.9	4.2	4	13.9	3.54	Yes	Yes	Yes
1791	1/8/98	21	1	80	1047.6	4.2	4	13.9	3.54	Yes	Yes	Yes
1792	1/8/98	22	0.25	8	257.9	24.1	1.8	17.7	45.13			
1793	1/9/98	6	0.5	47	746.2	28.9	3.1	15.5	31.42			
1794	1/9/98	7	1	85	1093.7	4.5	4	13.9	3.79	Yes	Yes	Yes
1795	1/9/98	8	1	98	1183.4	4.3	4.1	13.7	3.54	Yes	Yes	Yes
1796	1/9/98	9	1	83	1083.2	4.1	4	13.9	3.45	Yes	Yes	Yes
1797	1/9/98	10	1	83	1082.4	4.1	4	13.9	3.45	Yes	Yes	Yes
1798	1/9/98	11	1	85	1099.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1799	1/9/98	12	1	87	1103.2	4.1	4	13.9	3.45	Yes	Yes	Yes
1800	1/9/98	13	1	84	1087.5	4.1	4	13.9	3.45	Yes	Yes	Yes
1801	1/9/98	14	1	83	1080.7	4.1	4	13.9	3.45	Yes	Yes	Yes
1802	1/9/98	15	1	82	1071.8	4.1	4	13.9	3.45	Yes	Yes	Yes
1803	1/9/98	16	1	83	1077.8	4.1	4	13.9	3.45	Yes	Yes	Yes
1804	1/9/98	17	1	85	1090.7	4	3.9	14.1	3.46	Yes	Yes	Yes
1805	1/9/98	18	1	89	1118.8	4.2	4	13.9	3.54	Yes	Yes	Yes
1806	1/9/98	19	1	82	1072.4	4.1	4	13.9	3.45	Yes	Yes	Yes
1807	1/9/98	20	1	82	1070.8	4	4	13.9	3.37	Yes	Yes	Yes
1808	1/9/98	21	0.5	59	823.6	9.5	3.4	14.9	9.42			
1809	1/10/98	9	0.75	69	944.4	24.7	3.2	15.3	26.02	Yes	**** No ****	**** No ****
1810	1/10/98	10	1	84	1081	4.4	4	13.9	3.71	Yes	Yes	Yes
1811	1/10/98	11	1	83	1078.1	4.1	3.9	14.1	3.54	Yes	Yes	Yes
1812	1/10/98	12	1	83	1078.8	4.1	4	13.9	3.45	Yes	Yes	Yes
1813	1/10/98	13	1	83	1071.5	4.1	4	13.9	3.45	Yes	Yes	Yes
1814	1/10/98	14	0.25	22	441.2	19.1	2.3	16.9	27.99			
1815	1/11/98	18	0.25	30	596.4	38.2	2.7	16.2	47.69			
1816	1/11/98	19	1	110	1267.3	5.6	4	13.9	4.72	Yes	Yes	Yes
1817	1/11/98	20	1	92	1127.6	4.5	4	13.9	3.79	Yes	Yes	Yes
1818	1/11/98	21	1	71	930	7.2	3.6	14.6	6.74	Yes	Yes	Yes
1819	1/12/98	6	0.25	5	288	10	1.7	17.9	19.83			
1820	1/12/98	7	1	85	1097.7	13.2	4	13.9	11.12	Yes	**** No ****	Yes
1821	1/12/98	8	1	103	1219.3	4.3	4.1	13.7	3.54	Yes	Yes	Yes
1822	1/12/98	9	1	123	1366.7	4.7	4.1	13.7	3.86	Yes	Yes	Yes
1823	1/12/98	10	1	82	1074.7	4	4	13.9	3.37	Yes	Yes	Yes
1824	1/12/98	11	1	82	1074	4	3.9	14.1	3.46	Yes	Yes	Yes
1825	1/12/98	12	1	82	1071	4.1	4	13.9	3.45	Yes	Yes	Yes
1826	1/12/98	13	1	82	1070.3	4.1	4	13.9	3.45	Yes	Yes	Yes
1827	1/12/98	14	1	81	1069.6	4.1	4	13.9	3.45	Yes	Yes	Yes
1828	1/12/98	15	1	82	1072.6	4.1	4	13.9	3.45	Yes	Yes	Yes
1829	1/12/98	16	1	86	1098.9	4.1	4	13.9	3.45	Yes	Yes	Yes
1830	1/12/98	17	1	107	1246.5	4.3	3.9	14.1	3.72	Yes	Yes	Yes
1831	1/12/98	18	1	120	1349.2	4.6	4.1	13.7	3.78	Yes	Yes	Yes
1832	1/12/98	19	1	123	1366.4	4.7	4.1	13.7	3.86	Yes	Yes	Yes
1833	1/12/98	20	1	104	1224.6	4.4	4.1	13.7	3.62	Yes	Yes	Yes
1834	1/12/98	21	0.5	62	844	9.3	3.3	15.1	9.50	Yes	**** No ****	Yes
1835	1/18/98	23	0.75	3	377.8	3	3.3	15.1				
1836	1/19/98	17	0.75	96	1138.5	18.1	3.3	15.1	18.49	Yes	**** No ****	**** No ****
1837	1/19/98	18	1	113	1290.4	4.8	4	13.9	4.04	Yes	Yes	Yes
1838	1/19/98	19	1	85	1030.4	7.1	3.6	14.6	6.65	Yes	Yes	Yes
1839	2/6/98	19	0.25	0	283.2	10.7	1.7	17.9	21.22			
1840	2/6/98	20	0.25	0	399.4		2	17.4				
1841	2/7/98	8	0.75	7	416.4	30.7	2.2	17.0	47.04			
1842	2/7/98	9	1	53	850.9	49.7	3.8	14.2	44.09			
1843	2/7/98	10	1	69	970.9	12.9	3.9	14.1	11.15	Yes	**** No ****	Yes
1844	2/7/98	11	1	111	1271.6	13.6	4.1	13.7	11.18	Yes	**** No ****	Yes
1845	2/7/98	12	1	126	1384.6	15.7	4	13.9	13.23	Yes	**** No ****	Yes
1846	2/7/98	13	1	135	1472.9	16.3	4	13.9	13.74	Yes	**** No ****	Yes
1847	2/7/98	14	1	112	1279.3	14.6	4	13.9	12.30	Yes	**** No ****	Yes
1848	2/7/98	15	1	58	883.2	9.4	3.9	14.1	8.12			
1849	2/7/98	16	0.5	32	667.8	42.6	3.5	14.8	41.03			
1850	2/8/98	8	0.75	9	455.6	21	1.6	18.1	44.24			
1851	2/8/98	9	1	64	901.5	46.2	3.3	15.1	47.19	Yes	**** No ****	**** No ****
1852	2/8/98	10	1	49	758.6	20	2.8	16.0	24.08			
1853	2/8/98	11	0.75	37	682.8	21.9	3.3	15.1	22.37			
1854	2/8/98	12	0.5	29	640.5	22.9	3.3	15.1	23.39			
1855	2/9/98	15	0.25	1	235.6	6.3	1.5	18.3	14.16			
1856	2/9/98	16	1	52	803.1	38.6	2.4	16.7	54.21			
1857	2/9/98	17	1	129	1424.2	14.8	3.9	14.1	12.79	Yes	**** No ****	Yes
1858	2/9/98	18	1	61	855.5	34.1	2.7	16.2	42.57	Yes	**** No ****	**** No ****
1859	2/9/98	19	1	25	589.5	46	2.6	16.3	58.64			
1860	2/9/98	20	1	73	938.3	60.5	2.8	16.0	72.83	Yes	**** No ****	**** No ****
1861	2/9/98	21	0.25	31	502.7	38	1.9	17.6	67.41			
1862	2/10/98	16	0.75	11	449.5	23.8	2.2	17.0	36.46			
1863	2/10/98	17	1	13	436.4	29.1	2.1	17.2	46.71			
1864	2/10/98	18	1	29	550.4	45.2	1.9	17.6	80.19			
1865	2/10/98	19	0.75	33	604.7	54.4	2.1	17.2	87.32			
1866	2/11/98	11	0.25	0	0	0	0	20.9				
1867	2/14/98	10	0.5	52	762.8	31.8	3	15.6	35.73			
1868	2/14/98	11	1	88	1112.3	14.1	4	13.9	11.88	Yes	**** No ****	Yes
1869	2/14/98	12	1	83	1066.5	12.1	3.9	14.1	10.46	Yes	**** No ****	Yes
1870	2/14/98	13	0.25	12	319	25.7	2.1	17.2	41.25			
1871	2/16/98	9	1	63	911.2	25.2	3.2	15.3	26.54	Yes	**** No ****	**** No ****
1872	2/16/98	10	1	79	1041.2	10.3	3.9	14.1	8.90	Yes	Yes	Yes
1873	2/16/98	11	1	79	1033.3	10.1	3.9	14.1	8.73	Yes	Yes	Yes
1874	2/16/98	12	1	80	1048.1	10.3	4	13.9	8.68	Yes	Yes	Yes
1875	2/16/98	13	1	99	1190	13	4	13.9	10.95	Yes	**** No ****	Yes
1876	2/16/98	14	1	125	1383.4	17.5	4.1	13.7	14.39	Yes	**** No ****	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1877	2/16/98	15	1	106	1231.8	14.7	4.1	13.7	12.09	Yes	**** No ****	Yes
1878	2/16/98	16	1	111	1278.7	15.3	4.1	13.7	12.58	Yes	**** No ****	Yes
1879	2/16/98	17	1	120	1351.5	16.5	4.1	13.7	13.57	Yes	**** No ****	Yes
1880	2/16/98	18	1	115	1318.9	16.2	4	13.9	13.65	Yes	**** No ****	Yes
1881	2/16/98	19	1	115	1309.6	15.2	4.1	13.7	12.50	Yes	**** No ****	Yes
1882	2/16/98	20	1	100	1192.7	12.9	4.1	13.7	10.61	Yes	**** No ****	Yes
1883	2/16/98	21	1	83	1070.6	10.6	4	13.9	8.93	Yes	Yes	Yes
1884	2/16/98	22	0.75	69	932	12.7	3.7	14.4	11.57	Yes	**** No ****	Yes
1885	2/19/98	16	0.25	0	50	0.6	1.1	19.0	1.84			
1886	2/19/98	17	1	88	1117.1	14.4	3.9	14.1	12.45	Yes	**** No ****	Yes
1887	2/19/98	18	1	135	1485.6	16.5	4.1	13.7	13.57	Yes	**** No ****	Yes
1888	2/19/98	19	1	138	1500.5	16.8	4.1	13.7	13.81	Yes	**** No ****	Yes
1889	2/19/98	20	1	138	1503	15.6	4.1	13.7	12.83	Yes	**** No ****	Yes
1890	2/19/98	21	0.25	39	614.4	16.4	2.9	15.8	19.06			
1891	2/22/98	8	0.25	35	618	24.9	2.7	16.2	31.09			
1892	2/22/98	9	1	72	1000.7	11.1	4	13.9	9.35	Yes	**** No ****	Yes
1893	2/22/98	10	1	71	983.1	9.8	3.9	14.1	8.47	Yes	Yes	Yes
1894	2/22/98	11	1	70	974.6	9.7	3.9	14.1	8.38	Yes	Yes	Yes
1895	2/22/98	12	1	70	974	9.7	3.9	14.1	8.38	Yes	Yes	Yes
1896	2/22/98	13	1	71	975.3	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1897	2/22/98	14	1	71	980.8	9.8	3.9	14.1	8.47	Yes	Yes	Yes
1898	2/22/98	15	1	71	978.9	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1899	2/22/98	16	1	71	980.5	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1900	2/22/98	17	1	72	988.5	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1901	2/22/98	18	1	127	1411.7	14.5	4	13.9	12.22	Yes	**** No ****	Yes
1902	2/22/98	19	1	123	1364.8	13.9	4	13.9	11.71	Yes	**** No ****	Yes
1903	2/22/98	20	1	102	1210.8	12.8	4	13.9	10.79	Yes	**** No ****	Yes
1904	2/22/98	21	1	75	1014.7	9.6	4	13.9	8.09	Yes	Yes	Yes
1905	2/22/98	22	1	66	916.7	10.9	3.7	14.4	9.93	Yes	**** No ****	Yes
1906	2/23/98	6	0.5	45	730.2	22.4	3.2	15.3	23.59			
1907	2/23/98	7	1	72	1002.9	10.1	4	13.9	8.51	Yes	Yes	Yes
1908	2/23/98	8	1	74	1010.7	9.5	4	13.9	8.01	Yes	Yes	Yes
1909	2/23/98	9	1	70	986	9	4	13.9	7.58	Yes	Yes	Yes
1910	2/23/98	10	1	70	985.2	9.2	3.9	14.1	7.95	Yes	Yes	Yes
1911	2/23/98	11	1	71	989.1	9.1	3.9	14.1	7.86	Yes	Yes	Yes
1912	2/23/98	12	1	71	978.6	9.2	3.9	14.1	7.95	Yes	Yes	Yes
1913	2/23/98	13	1	71	977.5	9.3	3.9	14.1	8.04	Yes	Yes	Yes
1914	2/23/98	14	1	71	975.2	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1915	2/23/98	15	1	72	993.7	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1916	2/23/98	16	1	72	994.9	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1917	2/23/98	17	1	97	1185.2	11.4	4	13.9	9.61	Yes	**** No ****	Yes
1918	2/23/98	18	1	136	1486	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
1919	2/23/98	19	1	121	1359.2	14.3	4.1	13.7	11.76	Yes	**** No ****	Yes
1920	2/23/98	20	1	75	1019.4	9.7	4	13.9	8.17	Yes	Yes	Yes
1921	2/23/98	21	1	72	961.6	10.9	3.7	14.4	9.93	Yes	**** No ****	Yes
1922	2/24/98	7	0.25	32	599.3	26.1	2.7	16.2	32.58			
1923	2/24/98	8	1	81	1067.7	10.7	4	13.9	9.02	Yes	**** No ****	Yes
1924	2/24/98	9	1	136	1490.6	14.5	4	13.9	12.22	Yes	**** No ****	Yes
1925	2/24/98	10	1	84	1082.8	10.7	3.9	14.1	9.25	Yes	**** No ****	Yes
1926	2/24/98	11	1	72	985.5	9	3.8	14.2	7.98	Yes	Yes	Yes
1927	2/24/98	12	1	71	988	8.7	3.9	14.1	7.52	Yes	Yes	Yes
1928	2/24/98	13	1	75	1004.4	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1929	2/24/98	14	1	78	1028.9	10.1	3.9	14.1	8.73	Yes	Yes	Yes
1930	2/24/98	15	1	78	1022.4	10.5	3.9	14.1	9.07	Yes	**** No ****	Yes
1931	2/24/98	16	1	74	998.4	10.3	3.8	14.2	9.14	Yes	**** No ****	Yes
1932	2/24/98	17	1	76	1014.2	10.2	3.8	14.2	9.05	Yes	**** No ****	Yes
1933	2/24/98	18	1	128	1417.3	15.7	3.9	14.1	13.57	Yes	**** No ****	Yes
1934	2/24/98	19	1	91	1130.8	12.3	3.9	14.1	10.63	Yes	**** No ****	Yes
1935	2/24/98	20	0.5	41	629.2	11.8	2.8	16.0	14.21			
1936	2/25/98	6	1	74	972.8	17.4	3.4	14.9	17.25	Yes	**** No ****	**** No ****
1937	2/25/98	7	1	131	1434.8	14.9	3.7	14.4	13.57	Yes	**** No ****	Yes
1938	2/25/98	8	1	100	1193.7	11.1	3.9	14.1	9.59	Yes	**** No ****	Yes
1939	2/25/98	9	1	95	1156.2	11.6	4	13.9	9.78	Yes	**** No ****	Yes
1940	2/25/98	10	1	85	1077	11.4	4	13.9	9.61	Yes	**** No ****	Yes
1941	2/25/98	11	1	72	984.1	9.4	3.9	14.1	8.12	Yes	Yes	Yes
1942	2/25/98	12	1	72	985.7	9.4	3.9	14.1	8.12	Yes	Yes	Yes
1943	2/25/98	13	1	74	998.7	9.7	3.9	14.1	8.38	Yes	Yes	Yes
1944	2/25/98	14	1	73	991.2	9.6	3.9	14.1	8.30	Yes	Yes	Yes
1945	2/25/98	15	1	72	990.8	9.2	3.9	14.1	7.95	Yes	Yes	Yes
1946	2/25/98	16	1	72	991.7	9.4	4	13.9	7.92	Yes	Yes	Yes
1947	2/25/98	17	1	76	1015.3	9.5	4	13.9	8.01	Yes	Yes	Yes
1948	2/25/98	18	1	131	1442.7	15.2	4	13.9	12.81	Yes	**** No ****	Yes
1949	2/25/98	19	1	135	1473.7	15.5	4.1	13.7	12.74	Yes	**** No ****	Yes
1950	2/25/98	20	1	135	1476.6	15.6	4.1	13.7	12.83	Yes	**** No ****	Yes
1951	2/25/98	21	1	101	1180.3	14.7	3.8	14.2	13.04	Yes	**** No ****	Yes
1952	2/26/98	6	0.75	78	1004	23.9	3.8	14.2	21.20	Yes	**** No ****	**** No ****
1953	2/26/98	7	1	73	1004.2	9.8	4	13.9	8.26	Yes	Yes	Yes
1954	2/26/98	8	1	75	1015.2	9.8	4	13.9	8.26	Yes	Yes	Yes
1955	2/26/98	9	1	117	1313.8	14.1	4.1	13.7	11.59	Yes	**** No ****	Yes
1956	2/26/98	10	1	93	1136.5	11	3.9	14.1	9.51	Yes	**** No ****	Yes
1957	2/26/98	11	1	79	1041.6	10.2	4	13.9	8.60	Yes	Yes	Yes
1958	2/26/98	12	1	77	1022.3	10.3	4	13.9	8.68	Yes	Yes	Yes
1959	2/26/98	13	1	73	1000	9.5	4	13.9	8.01	Yes	Yes	Yes
1960	2/26/98	14	1	72	989.6	9.8	4	13.9	8.26	Yes	Yes	Yes
1961	2/26/98	15	1	72	987.3	9.5	4	13.9	8.01	Yes	Yes	Yes
1962	2/26/98	16	1	97	1172	11.9	4	13.9	10.03	Yes	**** No ****	Yes
1963	2/26/98	17	1	133	1451	14.7	4	13.9	12.39	Yes	**** No ****	Yes
1964	2/26/98	18	1	136	1479.5	14.4	4	13.9	12.13	Yes	**** No ****	Yes
1965	2/26/98	19	1	130	1425.1	14.2	4.1	13.7	11.67	Yes	**** No ****	Yes
1966	2/26/98	20	1	106	1247.3	12.8	4.1	13.7	10.52	Yes	**** No ****	Yes
1967	2/26/98	21	1	72	997.9	9.3	4	13.9	7.84	Yes	Yes	Yes
1968	2/26/98	22	1	66	909.3	10.8	3.7	14.4	9.84	Yes	**** No ****	Yes
1969	2/27/98	6	0.5	51	787.4	22.2	3.3	15.1	22.68			
1970	2/27/98	7	1	128	1419	14.1	4.1	13.7	11.59	Yes	**** No ****	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
1971	2/27/98	8	1	136	1476.8	14.4	4.1	13.7	11.84	Yes	**** No ****	Yes
1972	2/27/98	9	1	108	1257.6	13.4	4.1	13.7	11.02	Yes	**** No ****	Yes
1973	2/27/98	10	1	99	1187.1	12	4.1	13.7	9.87	Yes	**** No ****	Yes
1974	2/27/98	11	1	80	1054.8	10.7	4	13.9	9.02	Yes	**** No ****	Yes
1975	2/27/98	12	1	73	1000.9	9.7	4	13.9	8.17	Yes	Yes	Yes
1976	2/27/98	13	1	70	979.2	8.7	4	13.9	7.33	Yes	Yes	Yes
1977	2/27/98	14	1	70	979.3	9.3	4	13.9	7.84	Yes	Yes	Yes
1978	2/27/98	15	1	75	1016.5	9.6	4	13.9	8.09	Yes	Yes	Yes
1979	2/27/98	16	1	95	1165.7	11.8	4	13.9	9.94	Yes	**** No ****	Yes
1980	2/27/98	17	1	112	1294	12.5	4.1	13.7	10.28	Yes	**** No ****	Yes
1981	2/27/98	18	1	136	1480.2	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
1982	2/27/98	19	1	136	1476.9	15	4.1	13.7	12.33	Yes	**** No ****	Yes
1983	2/27/98	20	1	99	1200.2	12.3	4.1	13.7	10.11	Yes	**** No ****	Yes
1984	2/27/98	21	1	71	996.1	9.2	4	13.9	7.75	Yes	Yes	Yes
1985	2/27/98	22	1	73	982.8	11	3.9	14.1	9.51	Yes	**** No ****	Yes
1986	2/27/98	23	0.25	0	0.4	1.7	0	20.9				
1987	3/2/98	6	0.5	58	858.6	20.9	3.5	14.8	20.13			
1988	3/2/98	7	1	86	1108.1	10.6	4.1	13.7	8.71	Yes	Yes	Yes
1989	3/2/98	8	1	102	1207.4	12.7	4	13.9	10.70	Yes	**** No ****	Yes
1990	3/2/98	9	1	92	1142.3	12.2	4	13.9	10.28	Yes	**** No ****	Yes
1991	3/2/98	10	1	72	999.5	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1992	3/2/98	11	1	72	1000.4	9.3	3.9	14.1	8.04	Yes	Yes	Yes
1993	3/2/98	12	1	72	998.9	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1994	3/2/98	13	1	72	996.3	9.4	3.9	14.1	8.12	Yes	Yes	Yes
1995	3/2/98	14	1	72	997	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1996	3/2/98	15	1	72	995.3	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1997	3/2/98	16	1	72	996	9.5	3.9	14.1	8.21	Yes	Yes	Yes
1998	3/2/98	17	1	69	967.2	9.3	3.8	14.2	8.25	Yes	Yes	Yes
1999	3/2/98	18	1	48	811.5	13.6	3.7	14.4	12.39			
2000	3/2/98	19	1	51	839.6	13.2	3.7	14.4	12.03			
2001	3/2/98	20	1	111	1286.1	13.3	4	13.9	11.21	Yes	**** No ****	Yes
2002	3/2/98	21	0.5	53	780.7	12.8	3.3	15.1	13.07			
2003	3/3/98	6	1	48	797.4	11.4	3.6	14.6	10.67			
2004	3/3/98	7	1	99	1207.5	12.3	3.9	14.1	10.63	Yes	**** No ****	Yes
2005	3/3/98	8	1	136	1477.5	14.5	3.9	14.1	12.53	Yes	**** No ****	Yes
2006	3/3/98	9	1	136	1491.8	14.5	3.9	14.1	12.53	Yes	**** No ****	Yes
2007	3/3/98	10	1	135	1482.7	15.6	3.9	14.1	13.48	Yes	**** No ****	Yes
2008	3/3/98	11	1	133	1467.9	15.1	3.9	14.1	13.05	Yes	**** No ****	Yes
2009	3/3/98	12	1	132	1458.2	14.3	3.9	14.1	12.36	Yes	**** No ****	Yes
2010	3/3/98	13	1	129	1429.9	13	3.9	14.1	11.24	Yes	**** No ****	Yes
2011	3/3/98	14	1	130	1433.3	17.8	3.9	14.1	15.38	Yes	**** No ****	**** No ****
2012	3/3/98	15	1	132	1450.8	18.8	3.9	14.1	16.25	Yes	**** No ****	**** No ****
2013	3/3/98	16	1	56	868.3	9.3	3.7	14.4	8.47			
2014	3/3/98	17	1	51	828.7	7.9	3.7	14.4	7.20			
2015	3/3/98	18	1	52	837	8	3.7	14.4	7.29			
2016	3/3/98	19	1	46	793.9	13.5	3.6	14.6	12.64			
2017	3/3/98	20	0.75	20	506.7	25.8	2	17.4	43.48			
2018	3/10/98	5	0.25	0	193.2	3.6	1.3	18.6	9.33			
2019	3/10/98	6	1	48	833.2	63.9	3.7	14.4	58.21			
2020	3/10/98	7	1	46	808.8	32	3.7	14.4	29.15			
2021	3/10/98	8	1	46	805.3	12.3	3.8	14.2	10.91			
2022	3/10/98	9	1	46	807.2	13	3.8	14.2	11.53			
2023	3/10/98	10	1	47	808.4	13.2	3.8	14.2	11.71			
2024	3/10/98	11	1	70	983	9.9	3.9	14.1	8.56	Yes	Yes	Yes
2025	3/10/98	12	1	72	996.3	9.5	3.9	14.1	8.21	Yes	Yes	Yes
2026	3/10/98	13	1	130	1443.1	14.9	4	13.9	12.56	Yes	**** No ****	Yes
2027	3/10/98	14	1	60	905.5	9	3.8	14.2	7.98			
2028	3/10/98	15	1	30	652.7	16.2	2.5	16.5	21.84			
2029	3/10/98	16	1	30	618.2	24.4	2.3	16.9	35.76			
2030	3/10/98	17	1	43	773	18.8	3.6	14.6	17.60			
2031	3/10/98	18	1	105	1246.4	13.1	3.9	14.1	11.32	Yes	**** No ****	Yes
2032	3/10/98	19	1	136	1480.3	13.7	4	13.9	11.54	Yes	**** No ****	Yes
2033	3/10/98	20	1	136	1476.1	13.9	4.1	13.7	11.43	Yes	**** No ****	Yes
2034	3/10/98	21	1	78	1036.7	13.9	3.8	14.2	12.33	Yes	**** No ****	Yes
2035	3/10/98	22	0.25	0	372.1	25.6	1.9	17.6	45.42			
2036	3/11/98	21	0.75	30	628.9	15.1	2.7	16.2	18.85			
2037	3/12/98	16	0.5	34	655.9		2.6	16.3				
2038	3/12/98	17	1	14	502.9	31.8	2.4	16.7	44.66			
2039	3/12/98	18	1	7	437	40.3	2.2	17.0	61.75			
2040	3/12/98	19	1	23	562.6	39	2.2	17.0	59.75			
2041	3/12/98	20	1	34	685.8	43.9	3.2	15.3	46.24			
2042	3/12/98	21	0.25	0	338.4	26.7	1.8	17.7	50.00			
2043	3/15/98	17	0.25	0	0	1.2	1.3	18.6	3.11			
2044	3/15/98	18	1	91	0	17.1	3.8	14.2	15.17	Yes	**** No ****	**** No ****
2045	3/15/98	19	1	134	0	16.1	4	13.9	13.57	Yes	**** No ****	Yes
2046	3/15/98	20	1	135	0	16.2	4	13.9	13.65	Yes	**** No ****	Yes
2047	3/15/98	21	1	82	0	11.2	3.9	14.1	9.68	Yes	**** No ****	Yes
2048	3/15/98	22	0.25	4	0	19	1.5	18.3	42.70			
2049	3/16/98	5	0.5	35	0	15.6	1.8	17.7	29.21			
2050	3/16/98	6	1	57	0	8.5	3.9	14.1	7.35			
2051	3/16/98	7	1	54	0	7.8	3.8	14.2	6.92			
2052	3/16/98	8	1	52	0	7.4	3.8	14.2	6.56			
2053	3/16/98	9	1	133	0	13.3	4	13.9	11.21	Yes	**** No ****	Yes
2054	3/16/98	10	1	136	0	14.1	4	13.9	11.88	Yes	**** No ****	Yes
2055	3/16/98	11	1	135	0	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2056	3/16/98	12	1	54	0	8.1	3.8	14.2	7.18			
2057	3/16/98	13	1	58	0	8	3.8	14.2	7.10			
2058	3/16/98	14	1	52	0	7.5	3.8	14.2	6.65			
2059	3/16/98	15	1	50	0	7.5	3.8	14.2	6.65			
2060	3/16/98	16	1	54	0	7.7	3.8	14.2	6.83			
2061	3/16/98	17	1	55	0	7.6	3.8	14.2	6.74			
2062	3/16/98	18	1	79	0	9.8	3.9	14.1	8.47	Yes	Yes	Yes
2063	3/16/98	19	1	68	0	9.2	3.8	14.2	8.16	Yes	Yes	Yes
2064	3/16/98	20	1	62	0	8.4	3.9	14.1	7.26	Yes	Yes	Yes



1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2065	3/16/98	21	1	52	0	9.3	3.5	14.8	8.96			
2066	3/17/98	9	0.5	33	621.1	20.9	1.9	17.6	37.08			
2067	3/17/98	10	1	51	836.3	8	3.8	14.2	7.10			
2068	3/17/98	11	1	51	831.5	7.6	3.8	14.2	6.74			
2069	3/17/98	12	1	50	829.8	7.5	3.8	14.2	6.65			
2070	3/17/98	13	1	51	830	7.5	3.8	14.2	6.65			
2071	3/17/98	14	1	56	869.4	8	3.8	14.2	7.10			
2072	3/17/98	15	1	50	826.7	7.6	3.7	14.4	6.92			
2073	3/17/98	16	1	51	828.6	7.8	3.7	14.4	7.11			
2074	3/17/98	17	1	51	831.8	7.9	3.7	14.4	7.20			
2075	3/17/98	18	1	55	864.9	8	3.8	14.2	7.10			
2076	3/17/98	19	1	104	1222.8	12.1	4	13.9	10.20	Yes	**** No ****	Yes
2077	3/17/98	20	1	113	1298.2	13.2	4	13.9	11.12	Yes	**** No ****	Yes
2078	3/17/98	21	1	33	670.7	17.9	3.1	15.5	19.46			
2079	3/17/98	22	1	23	553.8	28.8	2.6	16.3	37.34			
2080	3/18/98	10	0.75	45	768.5	29.3	3.2	15.3	30.86			
2081	3/18/98	11	1	92	1141.2	10.9	4	13.9	9.19	Yes	**** No ****	Yes
2082	3/18/98	12	1	101	1205.2	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2083	3/18/98	13	1	93	1146.7	11.3	4	13.9	9.52	Yes	**** No ****	Yes
2084	3/18/98	14	1	52	851.8	7.2	3.8	14.2	6.39			
2085	3/18/98	15	1	52	851.9	7	3.9	14.1	6.05			
2086	3/18/98	16	1	53	858.7	7.1	3.9	14.1	6.14			
2087	3/18/98	17	1	59	902.2	7.6	3.9	14.1	6.57			
2088	3/18/98	18	1	71	991.7	9	3.9	14.1	7.78	Yes	Yes	Yes
2089	3/18/98	19	1	51	842	7.1	3.8	14.2	6.30			
2090	3/18/98	20	1	50	839.4	7.2	3.9	14.1	6.22			
2091	3/18/98	21	0.75	42	724.9	8.8	3.4	14.9	8.72			
2092	3/19/98	8	0.5	53	817.7	25.5	3.2	15.3	26.86			
2093	3/19/98	9	1	75	1022.9	9.6	3.9	14.1	8.30	Yes	Yes	Yes
2094	3/19/98	10	1	52	850.4	7.5	3.9	14.1	6.48			
2095	3/19/98	11	1	54	864.1	7.6	3.9	14.1	6.57			
2096	3/19/98	12	1	52	851.3	7.5	3.9	14.1	6.48			
2097	3/19/98	13	1	54	861.3	7.7	3.9	14.1	6.65			
2098	3/19/98	14	1	54	865.1	7.8	3.9	14.1	6.74			
2099	3/19/98	15	1	51	843	7.6	3.9	14.1	6.57			
2100	3/19/98	16	1	51	845.5	7.4	3.9	14.1	6.40			
2101	3/19/98	17	1	53	863.3	7.5	4	13.9	6.32			
2102	3/19/98	18	1	74	1019.8	9.4	4	13.9	7.92	Yes	Yes	Yes
2103	3/19/98	19	1	81	1063.3	10	4.1	13.7	8.22	Yes	Yes	Yes
2104	3/19/98	20	1	122	1371	13.6	4.2	13.5	10.91	Yes	**** No ****	Yes
2105	3/19/98	21	1	59	858.3	10.4	3.7	14.4	9.47			
2106	3/20/98	9	0.25	23	516.8	30.1	2.4	16.7	42.27			
2107	3/20/98	10	1	73	1011.5	11.3	4.1	13.7	9.29	Yes	**** No ****	Yes
2108	3/20/98	11	1	88	1119.3	11.2	4.1	13.7	9.21	Yes	**** No ****	Yes
2109	3/20/98	12	1	59	900.9	8.4	4	13.9	7.08			
2110	3/20/98	13	1	52	856.9	7.8	3.9	14.1	6.74			
2111	3/20/98	14	1	57	893	8	4	13.9	6.74			
2112	3/20/98	15	1	51	845	7.7	3.9	14.1	6.65			
2113	3/20/98	16	1	51	836.3	7.7	3.9	14.1	6.65			
2114	3/20/98	17	1	51	836.2	7.8	3.9	14.1	6.74			
2115	3/20/98	18	1	51	838.7	7.7	3.9	14.1	6.65			
2116	3/20/98	19	1	51	840.9	7.7	3.9	14.1	6.65			
2117	3/20/98	20	0.5	39	686.2	9.6	3.4	14.9	9.52			
2118	3/21/98	21	0.75	0	371		2.2	17.0				
2119	3/21/98	22	1	0	392.5	11.7	1.1	19.0	35.85			
2120	3/21/98	23	0.5	0	302.6	15.6	1.1	19.0	47.80			
2121	3/22/98	18	1	94	1059.5	20.9	3.8	14.2	18.54	Yes	**** No ****	**** No ****
2122	3/22/98	19	1	130	1444.6	16.3	4	13.9	13.74	Yes	**** No ****	Yes
2123	3/22/98	20	1	71	983.4	10.3	3.8	14.2	9.14	Yes	**** No ****	Yes
2124	3/22/98	21	0.75	40	688.9	9.1	3.3	15.1	9.29			
2125	3/23/98	13	0.5	35	653.4	20.5	3.1	15.5	22.29			
2126	3/23/98	14	1	68	960.6	10.6	3.9	14.1	9.16	Yes	**** No ****	Yes
2127	3/23/98	15	1	55	862.7	8.6	3.8	14.2	7.63			
2128	3/23/98	16	1	51	829.8	7.9	3.7	14.4	7.20			
2129	3/23/98	17	1	51	829	7.9	3.7	14.4	7.20			
2130	3/23/98	18	1	89	1119.6	10.9	3.9	14.1	9.42	Yes	**** No ****	Yes
2131	3/23/98	19	1	118	1339.4	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2132	3/23/98	20	1	110	1270	12.2	4	13.9	10.28	Yes	**** No ****	Yes
2133	3/23/98	21	0.75	89	1063.8	12.5	3.6	14.6	11.70	Yes	**** No ****	Yes
2134	3/24/98	12	0.5	83	689.2		3.7	14.4		Yes	Yes	Yes
2135	3/24/98	13	1	117	1333.8	13.5	3.9	14.1	11.67	Yes	**** No ****	Yes
2136	3/24/98	14	1	118	1335.7	14.8	3.9	14.1	12.79	Yes	**** No ****	Yes
2137	3/24/98	15	1	113	1292.8	13.4	3.9	14.1	11.58	Yes	**** No ****	Yes
2138	3/24/98	16	1	112	1283.8	13.3	3.9	14.1	11.49	Yes	**** No ****	Yes
2139	3/24/98	17	1	111	1272.8	12.8	3.9	14.1	11.06	Yes	**** No ****	Yes
2140	3/24/98	18	1	119	1347.2	14.4	3.9	14.1	12.45	Yes	**** No ****	Yes
2141	3/24/98	19	1	111	1268.2	12.9	3.9	14.1	11.15	Yes	**** No ****	Yes
2142	3/24/98	20	0.75	94	1112.4	13.4	3.7	14.4	12.21	Yes	**** No ****	Yes
2143	3/25/98	10	1	4	393	37.7	2	17.4	63.54			
2144	3/25/98	11	0.5	4	389.2		2.3	16.9				
2145	3/25/98	12	0.25	21	480.9		2.3	16.9				
2146	3/25/98	13	1	25	588.1	25.7	2.6	16.3	33.32			
2147	3/25/98	14	0.5	13	469.1	26.3	2.1	17.2	42.21			
2148	3/25/98	16	0.75	34	641	13.1	0.4	20.2	110.39			
2149	3/26/98	5	0.25	0	0	0	0	20.9				
2150	3/27/98	17	0.25	0	371.5	20.4	0.7	19.7	98.23			
2151	3/28/98	11	0.25	41	725	67.6	1.8	17.7	126.59			
2152	3/28/98	12	1	30	636	38.3	2.9	15.8	44.52			
2153	3/28/98	13	1	34	665	54.3	2.7	16.2	67.79			
2154	3/28/98	14	0.25	14	339.6	40.2	2	17.4	67.75			
2155	3/30/98	8	0.25	5	296.4	10.8	1.7	17.9	21.41			
2156	3/30/98	9	1	110	1283	19.6	4	13.9	16.52	Yes	**** No ****	**** No ****
2157	3/30/98	10	1	116	1311.8	14.2	4	13.9	11.97	Yes	**** No ****	Yes
2158	3/30/98	11	1	111	1267	14.4	4	13.9	12.13	Yes	**** No ****	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2159	3/30/98	12	0.75	99	976.5	16.4	3.8	14.2	14.55	Yes	**** No ****	Yes
2160	3/30/98	17	0.5	44	762	56.6	2.4	16.7	79.49			
2161	3/30/98	18	1	45	772.6	19.7	3.5	14.8	18.97			
2162	3/30/98	19	1	49	823.8	7.4	3.8	14.2	6.56			
2163	3/30/98	20	1	49	821.8	7.2	3.8	14.2	6.39			
2164	3/30/98	21	1	48	815	7.2	3.8	14.2	6.39			
2165	3/30/98	22	0.25	2	150.9	17.7	1.3	18.6	45.89			
2166	3/31/98	3	1	61	880.8	15.5	3.6	14.6	14.51	Yes	**** No ****	Yes
2167	3/31/98	4	1	55	869.2	8.1	3.9	14.1	7.00			
2168	3/31/98	5	1	51	840.6	7.5	3.8	14.2	6.65			
2169	3/31/98	6	1	59	900.7	7.8	3.8	14.2	6.92			
2170	3/31/98	7	1	125	1397.2	13.7	4	13.9	11.54	Yes	**** No ****	Yes
2171	3/31/98	8	1	137	1489	14.2	3.9	14.1	12.27	Yes	**** No ****	Yes
2172	3/31/98	9	1	137	1490.3	14.1	3.9	14.1	12.19	Yes	**** No ****	Yes
2173	3/31/98	10	1	137	1491.6	15	4	13.9	12.64	Yes	**** No ****	Yes
2174	3/31/98	11	1	136	1480.5	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2175	3/31/98	12	1	135	1468.6	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2176	3/31/98	13	1	133	1454.2	15.8	3.9	14.1	13.66	Yes	**** No ****	Yes
2177	3/31/98	14	1	132	1447.3	16	3.9	14.1	13.83	Yes	**** No ****	Yes
2178	3/31/98	15	1	132	1445.1	16.1	3.9	14.1	13.91	Yes	**** No ****	Yes
2179	3/31/98	16	1	132	1448.3	16	3.9	14.1	13.83	Yes	**** No ****	Yes
2180	3/31/98	17	1	132	1450.9	16.1	4	13.9	13.57	Yes	**** No ****	Yes
2181	3/31/98	18	1	133	1459	16	4	13.9	13.48	Yes	**** No ****	Yes
2182	3/31/98	19	1	134	1467.2	15.8	4	13.9	13.31	Yes	**** No ****	Yes
2183	3/31/98	20	1	136	1481.7	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2184	3/31/98	21	0.5	78	966.3	14.3	3.3	15.1	14.61	Yes	**** No ****	Yes
2185	4/1/98	7	1	47	790.6	15.7	3.4	14.9	15.56			
2186	4/1/98	8	1	53	856.7	7.9	3.8	14.2	7.01			
2187	4/1/98	9	1	49	824.3	8.4	3.8	14.2	7.45			
2188	4/1/98	10	0.25	3	574.3	29.2	1.6	18.1	61.52			
2189	4/1/98	11	0.5	39	701.7		2.2	17.0	0.00			
2190	4/1/98	12	1	44	739.3	16.5	2.9	15.8	19.18			
2191	4/1/98	13	1	60	901	8.9	3.8	14.2	7.89			
2192	4/1/98	14	1	60	898.7	8.9	3.8	14.2	7.89			
2193	4/1/98	15	1	60	898.1	9	3.8	14.2	7.98			
2194	4/1/98	16	1	31	627.4	45.6	2.8	18.0	54.89			
2195	4/1/98	17	0.5	45	756		2.7	16.2	0.00			
2196	4/1/98	20	0.25	45	762	63.5	3	15.6	71.35			
2197	4/1/98	21	0.5	30	691		3	15.6	0.00			
2198	4/2/98	6	0.5	38	677.7		3	15.6	0.00			
2199	4/2/98	7	1	54	861.4	6.5	3.1	15.5	7.07			
2200	4/2/98	8	1	55	869.6	7.9	3.8	14.2	7.01			
2201	4/2/98	9	1	52	846.1	7.6	3.8	14.2	6.74			
2202	4/2/98	10	1	70	976.8	9.1	3.9	14.1	7.86	Yes	Yes	Yes
2203	4/2/98	11	1	61	915.4	7.9	3.9	14.1	6.83	Yes	Yes	Yes
2204	4/2/98	12	1	53	849.9	7.3	3.6	14.6	6.84			
2205	4/2/98	13	1	50	830	7	3.8	14.2	6.21			
2206	4/2/98	14	0.25	27	658.5	20	2.7	16.2	24.97			
2207	4/4/98	12	0.75	39	697.1		3.3	15.1	0.00			
2208	4/4/98	13	1	39	734.3		3.5	14.8	0.00			
2209	4/5/98	19	1	100	1180.3	18.4	3.4	14.9	18.24	Yes	**** No ****	**** No ****
2210	4/5/98	20	0.5	65	879.1	12.7	3.3	15.1	12.97	Yes	**** No ****	**** No ****
2211	4/6/98	5	0.75	84	1052.4	19.5	3.6	14.6	18.26	Yes	**** No ****	**** No ****
2212	4/6/98	6	1	126	1399.7	13.1	4	13.9	11.04	Yes	**** No ****	Yes
2213	4/6/98	7	1	123	1372.7	12.8	4	13.9	10.79	Yes	**** No ****	Yes
2214	4/6/98	8	0.25	14	658.9	26.6	2.6	16.3	34.48			
2215	4/6/98	14	0.25	60	794.4	26.1	3.5	14.8	25.14			
2216	4/6/98	15	1	126	1394	12.2	4	13.9	10.28	Yes	**** No ****	Yes
2217	4/6/98	16	1	126	1395.1	12.6	4	13.9	10.62	Yes	**** No ****	Yes
2218	4/6/98	17	1	120	1347.9	12.2	4	13.9	10.28	Yes	**** No ****	Yes
2219	4/6/98	18	1	125	1385.9	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2220	4/6/98	19	1	125	1384.3	12.2	4.1	13.7	10.03	Yes	**** No ****	Yes
2221	4/6/98	20	1	98	1180.1	10.7	4	13.9	9.02	Yes	**** No ****	Yes
2222	4/6/98	21	0.75	56	824.3	10.2	3.6	14.6	9.55			
2223	4/7/98	13	0.5	39	728.2	21	3.3	15.1	21.45			
2224	4/7/98	14	1	53	854.5	7.5	3.8	14.2	6.65			
2225	4/7/98	15	1	53	851.5	7.8	3.8	14.2	6.92			
2226	4/7/98	16	1	53	851.7	7.7	3.8	14.2	6.83			
2227	4/7/98	17	1	52	847.5	7.6	3.8	14.2	6.74			
2228	4/7/98	18	1	92	1146.8	10.4	4	13.9	8.76	Yes	Yes	Yes
2229	4/7/98	19	1	109	1271.7	12.8	4.1	13.7	10.52	Yes	**** No ****	Yes
2230	4/7/98	20	1	45	768.3	8.6	3.6	14.6	8.05			
2231	4/8/98	13	0.25	4	302.3	16	1.8	17.7	29.96			
2232	4/8/98	14	1	51	846.8	14.9	3.8	14.2	13.22			
2233	4/8/98	15	1	50	835.4	7.8	3.8	14.2	6.92			
2234	4/8/98	16	1	50	833.7	7.4	3.9	14.1	6.40			
2235	4/8/98	17	1	53	865.5	7.5	3.9	14.1	6.48			
2236	4/8/98	18	1	87	1116.9	10.3	4	13.9	8.68	Yes	Yes	Yes
2237	4/8/98	19	1	105	1242.4	12.1	4.1	13.7	9.95	Yes	**** No ****	Yes
2238	4/8/98	20	1	51	848.4	7.3	3.9	14.1	6.31			
2239	4/8/98	21	0.75	41	732.1	8.8	3.5	14.8	8.47			
2240	4/9/98	12	0.5	39	681.4	24	2.6	16.3	31.11			
2241	4/9/98	13	1	64	940.8	9.2	3.9	14.1	7.95	Yes	Yes	Yes
2242	4/9/98	14	1	93	1153.4	10.7	3.9	14.1	9.25	Yes	**** No ****	Yes
2243	4/9/98	15	1	125	1394.5	13.1	4	13.9	11.04	Yes	**** No ****	Yes
2244	4/9/98	16	1	125	1394.9	13.2	4	13.9	11.12	Yes	**** No ****	Yes
2245	4/9/98	17	1	125	1395.7	13	4	13.9	10.95	Yes	**** No ****	Yes
2246	4/9/98	18	1	106	1251.3	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2247	4/9/98	19	1	94	1166	11.5	3.9	14.1	9.94	Yes	**** No ****	Yes
2248	4/9/98	20	1	93	1149.5	11.2	4	13.9	9.44	Yes	**** No ****	Yes
2249	4/9/98	21	0.5	44	709.9	11.1	3.2	15.3	11.69			
2250	4/13/98	11	0.5	82	1079.1	25	3.7	14.4	22.78	Yes	**** No ****	**** No ****
2251	4/13/98	12	1	126	1410.7	13.5	3.9	14.1	11.67	Yes	**** No ****	Yes
2252	4/13/98	13	1	127	1404.4	13.4	4	13.9	11.29	Yes	**** No ****	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2253	4/13/98	14	1	126	1392.9	13.2	4	13.9	11.12	Yes	**** No ****	Yes
2254	4/13/98	15	1	126	1394.2	12.8	4	13.9	10.79	Yes	**** No ****	Yes
2255	4/13/98	16	1	126	1394.7	12.7	4	13.9	10.70	Yes	**** No ****	Yes
2256	4/13/98	17	1	126	1391.6	12.7	4	13.9	10.70	Yes	**** No ****	Yes
2257	4/13/98	18	1	126	1399.1	12.6	4.1	13.7	10.36	Yes	**** No ****	Yes
2258	4/13/98	19	1	126	1395.6	12.5	4.1	13.7	10.28	Yes	**** No ****	Yes
2259	4/13/98	20	1	126	1391.1	12.4	4.1	13.7	10.19	Yes	**** No ****	Yes
2260	4/13/98	21	1	105	1199.4	12.8	3.8	14.2	11.35	Yes	**** No ****	Yes
2261	4/14/98	5	0.75	50	796.7	21.2	3.4	14.9	21.02			
2262	4/14/98	6	1	54	867.3	7.6	3.9	14.1	6.57			
2263	4/14/98	7	1	64	939.7	7.9	3.9	14.1	6.83	Yes	Yes	Yes
2264	4/14/98	8	1	123	1373.7	12	4	13.9	10.11	Yes	**** No ****	Yes
2265	4/14/98	9	1	126	1395.2	12.4	4.1	13.7	10.19	Yes	**** No ****	Yes
2266	4/14/98	10	1	126	1390.4	12.5	4.1	13.7	10.28	Yes	**** No ****	Yes
2267	4/14/98	11	1	126	1397.9	12.4	4	13.9	10.45	Yes	**** No ****	Yes
2268	4/14/98	12	1	126	1398.9	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2269	4/14/98	13	1	125	1396.3	12.5	4	13.9	10.53	Yes	**** No ****	Yes
2270	4/14/98	14	1	78	1026.6	9.4	3.9	14.1	8.12	Yes	Yes	Yes
2271	4/14/98	15	1	55	867.4	7.3	3.8	14.2	6.48			
2272	4/14/98	16	1	52	846.9	7.3	3.8	14.2	6.48			
2273	4/14/98	17	1	52	853.2	7.5	3.8	14.2	6.65			
2274	4/14/98	18	1	82	1073.8	9.4	3.9	14.1	8.12	Yes	Yes	Yes
2275	4/14/98	19	1	133	1470.8	14.4	4.1	13.7	11.84	Yes	**** No ****	Yes
2276	4/14/98	20	1	135	1487.8	14.8	4.1	13.7	12.17	Yes	**** No ****	Yes
2277	4/14/98	21	1	57	885	8.2	3.9	14.1	7.09			
2278	4/14/98	22	0.25	17	400.7	13.2	2.4	16.7	18.54			
2279	4/15/98	5	0.75	47	790.2	12.2	3.5	14.8	11.75			
2280	4/15/98	6	1	85	1091.2	9.8	4	13.9	8.26	Yes	Yes	Yes
2281	4/15/98	7	1	127	1398.2	13.1	4.1	13.7	10.77	Yes	**** No ****	Yes
2282	4/15/98	8	1	127	1398.1	13	4.1	13.7	10.69	Yes	**** No ****	Yes
2283	4/15/98	9	1	127	1397.7	12.8	4	13.9	10.79	Yes	**** No ****	Yes
2284	4/15/98	10	1	127	1393.7	12.8	4.1	13.7	10.52	Yes	**** No ****	Yes
2285	4/15/98	11	1	128	1393.5	12.7	4.1	13.7	10.44	Yes	**** No ****	Yes
2286	4/15/98	12	1	128	1392.8	12.8	4	13.9	10.79	Yes	**** No ****	Yes
2287	4/15/98	13	1	127	1393.1	12.9	4	13.9	10.87	Yes	**** No ****	Yes
2288	4/15/98	14	1	127	1394.1	12.9	4	13.9	10.87	Yes	**** No ****	Yes
2289	4/15/98	15	1	127	1395.6	12.9	4	13.9	10.87	Yes	**** No ****	Yes
2290	4/15/98	16	1	128	1394.2	13	4	13.9	10.95	Yes	**** No ****	Yes
2291	4/15/98	17	1	132	1429.6	13.6	4	13.9	11.46	Yes	**** No ****	Yes
2292	4/15/98	18	1	137	1483.9	14.3	4	13.9	12.05	Yes	**** No ****	Yes
2293	4/15/98	19	1	136	1478.7	13.9	4	13.9	11.71	Yes	**** No ****	Yes
2294	4/15/98	20	1	136	1475.6	13.4	4	13.9	11.29	Yes	**** No ****	Yes
2295	4/15/98	21	1	81	1029.9	11.4	3.7	14.4	10.39	Yes	**** No ****	Yes
2296	4/16/98	5	0.5	42	727.1	17.9	3.6	14.6	16.76			
2297	4/16/98	6	1	51	838.4	7.6	3.9	14.1	6.57			
2298	4/16/98	7	1	120	1354.4	12.8	4.1	13.7	10.52	Yes	**** No ****	Yes
2299	4/16/98	8	1	81	1065.2	9.8	4	13.9	8.26	Yes	Yes	Yes
2300	4/16/98	9	1	132	1449.4	13.9	4.1	13.7	11.43	Yes	**** No ****	Yes
2301	4/16/98	10	1	136	1479.7	13.4	4	13.9	11.29	Yes	**** No ****	Yes
2302	4/16/98	11	1	137	1477.7	13.5	4	13.9	11.38	Yes	**** No ****	Yes
2303	4/16/98	12	1	137	1480.7	13.7	4	13.9	11.54	Yes	**** No ****	Yes
2304	4/16/98	13	1	137	1482	14.1	4	13.9	11.88	Yes	**** No ****	Yes
2305	4/16/98	14	1	137	1485.1	14	4	13.9	11.80	Yes	**** No ****	Yes
2306	4/16/98	15	1	137	1486.8	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2307	4/16/98	16	1	75	1013.4	9.9	3.9	14.1	8.56	Yes	Yes	Yes
2308	4/16/98	17	1	67	951.6	8.6	3.9	14.1	7.43	Yes	Yes	Yes
2309	4/16/98	18	1	131	1439	14.1	4.1	13.7	11.59	Yes	**** No ****	Yes
2310	4/16/98	19	1	138	1506.2	15	4.1	13.7	12.33	Yes	**** No ****	Yes
2311	4/16/98	20	1	132	1450.6	14.7	4.1	13.7	12.09	Yes	**** No ****	Yes
2312	4/16/98	21	0.5	55	788	11.8	3.3	15.1	12.05			
2313	4/17/98	7	0.5	51	776.4	18.2	3.3	15.1	18.59			
2314	4/17/98	8	1	71	983.8	9.3	4	13.9	7.84	Yes	Yes	Yes
2315	4/17/98	9	1	71	980.1	8.9	4	13.9	7.50	Yes	Yes	Yes
2316	4/17/98	10	1	70	976.9	8.8	4	13.9	7.42	Yes	Yes	Yes
2317	4/17/98	11	1	70	976	8.8	3.9	14.1	7.61	Yes	Yes	Yes
2318	4/17/98	12	1	70	975.6	8.9	3.9	14.1	7.69	Yes	Yes	Yes
2319	4/17/98	13	1	68	954.1	9.5	3.9	14.1	8.21	Yes	Yes	Yes
2320	4/17/98	14	0.25	4	247.5	23.7	1.5	18.3	53.26			
2321	4/18/98	0	0.25	1	0	0	0	20.9				
2322	4/18/98	7	0.75	97	1158.9	18.2	3.6	14.6	17.04	Yes	**** No ****	**** No ****
2323	4/18/98	8	1	129	1436.8	13.4	4.1	13.7	11.02	Yes	**** No ****	Yes
2324	4/18/98	9	1	74	1013.2	9.8	4	13.9	8.26	Yes	Yes	Yes
2325	4/18/98	10	0.75	45	756.3	8.6	3.6	14.6	8.05			
2326	4/20/98	9	0.25	32	594.7	23	2.8	18.0	27.69			
2327	4/20/98	10	1	94	1171.5	9.9	3.8	14.2	8.78	Yes	Yes	Yes
2328	4/20/98	11	1	134	1477.2	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
2329	4/20/98	12	1	134	1474.9	15.8	4.1	13.7	12.99	Yes	**** No ****	Yes
2330	4/20/98	13	1	134	1473.9	15.9	4.1	13.7	13.07	Yes	**** No ****	Yes
2331	4/20/98	14	1	126	1410.1	15.4	4.1	13.7	12.66	Yes	**** No ****	Yes
2332	4/20/98	15	1	111	1298.6	12.6	4	13.9	10.62	Yes	**** No ****	Yes
2333	4/20/98	16	1	117	1344.1	13.4	4.1	13.7	11.02	Yes	**** No ****	Yes
2334	4/20/98	17	1	136	1490.8	14.6	4.1	13.7	12.00	Yes	**** No ****	Yes
2335	4/20/98	18	1	135	1487.4	13.8	4.1	13.7	11.35	Yes	**** No ****	Yes
2336	4/20/98	19	1	136	1494.8	14.4	4.1	13.7	11.84	Yes	**** No ****	Yes
2337	4/20/98	20	1	136	1493.8	14.7	4.1	13.7	12.09	Yes	**** No ****	Yes
2338	4/20/98	21	0.5	67	857.5	14.1	3.2	15.3	14.85	Yes	**** No ****	Yes
2339	4/21/98	8	1	97	1165.7	16.8	3.7	14.4	15.30	Yes	**** No ****	**** No ****
2340	4/21/98	9	1	105	1254.6	12.2	4.1	13.7	10.03	Yes	**** No ****	Yes
2341	4/21/98	10	1	115	1332.9	13.3	4.1	13.7	10.93	Yes	**** No ****	Yes
2342	4/21/98	11	1	133	1473.6	16.2	4.1	13.7	13.32	Yes	**** No ****	Yes
2343	4/21/98	12	1	132	1466.3	16.3	4.1	13.7	13.40	Yes	**** No ****	Yes
2344	4/21/98	13	1	128	1430.9	15.4	4.1	13.7	12.66	Yes	**** No ****	Yes
2345	4/21/98	14	1	120	1362.5	14	4.1	13.7	11.51	Yes	**** No ****	Yes
2346	4/21/98	15	1	127	1413	15.5	4.1	13.7	12.74	Yes	**** No ****	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2347	4/21/98	16	1	63	921.7	9.1	3.9	14.1	7.86	Yes	Yes	Yes
2348	4/21/98	17	1	71	985.3	9.4	3.9	14.1	8.12	Yes	Yes	Yes
2349	4/21/98	18	1	85	1096.5	10.2	4	13.9	8.60	Yes	Yes	Yes
2350	4/21/98	19	1	135	1480.4	15.7	4.1	13.7	12.91	Yes	**** No ****	Yes
2351	4/21/98	20	1	104	1212.5	13.7	3.8	14.2	12.15	Yes	**** No ****	Yes
2352	4/22/98	5	0.25	0	134.8	1.4	1.5	18.3	3.15			
2353	4/22/98	6	1	79	1054.9	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2354	4/22/98	7	1	130	1433.1	13.2	4.2	13.5	10.59	Yes	**** No ****	Yes
2355	4/22/98	8	1	130	1430.6	13	4.1	13.7	10.69	Yes	**** No ****	Yes
2356	4/22/98	9	1	130	1434	13.1	4.1	13.7	10.77	Yes	**** No ****	Yes
2357	4/22/98	10	1	130	1436	13.2	4.1	13.7	10.85	Yes	**** No ****	Yes
2358	4/22/98	11	1	129	1436.4	14.3	4.1	13.7	11.76	Yes	**** No ****	Yes
2359	4/22/98	12	1	129	1436.6	16.1	4.1	13.7	13.24	Yes	**** No ****	Yes
2360	4/22/98	13	1	129	1427.6	16.4	4.1	13.7	13.48	Yes	**** No ****	Yes
2361	4/22/98	14	1	129	1422.2	16.3	4	13.9	13.74	Yes	**** No ****	Yes
2362	4/22/98	15	1	129	1419.6	16.5	4.1	13.7	13.57	Yes	**** No ****	Yes
2363	4/22/98	16	1	129	1422	16.5	4.1	13.7	13.57	Yes	**** No ****	Yes
2364	4/22/98	17	1	130	1424.2	16.5	4.1	13.7	13.57	Yes	**** No ****	Yes
2365	4/22/98	18	1	128	1408.1	16.4	4.1	13.7	13.48	Yes	**** No ****	Yes
2366	4/22/98	19	1	59	886.4	8.6	3.9	14.1	7.43			
2367	4/22/98	20	0.75	45	725.7	9.4	3.5	14.8	9.05			
2368	4/23/98	7	1	51	808.3	12.7	3.7	14.4	11.57			
2369	4/23/98	8	1	60	894.5	8.5	3.9	14.1	7.35			
2370	4/23/98	9	1	57	883.5	8.2	3.8	14.2	7.27			
2371	4/23/98	10	1	55	872.2	8.2	3.8	14.2	7.27			
2372	4/23/98	11	1	56	876.7	8.4	3.8	14.2	7.45			
2373	4/23/98	12	1	58	890.4	8.8	3.8	14.2	7.81			
2374	4/23/98	13	1	67	952.4	9.8	3.8	14.2	8.69	Yes	Yes	Yes
2375	4/23/98	14	1	55	863.4	8.5	3.7	14.4	7.74			
2376	4/23/98	15	1	92	1151.6	12.2	3.8	14.2	10.82	Yes	**** No ****	Yes
2377	4/23/98	16	1	122	1375.2	16.4	3.9	14.1	14.17	Yes	**** No ****	Yes
2378	4/23/98	17	1	123	1379.5	16.5	3.9	14.1	14.26	Yes	**** No ****	Yes
2379	4/23/98	18	1	125	1392.3	16.3	3.9	14.1	14.09	Yes	**** No ****	Yes
2380	4/23/98	19	1	126	1407	16.1	4	13.9	13.57	Yes	**** No ****	Yes
2381	4/23/98	20	1	127	1412.4	15.9	4	13.9	13.40	Yes	**** No ****	Yes
2382	4/23/98	21	1	74	955.5	12.4	3.6	14.6	11.61	Yes	**** No ****	Yes
2383	4/28/98	7	1	25	582.1	47.2	2.1	17.2	75.76			
2384	4/28/98	8	0.5	19	484.4	44.6	2	17.4	75.17			
2385	5/1/98	19	0.75	13	443.1	32.1	1.5	18.3	72.13			
2386	5/4/98	7	0.5	13	429.4	35.9	2	17.4	60.50			
2387	5/4/98	8	0.5	15	501	35.6	1.6	18.1	75.00			
2388	5/4/98	17	0.25	15	495.4		2.5	16.5				
2389	5/5/98	21	1	44	773.4	15.2	3.4	14.9	15.07			
2390	5/5/98	22	0.25	0	0.2	0.9	0	20.9				
2391	5/6/98	7	1	45	764.5	8	3.8	14.2	7.10			
2392	5/6/98	8	1	62	923.5	8.1	3.9	14.1	7.00	Yes	Yes	Yes
2393	5/6/98	9	1	42	732.8	32.9	3.1	15.5	35.77			
2394	5/6/98	10	1	15	506.7	19.2	2.7	16.2	23.97			
2395	5/6/98	11	0.25	12	577.9	20.5	2.4	16.7	28.79			
2396	5/6/98	13	0.25	30	620.1	54.3	2.3	16.9	79.58			
2397	5/6/98	21	0.25	18	881.7	35	2.9	15.8	40.68			
2398	5/7/98	7	0.75	24	560.1	29.3	2.7	16.2	36.58			
2399	5/7/98	8	0.75	30	636.4	12.8	2.7	16.2	15.98			
2400	5/7/98	9	0.5	31	639	12.7	2.7	16.2	15.85			
2401	5/7/98	16	0.25	8	965.9		2.2	17.0				
2402	5/8/98	5	1	53	790.2		2.2	17.0				
2403	5/8/98	6	1	65	947.8		2.2	17.0		Yes	Yes	Yes
2404	5/8/98	7	1	63	908.1	3.1	1.6	18.1	6.53	Yes	Yes	Yes
2405	5/8/98	8	1	74	894.2	3.9	3.4	14.9	3.87	Yes	Yes	Yes
2406	5/9/98	10	0.25	29	424.1	55.7	3.2	15.3	58.67			
2407	5/9/98	11	0.5	30	636.3	30.9	2.9	15.8	35.92			
2408	5/9/98	14	0.75	30	644	51.5	2.9	15.8	59.86			
2409	5/9/98	15	1	64	934.4	9.5	3.8	14.2	8.43	Yes	Yes	Yes
2410	5/9/98	16	1	63	930.7	8.6	3.8	14.2	7.63	Yes	Yes	Yes
2411	5/9/98	17	1	63	930.3	8.4	3.8	14.2	7.45	Yes	Yes	Yes
2412	5/9/98	18	1	63	925.7	8.3	3.8	14.2	7.36	Yes	Yes	Yes
2413	5/9/98	19	1	91	1125.7	11.1	3.9	14.1	9.59	Yes	**** No ****	Yes
2414	5/9/98	20	0.5	75	430.8	6.2	1.7	17.9	12.29	Yes	**** No ****	Yes
2415	5/11/98	7	1	78	818.5	12.8	3	15.6	14.38	Yes	**** No ****	Yes
2416	5/11/98	8	1	67	954.7	8.7	3.9	14.1	7.52	Yes	Yes	Yes
2417	5/11/98	9	1	65	941.9	7.6	3.5	14.8	7.32	Yes	Yes	Yes
2418	5/11/98	10	1	98	1170.1	11.9	3.9	14.1	10.28	Yes	**** No ****	Yes
2419	5/11/98	11	1	117	1331	14.7	3.9	14.1	12.70	Yes	**** No ****	Yes
2420	5/11/98	12	1	126	1405.7	16.2	3.9	14.1	14.00	Yes	**** No ****	Yes
2421	5/11/98	13	1	126	1407.4	16.2	3.9	14.1	14.00	Yes	**** No ****	Yes
2422	5/11/98	14	1	126	1403.7	16.3	3.9	14.1	14.09	Yes	**** No ****	Yes
2423	5/11/98	15	1	128	1418.9	16	3.9	14.1	13.83	Yes	**** No ****	Yes
2424	5/11/98	16	1	129	1430.4	16	3.9	14.1	13.83	Yes	**** No ****	Yes
2425	5/11/98	17	1	127	1410.5	16	3.9	14.1	13.83	Yes	**** No ****	Yes
2426	5/11/98	18	1	66	944.8	8.5	3.8	14.2	7.54	Yes	Yes	Yes
2427	5/11/98	19	1	97	1164.4	11.9	3.9	14.1	10.28	Yes	**** No ****	Yes
2428	5/11/98	20	1	80	1016.7	11.6	3.8	14.2	10.29	Yes	**** No ****	Yes
2429	5/12/98	3	0.75	61	551.8	9.1	1.5	18.3	20.45	Yes	**** No ****	**** No ****
2430	5/12/98	4	1	89	1115.1	11	3.9	14.1	9.51	Yes	**** No ****	Yes
2431	5/12/98	5	1	77	1027.5	9.6	2.5	16.5	12.94	Yes	**** No ****	Yes
2432	5/12/98	6	0.75	63	495.3	3	1.6	18.1	6.32	Yes	Yes	Yes
2433	5/12/98	8	0.25	0	11.9	0.3	0.2	20.5	5.06			
2434	5/12/98	9	1	62	925	18.8	3.8	14.2	16.68	Yes	**** No ****	**** No ****
2435	5/12/98	10	1	70	976.1	8.8	3.9	14.1	7.61	Yes	Yes	Yes
2436	5/12/98	11	1	96	1156.8	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2437	5/12/98	12	1	101	1192.5	11.4	3.7	14.4	10.39	Yes	**** No ****	Yes
2438	5/12/98	13	1	100	1186.6	13.5	3.9	14.1	11.67	Yes	**** No ****	Yes
2439	5/12/98	14	1	97	1169.3	12.4	3.9	14.1	10.72	Yes	**** No ****	Yes
2440	5/12/98	15	1	100	1185.3	11.9	3.9	14.1	10.28	Yes	**** No ****	Yes

1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION  
7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2441	5/12/98	16	1	89	1111.7	12.1	3.9	14.1	10.46	Yes	**** No ****	Yes
2442	5/12/98	17	1	84	1075.9	11	3.9	14.1	9.51	Yes	**** No ****	Yes
2443	5/12/98	18	1	96	1156.9	12.3	3.9	14.1	10.63	Yes	**** No ****	Yes
2444	5/12/98	19	1	100	1189.9	12.1	3.9	14.1	10.46	Yes	**** No ****	Yes
2445	5/12/98	20	1	72	989	9.7	3.9	14.1	8.38	Yes	Yes	Yes
2446	5/12/98	21	0.25	8	16.7	1.5	0.2	20.5	25.28			
2447	5/13/98	5	0.25	13	87.7	5.2	0.6	19.8	29.21			
2448	5/13/98	6	1	65	952	10.2	3.9	14.1	8.82	Yes	Yes	Yes
2449	5/13/98	7	1	65	946.9	8.3	3.9	14.1	7.17	Yes	Yes	Yes
2450	5/13/98	8	1	66	950.7	8.3	3.9	14.1	7.17	Yes	Yes	Yes
2451	5/13/98	9	1	67	955.1	8.5	3.9	14.1	7.35	Yes	Yes	Yes
2452	5/13/98	10	1	66	948.9	8.6	3.9	14.1	7.43	Yes	Yes	Yes
2453	5/13/98	11	1	66	946.5	8.8	3.8	14.2	7.81	Yes	Yes	Yes
2454	5/13/98	12	1	96	1181.3	12.5	3.8	14.2	11.09	Yes	**** No ****	Yes
2455	5/13/98	13	1	119	1353.8	16.5	3.9	14.1	14.26	Yes	**** No ****	Yes
2456	5/13/98	14	1	118	1343.4	16.7	3.9	14.1	14.43	Yes	**** No ****	Yes
2457	5/13/98	15	1	118	1339.5	16.7	3.9	14.1	14.43	Yes	**** No ****	Yes
2458	5/13/98	16	1	118	1338.3	16.7	3.9	14.1	14.43	Yes	**** No ****	Yes
2459	5/13/98	17	1	120	1359	16.2	3.9	14.1	14.00	Yes	**** No ****	Yes
2460	5/13/98	18	1	107	1240.9	12.2	3.9	14.1	10.54	Yes	**** No ****	Yes
2461	5/13/98	19	1	127	1411.4	15.8	4	13.9	13.31	Yes	**** No ****	Yes
2462	5/13/98	20	1	104	1235.5	13.8	3.9	14.1	11.93	Yes	**** No ****	Yes
2463	5/13/98	21	0.5	43	668.4	10.3	3	15.6	11.57			
2464	5/14/98	4	0.25	5	271.5	8.4	1.8	17.7	15.73			
2465	5/14/98	5	1	65	948	14.5	3.9	14.1	12.53	Yes	**** No ****	Yes
2466	5/14/98	6	1	82	1078.3	10.4	4	13.9	8.76	Yes	Yes	Yes
2467	5/14/98	7	1	131	1452.9	15.8	4	13.9	13.31	Yes	**** No ****	Yes
2468	5/14/98	8	1	130	1450	15.9	4	13.9	13.40	Yes	**** No ****	Yes
2469	5/14/98	9	1	132	1463.4	15.1	4	13.9	12.72	Yes	**** No ****	Yes
2470	5/14/98	10	1	131	1455.1	15.1	4.1	13.7	12.41	Yes	**** No ****	Yes
2471	5/14/98	11	1	124	1379.2		4	13.9	Yes	Yes	Yes	Yes
2472	5/14/98	12	1	90	1102.7		4	13.9	Yes	Yes	Yes	Yes
2473	5/14/98	13	1	66	977.6		4	13.9	Yes	Yes	Yes	Yes
2474	5/14/98	14	1	77	977.6		4	13.9	Yes	Yes	Yes	Yes
2475	5/14/98	15	1	108	1215.2		4	13.9	Yes	Yes	Yes	Yes
2476	5/14/98	16	1	65	946	8.2	3.9	14.1	7.09	Yes	Yes	Yes
2477	5/14/98	17	1	65	945.2	8.1	3.9	14.1	7.00	Yes	Yes	Yes
2478	5/14/98	18	1	78	1034	9.6	3.9	14.1	8.30	Yes	Yes	Yes
2479	5/14/98	19	1	72	995.2	8.9	3.9	14.1	7.69	Yes	Yes	Yes
2480	5/14/98	20	1	81	1026.7	11.3	3.8	14.2	10.02	Yes	**** No ****	Yes
2481	5/15/98	5	0.5	4	692.5	10.2	3.8	14.2	9.05			
2482	5/15/98	6	0.25	15	496.9	17.6	2.8	16.0	21.19			
2483	5/15/98	7	0.25	14	480.9	33.7	1.9	17.6	59.79			
2484	5/15/98	13	0.5	59	884.2	10.2	3.8	14.2	9.05			
2485	5/15/98	14	1	93	1138.6	12.3	3.9	14.1	10.63	Yes	**** No ****	Yes
2486	5/15/98	15	1	113	1311.8	12.8	3.9	14.1	11.06	Yes	**** No ****	Yes
2487	5/15/98	16	1	128	1426.7	16.1	4	13.9	13.57	Yes	**** No ****	Yes
2488	5/15/98	17	0.5	87	1045	15.7	3.4	14.9	15.56	Yes	**** No ****	**** No ****
2489	5/16/98	7	0.75	14	495.5	44.9	2.1	17.2	72.07			
2490	5/16/98	8	1	73	988.4	19.4	3.5	14.8	18.68	Yes	**** No ****	**** No ****
2491	5/16/98	9	1	86	1095.5	11.9	3.8	14.2	10.56	Yes	**** No ****	Yes
2492	5/16/98	10	1	87	1100.9	12.2	3.8	14.2	10.82	Yes	**** No ****	Yes
2493	5/16/98	11	1	87	1103.4	12.4	3.8	14.2	11.00	Yes	**** No ****	Yes
2494	5/16/98	12	1	80	1052.5	11.8	3.8	14.2	10.47	Yes	**** No ****	Yes
2495	5/16/98	13	1	65	939.6	9	3.7	14.4	8.20	Yes	Yes	Yes
2496	5/16/98	14	1	66	948.9	9.2	3.7	14.4	8.38	Yes	Yes	Yes
2497	5/16/98	15	1	83	1072.8	11.3	3.7	14.4	10.29	Yes	**** No ****	Yes
2498	5/16/98	16	1	99	1182.1	12.3	3.8	14.2	10.91	Yes	**** No ****	Yes
2499	5/16/98	17	1	89	1113.6	12	3.8	14.2	10.64	Yes	**** No ****	Yes
2500	5/16/98	18	1	69	974.8	9.5	3.7	14.4	8.65	Yes	Yes	Yes
2501	5/16/98	19	1	69	976.1	9.4	3.7	14.4	8.56	Yes	Yes	Yes
2502	5/16/98	20	1	69	977.8	9.2	3.7	14.4	8.38	Yes	Yes	Yes
2503	5/16/98	21	0.5	61	897.6	10.7	3.7	14.4	9.75	Yes	**** No ****	Yes
2504	5/18/98	7	0.75	55	835.4	20.6	3	15.6	23.15			
2505	5/18/98	8	1	129	1438.3	13.8	4	13.9	11.63	Yes	**** No ****	Yes
2506	5/18/98	9	1	130	1449.5	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2507	5/18/98	10	1	130	1452	15.7	4	13.9	13.23	Yes	**** No ****	Yes
2508	5/18/98	11	1	130	1450.5	15.7	4	13.9	13.23	Yes	**** No ****	Yes
2509	5/18/98	12	1	130	1449.1	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2510	5/18/98	13	1	130	1450.7		4	13.9	Yes	Yes	Yes	Yes
2511	5/18/98	14	1	130	1450.8		4	13.9	Yes	Yes	Yes	Yes
2512	5/18/98	15	1	130	1449.1		4	13.9	Yes	Yes	Yes	Yes
2513	5/18/98	16	1	130	1452		4	13.9	Yes	Yes	Yes	Yes
2514	5/18/98	17	1	131	1453		4	13.9	Yes	Yes	Yes	Yes
2515	5/18/98	18	1	109	1280		3.9	14.1	Yes	Yes	Yes	Yes
2516	5/18/98	19	1	81	1058.1		3.9	14.1	Yes	Yes	Yes	Yes
2517	5/18/98	20	1	76	1021.5		3.9	14.1	Yes	Yes	Yes	Yes
2518	5/18/98	21	0.5	44	210.5		2.4	16.7				
2519	5/19/98	8	0.25	0	0.1	0.7	0.9	19.3	2.62			
2520	5/19/98	9	0.5	22	463.4	16.7	2.5	16.5	22.52			
2521	5/19/98	10	1	130	1455.5	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2522	5/19/98	11	1	130	1460.8		4	13.9	Yes	Yes	Yes	Yes
2523	5/19/98	12	1	130	1460.6		4	13.9	Yes	Yes	Yes	Yes
2524	5/19/98	13	1	127	1429.4	15.8	4	13.9	13.31	Yes	**** No ****	Yes
2525	5/19/98	14	1	130	1449.1	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2526	5/19/98	15	1	130	1450.1	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2527	5/19/98	16	1	130	1448.2	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2528	5/19/98	17	1	130	1450.9	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2529	5/19/98	18	1	131	1451.3	15.7	4	13.9	13.23	Yes	**** No ****	Yes
2530	5/19/98	19	1	103	1214.1	12.2	3.9	14.1	10.54	Yes	**** No ****	Yes
2531	5/19/98	20	0.5	74	935.3	12.8	3.3	15.1	13.07	Yes	**** No ****	Yes
2532	5/20/98	12	0.25	127	1443.4	6	1.5	18.3	13.48	Yes	**** No ****	Yes
2533	5/20/98	15	1	129	1440.5	15	4	13.9	12.64	Yes	**** No ****	Yes
2534	5/20/98	16	1	128	1438.9	14.9	4	13.9	12.56	Yes	**** No ****	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2535	5/20/98	17	1	129	1442.8	14.7	4	13.9	12.39	Yes	**** No ****	Yes
2536	5/20/98	18	1	88	1122	10.9	3.9	14.1	9.42	Yes	**** No ****	Yes
2537	5/20/98	19	0.75	58	850.6	9.4	3.6	14.6	8.80			
2538	5/21/98	14	1	128	1431.9	15.3	4	13.9	12.89	Yes	**** No ****	Yes
2539	5/21/98	15	1	128	1433.5	15.2	4	13.9	12.81	Yes	**** No ****	Yes
2540	5/21/98	16	1	129	1433.6	15	4	13.9	12.64	Yes	**** No ****	Yes
2541	5/21/98	17	1	102	1226.2	12.3	4	13.9	10.36	Yes	**** No ****	Yes
2542	5/21/98	18	1	65	942.6	8.1	3.9	14.1	7.00	Yes	Yes	Yes
2543	5/21/98	19	0.25	33	566.5	10.3	3.1	15.5	11.20			
2544	5/22/98	9	0.25	131	1458	15.3	4	13.9	12.89	Yes	**** No ****	Yes
2545	5/22/98	10	1	130	1451.2	15	4	13.9	12.64	Yes	**** No ****	Yes
2546	5/22/98	11	1	130	1450.3	15.1	4	13.9	12.72	Yes	**** No ****	Yes
2547	5/22/98	12	1	131	1451.6	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2548	5/22/98	13	1	108	1261.6	12.7	4	13.9	10.70	Yes	**** No ****	Yes
2549	5/22/98	14	1	66	950.6	7.9	3.8	14.2	7.01	Yes	Yes	Yes
2550	5/22/98	15	1	83	1073.9	10.2	3.9	14.1	8.82	Yes	Yes	Yes
2551	5/22/98	16	1	65	945.9	7.9	3.9	14.1	6.83	Yes	Yes	Yes
2552	5/22/98	17	0.75	67	950.7	9.3	3.8	14.2	8.25	Yes	Yes	Yes
2553	5/23/98	14	0.25	43	621.2	14.5	3.7	14.4	13.21			
2554	5/23/98	19	0.25	106	1462.1	14.1	3.2	15.3	14.85	Yes	**** No ****	Yes
2555	5/23/98	20	0.25	49	795.4	15.7	3.8	14.2	13.93			
2556	5/24/98	15	0.25	133	1471.3	15.8	3.7	14.4	14.39	Yes	**** No ****	Yes
2557	5/24/98	16	0.75	97	1179.9	13.1	3.7	14.4	11.93	Yes	**** No ****	Yes
2558	5/26/98	9	1	22	551.9	23.5	2.1	17.2	37.72			
2559	5/26/98	10	1	126	1418.1	14.5	4	13.9	12.22	Yes	**** No ****	Yes
2560	5/26/98	11	1	91	992.5	13.7	3.7	14.4	12.48	Yes	**** No ****	Yes
2561	5/26/98	12	0.75	23	527.3	31.3	2.4	16.7	43.96			
2562	5/26/98	13	1	125	1408	14.6	4	13.9	12.30	Yes	**** No ****	Yes
2563	5/26/98	14	1	95	1166.5	12	3.9	14.1	10.37	Yes	**** No ****	Yes
2564	5/26/98	15	1	76	1024.3	9.8	3.9	14.1	8.47	Yes	Yes	Yes
2565	5/26/98	16	1	78	1031.6	9.9	3.9	14.1	8.56	Yes	Yes	Yes
2566	5/26/98	17	0.5	17	490.3	26.9	2.4	16.7	37.78			
2567	5/28/98	8	0.5	48	747.7	21.6	2.5	16.5	29.12			
2568	5/28/98	9	1	130	1463.3	15.9	4.1	13.7	13.07	Yes	**** No ****	Yes
2569	5/28/98	10	1	130	1462	15.8	4.1	13.7	12.99	Yes	**** No ****	Yes
2570	5/28/98	11	1	130	1458	15.8	4	13.9	13.31	Yes	**** No ****	Yes
2571	5/28/98	12	1	130	1451.1	15.9	4	13.9	13.40	Yes	**** No ****	Yes
2572	5/28/98	13	1	130	1449	16	4.1	13.7	13.15	Yes	**** No ****	Yes
2573	5/28/98	14	1	129	1443.2	15.7	4	13.9	13.23	Yes	**** No ****	Yes
2574	5/28/98	15	1	129	1445.5	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2575	5/28/98	16	1	129	1445.2	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2576	5/28/98	17	1	129	1442.1	15.2	4	13.9	12.81	Yes	**** No ****	Yes
2577	5/28/98	18	1	129	1440.5	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2578	5/28/98	19	1	129	1450.7	15.1	4	13.9	12.72	Yes	**** No ****	Yes
2579	5/28/98	20	1	124	1413.1	15	4	13.9	12.64	Yes	**** No ****	Yes
2580	5/28/98	21	0.5	57	879	9.5	3.8	14.2	8.43			
2581	5/29/98	5	0.25	16	410.5	22	2.1	17.2	35.31			
2582	5/29/98	6	1	65	961.7	10.4	4	13.9	8.76	Yes	Yes	Yes
2583	5/29/98	7	1	67	972	8.6	3.9	14.1	7.43	Yes	Yes	Yes
2584	5/29/98	8	1	128	1437.1	13.5	4	13.9	11.38	Yes	**** No ****	Yes
2585	5/29/98	9	1	129	1441.4	13.9	4	13.9	11.71	Yes	**** No ****	Yes
2586	5/29/98	10	1	130	1456.9	15.4	4.1	13.7	12.66	Yes	**** No ****	Yes
2587	5/29/98	11	1	129	1445.5	15.1	4.1	13.7	12.41	Yes	**** No ****	Yes
2588	5/29/98	12	1	128	1434.6	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
2589	5/29/98	13	1	128	1435.5	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
2590	5/29/98	14	1	128	1441.7	15.1	4	13.9	12.72	Yes	**** No ****	Yes
2591	5/29/98	15	1	128	1438.2	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2592	5/29/98	16	1	128	1438	15.1	4	13.9	12.72	Yes	**** No ****	Yes
2593	5/29/98	17	1	128	1437.9	15	4	13.9	12.64	Yes	**** No ****	Yes
2594	5/29/98	18	1	128	1434.5	14.9	4	13.9	12.56	Yes	**** No ****	Yes
2595	5/29/98	19	1	128	1437.8	15	4	13.9	12.64	Yes	**** No ****	Yes
2596	5/29/98	20	1	88	1127.6	11	3.9	14.1	9.51	Yes	**** No ****	Yes
2597	5/29/98	21	0.5	57	880.6	9.2	3.8	14.2	8.16			
2598	6/1/98	6	0.25	2	290.3	13.8	1.8	17.7	25.84			
2599	6/1/98	7	1	65	950.4	15.4	3.7	14.4	14.03	Yes	**** No ****	Yes
2600	6/1/98	8	1	90	1132.1	11.7	3.9	14.1	10.11	Yes	**** No ****	Yes
2601	6/1/98	9	1	130	1452.4	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2602	6/1/98	10	1	129	1452.9	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2603	6/1/98	11	1	130	1452.8	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2604	6/1/98	12	1	129	1450.3	15.7	4	13.9	13.23	Yes	**** No ****	Yes
2605	6/1/98	13	1	129	1449.7	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2606	6/1/98	14	1	129	1444.9	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2607	6/1/98	15	1	129	1442.6	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2608	6/1/98	16	1	129	1442.6	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2609	6/1/98	17	1	106	1245.6	12.8	3.9	14.1	11.06	Yes	**** No ****	Yes
2610	6/1/98	18	1	83	1071.6	11.7	3.8	14.2	10.38	Yes	**** No ****	Yes
2611	6/1/98	19	1	83	1074.9	10.6	3.8	14.2	9.40	Yes	**** No ****	Yes
2612	6/1/98	20	1	98	1190	12	3.9	14.1	10.37	Yes	**** No ****	Yes
2613	6/1/98	21	1	65	939	10.7	3.8	14.2	9.49	Yes	**** No ****	Yes
2614	6/2/98	6	0.5	44	724	16	3.2	15.3	16.85			
2615	6/2/98	7	1	64	944.5	9.1	3.8	14.2	8.07	Yes	Yes	Yes
2616	6/2/98	8	1	64	941.9	9.1	3.8	14.2	8.07	Yes	Yes	Yes
2617	6/2/98	9	1	70	988.4	9.4	3.8	14.2	8.34	Yes	Yes	Yes
2618	6/2/98	10	1	113	1311.8	13	3.9	14.1	11.24	Yes	**** No ****	Yes
2619	6/2/98	11	1	111	1291.2	12.6	3.9	14.1	10.89	Yes	**** No ****	Yes
2620	6/2/98	12	1	127	1425.7	14.7	4	13.9	12.39	Yes	**** No ****	Yes
2621	6/2/98	13	1	129	1443.3	15.4	4	13.9	12.98	Yes	**** No ****	Yes
2622	6/2/98	14	1	128	1440.9	15.5	4	13.9	13.06	Yes	**** No ****	Yes
2623	6/2/98	15	1	128	1439.4	15.6	4	13.9	13.15	Yes	**** No ****	Yes
2624	6/2/98	16	1	127	1428.9	15.2	4	13.9	12.81	Yes	**** No ****	Yes
2625	6/2/98	17	1	109	1268.6	12.3	3.9	14.1	10.63	Yes	**** No ****	Yes
2626	6/2/98	18	1	101	1204	12.1	3.9	14.1	10.46	Yes	**** No ****	Yes
2627	6/2/98	19	1	108	1265.8	12.5	3.9	14.1	10.80	Yes	**** No ****	Yes
2628	6/2/98	20	1	96	1185	11.7	3.9	14.1	10.11	Yes	**** No ****	Yes

**1997-1998 CEMS DATA FROM P.S.Co. of COLORADO -- FT. ST. VRAIN STATION**  
**7FA with DLN 2.6 COMBUSTORS (BASE LOAD ~130-140 MW)**

Data No.	Date	Hour	OPT	Load MW	Heat Input MBtu/hr	NOx ppm	CO2 percent	Calculated O2 percent	Calculated NOx ppm @ 15% O2	Load > 60 MW	NOx ppm @ 15% O2	
											< 9 ppm	< 15 ppm
2629	6/2/98	21	1	63	933.3	8.1	3.8	14.2	7.18	Yes	Yes	Yes
2630	6/2/98	22	0.5	56	866.7	9.7	3.8	14.2	8.60			
2631	6/3/98	3	0.75	48	781.6	15.7	3.4	14.9	15.56			
2632	6/3/98	4	1	62	934.7	8.4	3.8	14.2	7.45	Yes	Yes	Yes
2633	6/3/98	5	1	64	947.6	8.3	3.8	14.2	7.36	Yes	Yes	Yes
2634	6/3/98	6	1	65	954.9	8.3	3.8	14.2	7.36	Yes	Yes	Yes
2635	6/3/98	7	1	65	952.2	8.3	3.8	14.2	7.36	Yes	Yes	Yes
2636	6/3/98	8	1	65	954.7	8.4	3.8	14.2	7.45	Yes	Yes	Yes
2637	6/3/98	9	1	80	1067.7	9.3	3.9	14.1	8.04	Yes	Yes	Yes
2638	6/3/98	10	1	129	1434.4	13.4	3.9	14.1	11.58	Yes	**** No ****	Yes
2639	6/3/98	11	1	123	1383.2	13.1	3.9	14.1	11.32	Yes	**** No ****	Yes
2640	6/3/98	12	1	126	1410.6	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2641	6/3/98	13	1	126	1413	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2642	6/3/98	14	1	127	1413.5	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2643	6/3/98	15	1	127	1412	13.3	3.9	14.1	11.49	Yes	**** No ****	Yes
2644	6/3/98	16	1	127	1413.6	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2645	6/3/98	17	1	127	1413.3	13.1	3.9	14.1	11.32	Yes	**** No ****	Yes
2646	6/3/98	18	1	127	1412.9	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2647	6/3/98	19	0.75	105	1236.3	14.1	3.9	14.1	12.19	Yes	**** No ****	Yes
2648	6/5/98	6	0.75	34	666.3	19.8	2.9	15.8	23.01			
2649	6/5/98	7	1	63	945.2	8.4	3.9	14.1	7.26	Yes	Yes	Yes
2650	6/5/98	8	1	114	1326.4	13	4	13.9	10.95	Yes	**** No ****	Yes
2651	6/5/98	9	1	118	1347.6	13.3	4	13.9	11.21	Yes	**** No ****	Yes
2652	6/5/98	10	1	57	880.7	12.2	3.6	14.6	11.42			
2653	6/5/98	11	1	10	474.2	20.8	2.4	16.7	29.21			
2654	6/5/98	12	0.5	13	489.5	22	2.3	16.9	32.24			
2655	6/7/98	14	1	64	878.7	9.5	3.7	14.4	8.65	Yes	Yes	Yes
2656	6/7/98	15	0.25	8	233.6	12.2	1.6	18.1	25.70			
2657	6/10/98	15	0.75	84	998.8	9.9	3.9	14.1	8.56	Yes	Yes	Yes
2658	6/10/98	16	1	67	956.8	8.8	3.8	14.2	7.81	Yes	Yes	Yes
2659	6/10/98	17	1	67	956.4	9	3.8	14.2	7.98	Yes	Yes	Yes
2660	6/10/98	18	0.25	14	324	12.2	2	17.4	20.56			
2661	6/11/98	14	0.25	11	800.2	19.3	2.4	16.7	27.11			
2662	6/11/98	15	0.25	2	135.8		3.2	15.3	0.00			
2663	6/19/98	14	1	118	1349.4	17.7	3.9	14.1	15.30	Yes	**** No ****	**** No ****
2664	6/19/98	15	1	117	1343.3	17.1	3.9	14.1	14.78	Yes	**** No ****	Yes
2665	6/19/98	16	1	106	1248.5	14.9	3.9	14.1	12.88	Yes	**** No ****	Yes
2666	6/19/98	17	1	95	1150.1	12	3.9	14.1	10.37	Yes	**** No ****	Yes
2667	6/19/98	18	1	96	1158.7	11.8	3.9	14.1	10.20	Yes	**** No ****	Yes
2668	6/19/98	19	1	97	1169.2	12.4	3.9	14.1	10.72	Yes	**** No ****	Yes
2669	6/19/98	20	1	95	1153.5	12.6	3.9	14.1	10.89	Yes	**** No ****	Yes
2670	6/19/98	21	1	95	1149	13	3.9	14.1	11.24	Yes	**** No ****	Yes
2671	6/19/98	22	0.25	40	612.5	18.9	2.7	16.2	23.59			
2672	6/22/98	12	0.5	127	1430.5	14.9	4.1	13.7	12.25	Yes	**** No ****	Yes
2673	6/22/98	13	1	128	1434.9	15.3	4.1	13.7	12.58	Yes	**** No ****	Yes
2674	6/22/98	14	1	128	1433.3	15.3	4.1	13.7	12.58	Yes	**** No ****	Yes
2675	6/22/98	15	1	129	1441	15.3	4.1	13.7	12.58	Yes	**** No ****	Yes
2676	6/22/98	16	1	128	1438.5	15.1	4.1	13.7	12.41	Yes	**** No ****	Yes
2677	6/22/98	17	1	94	1162.4	11.8	3.9	14.1	10.20	Yes	**** No ****	Yes
2678	6/22/98	18	1	51	839.4	6.9	3.8	14.2	6.12			
2679	6/22/98	19	1	54	860.2	7	3.8	14.2	6.21			
2680	6/22/98	20	1	65	950.8	8.3	3.9	14.1	7.17	Yes	Yes	Yes
2681	6/22/98	21	0.5	37	619.7	8.9	3.1	15.5	9.68			
2682	6/24/98	14	0.75	71	936.7		3.5	14.8	0.00	Yes	Yes	Yes
2683	6/24/98	15	1	127	1429	15.2	4	13.9	12.81	Yes	**** No ****	Yes
2684	6/24/98	16	1	108	1269.6	13.2	3.9	14.1	11.41	Yes	**** No ****	Yes
2685	6/24/98	17	1	99	1191.7	11.6	3.8	14.2	10.29	Yes	**** No ****	Yes
2686	6/24/98	18	1	66	951.3	9.3	3.7	14.4	8.47	Yes	Yes	Yes
2687	6/24/98	19	1	50	835	7.5	3.7	14.4	6.83			
2688	6/24/98	20	1	50	836.4	7.5	3.7	14.4	6.83			
2689	6/24/98	21	0.5	36	649	10.2	3.2	15.3	10.74			
2690	6/28/98	14	1	91	1131	19.5	3.3	15.1	19.92	Yes	**** No ****	**** No ****
2691	6/28/98	15	1	126	1428.4	14.8	4.1	13.7	12.17	Yes	**** No ****	Yes
2692	6/28/98	16	1	126	1425.7	14.6	4	13.9	12.30	Yes	**** No ****	Yes
2693	6/28/98	17	1	126	1426.6	14.3	4	13.9	12.05	Yes	**** No ****	Yes
2694	6/28/98	18	1	126	1431.8	14.4	4.1	13.7	11.84	Yes	**** No ****	Yes
2695	6/28/98	19	1	127	1435.5	14.6	4	13.9	12.30	Yes	**** No ****	Yes
2696	6/28/98	20	1	128	1438.6	15	4.1	13.7	12.33	Yes	**** No ****	Yes
2697	6/28/98	21	0.75	98	1166.2	14.5	3.7	14.4	13.21	Yes	**** No ****	Yes

Number of data points above 60 MW and above 9 and 15 ppm, respectively =

519

66

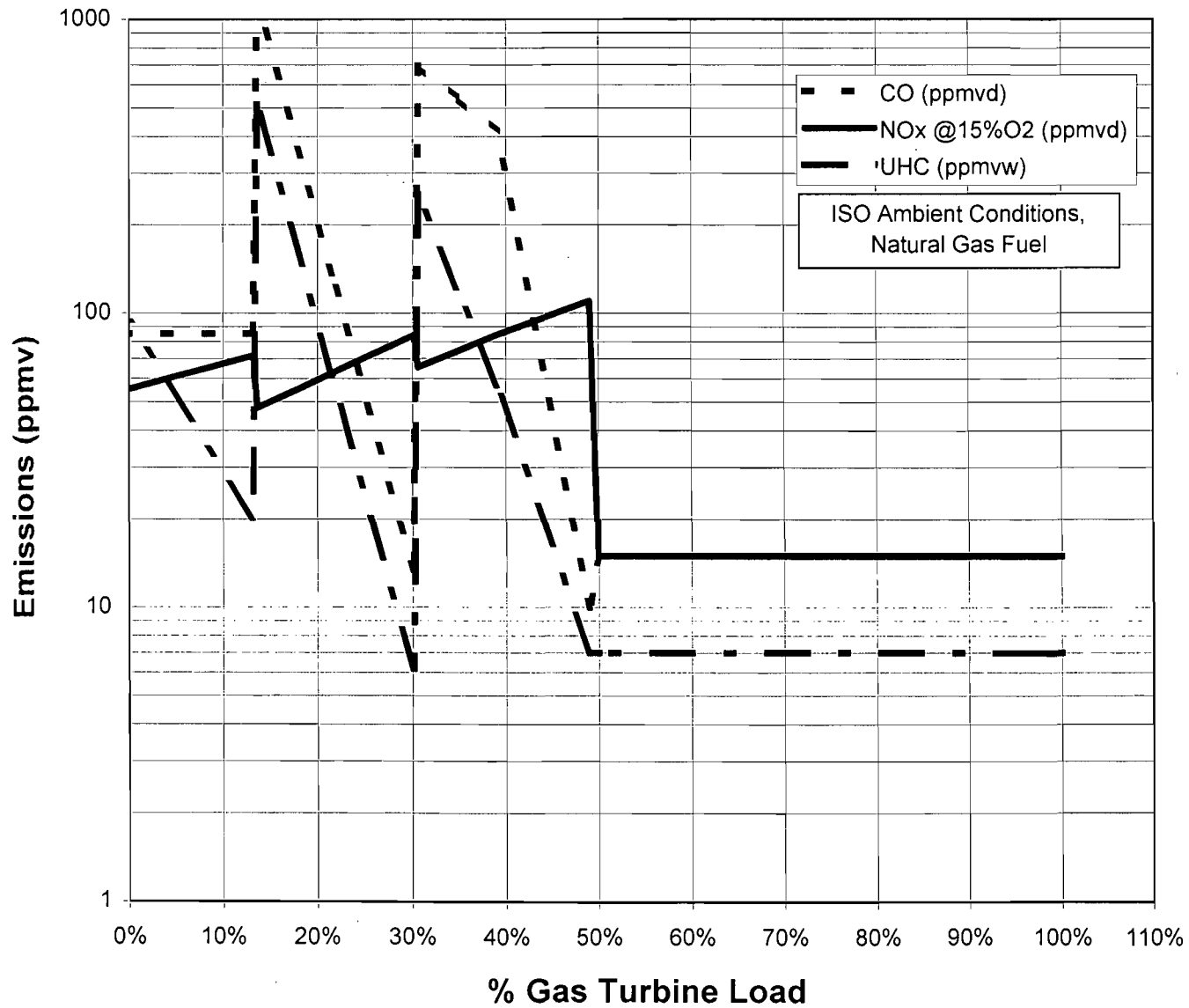






# PG7241FA with DLN2.6 Combustors

## Estimated Emissions



**GE Industrial & Power Systems**  
Gas Turbine**Unit Operation/Turbine (Gas)**

(Applicability MS7001FA, 9001FA)

**I. REFERENCE DATA AND PRECAUTIONS****A. Operator Responsibility**

It is essential that the turbine operators be familiar with the information contained in the following operation text, the Control Specification drawings (consult the Control System Settings drawing for the index of Control Specification drawings), the Piping Schematic drawings including the Device Summary (consult the Control System Settings Drawing for the index by model list and drawing number of applicable schematics), the SPEEDTRONIC® control sequence program and the SPEEDTRONIC® Mark V Users' Manual (GEH-5979). The operator must also be aware of the power plant devices which are tied into the gas turbine mechanically and electrically and could affect normal operation. No starts should be attempted whether on a new turbine or a newly overhauled turbine until the following conditions have been met:

1. Requirements listed under CHECKS PRIOR TO OPERATION have been met.
2. Control systems have been functionally checked for proper operation before restarting.
3. All GENERAL OPERATING PRECAUTIONS have been noted.

It is extremely important that gas turbine operators establish proper operating practices. We emphasize adherence to the following:

1. Respond to Annunciator Indicators — Investigate and correct the cause of the abnormal condition. This is particularly true for the protection systems, such as low oil pressure, overtemperature, vibration, overspeed etc.
2. Check of Control Systems — After any type of control maintenance is completed, whether repair or replacement of parts, functionally check control systems for proper operation. This should be done prior to restart of the turbine. It should not be assumed that reassembly, "as taken apart" is adequate without the functional test.
3. Monitor Exhaust Temperature During All Phases of Startup — The operator is alerted to the following:

**CAUTION**

Overtemperature can damage the turbine hot gas path parts.

*These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes the matter should be referred to the GE Company.*

Monitor exhaust temperature for proper control upon first startup and after any turbine maintenance is performed. Trip the turbine if the exhaust temperature exceeds the normal trip level, or increases at an unusual rate. A particularly critical period for overtemperature damage to occur is during the startup phase before the turbine reaches governing speed. At this time air flow is low and the turbine is unable to accelerate away from excess fuel.

## B. General Operating Precautions

### 1. Temperature Limits

Refer to the Control Specifications for actual exhaust temperature control settings. It is important to define a "baseline value" of exhaust temperature spread with which to compare future data. This baseline data is established during steady state operation after each of the following conditions:

- a. Initial startup of unit
- b. Before and after a planned shut-down
- c. Before and after planned maintenance

An important point regarding the evaluation of exhaust temperature spreads is not necessarily the magnitude of the spread, but the change in spread over a period of time. The accurate recording and plotting of exhaust temperatures daily can indicate a developing problem. Consult Control Specification-Settings Drawings for maximum allowable temperature spreads and wheelspace temperature operating limits.

The wheelspace thermocouples, identified together with their nomenclature, are on the Device Summary. A bad thermocouple will cause a "High Wheelspace Differential Temperature" alarm. The faulty thermocouple should be replaced at the earliest convenience.

When the average temperature in any wheelspace is higher than the temperature limit set forth in the table, it is an indication of trouble. High wheelspace temperature may be caused by any of the following faults:

1. Restriction in cooling air lines
2. Wear of turbine seals
3. Excessive distortion of the turbine stator
4. Improper positioning of thermocouple
5. Malfunctioning combustion system
6. Leakage in external piping
7. Excessive distortion of exhaust inner diffuser

Check wheelspace temperatures very closely on initial startup. If consistently high, and a check of the external cooling air circuits reveals nothing, it is permissible to increase the size of the cooling air orifices slightly. Consult with a General Electric Company field representative to obtain recommendations as to the size that an orifice should be increased. After a turbine overhaul, all

orifices should be changed back to their original size, assuming that all turbine clearances are returned to normal and all leakage paths are corrected.

### CAUTION

Wheelspace temperatures are read on the <I> CRT. Temperatures in excess of the maximum are potentially harmful to turbine hot-gas-path parts over a prolonged period of time. Excessive temperatures are annunciated but will not cause the turbine to trip. High wheelspace temperature readings must be reported to the General Electric technical representative as soon as possible.

## 2. Pressure Limits

Refer to the Device Summary for actual pressure switch settings. Lube oil pressure in the bearing feed header is a nominal value of 25 psig. The turbine will trip at 8 psig. Pressure variations between these values will result from entrapped particulate matter within the lube oil filtering system.

## 3. Vibration Limits

The maximum overall vibration velocity of the gas turbine should never exceed 1.0 inch (2.54 cm) per second in either the vertical or horizontal direction. Corrective action should be initiated when the vibration levels exceed 0.5 inch (1.27 cm) per second as indicated on the SPEEDTRONIC® <I> CRT.

If doubt exists regarding the accuracy of the reading or if more accurate and specific vibration readings are desired a vibration check is recommended using vibration test equipment.

## 4. Load Limit

The maximum load capability of the gas turbine is given in the control specification. For the upper limits of generator capability, refer to the Reactive Capability Curve following the GENERATOR AND ACCESSORIES tab.

## 5. Overloading of Gas Turbine, Facts Involved and Policy

It is General Electric practice to design gas turbines with margins of safety to meet the contract commitments and to secure long life and trouble-free operation.

So that maximum trouble-free operation can be secured, General Electric designs these machines with more than ample margins on turbine bucket thermal and dynamic stresses, compressor and turbine wheel stresses, generator ventilation, coolers, etc. As a result, these machines are designed somewhat better than is strictly necessary, because of the importance of reliability of these turbines to our customers and to the electrical industry.

It cannot be said, therefore, that these machines cannot be safely operated beyond the load limits. Such operation, however, always encroaches upon the design margins of the machines with a consequent

reduction in reliability and increased maintenance. Accordingly, any malfunction that occurs as a result of operation beyond contract limits cannot be the responsibility of the General Electric Company.

The fact that a generator operates at temperature rises below the 185F (85C) for the rotor and 140F (60C) for the stator permitted by the AIEE Standards does not mean that it can be properly run with full safety up to these values by overloading beyond the nameplate rating. These standards were primarily set up for the protection of insulation from thermal deterioration on small machines. The imbedded temperature detectors of the stator register a lower temperature than the copper because of the temperature drop through the insulation from the copper to the outside of the insulation, where the temperature detectors are located. There are also conditions of conductor expansion, insulation stress, etc., which impose limitations. These factors have been anticipated in the "Vee" curves and reactive capability curves which indicate recommended values consistent with good operating practice. The "Vee" curves and reactive capability curves form part of the operating instructions for the generator and it is considered unwise to exceed the values given.

The gas turbines are mechanically designed so that (within prescribed limits), advantage can be taken of the increased capability over nameplate rating, which is available at lower ambient temperatures (because of increased air density), without exceeding the maximum allowable turbine inlet temperature.

The load limit of the gas turbine-generator must not be exceeded, even when the ambient temperature is lower than that at which the load limit of the gas turbine is reached. Under these conditions, the gas turbine will operate at this load with a lower turbine inlet temperature and the design stresses on the load coupling and turbine shaft will not be exceeded.

If the turbine is overloaded so that the turbine exhaust temperature schedule is not followed for reasons of malfunctioning or improper setting of the exhaust temperature control system, the maximum allowable turbine inlet temperature or the maximum allowable exhaust temperature, or both, will be exceeded and will result in a corresponding increase in maintenance and, in extreme cases, might result in failure of the turbine parts.

The exhaust temperature control system senses the turbine exhaust temperature and introduces proper bias to limit the fuel flow so that neither the maximum allowable turbine inlet temperature nor the maximum allowable turbine exhaust temperature is exceeded.

## 6. Fire Protection System Operating Precautions

The fire protection system, when actuated, will cause several functions to occur in addition to actuating the media discharge system. The turbine will trip, an audible alarm will sound, and the alarm message will be displayed on the <I> CRT. The ventilation openings in the compartments will be closed by a pressure-operated latch and the damper in the turbine shell cooling discharge will be actuated.

The annunciator audible alarm may be silenced by clicking on the alarm SILENCE target. The alarm message can be cleared from the ALARM list on the <I> CRT after the ACKNOWLEDGE target and the ALARM RESET target are actuated, but only after the situation causing the alarm has been corrected.

The fire protection system *must be replenished and reset* before it can automatically react to another fire. Reset must be made after each activation of the fire protection system which includes an initial discharge followed by an extended discharge period of the fire protection media.

Fire protection system reset is accomplished by resetting the pressure switch located on the fire protection system.

Ventilation dampers, automatically closed by a signal received from the fire protection system, must be reopened manually in all compartments before restarting the turbine.

#### CAUTION

Failure to reopen compartment ventilation dampers will severely shorten the service life of major accessory equipment. Failure to reopen the load coupling compartment dampers will materially reduce the performance of the generator.

### 7. Combustion System Operating Precautions

#### WARNING

**Sudden emission of black smoke may indicate a possibility of outer casing failure or other serious combustion problems. In such an event:**

- a. Immediately shut down the turbine.
- b. Allow no personnel inside the turbine compartment until turbine is shut down.
- c. Caution all personnel against standing in front of access door openings into pressurized compartments.
- d. Perform a complete combustion system inspection.

To reduce the possibility of combustion outer casing failure, the operator should adhere to the following:

- a. During operation, exhaust temperatures are monitored by the SPEEDTRONIC® control system. The temperature spread is compared to allowable spreads with alarms and/or protective trips resulting if the allowable spread limits are exceeded.
- b. After a trip from 75% load or above, observe the exhaust on startup for black or abnormal smoke and scan the exhaust thermocouples for unusually high spreads. Record temperature spread during a normal startup to obtain base line signature for comparison. Excessive tripping should be investigated and eliminated.
- c. Adhere to recommended inspection intervals on combustion liners, transition pieces and fuel nozzles.

Operating a turbine with non-operational exhaust thermocouples increases the risk of turbine overfiring and prevents diagnosis of combustion problems by use of temperature differential readings.

To prevent the above described malfunctions the operator should keep the number of non-operational exhaust thermocouples to a maximum of two but no more than *one* of any three adjacent thermocouples.

#### CAUTION

Operation of the gas turbine with a single faulty thermocouple should not be neglected, as even one faulty thermocouple will increase the risk of an invalid "combustion alarm" and/or "Trip". The unit should not be shut down just for replacement of a single faulty thermocouple. However, every effort should be made to replace the faulty thermocouples when the machine is down for any reason.

Adherence to the above criteria and early preventive maintenance should reduce distortions of the control and protection functions and the number of unnecessary turbine trips.

### 8. Cooldown/Shutdown Precautions

#### CAUTION

In the event of an emergency shutdown in which internal damage of any rotating equipment is suspected, do not turn the rotor after shutdown. Maintain lube oil pump operation, since lack of circulating lube oil following a hot shutdown will result in rising bearing temperatures which can result in damaged bearing surfaces. If the malfunction that caused the shutdown can be quickly repaired, or if a check reveals no internal damage affecting the rotating parts, reinstate the cooldown cycle.

If there is an emergency shutdown and the turbine is not turned with the rotor turning device, the following factors should be noted:

- a. Within 20 minutes, maximum, following turbine shutdown, the gas turbine may be started without cooldown rotation. Use the normal starting procedure.
- b. Between 20 minutes and 48 hours after shutdown a restart should not be attempted unless the gas turbine rotor has been turned from one to two hours.
- c. If the unit has been shut down and not turned at all, it must be shut down for approximately 48 hours before it can be restarted without danger of shaft bow.

**CAUTION**

Where the gas turbine has not been on rotor turning operation after shutdown and a restart is attempted, as under conditions (1) and (2) above, the operator should maintain a constant check on vibration velocity as the unit is brought up to its rated speed. If the vibration velocity exceeds one inch per second at any speed, the unit should be shut down and the shaft rotated for at least one hour before a second starting attempt is made. If seizure occurs during the turning operation of the gas turbine, the turbine should be shut down and remain idle for at least 30 hours, or until the rotor is free. The turbine may be rotated at any time during the 30-hour period if it is free; however, audible checks should be made for rubs.

**Note:** The vibration velocity must be measured at points near the gas turbine bearing caps.

**II. PREPARATIONS FOR NORMAL LOAD OPERATION****A. Standby Power Requirements**

Standby AC power insures the immediate startup capability of particular turbine equipment and related control systems when the start signal is given. Functions identified by asterisk are also necessary for unit environmental protection and should not be turned off except for maintenance work on that particular function. Standby AC power is required for:

1. Lube oil heaters, which when used in conjunction with the lube oil pumps, heat and circulate turbine lube oil at low ambient temperatures to maintain proper oil viscosity.
2. \*Control panel heating.
3. \*Generator heating.
4. Lube oil pumps. Auxiliary pump should be run at periodic intervals to prevent rust formation in the lube oil system.
5. Fuel oil heaters, where used. These heaters used in conjunction with the fuel oil pumps, heat and circulate fuel oil at low ambient temperatures to maintain proper fuel oil viscosity.
6. Compartment heating.
7. \*Operation of control compartment air conditioner during periods of high ambient temperature to maintain electrical equipment insulation within design temperature limits.
8. \*Battery charging (where applicable).

**B. Checks Prior to Operation**

The following checks are to be made before attempting to operate a new turbine or an overhauled turbine. It is assumed that the turbine has been assembled correctly, is in alignment and that calibration of the



SPEEDTRONIC® system has been performed per the Control Specifications. A standby inspection of the turbine should be performed with the lube oil pump operating and emphasis on the following areas:

1. Check that all piping and turbine connections are securely fastened and that all blinds have been removed. Most tube fittings incorporate a stop collar which insures proper torquing of the fittings at initial fitting make up and at reassembly. These collars fit between the body of the fitting and the nut and contact in tightening of the fitting. The stop collar is similar to a washer and can be rotated freely on unassembled fittings. During initial assembly of a fitting with a stop collar, tighten the nut until it bottoms on the collar. The fitting has to be sufficiently tightened until the collar cannot be rotated by hand. This is the inspection for a proper fitting assembly. For each remake of the fitting, the nut should again be tightened until the collar cannot be rotated.
2. Inlet and exhaust plenums and associated ducting are clean and rid of all foreign objects. All access doors are secure.
3. Where fuel, air or lube oil filters have been replaced check that all covers are intact and tight.
4. Verify that the lube oil tank is within the operating level and if the tank has been drained that it has been refilled with the recommended quality and quantity of lube oil. If lube oil flushing has been conducted verify that all filters have been replaced and any blinds if used, removed.
5. Check operation of auxiliary and emergency equipment, such as lube oil pumps, water pumps, fuel forwarding pumps, etc. Check for obvious leakage, abnormal vibration (maximum 3 mils), noise or overheating.
6. Check lube oil piping for obvious leakage. Also using provided oil flow sights, check visually that oil is flowing from the bearing drains. The turbine should not be started unless flow is visible at each flow sight.
7. Check condition of all thermocouples and/or resistance temperature detectors (RTDs) on the <I>CRT. Reading should be approximately ambient temperature.
8. Check spark plugs for proper arcing.

#### WARNING

**Do not test spark plugs where explosive atmosphere is present.**

If the arc occurs anywhere other than directly across the gap at the tips of the electrodes, or if by blowing on the arc it can be moved from this point, the plug should be cleaned and the tip clearance adjusted. If necessary, the plug should be replaced. Verify the retracting piston for free operation.

9. Devices requiring manual lubrication are to be properly serviced.
10. Determine that the cooling water system has been properly flushed and filled with the recommended coolant. Any fine powdery rust, which might form in the piping during short time exposure to atmosphere, can be tolerated. If there is evidence of a scaly rust, the cooling system should be power flushed until all scale is removed. If it is necessary to use a chemical cleaner, most automobile cooling system cleaners are acceptable and will not damage the carbon and rubber parts of the pump mechanical seals or rubber parts in the piping.

Refer to "Cooling Water Recommendations for Combustion Gas Turbine Closed Cooling Systems" included under tab titled Fluid Specifications. Note the following regarding antifreeze.

**CAUTION**

Do not change from one type antifreeze to another without first flushing the cooling system very thoroughly. Inhibitors used may not be compatible and can cause formation of gums, in addition to destroying effectiveness as an inhibitor. Consult the antifreeze vendor for specific recommendations.

Following the water system refill ensure that water system piping, primarily pumps and flexible couplings, do not leak. It is wise not to add any corrosion inhibitors until after the water system is found to be leak free.

11. The Load Commutator Inverter (LCI) should be calibrated and tested as per GEH-6192.
12. The use of radio transmitting equipment in the vicinity of open control panels is not recommended. Prohibiting such use will assure that no extraneous signals are introduced into the control system that might influence the normal operation of the equipment.
13. Check the Cooling and Sealing Air Piping against the assembly drawing and piping schematic, to ensure that all orifice plates are of designated size and in designated positions.
14. At this time all annunciated ground faults should be cleared. It is recommended that units not be operated when a ground fault is indicated. Immediate action should be taken to locate all grounds and correct the problems.

**C. Checks During Start Up and Initial Operation**

The following is a list of important checks to be made on a new or newly overhauled turbine with the OPERATION SELECTOR switch in various modes. The Control Specifications — Control Systems Adjustments should be reviewed prior to operating the turbine.

**CAUTION**

Where an electric motor is used as the starting means refer to the Control Specifications for maximum operating time.

When a unit has been overhauled those parts or components that have been removed and taken apart for inspection/repair should be critically monitored during unit startup and operation. This inspection should include: leakage check, vibration, unusual noise, overheating, lubrication.

**1. Crank**

- a. Listen for rubbing noises in the turbine compartment especially in the load tunnel area. A soundscope or some other listening type device is suggested. Shutdown and investigate if unusual noise occurs.
- b. Check for unusual vibration.
- c. Inspect for water system leakage.

## 2. Fire

**\* \* \* WARNING \* \* \***

**Due to the complexity of gas turbine fuel systems, it is imperative for everyone to exercise extreme caution in and near any turbine compartment, fuel handling system, or any other enclosures or areas containing fuel piping or fuel system components.**

**Do not enter the turbine compartment unless absolutely necessary. When it is necessary, exercise caution when opening and entering the compartment. Be aware of the possibility of fuel leaks, and be prepared to shut down the turbine and take action if a leak is discovered.**

**At any time, if/when entering the turbine compartment or when in the vicinity of the fuel handling system or other locations with fuel piping, fuel system components, or fuel system connections, while the turbine is operating, implement the following:**

**Conduct an environmental evaluation of the turbine compartment, fuel handling system, or specific area. Pay particular attention to all locations where fuel piping/components/connections exist.**

**Follow applicable procedures for leak testing. If fuel leaks are discovered, exit the area quickly, shut the turbine down, and take appropriate actions to eliminate the leak(s).**

**Require personnel entering the turbine compartment to be fitted with the appropriate personal protective equipment, i.e., hard hat, safety glasses, hearing protection, harness/manline (optional depending on space constraints), heat resistant/flame retardant coveralls and gloves.**

**Establish an attendant to maintain visual contact with personnel inside the turbine compartment and radio communications with the control room operator.**

**During the first start-up after a disassembly, visually check all connections for fuel leaks. Preferably check the fittings during the warm-up period when pressures are low. Visually inspect the fittings again at full speed, no load, and at full load. Do not attempt to correct leakage problems by tightening fittings and/or bolting while lines are fully pressurized. Note area in question and, depending on severity of leak, repair at next shutdown, or if required shut unit down immediately. Attempts to correct leakage problem on pressurized lines could lead to sudden and complete failure of component and resulting damage to equipment and personnel injury.**

- a. Bleed fuel oil filters, if appropriate. Then check entire fuel system and the area immediately around the fuel nozzle for leaks. In particular check for leaks at the following points:

**Turbine Compartment**

- (1) Fuel piping/tubing to fuel nozzle
- (2) Fuel check valves
- (3) Atomizing air manifold and associated piping (when used)
- (4) Gas manifold and associated piping (when used)

**Accessory Module**

- (1) Flow divider (when used)
- (2) Fuel and water pumps
- (3) Filter covers and drains

**CAUTION**

Elimination of fuel leakage in the turbine compartment is of extreme importance as a fire preventive measure.

- b. Monitor FLAME status on the <I> processor to verify all flame detectors are correctly indicating flame.
- c. Monitor the turbine control system readings on the <I> processor for unusual exhaust thermocouple temperature, wheelspace temperature, lube oil drain temperature, highest to lowest exhaust temperature spreads and “hot spots” i.e. combustion chamber(s) burning hotter than all the others.
- d. Listen for unusual noises and rubbing.
- e. Monitor for excessive vibration.

**3. Automatic, Remote**

On initial startup, permit the gas turbine to operate for a 30 to 60 minute period in a full speed, no load condition. This time period allows for uniform and stabilized heating of the parts and fluids. Tests and checks listed below are to supplement those recorded in Control Specification — Control System Adjustments. Record all data for future comparison and investigation.

- a. Continue monitoring for unusual rubbing noises and shutdown immediately if noise persists.
- b. Monitor lube oil tank, header and bearing drain temperatures continually during the heating period. Refer to the Schematic Piping Diagram — Summary Sheets for temperature guidelines. Adjust VTRs if required.
- c. At this time a thorough vibration check is recommended, using vibration test equipment such as IRD equipment (IRD Mechanical, Inc.) or equivalent with filtered or unfiltered readings. It is suggested that horizontal, vertical and axial data be recorded for the:

- (1) all accessible bearing covers on the turbine
  - (2) turbine forward compressor casing
  - (3) turbine support legs
  - (4) bearing covers on the load equipment
- d. Check wheelspace, exhaust and control thermocouples for proper indication on the <I> CRT. Record these values for future reference.
  - e. Flame detector operation should be tested per the Control Specification — Control System Adjustments.
  - f. Utilize all planned shutdowns in testing the Electronic and Mechanical Overspeed Trip System per the Control Specifications — Control System Adjustments. Refer to Special Operations section of this text.
  - g. Monitor <I> CRT display data for proper operation.

### III. OPERATING PROCEDURES

#### A. General

The following instructions pertain to the operation of a model series 7001FA or 9001FA gas turbine unit designed for generator drive application. These instructions are based on use of Mark V SPEEDTRON-IC® turbine control panels.

Functional description of the <I> CRT Main Display follows; however, panel installation, calibration, and maintenance are not included.

Operational information includes startup and shutdown sequencing in the AUTO mode of operation. The most common causes of alarm messages can be found in the concluding section.

It is not intended to cover initial turbine operation herein; rather, it will be assumed that initial startup, calibration and checkouts have been completed. The turbine is in the cooldown or standby mode ready for normal operation with AC and DC power available for all pumps, motors, heaters, and controls and all annunciator drops are cleared.

Refer to the Control Specifications (Control and Protection Systems) in this volume, and the previously furnished Control Sequence Program (CSP) for additional operating sequence information and related diagrams.

#### B. Start-Up

##### 1. General

Operation of a single turbine/generator unit may be accomplished either locally or remotely.

The following description lists operator, control system and machine actions or events in starting the gas turbine.

Reference the section "Description of Panels and Terms — Turbine Control Panel" for description of turbine panel devices. The following assumes that the unit is off of cooldown, and in a ready to start condition.

## 2. Starting Procedure

- a. Using the cursor positioning device, select "MAIN" display from the DEMAND DISPLAY menu.

- (1) The display will indicate speed, temperature, various conditions etc. Three lines displayed on the <I> CRT will read:

```
SHUTDOWN STATUS  
OFF COOLDOWN  
OFF
```

- b. Select "AUTO" and "EXECUTE"

- (1) The <I> CRT display will change to:

```
STARTUP STATUS  
READY TO START  
AUTO
```

- c. Select "START" and "EXECUTE"

- (1) Unit auxiliaries will be started including a motor driven lube oil pump used to establish lube oil pressure. The <I> CRT message SEQ IN PROGRESS will appear.
- (2) When permissives are satisfied, the master protective logic (L4) will be satisfied. The CRT display will change to:

```
STARTUP STATUS  
STARTING  
AUTO;  
START
```

- (3) The turbine shaft will begin to rotate on turning gear. The zero speed signal "14HR" will be displayed. When the unit reaches approximately 6 rpm, the starting device will be energized and accelerate the unit. The <I> CRT display will change to START-UP STATUS/CRANKING.
- (4) When the unit reaches approximately 15% speed, the minimum speed signal "14HM" will be displayed on the <I> CRT. (For machines with cooling water fan motors receiving power from the generator terminals via the UCAT transformer, field flashing will be initiated to build up generator voltage to power the fans; otherwise, field flashing to build up generator voltage will occur at operating speed.)
- (5) If the unit configuration requires purging of the gas path prior to ignition, the starting device will crank the gas turbine at purge speed for a period of time determined by the setting of the purge timer. See Control Specifications-Settings Drawing for purge timer settings.

- (6) FSR will be set to firing value. (FSR, Fuel Stroke Reference, is the electrical signal that determines the amount of fuel delivered to the turbine combustion system.) Ignition sequence is initiated. The <I> CRT display will change to START UP STATUS/FIRING.
- (7) When flame is established, the <I> CRT display will indicate flame in those combustors equipped with flame detectors.
- (8) FSR is set back to warm-up value, and the <I> CRT display will indicate STARTUP STATUS/WARMING UP. If the flame goes out during the 60 second firing period, FSR will be reset to firing value. (At the end of the ignition period, if flame has not been established, the unit will remain at firing speed. Refer to operation 8 in the Special Operations section for specific operating instructions for DLN 2.0 and DLN 2.6 configured machines.) At this time the operator may shut the unit down or attempt to fire again. To fire again select CRANK on the Main Display. The purge timer and firing timer are reinitialized. The purge timer will begin to time. Reselecting AUTO will cause the ignition sequence to repeat itself after the purge timer has timed out. If the unit is being operated remotely and multiple starts capability exists (REMOTE having previously been selected on the Main Display), and no fire has been established at the end of the ignition period, the unit will be purged of unburned fuel. At the end of the purge period ignition will be attempted again. If flame is not established at this time, the starting sequence will be terminated and the unit will shutdown.

At the end of the warmup period, with flame established, FSR will begin increasing. The <I> CRT will indicate STARTUP STATUS/ACCELERATING and the turbine will increase in speed. At approximately 50% speed, the accelerating speed signal "14HA" will be displayed on the <I> CRT.

- (9) The turbine will continue to accelerate. When it reaches 85–90% speed, the starting device will disengage and shutdown. The <I> CRT will indicate the change in status from STARTUP CONTROL to SPEED CONTROL at approximately 60% speed.
- (10) When the turbine reaches operating speed, the operating speed signal "14HS" will be displayed on the <I> CRT. Field flashing is terminated. If the synchronizing selector switch (43S) on the generator control panel is in the OFF position and REMOTE is not selected on the <I> CRT, as the turbine reaches operating speed, <I> CRT will now read:

RUN STATUS  
FULL SPEED NO LOAD  
AUTO; START

If the synchronizing selector switch on the generator panel is in the AUTO position or REMOTE is selected on the <I> CRT automatic synchronizing is initiated. The <I> CRT will read SYNCHRONIZING.

The turbine speed is matched to the system (to less than 1/3 Hz difference) and when the proper phase relationship is achieved the generator breaker will close. The machine will load to Spinning Reserve unless a load control point BASE, PEAK or PRESELECTED LOAD has been selected.

The <I> CRT will display SPINNING RESERVE, once the unit has reached this load point.

### C. Synchronizing

When a gas turbine-driven synchronous generator is connected into a power transmission system, the phase angle of the generator going on-line must correspond to the phase angle of the existing line voltage at the moment of its introduction into the system. This is called synchronizing.

#### CAUTION

Before initiating synchronization procedures, be sure that all synchronization equipment is functioning properly, and that the phase sequence of the incoming unit corresponds to the existing line phase sequence and the potential transformers are connected correctly to proper phases. Initial synchronization and checkout after performing maintenance to synchronizing equipment should be performed with the breaker racked out.

**Note:** Synchronizing cannot take place unless **AUTO** or **REMOTE** has been selected on the <I> CRT Main Display and the turbine has reached full speed.

Generator synchronization can be accomplished either automatically or manually. Manual synchronization is accomplished by the following procedure:

1. Place the synchronizing selector switch on the generator panel (43S) in the MANUAL position.
2. Select AUTO on the <I> CRT Main Display.
3. Select START and EXECUTE on the <I> CRT Main Display. This will start the turbine and accelerate it to full speed as previously described. At this point the CRT will indicate RUN STATUS, FULL SPEED NO LOAD.
4. Compare the generator voltage with the line voltage. (These voltmeters are located on the generator control panel.)
5. Make any necessary voltage adjustment by operating the RAISE- LOWER (90R4) switch on the generator panel until the generator voltage equals the line voltage.
6. Compare the generator and line frequency on the synchroscope (located on the generator control panel). If the pointer is rotating counterclockwise, the generator frequency is lower than the line frequency and should be raised by increasing the turbine-generator speed. The brightness of the synchronizing lights will change with the rotation of the synchroscope. When the lights are their dullest the synchroscope will be at the 12 o'clock position. The lights should not be used to synchronize but only to verify proper operation of the synchroscope.
7. Adjust the speed until the synchroscope rotates clockwise at approximately five seconds per revolution or slower.
8. The generator circuit breaker "close" signal should be given when it reaches a point approximately one minute before the 12 o'clock position. This allows for a time lag for the breaker contacts to close after receiving the close signal.

Automatic synchronization is accomplished by the following steps:



1. Place the synchronizing selector switch (43S) in the AUTO position.
2. Select AUTO on the <I> CRT Main Display.
3. Select START on the <I> CRT Main Display.

This procedure will start the turbine, and upon attainment of “complete sequence”, match generator voltage to line voltage (if equipped with optional voltage matching), synchronize the generator to the line frequency, and load the generator to the preselected value. A “breaker closed” indicator will actuate when the generator circuit breaker has closed placing the synchronized unit on-line.

Once the generator has been connected to the power system, the turbine fuel flow may be increased to pick up load, and the generator excitation may be adjusted to obtain the desired KVAR value.

### WARNING

**Failure to synchronize properly may result in equipment damage and/or failure, or the creation of circumstances which could result in the automatic removal of generating capacity from the power system.**

In those cases where out-of-phase breaker closures are not so serious as to cause immediate equipment failure or system disruption, cumulative damage may result to the on-coming generator. Repeated occurrences of out-of-phase breaker closures can eventually result in generator failure because of the stresses created at the time of closure.

Out-of-phase breaker closure of a magnitude sufficient to cause either immediate or cumulative equipment damage mentioned above will usually result in annunciator drops to notify the operator of the problem. The following alarms have been displayed at various occurrences of known generator breaker malclosures:

1. High vibration trip
2. Loss of excitation
3. Various AC undervoltage drops

Out-of-phase breaker closure will result in abnormal generator noise and vibration at the time of closure. If there is reason to suspect such breaker malclosure, the equipment should be immediately inspected to determine the cause of the malclosure and for any damage to the generator.

Refer to the “Control and Protection” section of this volume for additional information on the synchronizing system.

## D. Normal Load Operation

### 1. Manual Loading

Manual loading is accomplished by clicking on the SPEED SP RAISE/SPEED SP LOWER targets on the <I> CRT Main Display.

Manual loading can also be accomplished by means of the governor control switch (70R4/CS) on the generator control panel. Holding the switch to the right will increase the load; holding it to the left will decrease the load.

Manual loading beyond the selected temperature control point BASE or PEAK is not possible. The manual loading rate is shown in the Control Specification-Settings Drawing.

**Note: When manually loading with the governor control switch (70R4/CS) for load changes greater than 25% of full load, the operator should not change more than 25% of full load in one minute.**

## 2. Automatic Loading

On startup if no load point is selected, the unit will load to the SPINNING RESERVE load point. The SPINNING RESERVE load point is slightly greater than no load, typically 8% of base rating.

An intermediate load point, PRE-SELECTED load, and temperature control load points BASE and PEAK can be selected anytime after a start signal has been given. The selection will be displayed on the <I> CRT. The unit will load to the selected load point. PRESELECTED LOAD is a load point greater than SPINNING RESERVE and less than BASE, typically 50%. The auto loading rate is shown in Control Specification-Settings Drawing.

## E. Remote Operation

To transfer turbine control from the control compartment to remotely located equipment, select REMOTE on the <I> CRT Main Display. The turbine may then be started, automatically synchronized, and loaded by the remote equipment.

If manual synchronization is to be performed at the remote location, the synchronizing selector switch (43S) mounted on the generator control panel must be placed in the OFF/REMOTE position.

## F. Shutdown and Cooldown

### 1. Normal Shutdown

Normal shutdown is initiated by selecting STOP on the <I> CRT Main Display. The shutdown procedure will follow automatically through generator unloading, turbine speed reduction, fuel shutoff at part speed and initiation of the cooldown sequence as the unit comes to rest.

### 2. Emergency Shutdown

Emergency shutdown is initiated by depressing the EMERGENCY STOP pushbutton. Cooldown operation after emergency shutdown is also automatic provided the permissives for this operation are met.

### 3. Cooldown

Immediately following a shutdown, after the turbine has been in the fired mode, the rotor is turned to provide uniform cooling. Uniform cooling of the turbine rotor prevents rotor bowing, resultant rubbing and imbalance, and related damage that might otherwise occur when subsequent starts are at-

tempted without cooldown. The turbine can be started and loaded at any time during the cooldown cycle.

The cooldown cycle may be accelerated using the starting device; in which case it will be operated at cranking speed.

A rotor turning device is provided for cooldown rotation. A description of rotor turning operation and servicing can be found in the Starting System tab.

The minimum time required for turbine cooldown depends mainly on the turbine ambient temperature. Other factors, such as wind direction and velocity in outdoor installations and air drafts in indoor installations, can have an affect on the time required for cooldown. The cooldown times recommended in the following paragraphs are the result of General Electric Company operating experience in both factory and field testing of General Electric gas turbines. The purchaser may find that these times can be modified as experience is gained in operation of the gas turbine under his particular site conditions.

Cooldown times should not be accelerated by opening up the turbine compartment doors or the lagging panels since uneven cooling of the outer casings may result in excessive stress.

The unit must be on rotor turning operation immediately following a shutdown for at least 24 hours to ensure minimum protection against rubs and unbalance on a subsequent starting attempt. The General Electric Company, however, recommends that the rotor turning operation continue for 48 hours after shutdown to ensure uniform rotor cooling.

## **G. Special Operations**

### **1. Fuel Transfer (Gas-Distillate Option)**

Fuel transfer is initiated using the Fuel Mixture Display on the <I> CRT. When transferring from one fuel to the other, there is a thirty second delay before the transfer begins. For the gas-to-distillate transfer, the delay allows for filling the liquid fuel lines. For the distillate-to-gas transfer, the delay allows time for the speed ratio valve (and gas control valve) to modulate the inter volume gas pressure before the transfer begins. Once started, fuel transfer takes approximately thirty seconds. The transfer can be stopped at any fuel mixture proportion within limits as specified in the Control Specification-Settings Drawing by setting the FUEL MIX SETPOINT and then selecting MIX. Fuel transfer should be initiated prior to ignition or after the unit reaches operating speed.

### **2. Automatic Fuel Transfer On Low Gas Pressure (Gas-Distillate Option)**

In the event of low fuel gas pressure the turbine will transfer to liquid fuel. The transfer will occur with no delay for line filling. To return to gas fuel operation after an automatic transfer, manually reselect gas fuel.

### **3. Testing the Emergency DC Lube Pump**

The DC emergency pump may be tested using the test pushbutton on the motor starter.

#### 4. Overspeed Trip Checks

Overspeed trip system testing should be performed on an annual basis on peaking and intermittently used gas turbines. On continuously operated units, the test should be performed at each scheduled shutdown and after each major overhaul. All units should be tested after an extended shutdown period of two or more months unless otherwise specified in the Control Specifications-Adjustments Drawing.

**Note:** The turbine should be operated for at least 30 minutes at rated speed before checking the overspeed settings.

Turbine speed is controlled by the turbine speed reference signal TNR. The maximum speed called for by TNR is limited by the high speed stop control constant. This value is nominally set at 107% of rated speed. It will be necessary to select the overspeed test function, which will reprogram the 107% setpoint to 113%, in order to allow the speed to increase above the electrical overspeed trip setting. With the high speed stop constant adjusted to be higher than the electrical overspeed trip speed, raise unit speed gradually by using the SPEED SP RAISE target on the <I> Main Display and observe speed at which the unit trips against the value tabulated in the Control Specifications — Setting drawing. Once the unit trips, the speed setpoint is returned to the 107% maximum value.

#### CAUTION

1. Do not exceed the maximum search speed as defined in the Control Specifications.
2. Return all constants to their normal value after coast-down of unit.

#### 5. Steam Injection Operation (Optional)

Before operating the steam injection system for the first time following an overhaul or periods of extended shutdown, it is important that the following checks be made:

- a. Steam supply is within design parameters
- b. Instrument air supply is at required pressure
- c. Steam line orifice size is correct

##### a. Pre-Operation Checks

Prior to operation, check for the following conditions:

- a. <I> CRT controls are in non-select positions (Steam Injection OFF)
- b. Manual stop valve is open
- c. All hand valves in line of flow are open
- d. All valves to temperature or pressure gauges are open

- e. Steam supply pressure and temperature are in operating range

#### b. Startup

The automatic control system, in conjunction with logic circuits of the microcomputer of the SPEEDTRONIC® control system, operates the steam injection system control valving and assures that the proper amount of steam injection is provided to the turbine combustion system during operation.

To initiate steam injection the operator must first select the Steam Injection Overview Display on the <I> CRT. Selecting the STM INJ ON target initiates the steam injection control. At this point the automatic steam control circuits will take over, initiate the drain and stop valve sequences and control the system. When steam conditions are correct, the steam control valve releases steam into the combustion system at the proper steam-to-fuel flow ratio.

The startup and operating sequence of the steam injection system is described and explained in the Steam Injection control system text of the Control and Protection Tab.

#### c. Trouble Shooting

The purpose of the system is to provide steam to the turbine combustion system at the desired pressure, temperature and flow. If this does not happen, the following problems may be the cause:

- (1) Steam supply exhausted
- (2) Insufficient supply pressure
- (3) Control valve closed
- (4) Stop valve closed

The following should be checked:

- (1) Adequate steam supply
- (2) Check steam supply system
- (3) Check control valve actuator and drain valve operation
- (4) Check that instrument air supply pressure is sufficient and/or check solenoid control valve operation.

Alarm and shutdown conditions of the steam injection system are detected by a protection program built into Control Sequence Program. Alarm and trip indications are displayed on the <I> CRT. An alarm condition is initiated by high or low pressure levels and by high or low temperatures. See Control Specifications for alarm and trip point values.

The computer program is designed to trip the steam stop valve and prevent steam flow if steam temperature becomes too high or too low. It can trip the system on temperature or pressure to protect against loss of superheat and carry over of condensate. Steam at too high a pressure can cause damage to valve stem packing and system seals. A steam injection trip only shuts down the steam injection system. It does not trip the turbine.

## 6. DLN<sub>x</sub> II SYSTEM OPERATION

### a. General

The Dry Low Nox II control system regulates the distribution of fuel delivered to multi-nozzle combustors located around the gas turbine. This system stages the fuel through multiple modes of operation to attain the low emissions mode of **Premix**. DLN-2 has only one burning zone but multiple nozzles and manifolds.

### b. Gas Fuel Operation

There are three basic modes for fuel distribution to the combustor:

(1) Primary

Fuel to primary manifold only

(2) Lean-Lean

Fuel to primary and tertiary manifolds

(3) Premix

In this mode, fuel is in both the secondary and tertiary manifolds. This is the low emission mode.

### c. Valves

There are four main valves in DLN-2:

Primary Gas Control Valve (GCVP)

Secondary Gas Control Valve (GCVS)

Quaternary Gas Control Valve (GCVQ)

Premix Splitter Valve (PMSV)

The PMSV is used downstream of the secondary gas control valve. This valve controls the flow between 4 secondary nozzles and 1 tertiary nozzle (The tertiary nozzle is not used during Primary mode).

### d. Startup and Load Sequence

The gas turbine will startup with fuel going to primary manifold only and will accelerate to 81% corrected speed. At this point fuel flow will be initiated into the tertiary manifold and Lean-Lean will be established. As the unit is loaded to approximately 60% load (with no Bleed Heat), or 40% load (with Bleed Heat) a transfer to Premix will be performed. When transferring to Premix, the primary gas control valve will close, the secondary gas control valve will open, and the Premix splitter valve will modulate to control the flow between the tertiary and secondary nozzles. Once the Primary control valve is closed, the Primary Purge System will open to purge the primary nozzles.

The sequence of events on an unload is as follows:

- (1) Premix to Transfer Mode
- (2) Premix Transfer to Lean–Lean
- (3) Fired shutdown in Lean–Lean

The mode selection is performed automatically in the control system when the turbine is at the proper operating conditions.

These conditions must be met before startup; The following valves must be in the closed position:

Stop/Speed Ratio

Primary Control Valve (GCVP)

Secondary Control Valve (GCVS)

Quaternary Control Valve (GCVQ)

The Premix Splitter Valve (PMSV) should be at 100% split (no secondary flow).

Bleed Heat Valve closed (If applicable)

#### e. Inlet Guide Vane Operation (IGV)

The DLN–2 combustor emission performance is sensitive to changes in fuel to air ratio. The DLNx combustor was designed according to the airflow regulation scheme used with IGV Temperature Control. The IGV's should remain at a fixed minimum value from full speed no load until the turbine increases load while on the exhaust temperature control curve. The IGV's open from their minimum value as the turbine increases load while on the exhaust temperature control curve until they reach a maximum at Base Load.

**IGV Temperature Control is defaulted to be “on”, but the operator should always check this during startup.** The only exception to this rule is when temperature matching is selected (see Temperature Matching below), or simple cycle IGV control is selected. Simple Cycle IGV control can be selected between breaker closer and 8 MW, or at Full open IGV's.

#### f. Inlet Heating

Operation of the gas turbine with reduced minimum IGV settings can be used to extend the Premix operating region to lower loads. Reducing the minimum IGV angle allows the combustor to operate near a constant firing temperature that is high enough to support Premix operation while maintaining a sufficient fuel to air ratio.

Inlet heating through the use of recirculated compressor discharge airflow is necessary when operating with reduced IGV angles in order to protect the turbine compressor. Inlet heating protects the turbine compressor from stall by relieving discharge pressure and by increasing the inlet air stream temperature. Also, inlet heating prevents ice formation due to increased pressure drop across the reduced IGV angle.

The inlet heating system regulates the compressor discharge bleed flow through a control valve and into a manifold located in the compressor inlet air stream. The control valve varies the inlet air flow as a function of the IGV angle, compressor operating and ambient temperature.

**g. Temperature Matching**

Temperature matching is used when the gas turbine exhaust temperature is to be controlled to bring on a steam turbine. The operator must select temperature matching "on". Once selected, the turbine has to be loaded/unloaded to the matching window. Once the unit is in the matching window, the operator can enable matching with temperature matching on the Gas Turbine Exhaust temperature can be increased using the targets on the Temperature Matching Control Screen.

**h. DLNx II Display Messages**

The following display messages will appear on the control panel CRT in order to inform the operator of the current combustion mode of operation:

Primary Mode

Lean-Lean Mode

Secondary Prefill

Piloted Premix Mode

Premix Transfer Mode

Premix Steady State

Tertiary only FSNL Mode

**7. Water Washing System Operation (Optional)**

**a. General**

Water washing should be scheduled during a normal shutdown, if possible. This will allow enough time for the internal machine temperature to drop to the required levels for the washing. The time required to cool the machine can be shortened by maintaining the unit at crank speed. During this cooling of the turbine, the wash water is to be heated to the proper level.

**b. Mandatory Precautions**

Before water washing of the compressor begins, the turbine blading temperature must be low enough so that the water does not cause thermal shock.



**CAUTION**

The differential temperature between the wash water and the interstage wheelspace temperature must not be greater than 120°F (48.9°C) to prevent thermal shock to the hot gas parts. For wash water of 180°F (82.2°C), the maximum wheelspace temperature must be no greater than 300°F (148.9°C) as measured by the digital thermocouple readout system on the turbine control panel.

To reduce this difference, the wash water may be heated and the turbine kept on crank until the wheelspace temperatures drop to an acceptable level. The wheelspace temperatures are read in the control room on the <I> CRT.

**CAUTION**

If, during operation, there has been an increase in exhaust temperature spread above the normal 15°F to 30°F (8.3°C to 16.6°C), the thermocouples in the exhaust plenum should be examined. If they are coated with ash, the ash should be removed. Radiation shields should also be checked.

If they are not radially oriented relative to the turbine, they should be repositioned per the appropriate drawing. If the thermocouples are coated with ash, or if the radiation shields are not properly oriented, a correct temperature reading will not be obtained.

If neither of the above conditions exists and there is no other explanation for the temperature spread, consult the General Electric Installation and Service Engineering representative.

**WARNING**

**The water wash operation involves water under high pressure. Caution must be exercised to ensure the proper positioning of all valves during this operation. Since the water may also be hot, necessary precautions should be taken in handling valves, pipes, and potentially hot surfaces.**

**Note:** Before water washing the compressor, inspect the inlet plenum and gas turbine bellmouth for large accumulations of atmospheric contaminants which could be washed into the compressor. These deposits can be removed by washing with a garden hose.

### c. Water Wash Procedures

Refer to cleaning publication included in this section for details on procedure.

## 8. Unit Operation After Failure to Fire on Liquid Fuel (DLN 2.0 or DLN 2.6)

The following only applies to units with DLN 2.0 or DLN 2.6 combustion systems. After every failure to fire on oil, a STOP command should be given and the unit allowed to decelerate to 2% speed and operate there for at least 2 minutes before being restarted on gas or liquid fuel. Currently, this must be done manually. This operation allows excess liquid fuel to drain from liners.

## IV. DESCRIPTION OF PANELS AND TERMS

### A. Turbine Control Panel (TCP)

The turbine control panel contains the hardware and software required to operate the turbine. A front elevation view of the panel can be seen in the Hardware Description.

**EMERGENCY STOP (5E)** — This red pushbutton is located on the front of the TCP. Operation of this pushbutton immediately shuts off turbine fuel.

**BACKUP OPERATOR INTERFACE (BOI)** — This interactive display is mounted on the front of the TCP. All operator commands can be issued from this module. In addition, alarm management can be performed and turbine parameters can be monitored from the <BOI>.

### B. <I> CRT

The <I> CRT is a personal computer that directly interfaces to the turbine control panel. This is the primary operator station. All operator commands can be issued from the <I> CRT. Alarm management can be performed and turbine parameters can be monitored. With the proper password, editing can also be accomplished.

#### 1. Main Display

Operator selector targets and master control selector targets can be actuated from the main display by using the cursor positioning device (CPD). Operator selector targets include:

**OFF** — Inhibits a start signal.

**CRANK** — With crank selected, a start signal will bring the machine to purge speed.

**FIRE** — With FIRE selected, a START signal will bring the machine to minimum speed and establish flame in the combustors. Selecting FIRE while the machine is on CRANK will initiate the firing sequence and establish flame in the combustors.

**AUTO** — With AUTO selected, a START signal will bring the machine to operating speed. Changing selections from FIRE to AUTO will allow the machine to accelerate to operating speed.

**REMOTE** — With REMOTE selected, control for the unit is transferred to the remote control equipment.

Master control selector targets include:

**START** — A START selection will cause the unit to start. With AUTO selected, the unit will load to the SPINNING RESERVE load point.

**FAST START** - A FAST START selection will cause the unit to start. With AUTO selected, the unit will load to the PRESELECTED load point. The machine will load at the manual loading rate.

**STOP** - A STOP selection will cause the unit to initiate a normal shutdown.

All operator selector switches and master control selector targets are green and are located on the right side of the display. All green targets are the AUTO/EXECUTE type, which means that the target must be selected with the CPD and then, within three seconds, the EXECUTE target at the bottom of the display must also be selected in order to actuate that command.

## **2. Load Control Display**

Load selector targets can be actuated from the load control display by using the cursor positioning device (CPD). Load selector targets include:

**PRESEL** - Select the preselected load point.

**BASE** - Select base temperature control load point.

**\*PEAK** - Select peak temperature control load point.

## **3. \*Fuel Mixture Display**

Fuel selector targets are used to select the desired fuel by using the cursor positioning device (CPD). Fuel selector targets include:

**GAS SELECT** - 100% gas fuel operation.

**DIST SELECT** - 100% distillate fuel operation.

**MIX SELECT** - Selecting MIX while on 100% single fuel will cause the machine to transfer to mixed fuel operation at a preset mixture (not applicable on DLN units).

## **4. \*Isochronous Setpoint Display**

Governor selector targets are used to select the desired type of speed control by using the cursor positioning device (CPD). Governor selector targets include:

**DROOP SELECT** - Used to select droop speed control.

**ISOCH SELECT** - Used to select isochronous speed control.

### 5. \*Inlet Guide Vane Control Display

The inlet guide vane (IGV) temperature control targets are IGV TEMP CNTL ON and IGV TEMP CNTL OFF. The IGV AUTO target selects normal operation of the IGVs. The IGV MANUAL target allows the maximum IGV angle to be manually set by the operator (not normally used while on-line).

### 6. Alarm Display

This screen displays the current un-reset alarms, the time when each alarm occurred, the alarm drop number and a word description of the alarm. An "\*" indicates that the alarm has not been acknowledged. The "\*" disappears after the alarm has been acknowledged. For more information, see the Mark V Users' Manual (GEH-5979).

### 7. Auxiliary Display

COOLDOWN ON and COOLDOWN OFF can be selected from this display.

### 8. Manual Reset Target

Selecting the manual reset target resets the Master Reset Lockout function. This target must be selected so that the unit can be restarted following a trip.

## C. Definition of Terms

**SPINNING RESERVE** - The minimum load control point based on generator output. The spinning reserve magnitude in MWs can be found in the control specifications (5-10% of rating is a typical value).

**PRESELECTED LOAD** - A load control point based on generator output. The preselected load point is adjustable within a range designated in the Control Specification. The preselected load point is normally set below the base load point (50-60% of rating is a typical value).

**BASE LOAD** - This is the normal maximum loading for continuous turbine operation as determined by turbine exhaust temperature levels.

**PEAK LOAD (Optional)** - This is the maximum allowable output permitted for relatively long-duration, emergency power requirement situations consistent with acceptable turbine parts life. Peak loading duration is based on turbine exhaust temperature levels.

## D. Generator Control Panel (Typical)

**SYNCHRONIZING LAMPS** — Rough indication of the speed and phase relationship between the generator and the bus.

**FREQUENCY METER** — Indicates generator frequency.

**INCOMING VOLTMETER** — Indicates generator voltage.

**RUN VOLTMETER** — Indicates bus voltage.

**SYNCHROSCOPE** — Indicates the phase relationship between the generator and bus voltage.

GENERATOR AMMETER — Indicates generator phase current. The phase current to be read is selected on the three position ammeter selector switch.

GENERATOR WATTMETER — Indicates the generator output in megawatts.

GENERATOR VAR METER — Indicates the generator reactive output in megavars.

GENERATOR TEMPERATURE METER — (Traditionally included on the Generator Control Panel, but actually displayed in Mark V SPEEDTRONIC® systems on the <I> CRT.) Reads the generator Resistance Temperature Detector (RTD) selected by the temperature meter selector switch.

EXCITER VOLTMETER — Indicates generator field voltage (if used).

GENERATOR FIELD AMMETER — Indicates generator field amperes (if used).

AMMETER SELECTOR SWITCH — See Generator Ammeter (above).

SYNCHRONIZING SELECTOR SWITCH (43S/CS) — Three position switch used to select the synchronizing mode.

Manual — Selects manual synchronizing mode. In this position the generator frequency and voltage, bus voltage, and phase relationship will be displayed to facilitate manual synchronizing.

Off/Remote — Used when the unit is being controlled from the remote control equipment.

Auto — Used for local automatic synchronizing.

VOLTMETER SWITCH (VS) — Used to select the phase of the bus voltage to be displayed on the run voltmeter.

TEMPERATURE METER SELECTOR SWITCH — Traditionally included on the Generator Control Panel, but actually displayed in Mark V SPEEDTRONIC® systems on the <I> CRT.

VOLTAGE/VAR CONTROL SWITCH (90R4/CS) — Controls generator voltage when the unit is off the line, and controls voltage/vars when the machine is on the line. (Increase — Right; Decrease — Left; spring return to normal.)

GENERATOR BREAKER CONTROL SWITCH (52G/CS) — Used to open or close the generator breaker. The indicator lights above the switch indicate Open (Green) and Closed (Red).

**Note: Using this switch, the generator breaker should be closed only when proper synchronizing techniques are used or when the system onto which the generator is being brought is not energized.**

GENERATOR DIFFERENTIAL LOCK-OUT SWITCH (86G) — Manual reset lockout switch which operates in the event of a generator fault.

GOVERNOR RAISE/LOWER CONTROL SWITCH (70R4/CS) — Used to control turbine speed when the generator is off the line (i.e. for manual synchronizing); generator load when the generator is on the line; and frequency when the generator is running isolated and on DROOP speed control.

TRANSFORMER DIFFERENTIAL LOCK-OUT SWITCH (86T) — Manual reset lockout switch which operates in the event of a transformer fault.

WATTHOUR METER — Measures the watthour output of the generator.

#### E. Motor Control Center

The turbine is provided with a motor control center for the control of the electrical auxiliaries. The motor control center includes AC and DC distribution systems.

Motor controllers are used for auxiliaries such as motors and heaters. Each motor controller normally consists of a breaker, control power transformer, control circuit, power contactor, selector switch and indicator lights. The selector switch is normally left in AUTO. Each motor control center is also provided with AC and DC distribution panel boards with circuit breakers.

#### F. Supervisory Remote Equipment

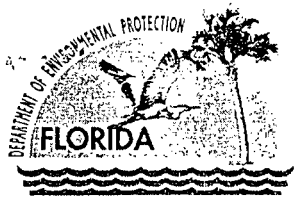
Supervisory equipment is normally functionally the same as the equipment described in the cable connected master panel. However, it may differ somewhat in metering and indications. Refer to the supervisory manufacturer's instruction manual for details.

#### G. Annunciator System

Alarms are displayed on the <I> CRT when the ALARM Display mode is selected. Before clearing an alarm, action should be taken to determine the cause and perform the necessary corrective action. The following is a list of annunciator messages along with suggested operator action.

**Note:** The alarm messages can be categorized as either "trip" or "alarm". The "trip" messages contain the word TRIP in the message. The "alarm" messages do not indicate TRIP. For those alarms associated with permissive to start and trip logics latched up through the MASTER RESET function, it will be necessary to call up the <I> CRT Display with the Master Reset target in order to unlatch and clear these alarms.

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# Department of Environmental Protection

Lawton Chiles  
Governor

Virginia B. Wetherell  
Secretary

November 25, 1998

## CERTIFIED MAIL -RETURN RECEIPT REQUESTED

Mr. Walter P. Bussels  
Managing Director & Chief Executive Officer  
Jacksonville Electric Authority  
21 West Church Street  
Jacksonville, Fl 32202-3139

Re: Jacksonville Electric Authority  
Kennedy Generating Station  
File No. 0310047-002-AC

Dear Mr. Bussels:

The Department received your application for the construction/installation of a 170 MW GE PG7241 FA simple cycle combustion turbine at the Kennedy Generating Plant on October 30, 1998. Based on a technical review, the application is incomplete. Pursuant to Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, F.A.C., please submit the following information, including all assumptions, reference materials and calculations:

1. Pursuant to Rule 62-212.400 (2)(e), F.A.C., please recalculate the net emission increases (sum of all 5 year contemporaneous source-wide creditable increases and decreases in the actual emissions of the facility) for all affected PSD pollutants listed in Table 62-212.400-2, F.A.C., to determine PSD applicability.
2. Please provide technical information that will explain the simple cycle vs the combined cycle mechanism of fine tuning, etc., in relation to the NO<sub>x</sub> emission rate. What is the lowest NO<sub>x</sub> rate GE guarantees for this type of turbine operating in the simple cycle.
3. Illustrate the emissions performance of the DLN-2.6 combustor employed in this application. Submit the NO<sub>x</sub> and CO graph figures (for oil and gas) that will show the GE DLN 2.6 system performance (load at a given temperature vs turbine configuration). Attached is an example of the characteristics of the DLN 2.0 that we wish to have updated for the DLN 2.6.
4. Please explain why emissions of NO<sub>x</sub> are estimated to be 15 ppm. GE guaranteed a limit of 9 ppm at the City of Tallahassee Combined Cycle Project where similar turbine will be used.
5. If possible provide an 8 X 11' photo or drawing of this site.

*"Protect, Conserve and Manage Florida's Environment and Natural Resources"*

*Printed on recycled paper.*



6. Describe procedures used to startup and shutdown of this unit to minimize excess emissions.
7. Does this facility comply with the Jacksonville air pollution control regulations?

We will resume processing the application after the requested information is received. If you have any questions regarding this matter, please call Teresa Heron (Review Engineer) at (850)921-9529.

Sincerely,



A. A. Linero, P.E. Administrator  
New Source Review Section

AAL/th

cc: Anthony L. Compaan, PE  
Gregg Worley, EPA  
Chris Kirts, DEPNED  
James L. Manning, RESD

mode. Diffusion, piloted premix, and premix flame are established by changing the distribution of fuel flow in the combustor. The gas fuel system shown in Figure 18 consists of the gas fuel stop/ratio valve, primary gas control valve, secondary gas control valve, premix splitter valve, and quaternary gas control valve. The stop/ratio valve is designed to maintain a predetermined pressure at the control valve inlet. The primary, secondary, and quaternary gas control valves regulate the desired gas fuel flow delivered to the turbine in response to the fuel command from the SPEEDTRONIC™ controls. The premix splitter valve controls the fuel flow split between the secondary and tertiary fuel system.

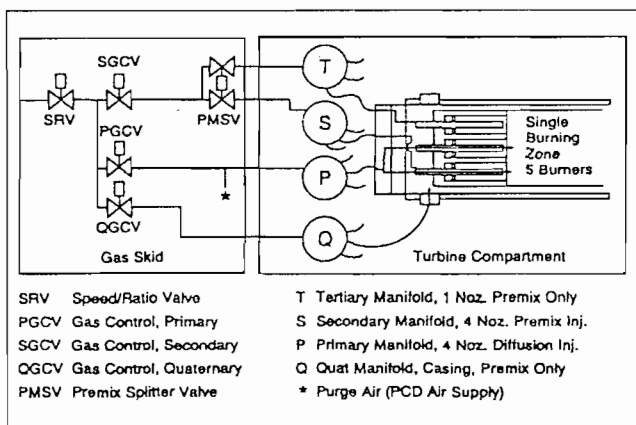


Figure 18. DLN-2 gas fuel system

GT224553

### DLN-2 Emissions Performance

Figures 19 and 20 show the emissions performance for a DLN-2 equipped 7FA/9FA for gas fuel and for oil fuel with water injection.

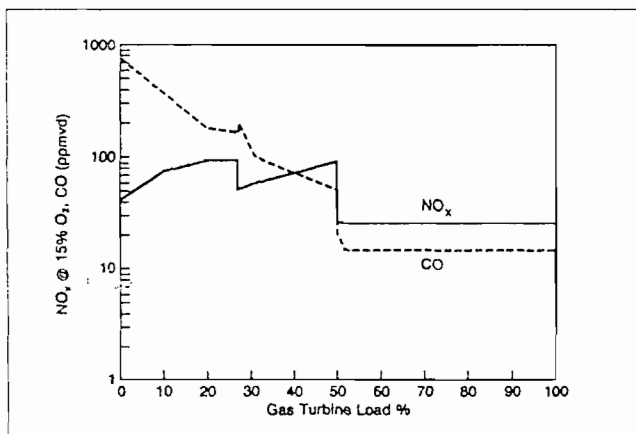


Figure 19. Emissions performance for DLN-2 equipped 7FA/9FA for gas fuel

GT24554

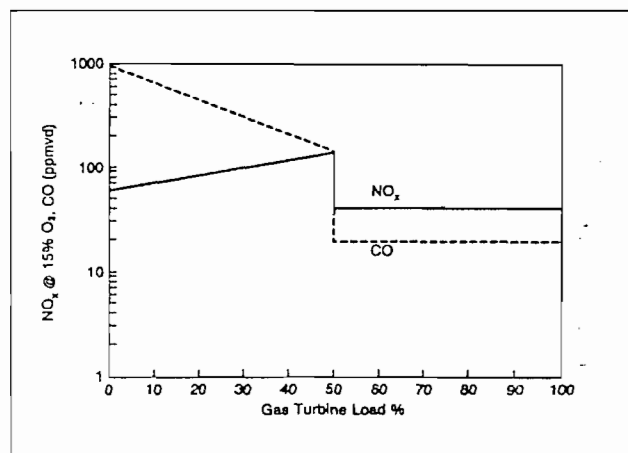


Figure 20. Emissions performance for DLN-2 equipped 7FA/9FA for oil fuel with water injection

GT24555

### DLN-2 Experience

The first DLN-2 systems were placed in service at Florida Power and Light's Martin Station with commissioning beginning in September, 1993, and the first two (of four) units entering commercial service in February 1994. During commissioning, quaternary fuel was added and other combustor modifications were made to control dynamic pressure oscillations in the combustor. All four FPL units are currently in commercial service, and are achieving the emissions goals of less than 25 ppm NO<sub>x</sub> and 15 ppm CO. They have accumulated nearly 15,000 hours of premixed operation. Five additional units are being commissioned and will enter commercial service in 1994.

### SUMMARY

GE's Dry Low NO<sub>x</sub> development program is focused on the development of systems capable of the extremely low NO<sub>x</sub> levels required to meet today's stringent regulations and to prepare for more stringent requirements in the future. New unit production needs, as well as the requirement for existing machines, are being addressed. GE DLN systems are currently in operation on more than sixty machines and have accumulated nearly 200,000 hours in service. As of this writing, over 200 DLN systems have been either put into service, shipped, or placed on order. GE is the only manufacturer with 2350 F (1288 C) class machines operating below 25ppmvd.



**GE Energy Services**

**Marvin V. Sindel Jr.**  
Sales Manager

GE Energy Services Sales  
General Electric International, Inc.  
10 Van Dyck Rd. Jacksonville, FL 32218  
Tel: 904-737-2620, Dial Comm: 800-585-2620  
Fax: 904-752-2652  
Email: marvin.sindel@ps.ge.com

12/8/98

Subject: GE Frame 7FA Gas Turbine NOx Guarantee for JEA - Kennedy

Mr. Jim Connolly, P.E.  
JEA  
21 West Church Street  
Jacksonville, FL 32202

Dear Jim,

Pursuant to your question on the NOx emission guarantee for the GE Frame 7FA units that JEA has purchased, the following information is offered:

1. The GE guarantee for the units purchased is 15 ppm NOx. GE will guarantee this level only for the "new and clean" test performed immediately after the installation of the unit is complete. This guarantee is similar to GE guaranteeing the performance of the unit at the "new and clean" condition.
2. The unit will operate at the 15 ppm level only for load conditions above 50% load. Should JEA use the units in their peaking mode for load control and operate the unit below this load point, the NOx level will exceed the 15 ppm.
3. The current NOx guarantee is for 15 ppm. However, with some additional modifications, GE is able to offer an improved guarantee of 9 ppm NOx. GE is working on providing an optional price to JEA to change the contractual guarantee to 9 ppm NOx.

I hope this answers your questions concerning the GE units contractual guarantee concerning NOx emissions. Should you have any further questions regarding the GE units, please contact me at your convenience.

Respectfully,

*Marvin Sindel*  
Marvin Sindel  
Sales Manager

cc: J. Grassman - GE Schenectady

*Kennedy CT Project*  
*Rec'd 12/8/98 RCT*  
 cc: J. Connolly  
 E. Berget  
 M. Barata  
 B. Gianozza  
 RCT



Fold at line over top of envelope to the right of the return address

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

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

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to: Walter P. Bussels JEA 21 W. Church St. Jacksonville, FL 32202-3139	4a. Article Number Z 333 612 559
5. Received By: (Print Name)	4b. Service Type <input type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail <input type="checkbox"/> Insured <input type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> COD
6. Signature: (Addressee or Agent) X <i>D. Bussels</i>	7. Date of Delivery 12-1-98
	8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.

PS Form 3811, December 1994

102595-97-B-0179

Domestic Return Receipt

Z 333 612 559

US Postal Service

**Receipt for Certified Mail**

No Insurance Coverage Provided.

Do not use for International Mail (See reverse)

Sent to	Walter Bussels
Street & Number	JEA
Post Office, State & ZIP Code	Jacksonville FL
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	11-25-98
	0310047-002 AC

PS Form 3800, April 1995

21 West Church Street  
Jacksonville, Florida 32202-3139



**RECEIVED**

**OCT 30 1998**

**BUREAU OF  
AIR REGULATION**

October 29, 1998

Mr. Clair H. Fancy, P.E.  
Chief, Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

RE: Air Construction Permit Application for  
Kennedy Generating Station Combustion Turbine

0310047-002-AC

Dear Mr. Fancy:

Attached to this letter please find a copy of the air construction permit application for the installation of a simple cycle combustion turbine (CT) at Jacksonville Electric Authority's (JEA's) Kennedy Generating Station. This application has been prepared on DEP Form No. 62-210.900(1) in accordance with the applicable instructions for this form.

Background:

JEA proposes to construct a 170 MW natural gas (NG) and No. 2 fuel oil (FO) fired electrical generating CT at the existing Kennedy Generating Station in Jacksonville, Florida. The proposed CT would replace an aging NG and FO fired boiler (KE10) and will be used to provide peaking electrical power to the grid. KE10 would be taken out of service once the CT becomes operational. It is anticipated that construction of this project will begin on June 1, 1999 with operation commencing following completion of construction about May 1, 2000.

While previous correspondence with the DEP about this project, including the February 12, 1998 "Request for PSD Determination" (attached), indicated that a particular CT had not yet been selected for the project, a CT has now been selected. The CT proposed for this project is one of two mentioned in our previous correspondence, the General Electric PG 7241 FA model. Emissions data for this CT have been included as an attachment to the permit application.

PSD Applicability:

The proposed CT is being permitted as a minor source due to its limited hours of operation and the contemporaneous shutdown of KE10. The "netting analysis" to determine PSD applicability is documented in the February 12, 1998 "Request for PSD Determination" report previously submitted to your department. This analysis determined that based on the historical use of the existing KE10 boiler, the proposed CT could operate several hundred hours per year on either NG or FO without exceeding applicable Prevention of Significant Deterioration (PSD) major source significance levels.

This analysis has recently been updated to include the most recent twenty-four months of operation for the KE10 boiler, resulting in increased allowable hours of operation for the proposed CT while still remaining a minor source.

These hours are determined by a formula establishing a maximum number of hours of operation on NG (4,050 hours) which the proposed CT can operate without exceeding the PSD significance levels. Operation on FO, with its higher associated emissions, results in a lower maximum number of hours of operation (1,260 hours). Due to potential NG fuel supply curtailments and economic considerations, normal operations of the proposed CT may result in the CT being fired with both NG and FO in any twelve month period. Therefore, a formula was derived to determine the maximum number of hours of FO and NG firing annually allowed. This requires that the actual number of hours of operation on FO be subtracted from the maximum number of allowed hours of operation on natural gas to determine the overall number of hours of operation on either fuel in any twelve month period. This formula is expressed as follows:

$$\text{MAXHRSNG} = 4,050 - 3.215 * \text{ACTHRSFO}$$

Where: MAXHRSNG = The maximum number of hours on natural gas (4,050) in any twelve month period.

ACTHRSFO = The actual hours of hours of operation in any twelve month period, not to exceed 1,260 hours.

Note that this is essentially the same formula used in the February 12, 1998 "Request for PSD Determination" which resulted the DEP determination that the proposed project was classified as a minor modification to an existing major source. The only change to this formula is due to the increased use of the KE10 boiler in the last twenty-four months. JEA proposes that this formula be used as a specific condition of the permit in order to determine compliance with applicable regulations. This is discussed further in Attachment 5 of the permit application.

Ambient Air Quality Analysis:

Because the proposed project was determined to be a minor modification as a result of the netting analysis, no dispersion modeling was required.

Continuous Emissions Monitoring:

JEA notes that the proposed CT, producing more than 25 MW, will be subject to the monitoring requirements of 40 CFR 60 Subpart GG due to the required water injection during FO firing, and the continuous emissions monitoring (CEM) requirements of 40 CFR Subpart 75, the Acid Rain Program. 40 CFR 60 Subpart GG requires the owner or operator of any stationary gas turbine using water injection to control NO<sub>x</sub> emissions, to install and operate a continuous monitoring system to monitor and record the fuel consumption and ratio of water to fuel being fired in the turbine to determine compliance with these provisions. This project will use water injection during periods of FO firing only. Sampling of the fuel for nitrogen and sulfur content is also required under these provisions in order to demonstrate compliance.

The Acid Rain Program also requires the owner or operator to measure opacity and SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> emissions from each affected unit. Because JEA intends to operate the CT as a gas-fired peaking unit, certain alternatives to the physical installation of CEMs are available under this regulation in Appendices D, E and G of 40 CFR 75. In order to be classified as a gas fired peaking unit under this regulation, JEA must ensure that:

1. The three year average annual heat input from natural gas is greater than or equal to 90 percent. It must also not have fired more than 15 percent oil in any one of the three averaging years.
2. The three year average annual capacity factor is not greater than 10 percent.
3. The highest annual capacity factor is not greater than 20 percent.

Given these requirements, JEA proposes to:

1. Install fuel flow meters to measure, and a digital acquisition system to record, the amount of fuel used on an hourly basis.
2. Record the load and heat input rate.
3. Perform fuel sampling and analysis, for gas or oil, as appropriate, to enable the calculation of SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> on an hourly basis using the fuel flow measured above.
4. Install an opacity monitor and other required CEMs in accordance with 40 CFR part 75, the Acid Rain program.



Mr. Clair H. Fancy, P.E.

10/29/98

Page 4

Should you have any questions regarding the information in this letter or the permit application, please do not hesitate to call me at (904) 665-6247.

Sincerely,



N. Bert Gianazza, P.E.  
Environmental Group

NBG

KG SCT

Enclosure

cc: Amy Carlson, Black & Veatch  
-Marty Costello, FDEP

cc: NED

Doval Co

T. Keron, BAR

**RECEIVED**

**OCT 30 1998**

**BUREAU OF  
AIR REGULATION**

**Air Construction Permit Application  
for the  
Jacksonville Electric Authority  
Kennedy Generating Station**

**October 1998**

# Department of Environmental Protection

## DIVISION OF AIR RESOURCES MANAGEMENT

### APPLICATION FOR AIR PERMIT - LONG FORM

See Instructions for Form No. 62-210.900(1)

#### I. APPLICATION INFORMATION

This section of the Application for Air Permit form identifies the facility and provides general information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

#### Identification of Facility Addressed in This Application

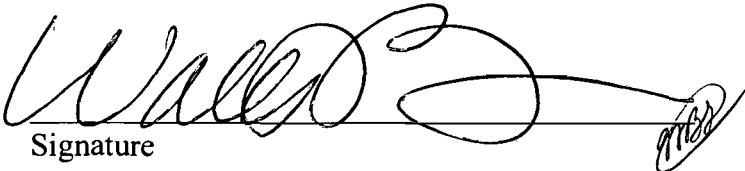

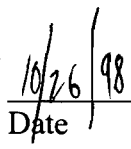
Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

Facility Owner/Company Name: Jacksonville Electric Authority	
2. Site Name: Kennedy Generating Station	
3. Facility Identification Number: 0310047 <span style="float: right;">[ ] Unknown</span>	
4. Facility Location: Street Address or Other Locator: 4215 Talleyrand Ave City: Jacksonville <span style="margin-left: 100px;">County: Duval</span> <span style="float: right;">Zip Code: 32206</span>	
5. Relocatable Facility? [ ] Yes [X] No	6. Existing Permitted Facility? [X] Yes [ ] No

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	Oct 30 1998
2. Permit Number:	0310047-002-AP
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official: Walter P. Bussels Managing Director & Chief Executive Officer
2. Owner/Authorized Representative or Responsible Official Mailing Address:  Organization/Firm: Jacksonville Electric Authority Street Address: 21 West Church Street City: Jacksonville State: FL Zip Code: 32202-3139
3. Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: (904) 665-7220 Fax: (904) 665-7366
4. Owner/Authorized Representative or Responsible Official Statement:  <i>I, the undersigned, am the owner or authorized representative* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.</i>   Signature   Date

\* Attach letter of authorization if not currently on file.



**Purpose of Application and Category**

Check one (except as otherwise indicated):

**Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.
- Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

- Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit to be revised: \_\_\_\_\_

- Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: \_\_\_\_\_

- Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit. Give reason for the revision; e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

\_\_\_\_\_

**Category II: All Air Operation Permit Applications Subject to Processing Under Rule 62-210.300(2)(b), F.A.C.**

This Application for Air Permit is submitted to obtain:

- Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): \_\_\_\_\_

- Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: \_\_\_\_\_

- Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g., to address one or more newly constructed or modified emissions units.

Operation permit to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units**

This Application for Air Permit is submitted to obtain:

- Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: \_\_\_\_\_

- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s): \_\_\_\_\_

- Air construction permit for one or more existing, but unpermitted, emissions units.

**Application Processing Fee**

Check one:

[ ] Attached - Amount: \_\_\_\_\_

[ X ] Not Applicable.

**Construction/Modification Information**

1. Description of Proposed Project or Alterations:

JEA proposes to construct a 170 MW natural gas (NG) and #2 fuel oil (FO) fired simple cycle combustion turbine (CT) electrical generating unit at the existing Kennedy Generating Station in Jacksonville, Florida. The proposed CT would replace an aging NG and FO fired boiler (KE10) and will be used as a peaking unit. KE10 would be taken out of service once the CT becomes operational. The CT proposed for this project is a General Electric PG7241 FA (GE PG7241 FA).

2. Projected or Actual Date of Commencement of Construction: June 1, 1999

3. Projected Date of Completion of Construction: May 1, 2000

**Professional Engineer Certification**

1. Professional Engineer Name: Anthony L. Compaan  
Registration Number: PE-0045662

2. Professional Engineer Mailing Address:

Organization/Firm: Black & Veatch

Street Address: JEA Tower  
21 West Church Street, T-10

City: Jacksonville State: FL Zip Code: 32202-3139

3. Professional Engineer Telephone Numbers:

Telephone: (904 ) 665 - 7867 Fax: (904 ) 665 - 7263











## B. FACILITY REGULATIONS

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

This facility is subject to preconstruction review for stationary sources (Chpt. 62-212 FAC).

Rule 62-212.300 requires the following.

### General

Air emissions units must obtain an air construction permit prior to construction or Modification. Construction permits shall not be issued to any emissions unit that would Cause or contribute to a violation of the ambient air quality standards or exceeds the appropriate baseline concentrations plus the appropriate maximum allowable increase.

### (2) Permitting requirements

The applicant shall provide the nature and amounts of emissions from the emissions unit and the location, design, construction and operation of the emissions unit.





**D. FACILITY POLLUTANT DETAIL INFORMATION**

**Facility Pollutant Detail Information:** Pollutant \_\_\_\_\_ of \_\_\_\_\_

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hour)	(tons/year)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		

**Facility Pollutant Detail Information:** Pollutant \_\_\_\_\_ of \_\_\_\_\_

1. Pollutant Emitted:		
2. Requested Emissions Cap:	(lb/hour)	(tons/year)
3. Basis for Emissions Cap Code:		
4. Facility Pollutant Comment (limit to 400 characters):		



## E. FACILITY SUPPLEMENTAL INFORMATION

### Supplemental Requirements for All Applications

1. Area Map Showing Facility Location: <input checked="" type="checkbox"/> Attached, Document ID: <u>  1  </u> <input type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input checked="" type="checkbox"/> Attached, Document ID: <u>  2  </u> <input type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input checked="" type="checkbox"/> Attached, Document ID: <u>  3  </u> <input type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input checked="" type="checkbox"/> Attached, Document ID: <u>  4  </u> <input type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
5. Fugitive Emissions Identification: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
6. Supplemental Information for Construction Permit Application: <input checked="" type="checkbox"/> Attached, Document ID: <u>  5  </u> <input type="checkbox"/> Not Applicable

### Additional Supplemental Requirements for Category I Applications Only

7. List of Proposed Exempt Activities: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
8. List of Equipment/Activities Regulated under Title VI:  <input type="checkbox"/> Attached, Document ID: _____  <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed  <input type="checkbox"/> Not Applicable
9. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
10. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable

11. Identification of Additional Applicable Requirements: <input type="checkbox"/> Attached, Document ID:_____ <input type="checkbox"/> Not Applicable
12. Compliance Assurance Monitoring Plan: <input type="checkbox"/> Attached, Document ID:_____ <input type="checkbox"/> Not Applicable
13. Risk Management Plan Verification:  <input type="checkbox"/> Plan Submitted to Implementing Agency - Verification Attached, Document ID:_____
<input type="checkbox"/> Plan to be Submitted to Implementing Agency by Required Date
<input type="checkbox"/> Not Applicable
14. Compliance Report and Plan: <input type="checkbox"/> Attached, Document ID:_____ <input type="checkbox"/> Not Applicable
15. Compliance Certification (Hard-copy Required): <input type="checkbox"/> Attached, Document ID:_____ <input type="checkbox"/> Not Applicable

### III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through L as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application. Some of the subsections comprising the Emissions Unit Information Section of the form are intended for regulated emissions units only. Others are intended for both regulated and unregulated emissions units. Each subsection is appropriately marked.

#### A. TYPE OF EMISSIONS UNIT (Regulated and Unregulated Emissions Units)

##### Type of Emissions Unit Addressed in This Section

1. Regulated or Unregulated Emissions Unit? Check one:

[ X ] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

2. Single Process, Group of Processes, or Fugitive Only? Check one:

[ X ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

**B. GENERAL EMISSIONS UNIT INFORMATION  
(Regulated and Unregulated Emissions Units)**

**Emissions Unit Description and Status**

1. Description of Emissions Unit Addressed in This Section (limit to 60 characters): 170 MW dual-fuel simple cycle combustion turbine		
2. Emissions Unit Identification Number: [ ] No Corresponding ID [ ] Unknown 014		
3. Emissions Unit Status Code: C	4. Acid Rain Unit? [ X ] Yes [ ] No	5. Emissions Unit Major Group SIC Code: 49
6. Emissions Unit Comment (limit to 500 characters): This emissions unit will be a GE PG7241 FA combustion turbine.		

**Emissions Unit Control Equipment**

**A.**

1. Description (limit to 200 characters): Low NOx burners.
2. Control Device or Method Code: 024

**B.**

1. Description (limit to 200 characters):
2. Control Device or Method Code:

**C.**

1. Description (limit to 200 characters):
2. Control Device or Method Code:

**C. EMISSIONS UNIT DETAIL INFORMATION  
(Regulated Emissions Units Only)**

**Emissions Unit Details**

1. Initial Startup Date:		
2. Long-term Reserve Shutdown Date:		
3. Package Unit: GE PG7241 FA		
Manufacturer:	Model Number:	
4. Generator Nameplate Rating: 170	MW	
5. Incinerator Information:		
Dwell Temperature:		°F
Dwell Time:		seconds
Incinerator Afterburner Temperature:		°F

**Emissions Unit Operating Capacity**

1. Maximum Heat Input Rate: GE PG7241 FA = 1,736 (NG)	mmBtu/hr (LHV)
1,905 (FO)	
2. Maximum Incineration Rate:	lb/hr tons/day
3. Maximum Process or Throughput Rate:	
4. Maximum Production Rate:	
5. Operating Capacity Comment (limit to 200 characters):	
4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO.	
1,260 hrs/yr on FO (max).	

**Emissions Unit Operating Schedule**

Requested Maximum Operating Schedule:			
	hours/day 24		days/week 7
	weeks/year 52		hours/year above

**D. EMISSIONS UNIT REGULATIONS  
(Regulated Emissions Units Only)**

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

This unit is subject to preconstruction review for stationary sources (Chpt. 62-212 FAC).

Rule 62-212.300 requires the following.

**General**

Air emissions units must obtain an air construction permit prior to construction or modification. Construction permits shall not be issued to any emissions unit that would cause or contribute to a violation of the ambient air quality standards or exceeds the appropriate baseline concentrations plus the appropriate maximum allowable increase.

**(2) Permitting requirements**

The applicant shall provide the nature and amounts of emissions from the emissions unit and the location, design, construction and operation of the emissions unit.





**E. EMISSION POINT (STACK/VENT) INFORMATION  
(Regulated Emissions Units Only)**

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram: 014
2. Emission Point Type Code: <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
3. Descriptions of Emissions Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:
5. Discharge Type Code: <input type="checkbox"/> D <input type="checkbox"/> F <input type="checkbox"/> H <input type="checkbox"/> P <input type="checkbox"/> R <input checked="" type="checkbox"/> V <input type="checkbox"/> W
6. Stack Height: 90 <span style="float: right;">feet</span>
7. Exit Diameter: 24 <span style="float: right;">feet</span>
8. Exit Temperature: 1116 <span style="float: right;">°F</span>

9. Actual Volumetric Flow Rate: 2,370,000	acfm
10. Percent Water Vapor : 8.4	%
11. Maximum Dry Standard Flow Rate:	dscfm
12. Nonstack Emission Point Height:	feet
13. Emission Point UTM Coordinates: Zone: 17                      East (km): 440000                      North (km): 3359100	
14. Emission Point Comment (limit to 200 characters): This data is representative of emissions during operation at normal conditions when firing NG.	

**F. SEGMENT (PROCESS/FUEL) INFORMATION  
(Regulated and Unregulated Emissions Units)**

**Segment Description and Rate:** Segment 1 of 2

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters): Natural gas firing.	
2. Source Classification Code (SCC): 20100201	
3. SCC Units: lb/mmcf burned	
4. Maximum Hourly Rate: 1.85 mmscf/hr	1. Maximum Annual Rate: 5,403 mmscf
6. Estimated Annual Activity Factor:	
7. Maximum Percent Sulfur:	8. Maximum Percent Ash:
9. Million Btu per SCC Unit: 937 (LHV)	
10. Segment Comment (limit to 200 characters):	

Segment Description and Rate: Segment 2 of 2

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters): No. 2 fuel oil firing.	
2. Source Classification Code (SCC): 20100101	
3. SCC Units: lb/1,000 gal burned	
4. Maximum Hourly Rate: 14,264 gal/hr	5. Maximum Annual Rate: 13,094,000 gals
6. Estimated Annual Activity Factor:	
7. Maximum Percent Sulfur: 0.05	8. Maximum Percent Ash:
9. Million Btu per SCC Unit: 133.6 (LHV)	
10. Segment Comment (limit to 200 characters):	



**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: NO <sub>x</sub>		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions: GE PG7241 FA	lb/hour 401	tons/year 200.48
4. Synthetically Limited? [ X ] Yes      [   ] No		
5. Range of Estimated Fugitive/Other Emissions: [   ] 1      [   ] 2      [   ] 3      _____ to _____ tons/year		
6. Emission Factor: Reference: Vendor data		
7. Emissions Method Code: [   ] 0      [ X ] 1      [   ] 2      [   ] 3      [   ] 4      [   ] 5		
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
2. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	401	200.48
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code: RULE		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: 75 ppmv @15% O2, dry basis		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
GE PG7241 FA	575	2,518.5
4. Method of Compliance (limit to 60 characters): Monitoring and recordkeeping of nitrogen content of fuel.		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters): 40 CFR 60.332 (a)(1)		

**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: CO		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	lb/hour	tons/year
GE PG7241 FA	1,759	97.2
4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
5. Range of Estimated Fugitive/Other Emissions: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3      _____ to _____ tons/year		
6. Emission Factor: Reference: Vendor data		
7. Emissions Method Code: <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5		
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		



**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
2. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	1,759	97.2
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code:		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units:		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
5. Method of Compliance (limit to 60 characters):		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):		

**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: VOC		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions: GE PG7241 FA	lb/hour 55.8	tons/year 5.67
4. Synthetically Limited? [ X ] Yes      [   ] No		
5. Range of Estimated Fugitive/Other Emissions: [   ] 1      [   ] 2      [   ] 3      _____ to _____ tons/year		
6. Emission Factor: Reference: Vendor data		
7. Emissions Method Code: [   ] 0      [ X ] 1      [   ] 2      [   ] 3      [   ] 4      [   ] 5		
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
2. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	55.8	5.67
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code:		
3. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units:		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
5. Method of Compliance (limit to 60 characters):		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters): 40 CFR 60.332 (a)(1)		

**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: SO <sub>2</sub>		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	lb/hour	tons/year
GE PG7241 FA	98	61.74
4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
5. Range of Estimated Fugitive/Other Emissions: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3      _____ to _____ tons/year		
6. Emission Factor: Reference: Vendor data		
7. Emissions Method Code: <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5		
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	98	61.74
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code: RULE		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: 0.8% sulfur in fuel		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
GE PG7241 FA	1,522	6,665
5. Method of Compliance (limit to 60 characters): Monitoring and recordkeeping of sulfur content of fuel.		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters): 40 CFR 60.333 (b)		

**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: PM10		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	lb/hour	tons/year
GE PG7241 FA	17.0	18.23
4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
5. Range of Estimated Fugitive/Other Emissions: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3      _____ to _____ tons/year		
6. Emission Factor: Reference: Vendor data		
7. Emissions Method Code: <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5		
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	17.0	18.23
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code: RULE		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: 0.1 lb / mmBtu		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
GE PG7241 FA	1,832	8,024
5. Method of Compliance (limit to 60 characters): Recordkeeping of hours of operation and load.		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters): FAC 62-296.410 (2) (b) 2		

**H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION  
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)**

**Pollutant Detail Information:**

1. Pollutant Emitted: SAM			
2. Total Percent Efficiency of Control:			%
3. Potential Emissions:	lb/hour	tons/year	
GE PG7241 FA	10	6.3	
4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
5. Range of Estimated Fugitive/Other Emissions: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3      _____ to _____ tons/year			
6. Emission Factor: Reference: Vendor data			
7. Emissions Method Code: <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5			
8. Calculation of Emissions (limit to 600 characters): Based on vendor supplied data (attached).			
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).			



**Allowable Emissions** (Pollutant identified on front of page)

**A.**

1. Basis for Allowable Emissions Code: ESCPSD		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units: Other – hrs. of operation per fuel type per 12 month period.		
4. Equivalent Allowable Emissions:	lb/hour	tons/year
GE PG7241 FA	10	6.3
5. Method of Compliance (limit to 60 characters): Recordkeeping – hrs. of operation per fuel type per 12 month period.		
6. Pollutant Allowable Emissions Comment (Desc. Of Related Operating Method/Mode) (limit to 200 characters):  4,050 hrs of operation on NG (max) – 3.215 times the hrs on 0.05% S (max) FO. 1,260 hrs/yr on FO (max).		

**B.**

1. Basis for Allowable Emissions Code:		
2. Future Effective Date of Allowable Emissions:		
3. Requested Allowable Emissions and Units:		
4. Equivalent Allowable Emissions:	lb/hr	tons/year
GE PG7241 FA	575	2,518.5
5. Method of Compliance (limit to 60 characters): Monitoring and recordkeeping of nitrogen content of fuel.		
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters): 40 CFR 60.332 (a)(1)		

**I. VISIBLE EMISSIONS INFORMATION**  
**(Regulated Emissions Units Only)**

**Visible Emissions Limitation:** Visible Emissions Limitation   1   of   1  

1. Visible Emissions Subtype: VE20
2. Basis for Allowable Opacity: <input checked="" type="checkbox"/> Rule <input type="checkbox"/> Other
3. Requested Allowable Opacity: Normal Conditions: 30                    %                    Exceptional Conditions: 40                    % Maximum Period of Excess Opacity Allowed: 2                    min/hour
4. Method of Compliance: Opacity CEM
5. Visible Emissions Comment (limit to 200 characters): FAC62-296.410(2)(B)1

**Visible Emissions Limitation:** Visible Emissions Limitation \_\_\_\_\_ of \_\_\_\_\_

1. Visible Emissions Subtype:
2. Basis for Allowable Opacity: <input type="checkbox"/> Rule <input type="checkbox"/> Other
3. Requested Allowable Opacity: Normal Conditions:                    %                    Exceptional Conditions:                    % Maximum Period of Excess Opacity Allowed:                    min/hour
4. Method of Compliance:
5. Visible Emissions Comment (limit to 200 characters):

**J. CONTINUOUS MONITOR INFORMATION  
(Regulated Emissions Units Only)**

**Continuous Monitoring System:** Continuous Monitor 1 of 4

1. Parameter Code: EM	2. Pollutant(s): SO2
3. CMS Requirement: <input checked="" type="checkbox"/> Rule <input type="checkbox"/> Other	
4. Monitor Information: Manufacturer: Model Number: <span style="float:right">Serial Number:</span>	
5. Installation Date:	
6. Performance Specification Test Date:	
7. Continuous Monitor Comment (limit to 200 characters): 40CFR 60 Subpart GG – Monitor sulfur content of the fuel.  40 CFR 75.10 – Either CEM and exhaust flow or fuel analysis and fuel flow.	

**Continuous Monitoring System:** Continuous Monitor 2 of 4

1. Parameter Code: EM	2. Pollutant(s): NOx
3. CMS Requirement: <input checked="" type="checkbox"/> Rule <input type="checkbox"/> Other	
4. Monitor Information: Manufacturer: Model Number: <span style="float:right">Serial Number:</span>	
5. Installation Date:	
6. Performance Specification Test Date:	
7. Continuous Monitor Comment (limit to 200 characters): 40 CFR 60 Subpart GG – Monitor the fuel consumption and water to fuel ratio while using water injection during fuel oil firing. Also must monitor the nitrogen content of the fuel.  40 CFR 75.10	



**K. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT  
TRACKING INFORMATION  
(Regulated and Unregulated Emissions Units)**

**PSD Increment Consumption Determination**

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

If the emissions unit addressed in this section emits particulate matter or sulfur dioxide, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for particulate matter or sulfur dioxide. Check the first statement, if any, that applies and skip remaining statements.

- ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.
- ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

If the emissions unit addressed in this section emits nitrogen oxides, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for nitrogen dioxide. Check first statement, if any, that applies and skip remaining statements.

- ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.
- ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.
- ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code:			
PM	<input checked="" type="checkbox"/> C	<input type="checkbox"/> E	<input type="checkbox"/> Unknown
SO2	<input checked="" type="checkbox"/> C	<input type="checkbox"/> E	<input type="checkbox"/> Unknown
NO2	<input checked="" type="checkbox"/> C	<input type="checkbox"/> E	<input type="checkbox"/> Unknown
4. Baseline Emissions:			
PM	lb/hour		tons/year
SO2	lb/hour		tons/year
NO2			tons/year
5. PSD Comment (limit to 200 characters):			

**L. EMISSIONS UNIT SUPPLEMENTAL INFORMATION  
(Regulated Emissions Units Only)**

**Supplemental Requirements for All Applications**

1. Process Flow Diagram <input checked="" type="checkbox"/> Attached, Document ID: <u>3</u> [ ] Not Applicable [ ] Waiver Requested
2. Fuel Analysis or Specification <input checked="" type="checkbox"/> Attached, Document ID: <u>6</u> [ ] Not Applicable [ ] Waiver Requested
3. Detailed Description of Control Equipment <input checked="" type="checkbox"/> Attached, Document ID: <u>7</u> [ ] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities <input checked="" type="checkbox"/> Attached, Document ID: <u>8</u> [ ] Not Applicable [ ] Waiver Requested
5. Compliance Test Report <input type="checkbox"/> Attached, Document ID: _____  <input type="checkbox"/> Previously submitted, Date: _____  <input checked="" type="checkbox"/> Not Applicable
6. Procedures for Startup and Shutdown <input type="checkbox"/> Attached, Document ID: _____ [ X ] Not Applicable
7. Operation and Maintenance Plan <input type="checkbox"/> Attached, Document ID: _____ [ X ] Not Applicable
8. Supplemental Information for Construction Permit Application <input checked="" type="checkbox"/> Attached, Document ID: <u>5</u> [ ] Not Applicable
9. Other Information Required by Rule or Statute <input type="checkbox"/> Attached, Document ID: _____ [ X ] Not Applicable

**Additional Supplemental Requirements for Category I Applications Only**

10. Alternative Methods of Operation <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
11. Alternative Modes of Operation (Emissions Trading) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
12. Identification of Additional Applicable Requirements <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
13. Compliance Assurance Monitoring Plan <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
14. Acid Rain Application (Hard-copy Required)  <input type="checkbox"/> Acid Rain Part - Phase II (Form No. 62-210.900(1)(a)) Attached, Document ID: _____  <input type="checkbox"/> Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) Attached, Document ID: _____  <input type="checkbox"/> New Unit Exemption (Form No. 62-210.900(1)(a)2.) Attached, Document ID: _____  <input type="checkbox"/> Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) Attached, Document ID: _____  <input type="checkbox"/> Not Applicable



**Attachment 1 - Area Map(s)**

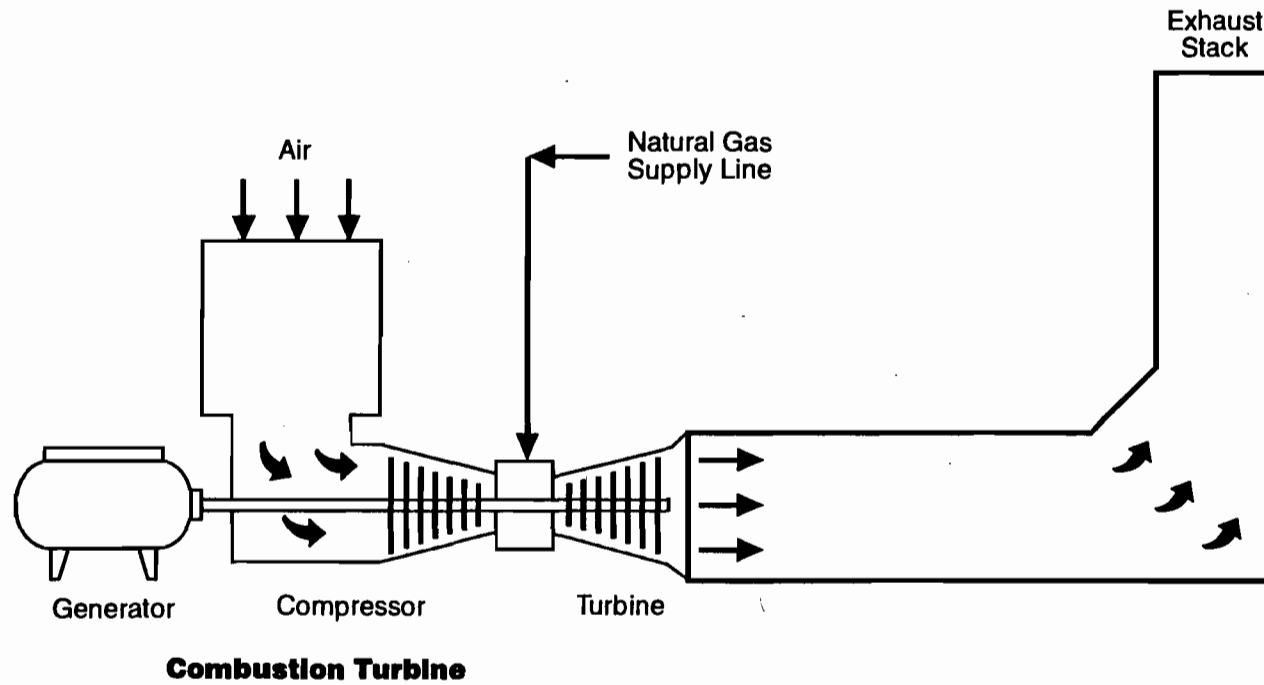
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{ Located in hard file }

**Attachment 2 - Facility Plot Plan**

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{ Located in Hard file }

**Attachment 3 - Process Flow Diagram**

Simple Cycle Combustion Turbine Process Flow Diagram



SIMPLE CYCLE COMBUSTION TURBINE

**Attachment 4 - Fugitive Particulate Matter Control Plan**

Precautions to Prevent Emissions of Unconfined Particulate Matter.

As a result of the construction of the simple cycle combustion turbine at the project site minimal quantities of unconfined particulate matter (fugitive dust) may be released to the atmosphere. These anticipated construction activities may be generally broken down into three phases as they relate to generating fugitive dust: debris removal, site preparation, and general construction. Because the combustion turbine is being installed at a preexisting site, material movement associated with debris removal and site preparation will be minimal. For the general construction phase of the project, JEA proposes to utilize watering to control fugitive dust. Watering is an effective stabilizing tool that controls fugitive dust by using water (or water combined with a surfactant) as a binder maintaining soil moisture content or establishing a crust which prevents soil movement under windy conditions. The water can be applied by any suitable means such as trucks, hoses, and/or sprinklers appropriate for site characteristics and size. For the construction phase of the project, it is proposed that water be applied as necessary during high wind conditions when fugitive dust is evident beyond the property boundary. The water will be applied using one or a combination of several methods listed above.

**Attachment 5 - Supplemental Information for Construction Permit Application**

BLACK & VEATCHLLP

MEMORANDUM

Jacksonville Electric Authority  
Kennedy CT  
Updated Baseline Emissions Calculations

B&V Project 29686  
B&V File  
09/14/98

To: Bert Gianazza, P.E.

From: M.J. Bareta

In reviewing the attached Table titled *K10 Fuel Usage and Emissions from August 1996 – July 1998*, it was noted that there are significant increases in recent usage of this boiler compared to the original 1995 – 1996 baseline. Based upon this new data, revised spreadsheets, based upon those used in the previous netting analysis and submitted to FDEP in the February 12, 1998 *Request for PSD Determination* (also attached) were prepared. These spreadsheets clearly show that based on the historic use of boiler KE10, and current vendor provided emissions data for the proposed replacement combustion turbine, over 4,050 hours of operation on natural gas, or 1,260 hours of operation are allowable without exceeding the PSD significant emissions threshold. Based on this data, the proposed project should continue to be classified as a minor source. Overall emissions will need to be limited in any twelve-month period to this operation. This can be demonstrated by accepting a permit condition limiting hours of operation to:

4,050 hours of operation on natural gas (max) – 3.125 \* hours of operation on fuel oil.  
1,260 hours of operation on 0.05% S fuel oil (max) in any twelve-month period.

Should you have any questions, please do not hesitate to call me.



K10 Fuel Usage and Emissions from August 1996 - July 1998

	1996					1997		1998					Annual Avg		
	Aug	Sep	Oct	Nov	Dec	Jan	Dec	Jan	Feb	Mar	Apr	May		Jun	Jul
#6 Oil Burned (BBLs)	8,575.00	-	-	-	6,939.00	14,768.00	-	-	-	-	-	11,585.00	72,439.00	65,524.00	89,915.00
%Sulfur of Oil	0.98	N/A	N/A	N/A	0.91	0.98	N/A	N/A	N/A	N/A	N/A	0.98	0.82	0.94	N/A
Natural Gas Burned (KCF)	95,799.00	39,830.00	339.00	-	1,290.00	210,554.00	-	-	-	-	-	7,300.00	21,259.00	104,965.00	240,668.00
Btu/BBL	6,397,985.00	N/A	N/A	N/A	6,369,095.00	6,406,340.00	N/A	N/A	N/A	N/A	N/A	6,415,108.00	6,317,118.00	6,361,171.00	N/A
Btu/FT3	1,046.00	1,052.00	1,052.00	N/A	1,290.00	1,055.00	N/A	N/A	N/A	N/A	N/A	1,057.00	1,066.00	1,047.00	N/A
MBtu from Oil	54,862.72	-	-	-	44,195.15	94,608.83	-	-	-	-	-	74,319.03	457,605.71	416,809.37	571,200.40
MBtu from Gas	100,205.75	41,901.16	356.63	-	1,664.10	222,134.47	-	-	-	-	-	7,716.10	22,662.09	109,898.36	253,269.33
MBtu Total	155,068.48	41,901.16	356.63	-	45,859.25	316,743.30	-	-	-	-	-	82,035.13	480,267.80	526,707.72	824,469.73
NOx from Oil (tons)	12.94	N/A	N/A	N/A	10.42	22.31	N/A	N/A	N/A	N/A	N/A	17.52	107.89	98.27	134.67
NOx from Gas (tons)	10.62	4.44	0.04	N/A	0.18	23.54	N/A	N/A	N/A	N/A	N/A	0.82	2.40	11.64	26.83
NOx Total (tons)	23.55	4.44	0.04	N/A	10.60	45.84	N/A	N/A	N/A	N/A	N/A	18.34	110.29	109.92	161.51
SOx from Oil (tons)	27.71	N/A	N/A	N/A	20.82	47.72	N/A	N/A	N/A	N/A	N/A	37.43	195.84	203.07	266.29
PM from Oil (tons)	2.20	N/A	N/A	N/A	1.69	3.79	N/A	N/A	N/A	N/A	N/A	2.97	16.36	16.32	21.67

Emission Factors:

	#6Oil	Natural Gas
NOx	0.47155 lbs/MBtu	0.119 lbs/MBtu
SOx	157*S lbs/Kgal	N/A
PM	(9.19*S + 3.22) lbs/Kgal	N/A

### PSD Netting Analysis Summaries

GE PG7241(FA)

	Combustion Turbine Potential Emissions (ton/year)	Revised KE10 Average Emissions, 1996- 98 (ton/year)	Net Emission Increase (ton/year)	PSD Significant Emission Rate (ton/year)	PSD Significant?
NOx	200.48	161.51	38.97	40	No
CO	97.20	14.51	82.69	100	No
VOC	5.67	1.61	4.06	40	No
SO2	61.74	266.29	-204.55	40	No
PM10 Front Half	18.23	21.67	-3.45	15	No
Lead	0.07	2.89E-03	0.06	0.6	No
H2SO4	6.30	11.87	-5.57	7	No

NOTE: Combustion turbine emissions have been calculated based on the proposed operational limitations.

### GE PG7241(FA) Potential Emissions

Potential emissions have been calculated based on the proposed operational limitations. For each pollutant, the range of operational scenarios was examined, and the scenario producing the highest annual emission rate is presented below for each pollutant.

Hourly emission rates reflect base load operation.

	Combustion Turbine Emissions [GE PG7241(FA)]								Allowable Emissions			
	Natural Gas Firing				Fuel Oil Firing				Total Emissions (ton/yr)	KE10 Average 95-96 Emissions (ton/yr)	PSD Significant Emission Rate (ton/yr)	Allowable CT Emission Rate (ton/yr)
	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)				
NOx	99.00	GE Data	4050	200.48	318	GE Data	0	0.00	200.48	161.50	40	201.50
CO	48	GE Data	4050	97.20	97	GE Data	0	0.00	97.20	14.51	100	114.51
VOC	2.8	GE Data	4050	5.67	7.5	GE Data	0	0.00	5.67	1.61	40	41.61
SO2	9.74	Note 1	0	0.00	98	GE Data	1260	61.74	61.74	266.88	40	306.88
PM10	9	GE Data	4050	18.23	17	GE Data	0	0.00	18.23	21.67	15	36.67
Lead	4.18E-04	Note 2	0	0.00	0.10629	AP-42 Table 3.1-4	1260	0.07	0.07	2.89E-03	0.6	0.60
H2SO4 Mist					10	GE Data	1260	6.30	6.30	11.87	7	18.87

- NOTES:
- 1) Based upon AP-42 Table 3.1-1 emission factor, 0.006 lb/mmBtu, and maximum heat input as reported by G.E.
  - 2) Based upon AP-42 Table 1.4-5 emission factor, 1050 Btu/SCF fuel heating value, and base load heat input as reported by G.E.

**Jacksonville Electric Authority -- Kennedy Generating Station  
KE10 Emissions Calculations**

Natural Gas Firing

	Emission Factor			Ann. avg. last 2 years						
	Value	Reference	Justification	Fuel Use (M ft3)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)	Fuel Use (M ft3)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)	
NOx	0.2119	lb / MBtu	Note 1	Note 2	240.7	1052	26.83	0	0	0.0000
CO	40	lb / M ft3	Note 3, 4	Standard reference	240.7	1052	5.06	0	0	0.0000
VOC	1.411	lb / M ft3	Note 4, 5	Standard reference	240.7	1052	0.18	0	0	0.0000
SO2	0.6	lb / M ft3	Note 3, 4	Standard reference	240.7	1052	0.08	0	0	0.0000
PM10 Front Half	5	lb / M ft3	Note 4, 6	Standard reference	240.7	1052	0.63	0	0	0.0000
Lead	2.71E-04	lb / M ft3	Note 4, 7	Standard reference	240.7	1052	3.43E-05	0	0	0
H2SO4										

Fuel Oil Firing

	Emission Factor			Ann. Avg. last 2 years							
	Value	Reference	Justification	Fuel Use (kgal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)	Fuel Use (kgal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)
NOx	0.47155	lb/MBtu	Note 1	Note 9	3776.4		151250	134.67	0		0.0000
CO	5	lb/kgal	AP-42, Table 1.3-1	Standard reference	3776.4			9.44	0		0.0000
VOC	0.76	lb/kgal	AP-42, Table 1.3-2	Standard reference	3776.4			1.44	0		0.0000
SO2	157*S	lb/kgal	AP-42, Table 1.3-1	Standard reference	3776.4	0.9		266.80	0		0.0000
PM10 Front Half	9.19*S+3.22	lb/kgal	AP-42, Table 1.3-1	Standard reference	3776.4	0.9		21.70	0		0.0000
Lead	1.51E-03	lb/kgal	AP-42, Table 1.3-1	Standard reference	3776.4			2.85E-03	0		0.0000
H2SO4	6.983*S	lb/kgal	Note 8	Standard reference	3776.4	0.9		11.87	0		0.0000

Total Emissions

	Annual Average Emissions (ton/year)	
NOx	161.4984	0.0000
CO	14.5053	0.0000
VOC	1.6137	0.0000
SO2	266.8786	0.0000
PM10 Front Half	22.3303	0.0000
Lead	0.0029	0.0000
H2SO4	11.8668	0.0000

- NOTES:
- 1) Stack test data for KE10 dated 12/04.
  - 2) Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions; note that this emission factor is lower than the AP-42 factor of ~0.55 lb/MBtu.
  - 3) AP-42, Table 1.4-1.
  - 4) Factor shown is based on natural gas heating value of 1000 Btu/SCF; for emission calculations, factor is retioed to reflect actual heating value shown.
  - 5) AP-42, Table 1.4-3.
  - 6) AP-42, Table 1.4-2.
  - 7) AP-42, Table 1.4-5.
  - 8) H2SO4 emissions from fuel oil combustion calculated as follows: AP-42, Table 1.3-1 Factor used to estimate SO3 emissions. All SO3 assumed to convert to H2SO4.
  - 9) Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions; note that this emission factor is almost equal to the AP-42 factor of ~0.47 lb/MBtu.

# JACKSONVILLE ELECTRIC AUTHORITY

21 WEST CHURCH STREET • JACKSONVILLE, FL 32202-3139



February 12, 1998

Mr. Clair H. Fancy, P.E.  
Chief, Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Subject: Request for PSD Determination

Dear Mr. Fancy:

On December 17, 1997, the Jacksonville Electric Authority (JEA) and Black & Veatch (JEA's air permitting consultant) met with the Florida Department of Environmental Protection (FDEP) to discuss air permitting issues associated with a potential new emission source. At the December 17 meeting, FDEP staff suggested that JEA submit information which would allow FDEP to make an official determination of Prevention of Significant Deterioration (PSD) applicability to this project. Therefore, this letter is submitted to FDEP to formally request such a determination.

JEA is proposing to install one simple cycle, 160 MW Frame F combustion turbine (CT) at the Kennedy Generating Station. This unit will be used primarily as a peaking unit, firing natural gas as its primary fuel and low sulfur distillate fuel oil as a backup fuel. Following the installation of the CT, the existing natural gas and residual oil-fired boiler KE10 will be taken out of service. Commensurate with PSD regulations and guidance, the determination of whether the proposed CT is a major modification to a major stationary source is based upon the potential emission increases from the new unit, combined with any contemporaneous increases or decreases in source emissions exceeding significant levels. Such a determination is often referred to as a "netting analysis". JEA has prepared a netting analysis in which past actual emissions from KE10 have been subtracted from the potential emission increases of the CT to determine the net emissions change. The assumptions and information used in this analysis are discussed in the following paragraphs.

Mr. Clair Fancy

February 12, 1998

Estimated CT Emission Increases

At this time, selection of a specific CT has yet to be completed. The range of choices has been narrowed to either a GE PG7241 FA or a Westinghouse 501F. Therefore, emissions from both of these CTs have been examined. In both cases, potential emissions of all PSD-regulated pollutants except lead have been calculated based on expected base load emissions data provided by the vendor. These data were developed based on ISO conditions (i.e., 59 F ambient temperature and 60% relative humidity). Lead emissions were based on AP-42 emission factors and the base load heat input rate.

The CT, once installed, will be used to supply peaking power. Therefore, JEA is proposing a reduced capacity factor for the CT. The proposed capacity factors, which are outlined in Table 1, would allow the project to "net out" of PSD review. As shown in the table, the specific limitations which would be imposed are dependent on the final turbine selection.

Table 1  
Proposed Operational Limitations for Combustion Turbine

	Maximum Natural Gas Firing (hours/year)	Maximum #2 Fuel Oil Firing (hours/year)	Fuel Oil Sulfur Content
GE PG7241 (FA)	3120 - 3.25X *	960	0.05 wt%
Westinghouse 501F	1841 - 2.63X *	700	0.05 wt%

\* X = hours of #2 fuel oil firing during the year

Contemporaneous Emission Decreases

Past actual KE10 emission estimates are presented in Table 2. These have been calculated based upon 1995 and 1996 operations. This satisfies PSD guidance, as these represent the two most recent available years of operational data which are representative of normal operation.

Table 2  
Estimated Average KE10 Emissions During 1995-96

Pollutant	KE10 1995-96 Average Emissions (ton/year)
NO <sub>x</sub>	115.9
CO	14.8
VOC	1.0
SO <sub>2</sub>	128.2
PM <sub>10</sub> (front half)	11.5
Lead	0.001
H <sub>2</sub> SO <sub>4</sub>	5.7

Emissions of the PSD-regulated pollutants (excluding NO<sub>x</sub>) from residual oil and natural gas combustion were calculated using emission factors from Sections 1.3 and 1.4, respectively, of AP-42 (fifth edition, including supplements). Relevant operational data were taken from Steam-Electric Plant Operation and Design Reports for 1995 and 1996 operations, submitted to the U.S. Department of Energy. Emission calculations for a given year were based on actual fuel usage, weighted average heating values, and weighted average residual oil sulfur content for that year, as reported on the Operation and Design Reports. SO<sub>2</sub> emissions from natural gas combustion were based on an average sulfur content of 2000 grains/10<sup>6</sup> SCF, as suggested by AP-42, Section 1.4. H<sub>2</sub>SO<sub>4</sub> emissions from residual oil combustion have been estimated using the emission factor for SO<sub>3</sub> emissions (taken from AP-42 Section 1.3), and assuming that all SO<sub>3</sub> is eventually converted to H<sub>2</sub>SO<sub>4</sub>.

The NO<sub>x</sub> emission factors for fuel oil firing and natural gas firing were obtained from stack testing data. Several stack tests were reviewed to determine which provided the most realistic and time-representative information. Isolated tests were performed on the unit in the early nineties at part-load operations. Testing was again performed at numerous loads for both oil and gas firing in December 1994. This testing was part of the Acid Rain Part 75 certification tests. Because the 1994 testing represents the most recent and comprehensive testing at all loads, the emission factors derived from the testing were utilized to calculate NO<sub>x</sub> emissions for KE10.

The December 1994 stack test data are believed to provide a good representation of KE10 NO<sub>x</sub> emissions during steady state operation. However, these data do not account for unsteady state operations such as startup, shutdown, load changes and malfunctions. Due largely to the age of the unit, KE10 air emissions are thought to be much higher during these conditions than during steady-state operation. Furthermore, the

Mr. Clair Fancy

February 12, 1998

time required to bring the unit and its associated emissions to steady state conditions following an unsteady state event is greater than would be expected with a newer unit. Since KE10 has been operated primarily as a peaking unit over the past several years, unsteady state operations occurred more often than would be expected with a baseload unit. As the December 1994 stack test results do not take into account unsteady state operation, annual emission estimates based on the stack testing are believed to be conservatively low.

In addition, while the December 1994 stack test data do suggest slightly higher NO<sub>x</sub> emissions from residual oil combustion than AP-42 (0.472 lb/10<sup>6</sup> Btu from the testing versus ~0.441 lb/10<sup>6</sup> Btu from AP-42 Section 1.3 for normal firing), the NO<sub>x</sub> emission rate derived from the stack tests during natural gas firing is less than the appropriate AP-42 emission factor by 0.31 lb/10<sup>6</sup> Btu. Consequently, the stack test results lead to annual emission estimates which are notably lower than if AP-42 factors were used.

Since the NO<sub>x</sub> emission estimates are believed to be of a conservative nature, and the magnitude of annual NO<sub>x</sub> emissions is relatively low, the JEA proposes that the NO<sub>x</sub> emissions calculation approach described above be used to determine baseline NO<sub>x</sub> emissions.

Attachment 1 outlines the net emission calculations for this project, considering both the GE and Westinghouse CTs. Based upon the assumptions and operational limits proposed above, the data presented in Attachment 1 demonstrate that the proposed project will not trigger PSD review. Attachment 2 contains detailed spreadsheet calculations which support the values reported in Attachment 1.

If you have any questions on this issue, please contact me at (904) 632-6247.

Sincerely,



N. Bert Gianazza, P.E.  
Environmental Health & Safety Group

Enclosures

cc: Amy Carlson, Black & Veatch  
Marty Costello, FDEP



## PSD Netting Analysis Summaries

## GE PG7241(FA)

	Combustion Turbine Potential Emissions (ton/year)	KE10 Average Emissions 1995-96 (ton/year)	Net Emission Increase (ton/year)	PSD Significant Emission Rate (ton/year)	PSD Significant?
NOx	154.560	115.940	38.620	40	No
CO	74.880	14.777	60.103	100	No
VOC	4.368	1.008	3.360	40	No
SO2	45.648	128.229	-82.581	40	No
PM10 Front Half	14.040	11.507	2.533	15	No
Lead	0.051	0.001	0.050	0.6	No
H2SO4	4.800	5.696	-0.896	7	No

## Westinghouse 501F

	Combustion Turbine Potential Emissions (ton/year)	KE10 Average Emissions 1995-96 (ton/year)	Net Emission Increase (ton/year)	PSD Significant Emission Rate (ton/year)	PSD Significant?
NOx	154.000	115.940	38.060	40	No
CO	75.481	14.777	60.704	100	No
VOC	6.650	1.008	5.642	40	No
SO2	31.150	128.229	-97.079	40	No
PM10 Front Half	24.624	11.507	13.117	15	No
Lead	0.033	0.001	0.031	0.6	No
H2SO4	3.271	5.696	-2.425	7	No

NOTE: Combustion turbine emissions have been calculated based on the proposed operational limitations.

**GE PG7241(FA) Potential Emissions**

Potential emissions have been calculated based on the proposed operational limitations. For each pollutant, the range of operational scenarios was examined, and the scenario producing the highest annual emission rate is presented below for each pollutant.

Hourly emission rates reflect base load operation.

	Combustion Turbine Emissions [GE PG7241(FA)]								Allowable Emissions			
	Natural Gas Firing				Fuel Oil Firing				Total Emissions (ton/yr)	KE10 Average 95-96 Emissions (ton/yr)	PSD Significant Emission Rate (ton/yr)	Allowable CT Emission Rate (ton/yr)
	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)				
NOx	99.00	GE Data	0	0	322	GE Data	960	154.56	154.56	115.9396	40	155.9396
CO	48	GE Data	3120	74.88	97	GE Data	0	0	74.88	14.7773	100	114.7773
VOC	2.8	GE Data	3120	4.368	7.5	GE Data	0	0	4.368	1.0078	40	41.0078
SO2	22.8603	Note 1	0	0.0000	95.1	GE Data	960	45.648	45.6480	128.2288	40	168.2288
PM10	9	GE Data	3120	14.04	17	GE Data	0	0	14.04	11.5072	15	26.5072
Lead	4.18E-04	Note 2	0	0.0000	0.10629	AP-42 Table 3.1-4	960	0.0510	0.0510	0.0013	0.6	0.6013
H2SO4 Mist					10	GE Data	960	4.8	4.8	5.6962	7	12.6962

- NOTES: 1) Based upon AP-42 Table 3.1-1 emission factor, 0.015 wt% sulfur in fuel, and maximum heat input as reported by G.E.  
2) Based upon AP-42 Table 1.4-5 emission factor, 1050 Btu/SCF fuel heating value, and base load heat input as reported by G.E.

Westinghouse 501F Potential Emissions

Potential emissions have been calculated based on the proposed operational limitations. For each pollutant, the range of operational scenarios was examined, and the scenario producing the highest annual emission rate is presented below for each pollutant.

Hourly emission rates reflect base load operation.

	Combustion Turbine Emissions								Allowable Emissions			
	Natural Gas Firing				Fuel Oil Firing				Total Emissions (ton/yr)	KE10 Average 95-96 Emissions (ton/yr)	PSD Significant Emission Rate (ton/yr)	Allowable CT Emission Rate (ton/yr)
	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)				
NOx	167.00	Westinghouse data	0	0.0000	440	Westinghouse data	700	154	154.0000	115.9396	40	155.9396
CO	82	Westinghouse data	1841	75.4810	166	Westinghouse data	0	0	75.4810	14.7773	100	114.7773
VOC	7	Westinghouse data	0	0.0000	19	Westinghouse data	700	6.65	6.6500	1.0078	40	41.0078
SO2	20	Note 1	0	0.0000	89	Westinghouse data	700	31.15	31.1500	128.2288	40	168.2288
PM10	19	Westinghouse data	0	0.0000	70.355	Note 3	700	24.62425	24.6243	11.5072	15	26.5072
Lead	4.19E-04	Note 2	0	0	0.093032	AP-42 Table 3.1-4	700	0.0325612	0.0326	0.0013	0.6	0.6013
H2SO4 Mist					9.345	Note 4	700	3.27075	3.2708	5.6962	7	12.6962

- NOTES:
- 1) Emission rate reflects 10 times the rate predicted by vendor data.
  - 2) Based upon AP-42 Table 1.4-5 emission factor, 1050 Btu/SCF fuel heating value, and base load heat input (LHV).
  - 3) Reflects Westinghouse data for front + back half PM, less estimated H2SO4 emission rate.
  - 4) Estimated from available vendor data as follows: ratio of H2SO4/SO2 mass emission rates for GE turbine used to estimate H2SO4 emissions from Westinghouse turbine by multiplying SO2 mass emission rate for Westinghouse turbine by the GE turbine ratio.

Jacksonville Electric Authority - Kennedy Generating Station  
KE10 Emissions Calculations

Natural Gas Firing

	Emission Factor			1995			1999		
	Value	Reference	Justification	Fuel Use (MMBtu)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)	Fuel Use (MMBtu)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)
NOx	0.2119	B / MBBtu Note 1	Note 2	000.0	1048	74.0409	344.4	1051	30.2501
CO	48	B / MBBtu Note 3, 4	Standard reference	000.0	1048	15.9782	344.4	1051	7.2303
VOC	1.411	B / MBBtu Note 4, 5	Standard reference	000.0	1048	0.4831	344.4	1051	0.2554
SO2	0.8	B / MBBtu Note 3, 4	Standard reference	000.0	1048	0.2097	344.4	1051	0.1089
PM10 Front Hall	5	B / MBBtu Note 4, 6	Standard reference	000.0	1048	1.7473	344.4	1051	0.0049
Lead	2.71E-04	B / MBBtu Note 4, 7	Standard reference	000.0	1048	0.47E-05	344.4	1051	4.905E-05
H2SO4									

Fuel Oil Firing

	Emission Factor			1995			1999				
	Value	Reference	Justification	Fuel Use (B/gal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)	Fuel Use (B/gal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)
NOx	0.47188	B-MBBtu Note 1	Note 2	184.0		151909	0.8171	3150		151904	112.8424
CO	5	B/gal AP-42, Table 1.3-1	Standard reference	184.0		0.4628	3150				7.8750
VOC	0.79	B/gal AP-42, Table 1.3-2	Standard reference	184.0		0.8702	3150				1.1970
SO2	157.3	B/gal AP-42, Table 1.3-1	Standard reference	184.0	0.999	14.9971	3150	0.979			242.0822
PM10 Front Hall	0.19E+3.22	B/gal AP-42, Table 1.3-1	Standard reference	184.0	0.999	1.1204	3150	0.979			19.2418
Lead	1.51E-03	B/gal AP-42, Table 1.3-10	Standard reference	184.0		0.0001	3150				0.0024
H2SO4	0.98378	B/gal Note 3	Standard reference	184.0	0.999	0.8252	3150	0.979			10.7873

Total Emissions

	1995	1999	95-99 Average
	Emissions (ton/year)	Emissions (ton/year)	Emissions (ton/year)
NOx	90.9698	151.2125	115.9309
CO	14.6402	16.1143	14.7773
VOC	0.5833	1.4524	1.0079
SO2	14.2088	242.1909	129.2288
PM10 Front Hall	2.8878	20.1487	11.5072
Lead	0.0002	0.0024	0.0013
H2SO4	0.0252	10.7873	5.0942

NOTES

- Stack test data for H2SO4 dated 12/94.
- Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions, note that this emission factor is lower than the AP-42 factor of 0.55 Btu/SCF.
- AP-42, Table 1.4-1.
- Factor shown is based on ratio of gas heating value of 1000 Btu/SCF, for emission calculations, factor is reduced to reflect actual heating value shown.
- AP-42, Table 1.4-3
- AP-42, Table 1.4-9
- AP-42, Table 1.4-6
- H2SO4 emissions from fuel oil combustion calculated by factor AP-42, Table 1.3-1 Factor used to estimate SO2 emissions. All SO2 assumed to convert to H2SO4.
- Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions, note that this emission factor is almost equal to the AP-42 factor of 0.47 Btu/SCF.

TECHNICAL PROPOSAL DATA

1.5 EQUIPMENT AND MATERIAL DATA. The information required on the following pages is to assist the Engineer in evaluating the Technical Proposal.

The data listed herein is stated for definitive purposes and for the convenience of the Engineer and the Owner.

General Electric Company  
(Bidder's Name)

1.5.1 Performance Data -  
Combustion Turbine  
Generators.

Performance Data at Specified  
Conditions (Reference Table 2.1-1)

<u>Parameter</u>	<u>Condition A</u>	<u>Condition B</u>
Guaranteed or expected	<u>Guaranteed</u>	<u>Guaranteed</u>
Gross generator output, kW	<u>173,200</u>	<u>182,000</u>
CTG auxiliary power, kW	<u>608</u>	<u>1542</u>
CTG heat consumption, LHV, MBtu/h	<u>1622.9</u>	<u>1821.8</u>
Net CTG output, kW*	<u>172590</u>	<u>180460</u>
Net CTG heat rate, LHV, Btu/kWh*	<u>9370</u>	<u>10010</u>
Fuel flow, lbm/h	<u>78496</u>	<u>98210</u>
Water injection flow, lbm/h	<u>0</u>	<u>119690</u>
Turbine inlet temperature °F	<u>Proprietary</u>	<u>Proprietary</u>
Inlet airflow, lbm/h	<u>3,423,600</u>	<u>3,423,600</u>
Inlet air pressure drop, in. H <sub>2</sub> O	<u>3.04</u>	<u>3.04</u>
Compressor inlet temperature, °F	<u>59</u>	<u>59</u>
Exhaust pressure drop, in. H <sub>2</sub> O	<u>5.5</u>	<u>5.5</u>
Exhaust gas flow, lbm/h	<u>3542 x 10<sup>3</sup></u>	<u>3683 x 10<sup>3</sup></u>
NO <sub>x</sub> emissions at 15 percent O <sub>2</sub> , ppmvd*	<u>15</u>	<u>42</u>
NO <sub>x</sub> emissions at 15 percent O <sub>2</sub> , lbm/h*	<u>99</u>	<u>318</u>
CO emissions ppmvd*	<u>15</u>	<u>20</u>
CO emissions lbm/h*	<u>48</u>	<u>65</u>

UHC emissions, ppmvw*	7	7
UHC emissions, lbm/h*	14	15
VOC emissions, ppmvw*	1.4	3.5
VOC emissions, lbm/h*	2.8	7.5
TSP, lbm/h*(non-condensables only)	9	17
PM10, lbm/h*(non-condensables only)	9	17
TSP, lbm/h*(excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	19	46
PM10, lbm/h*( excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	19	46
Opacity, percent*	5	20
SO <sub>2</sub> , ppmvw, lbm/h*	0.0	93
H <sub>2</sub> SO <sub>4</sub> , lbm/h*		

Note: The basis for each load condition is specified in the Technical Requirements, Subsection 2.1, Performance Criteria. Items marked with an asterisk (\*) shall be guaranteed for all load conditions designated "Guaranteed," in accordance with Subsection 2.1.

1.5.2 General Data - Combustion Turbine.

Manufacturer

GE

Location assembled

Greenville, SC

Combustion turbine model number

PG 7241 FA





TABLE 1.5 - 1

Ambient Temperature/  
Relative Humidity: 20 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = 20675 Btu/lb Fuel Oil =      Btu/lb  
Low No<sub>x</sub>

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 15

Power Factor: 0.90 pf

	Minimum Load	25 Percent of Baseload	50 Percent of Baseload	75 Percent of Baseload	100 Percent of Baseload
Gross output, kW	<u>14900</u>	<u>46600</u>	<u>93200</u>	<u>139900</u>	<u>186500</u>
Auxiliary power, kW	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>
Gross heat rate, Btu/kWh (LHV)	<u>35375</u>	<u>15650</u>	<u>11520</u>	<u>9950</u>	<u>9310</u>
Exhaust flow, lb/h	<u>2714x10<sup>3</sup></u>	<u>2725x10<sup>3</sup></u>	<u>2741x10<sup>3</sup></u>	<u>3025x10<sup>3</sup></u>	<u>3800x10<sup>3</sup></u>
Exhaust Temp., °F	<u>647</u>	<u>787</u>	<u>1017</u>	<u>1112</u>	<u>1081</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>60.4</u>	<u>88</u>
Fuel flow, lb/h	<u>25495</u>	<u>35274</u>	<u>51932</u>	<u>67327</u>	<u>83980</u>
Water injection flow lb/h	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>69</u>	<u>93</u>	<u>94</u>	<u>15</u>	<u>15</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>137</u>	<u>266</u>	<u>401</u>	<u>84</u>	<u>105</u>
Carbon monoxide, ppmvd	<u>102</u>	<u>102</u>	<u>699</u>	<u>15</u>	<u>15</u>
Carbon monoxide, lb/h	<u>261</u>	<u>259</u>	<u>1759</u>	<u>41</u>	<u>52</u>
Sulfur dioxide, ppmw	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Sulfur dioxide, lb/h	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>
TSP, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
PM10, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

Unburned hydrocarbon, ppmv	<u>128</u>	<u>25</u>	<u>182</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>193</u>	<u>38</u>	<u>279</u>	<u>12</u>	<u>15</u>
Volatile organic compounds, ppmv	<u>25.6</u>	<u>5</u>	<u>36.4</u>	<u>1.4</u>	<u>1.4</u>
Volatile organic compounds, lb/h	<u>38.6</u>	<u>7.6</u>	<u>55.8</u>	<u>2.4</u>	<u>3</u>
Oxygen, vol %	<u>17.54</u>	<u>16.11</u>	<u>13.85</u>	<u>12.57</u>	<u>12.54</u>
Nitrogen, vol %	<u>76.75</u>	<u>76.25</u>	<u>75.45</u>	<u>75</u>	<u>74.99</u>
Carbon, vol %	<u>1.59</u>	<u>2.25</u>	<u>3.3</u>	<u>3.89</u>	<u>3.9</u>
Argon, vol %	<u>.92</u>	<u>.91</u>	<u>.9</u>	<u>.89</u>	<u>.91</u>
Water, vol %	<u>3.21</u>	<u>4.49</u>	<u>6.5</u>	<u>7.65</u>	<u>7.67</u>
Opacity, percent	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>

TABLE 1.5 - 2

Ambient Temperature/  
Relative Humidity: 59 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = 20675 Btu/lb  
Low No<sub>x</sub> Fuel Oil =        Btu/lb

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 15

Power Factor: 0.90 pf

	<u>Minimum Load</u>	<u>25 Percent of Baseload</u>	<u>50 Percent of Baseload</u>	<u>75 Percent of Baseload</u>	<u>100 Percent of Baseload</u>
Gross output, kW	<u>13900</u>	<u>43300</u>	<u>86600</u>	<u>129900</u>	<u>173200</u>
Auxiliary power, kW	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>
Gross heat rate, Btu/kWh (LHV)	<u>36505</u>	<u>16080</u>	<u>11790</u>	<u>10120</u>	<u>9370</u>
Exhaust flow, lb/h	<u>2570x10<sup>3</sup></u>	<u>2580x10<sup>3</sup></u>	<u>2595x10<sup>3</sup></u>	<u>2890x10<sup>3</sup></u>	<u>3542x10<sup>3</sup></u>
Exhaust Temp., °F	<u>690</u>	<u>830</u>	<u>1060</u>	<u>1139</u>	<u>1116</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>61.8</u>	<u>88</u>
Fuel flow, lb/h	<u>24542</u>	<u>33678</u>	<u>49383</u>	<u>63584</u>	<u>78495</u>
Water injection flow lb/h	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>67</u>	<u>59</u>	<u>89</u>	<u>15</u>	<u>15</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>127</u>	<u>161</u>	<u>361</u>	<u>79</u>	<u>99</u>
Carbon monoxide, ppmvd	<u>102</u>	<u>&gt; 1000</u>	<u>647</u>	<u>15</u>	<u>15</u>
Carbon monoxide, lb/h	<u>246</u>	<u>2596</u>	<u>1533</u>	<u>39</u>	<u>48</u>
Sulfur dioxide, ppmw	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Sulfur dioxide, lb/h	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>
TSP, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
PM10, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

Unburned hydrocarbon, ppmvw	<u>103</u>	<u>479</u>	<u>145</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>148</u>	<u>691</u>	<u>211</u>	<u>11</u>	<u>14</u>
Volatile organic compounds, ppmvw	<u>20.6</u>	<u>95.8</u>	<u>29</u>	<u>1.4</u>	<u>1.4</u>
Volatile organic compounds, lb/h	<u>29.6</u>	<u>138.2</u>	<u>42.2</u>	<u>2.2</u>	<u>2.8</u>
Oxygen, vol %	<u>17.34</u>	<u>15.92</u>	<u>13.68</u>	<u>12.51</u>	<u>12.38</u>
Nitrogen, vol %	<u>76.12</u>	<u>75.62</u>	<u>74.84</u>	<u>74.44</u>	<u>74.39</u>
Carbon, vol %	<u>1.6</u>	<u>2.26</u>	<u>3.3</u>	<u>3.84</u>	<u>3.9</u>
Argon, vol %	<u>.91</u>	<u>.91</u>	<u>.89</u>	<u>.9</u>	<u>.89</u>
Water, vol %	<u>4.03</u>	<u>5.29</u>	<u>7.29</u>	<u>8.32</u>	<u>8.44</u>
Opacity, percent	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>

TABLE 1.5 - 3

Ambient Temperature/  
Relative Humidity: 95 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = 20675 Btu/lb  
Low No<sub>x</sub> Fuel Oil = \_\_\_\_\_ Btu/lb

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 15

Power Factor: 0.90 pf

	<u>Minimum Load</u>	<u>25 Percent of Baseload</u>	<u>50 Percent of Baseload</u>	<u>75 Percent of Baseload</u>	<u>100 Percent of Baseload</u>
Gross output, kW	<u>12000</u>	<u>37600</u>	<u>75200</u>	<u>112800</u>	<u>150400</u>
Auxiliary power, kW	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>	<u>608</u>
Gross heat rate, Btu/kWh (LHV)	<u>40305</u>	<u>17360</u>	<u>12500</u>	<u>10690</u>	<u>9760</u>
Exhaust flow, lb/h	<u>2429x10<sup>3</sup></u>	<u>2438x10<sup>3</sup></u>	<u>2452x10<sup>3</sup></u>	<u>2691x10<sup>3</sup></u>	<u>3253x10<sup>3</sup></u>
Exhaust Temp., °F	<u>729</u>	<u>862</u>	<u>1078</u>	<u>1170</u>	<u>1144</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>61.6</u>	<u>88</u>
Fuel flow, lb/h	<u>23395</u>	<u>31570</u>	<u>45465</u>	<u>58321</u>	<u>70999</u>
Water injection flow lb/h	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>	<u>-----</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>53</u>	<u>45</u>	<u>65</u>	<u>15</u>	<u>15</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>97</u>	<u>115</u>	<u>243</u>	<u>73</u>	<u>89</u>
Carbon monoxide, ppmvd	<u>102</u>	<u>&gt;1000</u>	<u>687</u>	<u>15</u>	<u>15</u>
Carbon monoxide, lb/h	<u>229</u>	<u>2129</u>	<u>1515</u>	<u>36</u>	<u>43</u>
Sulfur dioxide, ppmw	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Sulfur dioxide, lb/h	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>
TSP, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
PM10, lb/h (non-condensables only)	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

Unburned hydrocarbon, ppmv	<u>87</u>	<u>422</u>	<u>172</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>118</u>	<u>581</u>	<u>239</u>	<u>11</u>	<u>13</u>
Volatile organic compounds, ppmv	<u>17.4</u>	<u>84.4</u>	<u>34.4</u>	<u>1.4</u>	<u>1.4</u>
Volatile organic compounds, lb/h	<u>23.6</u>	<u>116.2</u>	<u>47.8</u>	<u>2.2</u>	<u>2.6</u>
Oxygen, vol %	<u>16.85</u>	<u>15.53</u>	<u>13.44</u>	<u>12.24</u>	<u>12.1</u>
Nitrogen, vol %	<u>74.33</u>	<u>73.88</u>	<u>73.17</u>	<u>72.76</u>	<u>72.71</u>
Carbon, vol %	<u>1.61</u>	<u>2.22</u>	<u>3.19</u>	<u>3.75</u>	<u>3.82</u>
Argon, vol %	<u>.89</u>	<u>.89</u>	<u>.87</u>	<u>.86</u>	<u>.87</u>
Water, vol %	<u>6.33</u>	<u>7.49</u>	<u>9.83</u>	<u>10.39</u>	<u>10.51</u>
Opacity, percent	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>

Section VI - Technical Specification

031398

TABLE 1.5 - 4

Ambient Temperature/  
Relative Humidity: 20 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = \_\_\_\_\_ Btu/lb Fuel Oil = 18550 Btu/lb  
Low No<sub>x</sub>

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 42

Power Factor: 0.90 pf

	<u>Minimum Load</u>	<u>25 Percent of Baseload</u>	<u>50 Percent of Baseload</u>	<u>75 Percent of Baseload</u>	<u>100 Percent of Baseload</u>
Gross output, kW	<u>15200</u>	<u>47600</u>	<u>95200</u>	<u>142900</u>	<u>190500</u>
Auxiliary power, kW	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>
Gross heat rate, Btu/kWh (LHV)	<u>34960</u>	<u>15590</u>	<u>12030</u>	<u>10480</u>	<u>10000</u>
Exhaust flow, lb/h	<u>2717x10<sup>3</sup></u>	<u>2729x10<sup>3</sup></u>	<u>2806x10<sup>3</sup></u>	<u>3156x10<sup>3</sup></u>	<u>3947x10<sup>3</sup></u>
Exhaust Temp., °F	<u>655</u>	<u>803</u>	<u>995</u>	<u>1058</u>	<u>1045</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>61.1</u>	<u>88</u>
Fuel flow, lb/h	<u>28646</u>	<u>40005</u>	<u>61741</u>	<u>80733</u>	<u>102695</u>
Water injection flow lb/h	<u>0</u>	<u>0</u>	<u>54260</u>	<u>87910</u>	<u>125980</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>72</u>	<u>112</u>	<u>42</u>	<u>42</u>	<u>42</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>148</u>	<u>333</u>	<u>196</u>	<u>259</u>	<u>332</u>
Carbon monoxide, ppmvd	<u>&gt;1000</u>	<u>428</u>	<u>124</u>	<u>38</u>	<u>20</u>
Carbon monoxide, lb/h	<u>2242</u>	<u>1096</u>	<u>315</u>	<u>108</u>	<u>70</u>
Sulfur dioxide, ppmw	<u>5</u>	<u>6</u>	<u>9</u>	<u>11</u>	<u>11</u>
Sulfur dioxide, lb/h	<u>27</u>	<u>38</u>	<u>59</u>	<u>77</u>	<u>98</u>
TSP, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
PM10, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>3</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>10</u>

Unburned hydrocarbon, ppmvw	<u>157</u>	<u>52</u>	<u>14</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>235</u>	<u>78</u>	<u>22</u>	<u>13</u>	<u>16</u>
Volatile organic compounds, ppmvw	<u>78.5</u>	<u>26</u>	<u>7</u>	<u>3.5</u>	<u>3.5</u>
Volatile organic compounds, lb/h	<u>117.5</u>	<u>39</u>	<u>11</u>	<u>6.5</u>	<u>8</u>
Oxygen, vol %	<u>17.65</u>	<u>16.22</u>	<u>13.24</u>	<u>11.78</u>	<u>11.45</u>
Nitrogen, vol %	<u>77.16</u>	<u>76.83</u>	<u>73.86</u>	<u>72.53</u>	<u>71.99</u>
Carbon, vol %	<u>2.1</u>	<u>3.01</u>	<u>4.49</u>	<u>5.24</u>	<u>5.36</u>
Argon, vol %	<u>.93</u>	<u>.92</u>	<u>.88</u>	<u>.86</u>	<u>.86</u>
Water, vol %	<u>2.17</u>	<u>3.03</u>	<u>7.53</u>	<u>9.59</u>	<u>10.35</u>
Opacity, percent	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

Section VI - Technical Specification

031398

1-12



TABLE 1.5 - 5

Ambient Temperature/  
Relative Humidity: 59 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = \_\_\_\_\_ Btu/lb  
Low No<sub>x</sub> Fuel Oil = 18550 Btu/lb

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 42

Power Factor: 0.90 pf

	<u>Minimum Load</u>	<u>25 Percent of Baseload</u>	<u>50 Percent of Baseload</u>	<u>75 Percent of Baseload</u>	<u>100 Percent of Baseload</u>
Gross output, kW	<u>14600</u>	<u>45500</u>	<u>91000</u>	<u>136500</u>	<u>182000</u>
Auxiliary power, kW	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>
Gross heat rate, Btu/kWh (LHV)	<u>35280</u>	<u>15790</u>	<u>12200</u>	<u>10800</u>	<u>10010</u>
Exhaust flow, lb/h	<u>2573x10<sup>3</sup></u>	<u>2585x10<sup>3</sup></u>	<u>2658x10<sup>3</sup></u>	<u>2820x10<sup>3</sup></u>	<u>3683x10<sup>3</sup></u>
Exhaust Temp., °F	<u>700</u>	<u>852</u>	<u>1050</u>	<u>1191</u>	<u>1098</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>56.7</u>	<u>88</u>
Fuel flow, lb/h	<u>27768</u>	<u>38728</u>	<u>59849</u>	<u>79472</u>	<u>98210</u>
Water injection flow lb/h	<u>0</u>	<u>0</u>	<u>51810</u>	<u>89620</u>	<u>119690</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>70</u>	<u>109</u>	<u>42</u>	<u>42</u>	<u>42</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>138</u>	<u>314</u>	<u>190</u>	<u>255</u>	<u>318</u>
Carbon monoxide, ppmvd	<u>&gt; 1000</u>	<u>384</u>	<u>91</u>	<u>20</u>	<u>20</u>
Carbon monoxide, lb/h	<u>1910</u>	<u>925</u>	<u>217</u>	<u>49</u>	<u>65</u>
Sulfur dioxide, ppmw	<u>5</u>	<u>6</u>	<u>10</u>	<u>12</u>	<u>11</u>
Sulfur dioxide, lb/h	<u>26</u>	<u>37</u>	<u>57</u>	<u>75</u>	<u>93</u>
TSP, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
PM10, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>3</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>10</u>

Unburned hydrocarbon, ppmw	<u>134</u>	<u>44</u>	<u>12</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>191</u>	<u>63</u>	<u>17</u>	<u>11</u>	<u>15</u>
Volatile organic compounds, ppmw	<u>67</u>	<u>22</u>	<u>6</u>	<u>3.5</u>	<u>3.5</u>
Volatile organic compounds; lb/h	<u>95.5</u>	<u>31.5</u>	<u>8.5</u>	<u>5.5</u>	<u>7.5</u>
Oxygen, vol %	<u>17.43</u>	<u>15.97</u>	<u>12.94</u>	<u>10.71</u>	<u>11.09</u>
Nitrogen, vol %	<u>76.53</u>	<u>76.19</u>	<u>73.22</u>	<u>71.3</u>	<u>71.3</u>
Carbon, vol %	<u>2.13</u>	<u>3.06</u>	<u>4.58</u>	<u>5.74</u>	<u>5.48</u>
Argon, vol %	<u>.92</u>	<u>.92</u>	<u>.88</u>	<u>.85</u>	<u>.86</u>
Water, vol %	<u>2.99</u>	<u>3.87</u>	<u>8.39</u>	<u>11.41</u>	<u>11.28</u>
Opacity, percent	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

TABLE 1.5 - 6

Ambient Temperature/  
Relative Humidity: 95 °F/ 60 percent  
GE

Manufacturer:

Barometric Pressure: 14.69 psia  
FA

Model No./Combustor: PG 7241

Natural Gas: LHV = \_\_\_\_\_ Btu/lb  
Low No<sub>x</sub> Fuel Oil = 18550 Btu/lb

Combustion System Type: Dry

NO<sub>x</sub> Control Level: 42

Power Factor: 0.90 pf

	<u>Minimum Load</u>	<u>25 Percent of Baseload</u>	<u>50 Percent of Baseload</u>	<u>75 Percent of Baseload</u>	<u>100 Percent of Baseload</u>
Gross output, kW	<u>12800</u>	<u>40000</u>	<u>80000</u>	<u>120100</u>	<u>160100</u>
Auxiliary power, kW	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>	<u>1542</u>
Gross heat rate, Btu/kWh (LHV)	<u>38490</u>	<u>16900</u>	<u>12770</u>	<u>11150</u>	<u>10240</u>
Exhaust flow, lb/h	<u>2432x10<sup>3</sup></u>	<u>2443x10<sup>3</sup></u>	<u>2501x10<sup>3</sup></u>	<u>2681x10<sup>3</sup></u>	<u>3365x10<sup>3</sup></u>
Exhaust Temp., °F	<u>740</u>	<u>886</u>	<u>1084</u>	<u>1200</u>	<u>1133</u>
Inlet guide vane position, degrees	<u>54</u>	<u>54</u>	<u>54</u>	<u>58.3</u>	<u>88</u>
Fuel flow, lb/h	<u>26561</u>	<u>36442</u>	<u>55072</u>	<u>72189</u>	<u>88377</u>
Water injection flow lb/h	<u>0</u>	<u>0</u>	<u>38960</u>	<u>68390</u>	<u>93580</u>
Nitrogen oxides, ppmvd at 15 percent O <sub>2</sub>	<u>55</u>	<u>84</u>	<u>42</u>	<u>42</u>	<u>42</u>
Nitrogen oxides, lb/h as NO <sub>2</sub>	<u>104</u>	<u>228</u>	<u>175</u>	<u>231</u>	<u>286</u>
Carbon monoxide, ppmvd	<u>731</u>	<u>372</u>	<u>87</u>	<u>20</u>	<u>20</u>
Carbon monoxide, lb/h	<u>1649</u>	<u>835</u>	<u>193</u>	<u>47</u>	<u>59</u>
Sulfur dioxide, ppmw	<u>5</u>	<u>6</u>	<u>9</u>	<u>12</u>	<u>11</u>
Sulfur dioxide, lb/h	<u>25</u>	<u>35</u>	<u>52</u>	<u>69</u>	<u>84</u>
TSP, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
PM10, lb/h (non-condensables only)	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
TSP, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
PM10, lbm/h (excluding H <sub>2</sub> SO <sub>4</sub> , Including other condensables)	<u>37</u>	<u>38</u>	<u>40</u>	<u>42</u>	<u>44</u>
H <sub>2</sub> SO <sub>4</sub> , lbm/h	<u>3</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>10</u>

Section VI - Technical Specification

031398

1-15

Unburned hydrocarbon, ppmv	<u>119</u>	<u>42</u>	<u>11</u>	<u>7</u>	<u>7</u>
Unburned hydrocarbon, lb/h	<u>162</u>	<u>57</u>	<u>16</u>	<u>11</u>	<u>13</u>
Volatile organic compounds, ppmv	<u>59.5</u>	<u>21</u>	<u>5.5</u>	<u>3.5</u>	<u>3.5</u>
Volatile organic compounds, lb/h	<u>81</u>	<u>28.5</u>	<u>8</u>	<u>5.5</u>	<u>6.5</u>
Oxygen, vol %	<u>16.93</u>	<u>15.55</u>	<u>12.8</u>	<u>10.91</u>	<u>10.97</u>
Nitrogen, vol %	<u>74.73</u>	<u>74.42</u>	<u>72.03</u>	<u>70.5</u>	<u>70.25</u>
Carbon, vol %	<u>2.14</u>	<u>3.02</u>	<u>4.45</u>	<u>5.46</u>	<u>5.37</u>
Argon, vol %	<u>.9</u>	<u>.89</u>	<u>.86</u>	<u>.83</u>	<u>.84</u>
Water, vol %	<u>5.3</u>	<u>6.12</u>	<u>9.86</u>	<u>12.3</u>	<u>12.57</u>
Opacity, percent	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

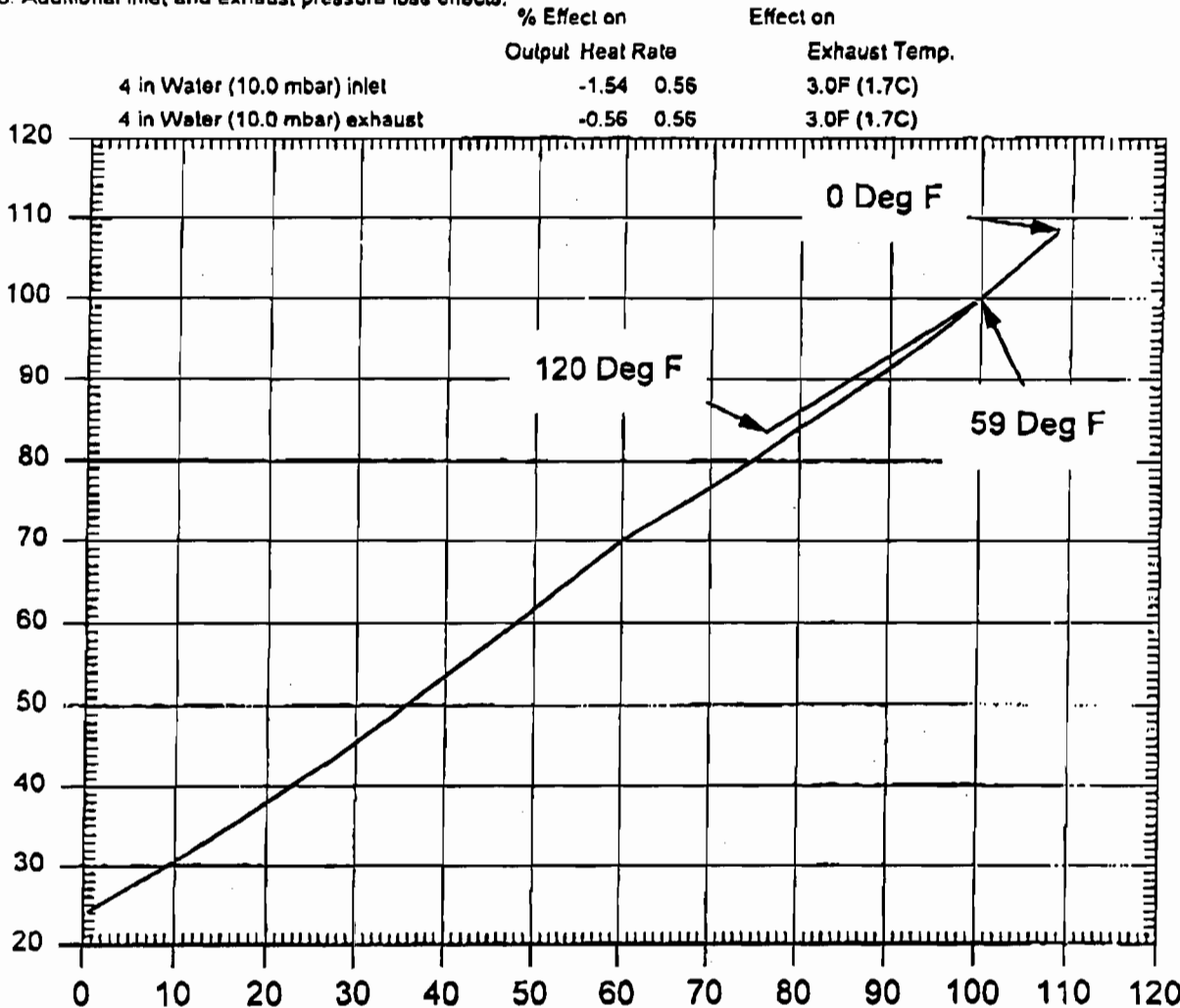
# General Electric Model PG7241(FA) Gas Turbine Jacksonville Electric Authority

Estimated Performance - Configuration: DLN Combustor  
Compressor Inlet Conditions 59 F (15 C), 60% Relative Humidity  
Atmospheric Pressure 14.7 psia (1.013 bar)

Fuel:		Customer Specified Gas
Design Output	kW	173200
Design Heat Rate (LHV)	Btu/kWh (kJ/kWh)	<del>9400 (9942)</del> 9570
Design Heat Cons (LHV)	Btu/h (kJ/h)x10 <sup>6</sup>	1622.9 (1711.8)
Design Exhaust Flow	lb/h (kg/h)x10 <sup>3</sup>	3542.0 (1607)
Exhaust Temperature	deg. F (deg. C)	1118 (602.2)
Load		Base

**Notes:**

- Altitude correction on curve 416HA662 Rev A.
- Ambient temperature correction on curve 543HA873 Rev 0.
- Effect of modulating IGV's on exhaust temperature and flow on curve 543HA874 Rev 0.
- Humidity effects on curve 498HA697 Rev. B - all performance calculated with 60% constant relative humidity.
- Plant Performance is measured at the generator terminals and includes allowances for the effects of excitation power, shaft driven auxiliaries, and 3.04 in H<sub>2</sub>O (6.33 mbar) inlet and 5.5 in H<sub>2</sub>O (13.70 mbar) exhaust pressure drops and a DLN Combustor.
- Additional inlet and exhaust pressure loss effects:



Heat Consumption - Percent Design

# General Electric Model PG7241(FA) Gas Turbine Jacksonville Electric Authority

Estimated Performance - Configuration: DLN Combustor  
Compressor Inlet Conditions 59 F (15 C), 60% Relative Humidity  
Atmospheric Pressure 14.7 psia (1.013 bar)

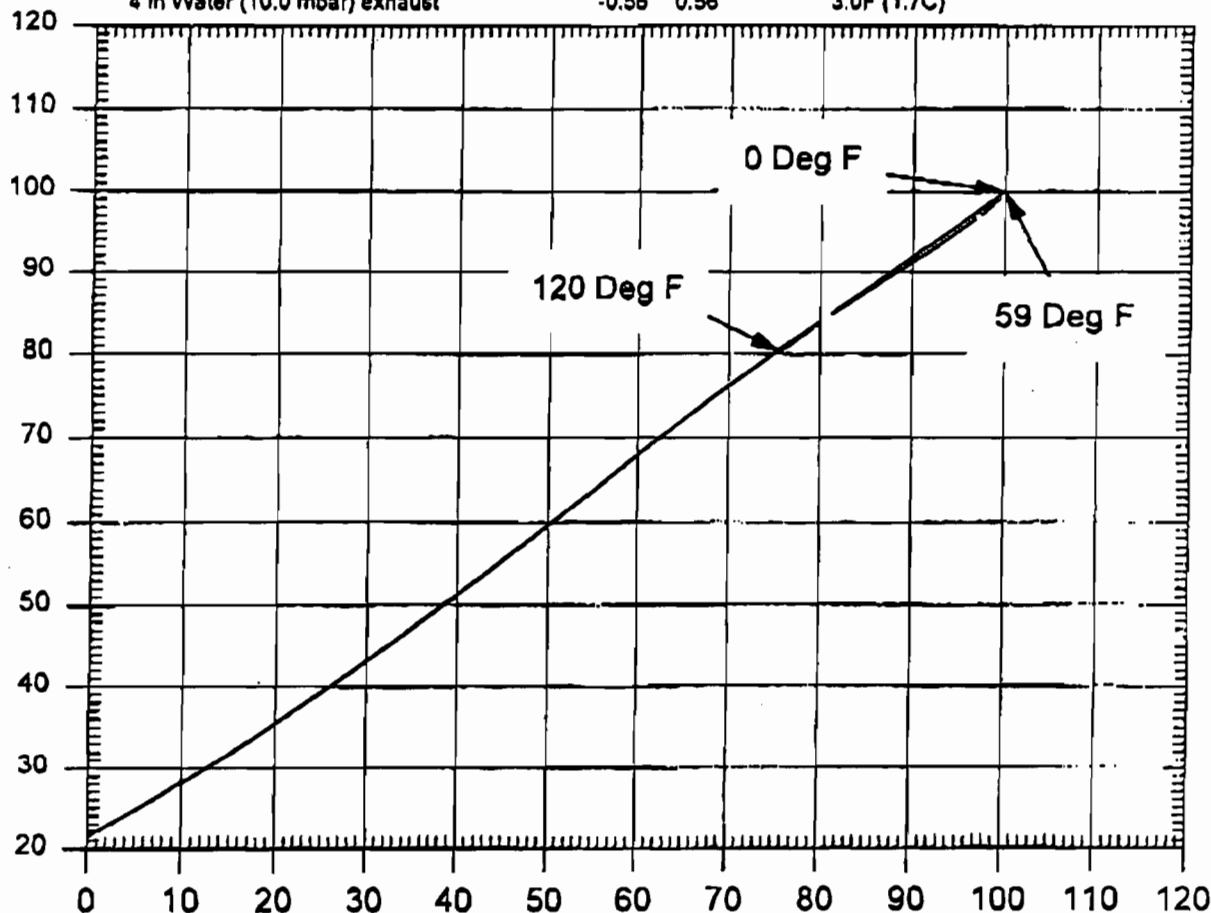
Fuel:	Distillate	
Design Output	kW	182000
Design Heat Rate (LHV)	Btu/kWh (kJ/kWh)	10100 (10650)
Design Heat Cons (LHV)	Btu/h (kJ/h)x10 <sup>6</sup>	1821.8 (1921.7)
Design Exhaust Flow	lb/h (kg/h)x10 <sup>3</sup>	3683.0 (1671)
Exhaust Temperature	deg. F (deg. C)	1098 (592.2)
Design Water Flow	lb/h	119690
Load	Base	

Notes:

- Altitude correction on curve 415HA662 Rev A.
- Ambient temperature correction on curve 543HA876 Rev 0.
- Effect of modulating IGV's on exhaust temperature and flow on curve 543HA877 Rev 0.
- Humidity effects on curve 498HA697 Rev. B - all performance calculated with 60% constant relative humidity.
- Plant Performance is measured at the generator terminals and includes allowances for the effects of excitation power, shaft driven auxiliaries, and 3.04 in H<sub>2</sub>O (6.33 mbar) inlet and 5.5 in H<sub>2</sub>O (13.70 mbar) exhaust pressure drops and a DLN Combustor.
- Additional Inlet and exhaust pressure loss effects:

	% Effect on Output Heat Rate	Effect on Exhaust Temp.
4 in Water (10.0 mbar) Inlet	-1.54 0.56	3.0F (1.7C)
4 in Water (10.0 mbar) exhaust	-0.56 0.56	3.0F (1.7C)

Heat Consumption - Percent Design



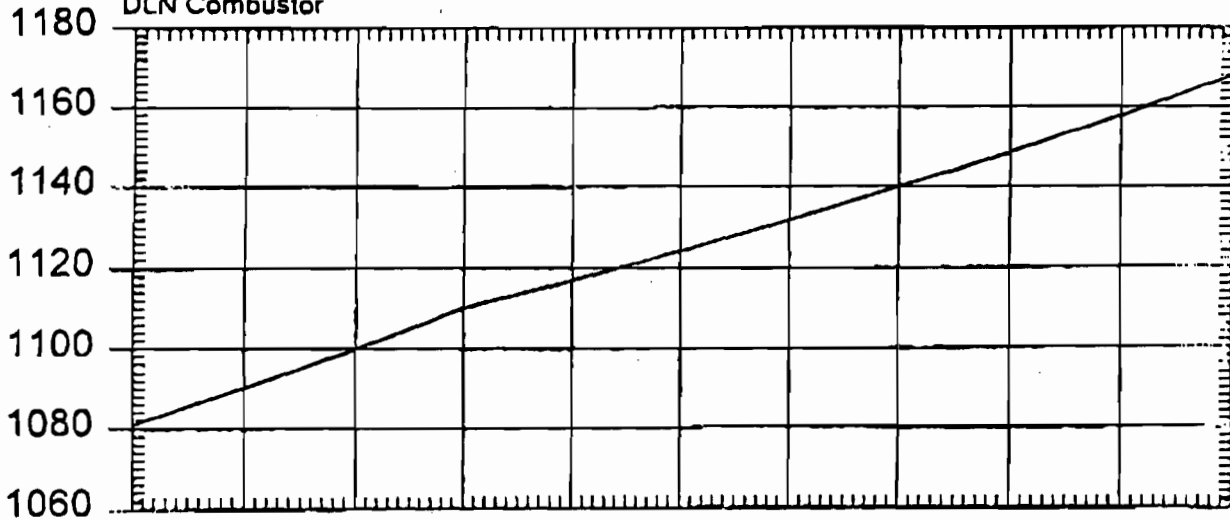
# GENERAL ELECTRIC MODEL PG7241(FA) GAS TURBINE

## Jacksonville Electric Authority

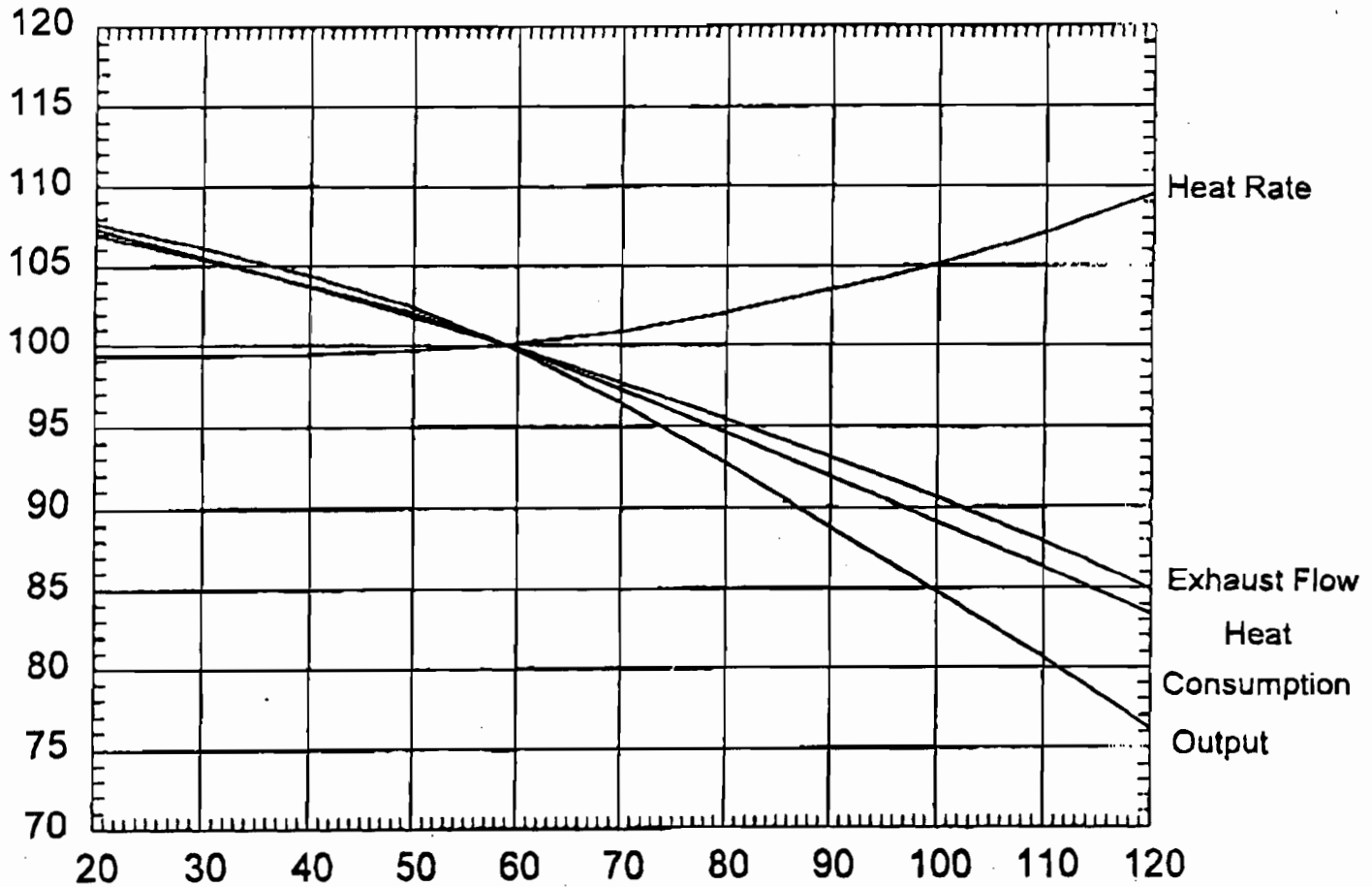
### Effect of Compressor Inlet Temperature on Output, Heat Rate, Heat Consumption, Exhaust Flow And Exhaust Temperature at Baseload

Fuel: Customer Specified Gas  
Design Values on Curve 543HA872 Rev 0  
DLN Combustor

Exhaust Temperature (deg F)



Percent Design

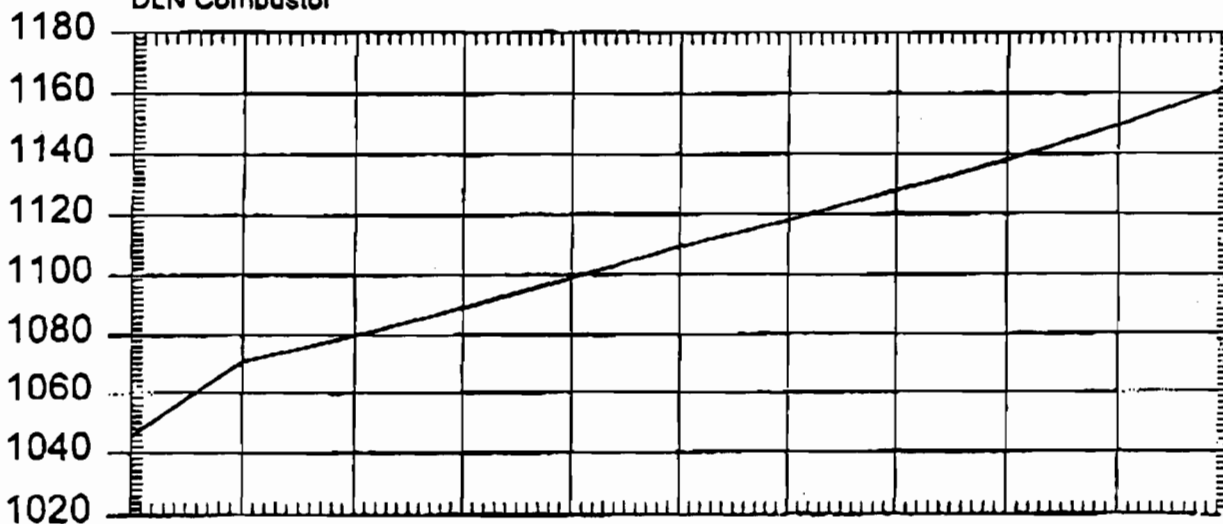


Compressor Inlet Temperature (deg F)

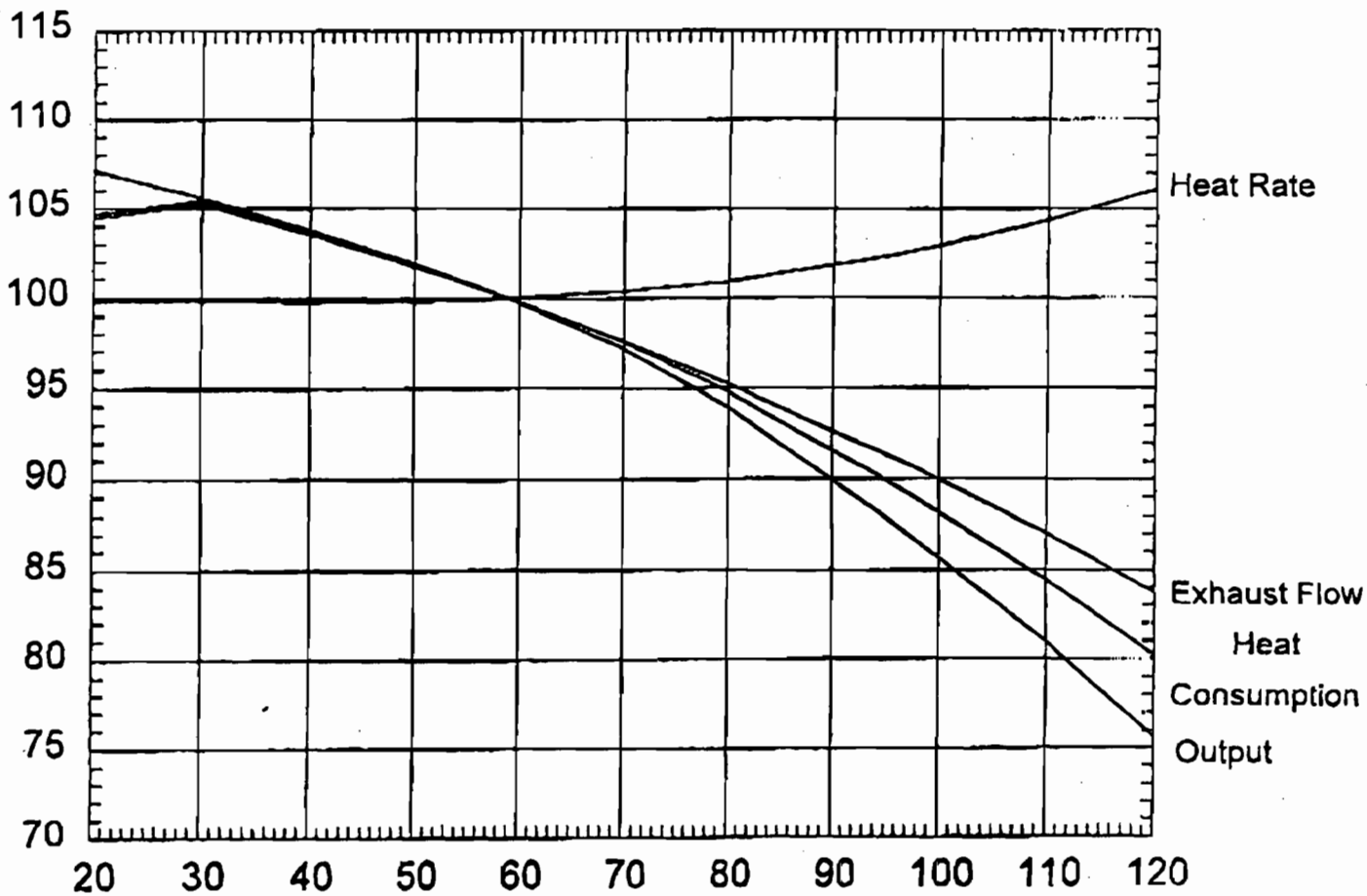
# GENERAL ELECTRIC MODEL PG7241(FA) GAS TURBINE Jacksonville Electric Authority Effect of Compressor Inlet Temperature on Output, Heat Rate, Heat Consumption, Exhaust Flow And Exhaust Temperature at Baseload

Fuel: Distillate  
Design Values on Curve 543HA875 Rev 0  
DLN Combustor

Exhaust Temperature (deg F)



Percent Design





**Attachment 6 - Fuel Analysis or Specification**

Fuel is specified as pipeline quality sweet natural gas or No. 2 fuel oil containing no more than 0.05% sulfur.

**Attachment 7 - Control Equipment**

The control equipment specified for this project consists of dry low NO<sub>x</sub> burners to control NO<sub>x</sub> emissions during natural gas firing and water injection to control NO<sub>x</sub> emissions during fuel oil firing.

**Attachment 8 - Description of Stack Sampling facilities**

The stack sampling facilities will conform to FAC Chapter 62-297, attached.

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TABLE OF CONTENTS  
Chapter 62-297  
Stationary Sources - Emissions Monitoring

	PAGE
62-297.100 PURPOSE AND SCOPE.....	1
62-297.200 DEFINITIONS. (REPEALED).....	1
62-297.310 GENERAL COMPLIANCE TEST REQUIREMENTS.....	2
62-297.330 APPLICABLE TEST PROCEDURES. (REPEALED).....	9
62-297.340 FREQUENCY OF COMPLIANCE TESTS. (REPEALED).....	9
62-297.345 STACK SAMPLING FACILITIES PROVIDED BY THE OWNER OF AN EMISSIONS UNIT. (REPEALED).....	9
62-297.350 DETERMINATION OF PROCESS VARIABLES. (REPEALED).....	9
62-297.400 EPA METHODS ADOPTED BY REFERENCE. (REPEALED).....	9
62-297.401 COMPLIANCE TEST METHODS. ....	9
62-297.411 DEP METHOD 1. (REPEALED).....	14
62-297.412 DEP METHOD 2 (REPEALED).....	14
62-297.413 DEP METHOD 3. (REPEALED).....	14
62-297.414 DEP METHOD 4. (REPEALED).....	14
62-297.415 DEP METHOD 5. (REPEALED).....	14
62-297.416 DEP METHOD 5A. (REPEALED) .....	14
62-297.417 DEP METHOD 6. (REPEALED).....	14
62-297.418 DEP METHOD 7. (REPEALED).....	14
62-297.419 DEP METHOD 8. (REPEALED).....	15
62-297.420 DEP METHOD 9. (REPEALED).....	15
62-297.421 DEP METHOD 10. (REPEALED).....	15
62-297.422 DEP METHOD 11. (REPEALED).....	15
62-297.423 EPA METHOD 12. (REPEALED).....	15
62-297.424 DEP METHOD 13. (REPEALED).....	15

62-297.440 SUPPLEMENTARY TEST PROCEDURES..... 15  
62-297.450 EPA VOC CAPTURE EFFICIENCY TEST PROCEDURES. .... 18  
62-297.500 CONTINUOUS EMISSION MONITORING REQUIREMENTS.  
(REPEALED).....20  
62-297.520 EPA CONTINUOUS MONITOR PERFORMANCE SPECIFICATIONS. .... 20  
62-297.570 TEST REPORTS. (REPEALED).....21  
62-297.620 EXCEPTIONS AND APPROVAL OF ALTERNATE PROCEDURES AND  
REQUIREMENTS.....21



Chapter 62-297  
Stationary Sources - Emissions Monitoring

62-297.100	Purpose and Scope.
62-297.200	Definitions. (Repealed)
62-297.310	General Test Requirements.
62-297.330	Applicable Test Procedures. (Repealed)
62-297.340	Frequency of Compliance Tests. (Repealed)
62-297.345	Stack Sampling Facilities Provided by the Owner of an Emissions Unit. (Repealed)
62-297.350	Determination of Process Variables.(Repealed)
62-297.400	EPA Methods Adopted by Reference. (Repealed)
62-297.401	EPA Test Procedures.
62-297.411	DEP Method 1. (Repealed)
62-297.412	DEP Method 2. (Repealed)
62-297.413	DEP Method 3. (Repealed)
62-297.414	DEP Method 4. (Repealed)
62-297.415	DEP Method 5. (Repealed)
62-297.416	DEP Method 5A. (Repealed)
62-297.417	DEP Method 6. (Repealed)
62-297.418	DEP Method 7. (Repealed)
62-297.419	DEP Method 8. (Repealed)
62-297.420	DEP Method 9. (Repealed)
62-297.421	DEP Method 10. (Repealed)
62-297.422	DEP Method 11. (Repealed)
62-297.423	EPA Methods 12 - Determination of Inorganic Lead Emissions from Stationary Sources. (Repealed)
62-297.424	DEP Method 13. (Repealed)
62-297.440	Supplementary Test Procedures.
62-297.450	EPA VOC Capture Efficiency Test Procedures.
62-297.500	Continuous Emission Monitoring Requirements. (Repealed)
62-297.520	EPA Continuous Monitor Performance Specifications.
62-297.570	Test Report. (Repealed)
62-297.620	Exceptions and Approval of Alternate Procedures and Requirements.

**62-297.100 Purpose and Scope.**

The Department of Environmental Protection adopts this chapter to establish test procedures that shall be used to determine the compliance of air pollutant emissions units with emission limiting standards specified in or established pursuant to any of the stationary source rules of the Department. Words and phrases used in this chapter, unless clearly indicated otherwise, are defined at Rule 62-210.200, F.A.C.

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(1)(a); Formerly 17-297.100; Amended 11-23-94, 3-13-96.

**62-297.200 Definitions. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.100; Amended 6-29-93; Formerly 17-297.200; Amended 11-23-94, 1-1-96, Repealed 3-13-96.

**62-297.310 General Compliance Test Requirements.**

The focal point of a compliance test is the stack or duct which vents process and/or combustion gases and air pollutants from an emissions unit into the ambient air.

(1) **Required Number of Test Runs.** For mass emission limitations, a compliance test shall consist of three complete and separate determinations of the total air pollutant emission rate through the test section of the stack or duct and three complete and separate determinations of any applicable process variables corresponding to the three distinct time periods during which the stack emission rate was measured; provided, however, that three complete and separate determinations shall not be required if the process variables are not subject to variation during a compliance test, or if three determinations are not necessary in order to calculate the unit's emission rate. The three required test runs shall be completed within one consecutive five-day period. In the event that a sample is lost or one of the three runs must be discontinued because of circumstances beyond the control of the owner or operator, and a valid third run cannot be obtained within the five-day period allowed for the test, the Secretary or his or her designee may accept the results of two complete runs as proof of compliance, provided that the arithmetic mean of the two complete runs is at least 20% below the allowable emission limiting standard.

(2) **Operating Rate During Testing.** Unless otherwise stated in the applicable emission limiting standard rule, testing of emissions shall be conducted with the emissions unit operation at permitted capacity as defined below. If it is impractical to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load 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 purpose of additional compliance testing to regain the authority to operate at the permitted capacity.

(a) **Combustion Turbines.** (Reserved)

(b) **All Other Sources.** Permitted capacity is defined as 90 to 100 percent of the maximum operation rate allowed by the permit.

(3) **Calculation of Emission Rate.** The indicated emission rate or concentration shall be the arithmetic average of the emission rate or concentration determined by each of the three separate test runs unless otherwise specified in a particular test method or applicable rule.

(4) **Applicable Test Procedures.**

(a) **Required Sampling Time.**

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.

2. **Opacity Compliance Tests.** When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.

b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.

c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

(b) Minimum Sample Volume. Unless otherwise specified in the applicable rule, the minimum sample volume per run shall be 25 dry standard cubic feet.

(c) Required Flow Rate Range. For EPA Method 5 particulate sampling, acid mist/sulfur dioxide, and fluoride sampling which uses Greenburg Smith type impingers, the sampling nozzle and sampling time shall be selected such that the average sampling rate will be between 0.5 and 1.0 actual cubic feet per minute, and the required minimum sampling volume will be obtained.

(d) Calibration of Sampling Equipment. Calibration of the sampling train equipment shall be conducted in accordance with the schedule shown in Table 297.310-1.

(e) Allowed Modification to EPA Method 5. When EPA Method 5 is required, the following modification is allowed: the heated filter may be separated from the impingers by a flexible tube.

TABLE 297.310-1  
CALIBRATION SCHEDULE

ITEM	MINIMUM CALIBRATION FREQUENCY	REFERENCE INSTRUMENT	TOLERANCE
Liquid in glass thermometer	Annually	ASTM Hg in glass ref. thermometer or equivalent, or thermometric points	+/-2%
Bimetallic thermometer	Quarterly	Calib. liq. in glass thermometer	5 degrees F
Thermocouple	Annually	ASTM Hg in glass ref. thermometer, NBS calibrated reference and potentiometer	5 degrees F
Barometer	Monthly	Hg barometer or NOAA station	+/-1% scale
Pitot Tube	When required or when damaged	By construction or measurements in wind tunnel D greater than 16" and standard pitot tube	See EPA Method 2, Fig. 2-2 & 2-3
Probe Nozzles	Before each test or when nicked, dented, or corroded Max. deviation between readings	Micrometer	+/-0.001" men of at least three readings .004"
Dry Gas Meter and Orifice Meter	1. Full Scale: When received, When 5% change observed, Annually 2. One Point: Semiannually 3. Check after each test series	Spirometer or calibrated wet test or dry gas test meter  Comparison check	2%  5%

(5) Determination of Process Variables.

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight 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.

(6) Required Stack Sampling Facilities. Sampling facilities include sampling ports, work platforms, access to work platforms, electrical power, and sampling equipment support. All stack sampling facilities must meet any Occupational Safety and Health Administration (OSHA) Safety and Health Standards described in 29 CFR Part 1910, Subparts D and E.

(a) Permanent Test Facilities. The owner or operator of an emissions unit for which a compliance test, other than a visible emissions test, is required on at least an annual basis, shall install and maintain permanent stack sampling facilities.

(b) Temporary Test Facilities. The owner or operator of an emissions unit that is not required to conduct a compliance test on at least an annual basis may use permanent or temporary stack sampling facilities. If the owner chooses to use temporary sampling facilities on an emissions unit, and the Department elects to test the unit, such temporary facilities shall be installed on the emissions unit within 5 days of a request by the Department and remain on the emissions unit until the test is completed.

(c) Sampling Ports.

1. All sampling ports shall have a minimum inside diameter of 3 inches.

2. The ports shall be capable of being sealed when not in use.

3. The sampling ports shall be located in the stack at least 2 stack diameters or equivalent diameters downstream and at least 0.5 stack diameter or equivalent diameter upstream from any fan, bend, constriction or other flow disturbance.

4. For emissions units for which a complete application to construct has been filed prior to December 1, 1980, at least two sampling ports, 90 degrees apart, shall be installed at each sampling location on all circular stacks that have an outside diameter of 15 feet or less. For stacks with a larger diameter, four sampling ports, each 90 degrees apart, shall be installed. For emissions units for which a complete application to construct is filed on or after December 1, 1980, at least two sampling ports, 90 degrees apart, shall be installed at each sampling location on all circular stacks that have an outside diameter of 10 feet or less. For stacks with larger diameters, four sampling ports, each 90 degrees apart, shall be installed. On horizontal circular ducts, the ports shall be located so that the probe can enter the stack vertically, horizontally or at a 45 degree angle.

5. On rectangular ducts, the cross sectional area shall be divided into the number of equal areas in accordance with EPA Method 1. Sampling ports shall be provided which allow access to each sampling point. The ports shall be located so that the probe can be inserted perpendicular to the gas flow.

(d) Work Platforms.

1. Minimum size of the working platform shall be 24 square feet in area. Platforms shall be at least 3 feet wide.

2. On circular stacks with 2 sampling ports, the platform shall extend at least 110 degrees around the stack.

3. On circular stacks with more than two sampling ports, the work platform shall extend 360 degrees around the stack.

4. All platforms shall be equipped with an adequate safety rail (ropes are not acceptable), toeboard, and hinged floor-opening cover if ladder access is used to reach the platform. The safety rail directly in line with the sampling ports shall be removable so that no obstruction exists in an area 14 inches below each sample port and 6 inches on either side of the sampling port.

(e). Access to Work Platform.

1. Ladders to the work platform exceeding 15 feet in length shall have safety cages or fall arresters with a minimum of 3 compatible safety belts available for use by sampling personnel.

2. Walkways over free-fall areas shall be equipped with safety rails and toeboards.

(f). Electrical Power.

1. A minimum of two 120-volt AC, 20-amp outlets shall be provided at the sampling platform within 20 feet of each sampling port.

2. If extension cords are used to provide the electrical power, they shall be kept on the plant's property and be available immediately upon request by sampling personnel.

(g). Sampling Equipment Support.

1. A three-quarter inch eyebolt and an angle bracket shall be attached directly above each port on vertical stacks and above each row of sampling ports on the sides of horizontal ducts.

a. The bracket shall be a standard 3 inch x 3 inch x one-quarter inch equal-legs bracket which is 1 and one-half inches wide. A hole that is one-half inch in diameter shall be drilled through the exact center of the horizontal portion of the bracket. The horizontal portion of the bracket shall be located 14 inches above the centerline of the sampling port.

b. A three-eighth inch bolt which protrudes 2 inches from the stack may be substituted for the required bracket. The bolt shall be located 15 and one-half inches above the centerline of the sampling port.

c. The three-quarter inch eyebolt shall be capable of supporting a 500 pound working load. For stacks that are less than 12 feet in diameter, the eyebolt shall be located 48 inches above the horizontal portion of the angle bracket. For stacks that are greater than or equal to 12 feet in diameter, the eyebolt shall be located 60 inches above the horizontal portion of the angle bracket. If the eyebolt is more than 120 inches above the platform, a length of chain shall be attached to it to bring the free end of the chain to within safe reach from the platform.

2. A complete monorail or dualrail arrangement may be substituted for the eyebolt and bracket.

3. When the sample ports are located in the top of a horizontal duct, a frame shall be provided above the port to allow the sample probe to be secured during the test.

(7) Frequency of Compliance Tests. The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.

(a) General Compliance Testing.

1. The owner or operator of a new or modified emissions unit that is subject to an emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining an operation permit for such emissions unit.

2. For excess emission limitations for particulate matter specified in Rule 62-210.700, F.A.C., a compliance test shall be conducted annually while the emissions

unit is operating under soot blowing conditions in each federal fiscal year during which soot blowing is part of normal emissions unit operation, except that such test shall not be required in any federal fiscal year in which a fossil fuel steam generator does not burn liquid and/or solid fuel for more than 400 hours other than during startup.

3. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to Rule 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:

a. Did not operate; or  
b. In the case of a fuel burning emissions unit, burned liquid and/or solid fuel for a total of no more than 400 hours.

4. During each federal fiscal year (October 1 -- September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for:

a. Visible emissions, if there is an applicable standard;  
b. Each of the following pollutants, if there is an applicable standard, and if the emissions unit emits or has the potential to emit: 5 tons per year or more of lead or lead compounds measured as elemental lead; 30 tons per year or more of acrylonitrile; or 100 tons per year or more of any other regulated air pollutant; and  
c. Each NESHAP pollutant, if there is an applicable emission standard.

5. An annual compliance test for particulate matter emissions shall not be required for any fuel burning emissions unit that, in a federal fiscal year, does not burn liquid and/or solid fuel, other than during startup, for a total of more than 400 hours.

6. For fossil fuel steam generators on a semi-annual particulate matter emission compliance testing schedule, a compliance test shall not be required for any six-month period in which liquid and/or solid fuel is not burned for more than 200 hours other than during startup.

7. For emissions units electing to conduct particulate matter emission compliance testing quarterly pursuant to Rule 62-296.405(2)(a), F.A.C., a compliance test shall not be required for any quarter in which liquid and/or solid fuel is not burned for more than 100 hours other than during startup.

8. Any combustion turbine that does not operate for more than 400 hours per year shall conduct a visible emissions compliance test once per each five-year period, coinciding with the term of its air operation permit.

9. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.

10. An annual compliance test conducted for visible emissions shall not be required for units exempted from permitting at Rule 62-210.300(3)(a), F.A.C., or units permitted under the General Permit provisions at Rule 62-210.300(4)(a)1. through 7., F.A.C.

(b) Special Compliance Tests. When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it shall require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

(c) Waiver of Compliance Test Requirements. If the owner or operator of an emissions unit that is subject to a compliance test requirement demonstrates to the Department, pursuant to the procedure established in Rule 62-297.620, F.A.C., that the compliance of the emissions unit with an applicable weight emission limiting standard can be adequately determined by means other than the designated test procedure, such as specifying a surrogate standard of no visible emissions for particulate matter sources equipped with a bag house or specifying a fuel analysis for sulfur dioxide emissions, the Department shall waive the compliance test requirements for such emissions units and order that the alternate means of determining compliance be used, provided, however, the provisions of Rule 62-297.310(7)(b), F.A.C., shall apply.

(8) Test Reports.

(a) The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test.

(b) The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed.

(c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA or DEP Method 9 test, shall provide the following information:

1. The type, location, and designation of the emissions unit tested.
2. The facility at which the emissions unit is located.
3. The owner or operator of the emissions unit.
4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
5. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
6. The type of air pollution control devices installed on the emissions unit, their general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.
7. A sketch of the duct within 8 stack diameters upstream and 2 stack diameters downstream of the sampling ports, including the distance to any upstream and downstream bends or other flow disturbances.
8. The date, starting time and duration of each sampling run.
9. The test procedures used, including any alternative procedures authorized pursuant to Rule 62-297.620, F.A.C. Where optional procedures are authorized in this chapter, indicate which option was used.
10. The number of points sampled and configuration and location of the sampling plane.
11. For each sampling point for each run, the dry gas meter reading, velocity head, pressure drop across the stack, temperatures, average meter temperatures and sample time per point.
12. The type, manufacturer and configuration of the sampling equipment used.
13. Data related to the required calibration of the test equipment.
14. Data on the identification, processing and weights of all filters used.
15. Data on the types and amounts of any chemical solutions used.
16. Data on the amount of pollutant collected from each sampling probe, the filters, and the impingers, are reported separately for the compliance test.
17. The names of individuals who furnished the process variable data, conducted the test, analyzed the samples and prepared the report.



18. All measured and calculated data required to be determined by each applicable test procedure for each run.

19. The detailed calculations for one run that relate the collected data to the calculated emission rate.

20. The applicable emission standard, and the resulting maximum allowable emission rate for the emissions unit, plus the test result in the same form and unit of measure.

21. A certification that, to the knowledge of the owner or his authorized agent, all data submitted are true and correct. When a compliance test is conducted for the Department or its agent, the person who conducts the test shall provide the certification with respect to the test procedures used. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(1)(b); Formerly 17-297.310; Amended 11-23-94, 3-13-96, 10-28-97.

#### **62-297.330 Applicable Test Procedures. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, 470.025, F.S.

History: Formerly 17-2.710, Amended 11-62-92, 12-02-92, Formerly 17-297.330; Amended 11-23-94, 1-1-96, Repealed 3-13-96.

#### **62-297.340 Frequency of Compliance Tests. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(2); Formerly 17-297.340; Amended 11-23-94, 1-1-96, Repealed 3-13-96.

#### **62-297.345 Stack Sampling Facilities Provided by the Owner of an Emissions Unit. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(4), Formerly 17-297.345, Amended 11-23-94, 1-1-96, Repealed 3-13-96.

#### **62-297.350 Determination of Process Variables. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(5), Formerly 17-297.350, Amended 11-23-94. Repealed 3-13-96.

#### **62-297.400 EPA Methods Adopted by Reference. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(1)(c), Formerly 17-297.400, Amended 11-23-94, Repealed 1-1-96.

#### **62-297.401 Compliance Test Methods.**

This rule adopts the test methods to be used where a compliance test is required by Department air pollution rule or air permit. The EPA test methods and quality

assurance procedures listed in this rule and contained in 40 CFR Part 51, Appendix M, 40 CFR Part 60, Appendix A and F, 40 CFR Part 61, Appendix B and C and 40 CFR Part 63, Appendix A, are adopted and incorporated by reference in Rule 62-204.800, F.A.C. The EPA test methods that are adopted by reference in Rule 62-204.800, F.A.C., are adopted in their entirety except for those provisions referring to approval of alternative procedures by the Administrator. For purposes of this rule, such alternative procedures may only be approved by the Secretary or his or her designee in accordance with Rule 62-297.620, F.A.C.

(1)(a) EPA Method 1 -- Sample and Velocity Traverses for Stationary sources -- 40 CFR 60 Appendix A.

(b) EPA Method 1A -- Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts -- 40 CFR 60 Appendix A.

(2) EPA Method 2 -- Determination of Stack Gas Velocity and Volumetric Flow Rate -- 40 CFR 60 Appendix A.

(a) EPA Method 2A -- Direct Measurement of Gas Volume Through Pipes and Small Ducts -- 40 CFR 60 Appendix A.

(b) EPA Method 2B -- Determination of Exhaust Gas Volume Flow Rate from Gasoline Vapor Incinerators -- 40 CFR 60 Appendix A.

(c) EPA Method 2C -- Determination of Stack Gas Velocity and Volumetric Flow Rate in Small Stacks and Ducts (Standard Pitot Tube) -- 40 CFR 60 Appendix A

(d) EPA Method 2D -- Measurement of Gas Volumetric Flow Rates in Small Pipes and Ducts -- 40 CFR 60 Appendix A.

(3) EPA Method 3 -- Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight -- 40 CFR 60 Appendix A.

(a) EPA Method 3A -- Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure) -- 40 CFR 60 Appendix A

(b) (Reserved).

(4) EPA Method 4 -- Determination of Moisture Content in Stack Gases -- 40 CFR 60 Appendix A.

(5) EPA Method 5 -- Determination of Particulate Emissions from Stationary Sources -- 40 CFR 60 Appendix A.

(a) EPA Method 5A -- Determination of Particulate Emissions from the Asphalt Processing and Asphalt Roofing Industry -- 40 CFR 60 Appendix A.

(b) EPA Method 5B -- Determination of Nonsulfuric Acid Particulate Matter from Stationary Sources -- 40 CFR 60 Appendix A.

(c) Reserved.

(d) EPA Method 5D -- Determination of Particulate Matter Emissions from Positive Pressure Fabric Filters -- 40 CFR 60 Appendix A.

(e) EPA Method 5E -- Determination of Particulate Emissions from the Wool Fiberglass Insulation Manufacturing Industry -- 40 CFR 60 Appendix A.

(f) EPA Method 5F -- Determination of Nonsulfate Particulate Matter from Stationary Sources -- 40 CFR 60 Appendix A.

(g) EPA Method 5G -- Determination of Particulate Emissions from Wood Heaters from a Dilution Tunnel Sampling Location -- 40 CFR 60 Appendix A.

(h) EPA Method 5H -- Determination of Particulate Emissions from Wood Heaters from a Stack Location -- 40 CFR 60 Appendix A.

(6) EPA Method 6 -- Determination of Sulfur Dioxide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.

(a) EPA Method 6A -- Determination of Sulfur Dioxide, Moisture, and Carbon Dioxide Emissions From Fossil Fuel Combustion Sources -- 40 CFR 60 Appendix A.

(b) EPA Method 6B -- Determination of Sulfur Dioxide and Carbon Dioxide Daily Average Emissions From Fossil Fuel Combustion Sources -- 40 CFR 60 Appendix A.

(c) EPA Method 6C -- Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure) -- 40 CFR 60 Appendix A.

(7) EPA Method 7 -- Determination of Nitrogen Oxide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.

(a) EPA Method 7A -- Determination of Nitrogen Oxide Emissions from Stationary Sources -- Ion Chromatographic Method -- 40 CFR 60 Appendix A.

(b) EPA Method 7B -- Determination of Nitrogen Oxide Emissions from Stationary Sources (Ultraviolet Spectrophotometry) -- 40 CFR 60 Appendix A.

(c) EPA Method 7C -- Determination of Nitrogen Oxide Emissions from Stationary Sources - Alkaline--Permanganate/  
- Colorimetric Method -- 40 CFR 60 Appendix A.

(d) EPA Method 7D -- Determination of Nitrogen Oxide Emissions from Stationary Sources - Alkaline--Permanganate/  
- Ion Chromatographic Method -- 40 CFR 60 Appendix A.

(e) EPA Method 7E -- Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Procedure) -- 40 CFR 60 Appendix A.

(8) EPA Method 8 -- Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.

(9)(a) EPA Method 9 -- Visual Determination of the Opacity of Emissions from Stationary Sources -- 40 CFR 60 Appendix A.

(b) Alternate Method 1 -- Determination of the Opacity of Emissions from Stationary Sources Remotely by Lidar -- 40 CFR 60 Appendix A.

(c) DEP Method 9. The provisions of EPA Method 9 (40 CFR 60, Appendix A) are adopted by reference with the following exceptions:

1. EPA Method 9, Section 2.4, Recording Observations. Opacity observations shall be made and recorded by a certified observer at sequential fifteen second intervals during the required period of observation.

2. EPA Method 9, Section 2.5, Data Reduction. For a set of observations to be acceptable, the observer shall have made and recorded, or verified the recording of, at least 90 percent of the possible individual observations during the required observation period. For single-valued opacity standards (e.g., 20 percent opacity), the test result shall be the highest valid six-minute average for the set of observations taken. For multiple-valued opacity standards (e.g., 20 percent opacity, except that an opacity of 40 percent is permissible for not more than two minutes per hour) opacity shall be computed as follows:

a. For the basic part of the standard (i.e., 20 percent opacity) the opacity shall be determined as specified above for a single-valued opacity standard.

b. For the short-term average part of the standard, opacity shall be the highest valid short-term average (i.e., two-minute, three-minute average) for the set of observations taken.

In order to be valid, any required average (i.e., a six-minute or two-minute average) shall be based on all of the valid observations in the sequential subset of observations selected, and the selected subset shall contain at least 90 percent of the observations possible for the required averaging time. Each required average shall be calculated by summing the opacity value of each of the valid observations in the appropriate subset, dividing this sum by the number of valid observations in the subset, and rounding the result to the nearest whole number. The number of missing observations in the subset shall be indicated in parenthesis after the subset average value.

- (10) EPA Method 10 -- Determination of Carbon Monoxide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (a) EPA Method 10A -- Determination of Carbon Monoxide Emissions in Certifying Continuous Emission Monitoring Systems at Petroleum Refineries -- 40 CFR 60 Appendix A.
- (b) EPA Method 10B -- Determination of Carbon Monoxide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (11) EPA Method 11 -- Determination of Hydrogen Sulfide Content of Fuel Gas Streams in Petroleum Refineries -- 40 CFR 60 Appendix A.
- (12) EPA Method 12 -- Determination of Inorganic Lead Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (13) EPA Methods 13A and 13B.
- (a) EPA Method 13A -- Determination of Total Fluoride Emissions from Stationary Sources -- SPADNS --- Zirconium Lake Method -- 40 CFR 60 Appendix A.
- (b) EPA Method 13B -- Determination of Total Fluoride Emissions from Stationary Sources -- Specific Ion Electrode Method -- 40 CFR 60 Appendix A.
- (14) EPA Method 14 -- Determination of Fluoride Emissions from Potroom Roof Monitors of Primary Aluminum Plants -- 40 CFR 60 Appendix A.
- (15) EPA Method 15 -- Determination of Hydrogen Sulfide, Carbonyl Sulfide and Carbon Disulfide Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (a) EPA Method 15A -- Determination of Total Reduced Sulfur Emissions from Sulfur Recovery Plants in Petroleum Refineries -- 40 CFR 60 Appendix A.
- (16) EPA Method 16 -- Semicontinuous Determination of Sulfur Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (a) EPA Method 16A -- Determination of Total Reduced Sulfur Emissions from Stationary Sources (Impinger Technique) -- 40 CFR 60 Appendix A.
- (b) EPA Method 16B -- Determination of Total Reduced Sulfur Emissions from Stationary Sources -- 40 CFR 60 Appendix A.
- (17) EPA Method 17 -- Determination of Particulate Emissions from Stationary Sources (In-Stack Filtration Method) -- 40 CFR 60 Appendix A.
- (18) EPA Method 18 -- Measurement of Gaseous Organic Compound Emissions by Gas Chromatography -- 40 CFR 60 Appendix A.
- (19) EPA Method 19 -- Determination of Sulfur Dioxide Removal Efficiency and Particulate, Sulfur Dioxide and Nitrogen Oxides Emission Rates -- 40 CFR 60 Appendix A.
- (20) EPA Method 20 -- Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines -- 40 CFR 60 Appendix A.
- (21) EPA Method 21 -- Determination of Volatile Organic Compound Leaks -- 40 CFR 60 Appendix A.
- (22) EPA Method 22 -- Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares -- 40 CFR 60 Appendix A.
- (23) EPA Method 23 -- Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources -- 40 CFR 60 Appendix A.
- (24) EPA Method 24 -- Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings -- 40 CFR 60 Appendix A.
- (a) EPA Method 24A -- Determination of Volatile Matter Content and Density of Printing Inks and Related Coatings -- 40 CFR 60 Appendix A.
- (b) No change.
- (25) EPA Method 25 -- Determination of Total Gaseous Nonmethane Organic Emissions as Carbon -- 40 CFR 60 Appendix A.
- (a) EPA Method 25A -- Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer -- 40 CFR 60 Appendix A.

- (b) EPA Method 25B -- Determination of Total Gaseous Organic Concentration Using a Nondispersive Infrared Analyzer -- 40 CFR 60 Appendix A.
- (26) EPA Method 26 -- Determination of Hydrogen Chloride Emissions From Stationary Sources -- 40 CFR 60, Appendix A.
- (a) EPA Method 26A -- Determination of Hydrogen Halide and Halogen Emissions From Stationary Sources - Isokinetic Method -- 40 CFR 60, Appendix A
- (27) EPA Method 27 -- Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure-Vacuum Test -- 40 CFR 60 Appendix A.
- (28) EPA Method 28 -- Certification and Auditing of Wood Heaters -- 40 CFR 60 Appendix A.
- (a) EPA Method 28A -- Measurement of Air to Fuel Ratio and Minimum Achievable Burn Rates for Wood-Fired Appliances -- 40 CFR 60 Appendix A.
- (29) EPA Method 29 -- Determination of Metals Emission from Stationary Sources -- 40 CFR 60 Appendix A.
- (30) Reserved.
- (31) 40 CFR 60 Appendix F -- Quality Assurance Procedures -- .
- (32) EPA Method 101 -- Determination of Particulate and Gaseous Mercury Emissions from Chlor-Alkali Plants - Air Streams -- 40 CFR 61 Appendix B.
- (a) EPA Method 101A -- Determination of Particulate and Gaseous Mercury Emissions from Sewage Sludge Incinerators -- 40 CFR 61 Appendix B.
- (33) EPA Method 102 -- Determination of Particulate and Gaseous Mercury Emissions from Chlor-Alkali Plants - Hydrogen Streams -- 40 CFR 61 Appendix B.
- (34) EPA Method 103 -- Beryllium Screening Method -- 40 CFR 61 Appendix B.
- (35) EPA Method 104 -- Determination of Beryllium Emissions from Stationary Sources -- 40 CFR 61 Appendix B.
- (36) EPA Method 105 -- Determination of Mercury in Wastewater Treatment Plant Sewage Sludges -- 40 CFR 61 Appendix B.
- (37) EPA Method 106 -- Determination of Vinyl Chloride Emissions from Stationary Sources -- 40 CFR 61 Appendix B.
- (38) EPA Method 107 -- Determination of Vinyl Chloride Content of Inprocess Wastewater Samples, and Vinyl Chloride Content of Polyvinyl Chloride Resin, Slurry, Wet Cake, and Latex Samples -- 40 CFR 61 Appendix B.
- (a) EPA Method 107A -- Determination of Vinyl Chloride Content of Solvents, Resin-Solvent Solution, Polyvinyl Chloride Resin, Resin Slurry, Wet Resin, and Latex Samples -- 40 CFR 61 Appendix B.
- (39) EPA Method 108 -- Determination of Particulate and Gaseous Arsenic Emissions -- 40 CFR 61 Appendix B.
- (a) EPA Method 108A -- Determination of Arsenic Content in Ore Samples from Nonferrous Smelters -- 40 CFR 61 Appendix B.
- (b) EPA Method 108B -- Determination of Arsenic Content in Ore Samples from Nonferrous Smelters -- 40 CFR 61 Appendix B.
- (c) EPA Method 108C -- Determination of Arsenic Content in Ore Samples from Nonferrous Smelters -- 40 CFR 61 Appendix B.
- (40) 40 CFR 61 Appendix C -- Quality Assurance Procedures.
- (41) EPA Method 201 -- Determination of PM<sub>10</sub> Emissions (Exhaust Gas Recycle Procedure) -- 40 CFR 51 Appendix M.
- (a) EPA Method 201A -- Determination of PM<sub>10</sub> Emissions (Constant Sampling Rate Procedure) -- 40 CFR 51 Appendix M.
- (42) EPA Method 202 -- Determination of Condensable Particulate Emissions from Stationary Sources -- 40 CFR 51 Appendix M.
- (43) EPA Method 301 -- Field Data Validation Protocol -- 40 CFR Part 63, Appendix A.

297

(44) EPA Method 303 -- Coke Oven Door Emissions -- 40 CFR Part 63, Appendix A.  
Specific Authority 403.061 FS.  
Law Implemented 403.021, 403.031, 403.061, 403.087 FS.  
History Formerly 17-2.700(6)(b), Amended 10-14-92, 6-29-93; Formerly 17-297.401; Amended 11-23-94, 1-1-96, 3-13-96, 10-7-96.

**62-297.411 DEP Method 1. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)1, Formerly 17-297.411, Amended 11-23-94, Repealed 1-1-96.

**62-297.412 DEP Method 2 (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)2, Formerly 17-297.412, Repealed 1-1-96.

**62-297.413 DEP Method 3. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)3, Formerly 17-297.413, Repealed 1-1-96.

**62-297.414 DEP Method 4. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)4, Formerly 17-297.414, Repealed 1-1-96.

**62-297.415 DEP Method 5. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)5.a, Formerly 17-297.415; Amended 11-23-94, Repealed 1-1-96.

**62-297.416 DEP Method 5A. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)5.b, Formerly 17-297.416, Repealed 1-1-96.

**62-297.417 DEP Method 6. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)6, Formerly 17-297.417, Amended 11-23-94, Repealed 1-1-96.

**62-297.418 DEP Method 7. (Repealed)**

Specific Authority: 403.061, F.S.  
Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.  
History: Formerly 17-2.700(6)(a)7, Formerly 17-297.418, Repealed 1-1-96.

**62-297.419 DEP Method 8. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(a)8, Formerly 17-297.419, Repealed 1-1-96.

**62-297.420 DEP Method 9. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(a)9, Formerly 17-297.420, Amended 11-23-94, Repealed 3-13-96.

**62-297.421 DEP Method 10. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(a)10, Formerly 17-297.421, Repealed 1-1-96.

**62-297.422 DEP Method 11. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 62-2.700(6)(a)11, Formerly 17-297.422, Repealed 1-1-96.

**62-297.423 EPA Method 12. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(a)12, Formerly 17-297.423, Amended 11-23-94, 1-1-96.

**62-297.424 DEP Method 13. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(a)13, Formerly 17-297.424, Repealed 1-1-96.

**62-297.440 Supplementary Test Procedures.**

The following test procedures are adopted by reference. Copies of these documents are available from the emissions units set forth below. Copies may also be inspected at the Department's Tallahassee Office.

(1) ASTM Methods. Standard Methods published by the American Society for Testing and Materials are available from the Society at 1916 Race Street, Philadelphia, Pennsylvania 19103.

(a) ASTM D 322-67, 1972. Standard Method of Test for Dilution of Gasoline Engine Crankcase Oils.

(b) ASTM D 396-76. Standard Specification for Fuel Oils, superceding ASTM D 396-69.

(c) ASTM D 2880-76. Standard Specification for Gas Turbine Fuel Oils, superceding ASTM D 2880-71.

(d) ASTM D 975-77. Standard Specification for Diesel Fuel Oils, superceding ASTM D 975-68.

(e) ASTM D 323-72. Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method).

(f) ASTM D 97-66. Standard Test Method for Pour Point of Petroleum Oils.

(g) ASTM D 4057-88. Standard Practice for Manual Sampling of Petroleum and Petroleum Products.

(h) ASTM D 129-91. Standard Test Method for Sulfur in Petroleum Products (General Bomb Method).

(i) ASTM D 2622-94. Standard Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry.

(j) ASTM D 4294-90. Standard Test Method for Sulfur in Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectroscopy.

(2) EPA Reports -- EPA occasionally publishes test methods and emission control guidelines in a report format. These documents are available (unless otherwise stated) from the National Technical Information Services, 5286 Port Royal Road, Springfield, Virginia 22216, and may be inspected at the Department's Tallahassee Office.

(a) Petroleum Liquid Storage.

1. Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks, EPA 450/2-78-047, p. 5-3.

2. Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed-Roof Tanks, EPA 450/2-77-036, p. 6-2.

(b) Gasoline Bulk Terminals.

1. Vapor Control System Test.

a. VOC emissions from the vapor control system shall be determined by the method given in Appendix A of EPA 450/2-77-026, except that an adequate sampling time shall be at least six (6) hours of operation. For continuous vapor processing systems at least 80,000 gallons (302,800 liters) of gasoline shall be loaded during the test. For intermittent vapor processing systems, at least 80,000 gallons (302,800 liters) of gasoline shall be loaded during the test and at least two full cycles of operation of the vapor processing system shall occur. This test shall be performed prior to the date of compliance and annually thereafter. Test results records shall be maintained at the terminal until the subsequent annual test shall be made available to the Department upon request.

b. Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals, EPA 450/2-77-026, Appendix A. Emission Test Procedure for Tank Truck Gasoline Loading Terminals.

2. Vapor Leak Detection.

a. During loading or unloading operations at bulk terminals, there shall be no reading greater than or equal to 100 percent of the lower explosive level (LEL), measured as propane at 1 in. (2.5 centimeters) around the perimeter of a potential leak source as detected by a combustible gas detector using the procedure described in Appendix B of EPA 450/2-78-051.

b. Control of Volatile Organic Compound Leaks from Gasoline Tank Trucks and Vapor Collection Systems, EPA 450/2-78-051, Appendix B, Gasoline Vapor Leak Detection Procedures by Combustible Gas Detector.

(c) Gasoline Service Stations.

1. Design Criteria for Stage I Vapor Control: Gasoline Service Stations, USEPA, OAQPS, ESED, November, 1975.

2. [Reserved]

(d) Non-destructive Control Devices.

1. Measurement of Volatile Organic Compounds, EPA 450/2-78-041, Attachment 3, Alternate Test for Direct Measurement of Total Gaseous Organic Compounds Using a Flame Ionization Analyzer.

2. [Reserved]

(e) Perchloroethylene Dry Cleaning Systems.

1. Control of Volatile Organic Emissions from Perchloroethylene Dry Cleaning Systems, EPA 450/2-78-050, p. 6-3, Compliance Procedures, Liquid Leakage.



2. RACT Compliance Guidance for Carbon Absorbers on Perchloroethylene Dry Cleaners. Task No. 119, Contract No. 68-01-4147. EPA, DSSE, May, 1980, pp. 8-21, Appendices A and B.

(f) Cross Recovery Determination. When determining if a kraft recovery furnace is a straight kraft or cross recovery furnace the procedure in 40 CFR 60.285(d)(3) of Subpart BB shall be used.

(3) American Conference of Governmental Industrial Hygienists, Recommended Practices -- Industrial Ventilation: A Manual of Recommended Practice. Equipment Specifications published in the 16th Edition of the Industrial Ventilation Manual (or any subsequent versions approved by the Department) are available from the American Conference of Governmental Industrial Hygienists, Committee on Industrial Ventilation, P. O. Box 16153, Lansing, Michigan 48901, and may be inspected at the Department's Tallahassee Office.

(4) American Petroleum Institute (API) Recommended Practices -- These are available from the API, 2101 L Street, Northwest, Washington, D. C. 20037

(a) API Standard 650, Welded Steel Tanks for Oil Storage, Sixth Edition, Revision 1, May 15, 1978.

(b) API Publication 2517, Evaporation Loss from External Floating Roof Tanks, Second Edition, February, 1980.

(c) API 1004, Bottom Loading and Vapor Recovery for MC-306 Tank Motor Vehicles, Fourth Edition, September 1, 1977.

(5) Technical Association of the Pulp and Paper Industry (TAPPI), Test Methods -- These are available from TAPPI, P. O. Box 105113, Atlanta, Georgia 30348.

(a) TAPPI Method T.624, Analysis of Soda and Sulfate White and Green Liquors.

(b) (Reserved).

(6) Sulphur Development Institute of Canada (SUDIC) Sampling and Testing Sulphur Forms -- These are available from SUDIC, Box 950, Bow Valley Square 1, 830, 202-6 Avenue S. W., Calgary, Alberta T2P 2W6.

(a) S1-77. Collection of a Gross Sample of Sulphur.

(b) S2-77. Sieve Analysis of Sulphur Forms, except paragraph 4.3 concerning wet sieving is not adopted.

(c) S3-77. Determination of Material Finer than No. 50 (300um) Sieve in Sulphur Forms by Washing.

(d) S5-77. Determination of Friability of Sulfur Forms.

(7) EPA VOC Capture Efficiency Test Procedures. Adopted by reference is an EPA memo dated April 16, 1990 entitled, "Guidelines for Developing a State Protocol for the Measurement of Capture Efficiency." A copy can be obtained by writing to: Bureau of Air Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

(a) Procedure F.1 -- Fugitive VOC Emissions from Temporary Enclosures.

(b) Procedure F.2 -- Fugitive VOC Emissions from Building Enclosures.

(c) Procedure G.1 -- Captured VOC Emissions.

(d) Procedure G.2 -- Captured VOC Emissions (dilution technique).

(e) Procedure L -- VOC in Liquid Input Stream.

(f) Procedure T -- Criteria for and Verification of Permanent or Temporary Total Enclosure.

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(6)(c); Amended 6-29-93, Formerly 17-297.440, Amended 11-23-94, 1-1-96.

### **62-297.450 EPA VOC Capture Efficiency Test Procedures.**

(1) Applicability. The requirements set forth in Rules 62-297.450(2) and (3), F.A.C., shall apply to all regulated VOC emitting emissions units employing a control system pursuant to Rules 62-296.501 through 62-296.516, F.A.C., and Rule 62-296.800, F.A.C., except as provided in Rules 62-297.450(1)(a) and (b), F.A.C.

(a) If an owner or operator installs a Permanent Total Enclosure that meets the specifications of Procedure T, and which directs all VOC to a control device, the capture efficiency is assumed to be 100 percent, and the facility owner or operator is exempted from the requirements described in Rule 62-297.450(2), F.A.C. This does not exempt the owner or operator from conducting any required control device efficiency test.

(b) If the owner or operator of an affected activity, process, or emissions unit uses a nondestructive control device designed to collect and recover VOC (e.g. carbon adsorber), an explicit measurement of capture efficiency is not necessary if the owner or operator is able to equate solvent usage with solvent recovery on a 24-hour (daily) basis, rather than a 30-day weighted average, and can determine this within 72 hours following each 24-hour period, and one of the following two criteria is also met:

1. The solvent recovery system (i.e., capture and control system) is dedicated to a single activity, process line, or emissions unit (e.g., one process line venting to a carbon adsorber system), or

2. The solvent recovery system controls multiple activities, process lines, or emissions units and the owner or operator is able to demonstrate that the overall control (i.e., the total recovered solvent VOC divided by the sum of liquid VOC input to all activities, process lines, or emissions units venting of the control system) meets or exceeds the most stringent emission standard applicable for any activity, process line, or emissions unit venting to the control system.

(c) If the conditions given above in Rule 62-297.450(1)(b), F.A.C., are met, the overall emission reduction efficiency of the system can be determined by dividing the recovered liquid VOC by the input liquid VOC. The general procedure for this determination is given in 40 CFR 60.433, which is adopted by reference.

(2) Specific Requirements. The capture efficiency of a capture system shall be determined using one of the following EPA procedures, or an alternate capture efficiency test procedure if approved by the Department under the provisions of Rule 62-297.620, F.A.C.

(a) Gas/gas method using a Temporary Total Enclosure. The EPA specifications to determine whether an enclosure is considered a Temporary Total Enclosure are given in Procedure T, which is adopted by reference in Rule 62-297.440, F.A.C. The capture efficiency equation to be used for this procedure is:

$$CE = Gw / (Gw + Fw)$$

where:

CE = capture efficiency, decimal fraction, times 100 (percentage)

Gw = mass of VOC captured and delivered to control device using a Temporary Total Enclosure

Fw = mass of fugitive VOC that escapes from a Temporary Total Enclosure Procedure G.1 or Procedure G.2 is used to obtain Gw. Procedure F.1 is used to obtain Fw.

(b) Liquid/gas method using Temporary Total Enclosure. The EPA specifications to determine whether an enclosure is considered a Temporary Total Enclosure are given in Procedure T, which is adopted by reference in Rule 62-297.440, F.A.C. The capture efficiency equation to be used for this procedure is:

$$CE = (L-F)/L$$

where:

CE = capture efficiency, decimal fraction, times 100 (percentage)

L = mass of liquid VOC input to the activity, process, or emissions unit

F = mass of fugitive VOC that escapes from a Temporary Total Enclosure Procedure L is used to obtain L. Procedure F.1 is used to obtain F.

(c) Gas/gas method using the building or room in which the affected activity, process, or emissions unit is located as the enclosure and in which G and F are measured while operating only the affected activity, process, or emissions unit. All fans and blowers in the building or room must be operated as they would under normal production. The capture efficiency equation to be used for this procedure is:

$$CE = G/(G + F \text{ sub B})$$

where:

CE = capture efficiency, decimal fraction, times 100 (percentage)

G = mass of VOC captured and delivered to a control device

F<sub>B</sub> = mass of fugitive VOC that escapes from building enclosure

Procedure G.1 or Procedure G.2 is used to obtain G. Procedure F.2 is used to obtain F<sub>B</sub>.

(d) Liquid/gas method using the building or room in which the affected activity, process, or emissions unit located as the enclosure and in which L and F are measured while operating only the affected activity, process, or emissions unit. All fans and blowers in the building or room shall be operated as they would under normal production. The capture efficiency equation to be used for this procedure is:

$$CE = (L-F_B)/L$$

where:

CE = capture efficiency, decimal fraction, times 100 (percentage)

L = mass of liquid VOC input to the activity, process, or emissions unit

F<sub>B</sub> = mass of fugitive VOC that escapes from building enclosure

Procedure L is used to obtain L. Procedure F.2 is used to obtain F sub B.

(3) Sampling Requirements. A capture efficiency test shall consist of at least three sampling runs. Each run shall cover at least one complete production cycle, but shall be at least 3 hours long. The sampling time for each run need not exceed 8 hours, even if the production cycle has not been completed.

(4) Recordkeeping and Reporting.

(a) The owner or operator of an affected activity, process, or emissions unit shall submit to the Department a list of the procedures that will be used for the capture efficiency tests at the owner or operator's facility. A copy of the list shall be kept on file at the affected facility.

(b) Required test reports shall be submitted to the Department within forty-five (45) days of the test date. A copy of the results shall be kept on file at the facility.

(c) If any physical or operational change is made to a control system, the owner or operator of the affected facility shall notify the Department of the change within ten (10) working days after making such change. The Department shall require the owner or operator of the affected activity, process, or emissions unit to conduct a new capture efficiency test if the Department has reason to believe (based on engineering calculations or empirical evidence) that a physical or operational change made to the capture system has decreased the overall emissions reduction efficiency of the system.

(d) Notwithstanding the provisions of Rule 62-297.340(1), F.A.C., the owner or operator of an affected activity, process, or emissions unit shall notify the Department thirty (30) days prior to performing any capture efficiency and/or control efficiency tests.

(e) The owner or operator of an affected activity, process, or emissions unit using a Permanent Total Enclosure shall demonstrate that this enclosure meets the requirement given in Procedure T for a Permanent Total Enclosure during any required control device efficiency test.

(f) The owner or operator of an affected activity, process, or emissions unit using a Temporary Total Enclosure shall demonstrate that this enclosure meets the requirements given in Procedure T for a Temporary Total Enclosure during any required control device efficiency test.

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(7); Amended 6-29-93, Formerly 17-297.450, Amended 11-23-94, 1-1-96.

#### **62-297.500 Continuous Emission Monitoring Requirements. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, 470.025, F.S.

History: Formerly 17-2.710, Amended 11-62-92, 12-02-92; 6-29-93; Formerly 17-297.500; Repealed 11-23-94.

#### **62-297.520 EPA Continuous Monitor Performance Specifications.**

This rule adopts the continuous monitor performance specifications to be used where required by Department air pollution rule or air permit. The EPA performance specifications listed in this rule and contained in 40 CFR 60, Appendix B, are adopted and incorporated by reference in Rule 62-204.800, F.A.C.

(1) Performance Specification 1--Specifications and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources.

(2) Performance Specification 2--Specifications and Test Procedures for SO<sub>2</sub> and NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources.

(3) Performance Specification 3--Specifications and Test Procedures for O<sub>2</sub> and CO<sub>2</sub> Continuous Emission Monitoring Systems in Stationary Sources.

(4) Performance Specification 4--Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources.

(5) Performance Specification 4A--Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources.

(6) Performance Specification 5--Specifications and Test Procedures for TRS Continuous Emission Monitoring Systems in Stationary Sources.

(7) Performance Specification 6--Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources.

(8) Performance Specification 7--Specifications and Test Procedures for Hydrogen Sulfide Continuous Emission Monitoring Systems in Stationary Sources.  
Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: New 6-29-93, Formerly 17-297.520, Amended 11-23-94, 3-13-96.

#### **62-297.570 Test Reports. (Repealed)**

Specific Authority: 403.061, F.S.

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(8), Formerly 17-297.570, Amended 11-23-94, Repealed 3-13-96.

#### **62-297.620 Exceptions and Approval of Alternate Procedures and Requirements.**

(1) The owner or operator of any emissions unit subject to the provisions of this chapter may request in writing a determination by the Secretary or his/her designee that any requirement of this chapter (except for any continuous monitoring requirements) relating to emissions test procedures, methodology, equipment, or test facilities shall not apply to such emissions unit and shall request approval of an alternate procedures or requirements.

(2) The request shall set forth the following information, at a minimum:

(a) Specific emissions unit and permit number, if any, for which exception is requested.

(b) The specific provision(s) of this chapter from which an exception is sought.

(c) The basis for the exception, including but not limited to any hardship which would result from compliance with the provisions of this chapter.

(d) The alternate procedure(s) or requirement(s) for which approval is sought and a demonstration that such alternate procedure(s) or requirement(s) shall be adequate to demonstrate compliance with applicable emission limiting standards contained in the rules of the Department or any permit issued pursuant to those rules.

(3) The Secretary or his/her designee shall specify by order each alternate procedure or requirement approved for an individual emissions unit source in accordance with this section or shall issue an order denying the request for such approval. The Department's order shall be final agency action, reviewable in accordance with Section 120.57, Florida Statutes.

(4) In the case of an emissions unit which has the potential to emit less than 100 tons per year of particulate matter and is equipped with a baghouse, the Secretary or the appropriate Director of District Management may waive any particulate matter compliance test requirements for such emissions unit specified in any otherwise applicable rule, and specify an alternative standard of 5% opacity. The waiver of compliance test requirements for a particulate emissions unit equipped with a baghouse, and the substitution of the visible emissions standard, shall be specified in the permit issued to the emissions unit.

If the Department has reason to believe that the particulate weight emission standard applicable to such an emissions unit is not being met, it shall require that compliance be demonstrated by the test method specified in the applicable rule.

Specific Authority: 403.061, F.S.

297

Law Implemented: 403.021, 403.031, 403.061, 403.087, F.S.

History: Formerly 17-2.700(3); Amended 6-29-93; Formerly 17-297.620; Amended 11-23-94.

# JACKSONVILLE ELECTRIC AUTHORITY

21 WEST CHURCH STREET • JACKSONVILLE, FL 32202-3139



March 12, 1998

Mr. Martin Costello, P.E.  
Florida Department of Environmental Protection  
Twin Towers Office Bldg.  
2600 Blair Stone Rd., Mail Station 5500  
Tallahassee, FL 32399-2400

**RECEIVED**

**MAR 23 1998**

**BUREAU OF  
AIR REGULATION**

RE: Kennedy Generating Station Proposed Single-Cycle Combustion Turbine

Dear Mr. Costello:

Per previous conversations with DEP staff, it is JEA's intent to permit the above referenced unit at the levels proposed in my letter dated February 12, 1998 while "netting-out" of the Prevention of Significant Deterioration (PSD) process.

Attached please find NOAA statistical information which shows that 1997 was an unusually moderate year resulting in below normal power demand. Since 1997 was not representative of normal operation, we are proposing to exclude 1997 from baseline calculations and use 1995 and 1996 as the baseline years for determining baseline emission levels. It is noted that the total permitted emissions of SO<sub>2</sub>, NO<sub>x</sub>, and PM combined will be just over 200 tons per year, with actual emissions expected to be considerably less.

The unit will utilize dry low NO<sub>x</sub> burner technology with expected guaranteed full-load emission rates of 15 ppm NO<sub>x</sub> on gas fuel and 42 ppm NO<sub>x</sub> on #2 oil utilizing water injection.

If you have any questions with regard to this matter, please advise.

Sincerely,

N. Bert Gianazza, P.E.  
Environmental, Health & Safety

cc: Mr. Steve Pace, P.E., RESD  
Ms. Christi Veleta, RESD

Jacksonville Electric Authority  
 Statistical Information  
 for the Twelve Months Ending September 30, 1997  
 Total Degree Day Comparison

Month	NOAA 30 Year Average	Fiscal Year 1995/96	Fiscal Year 1996/97	Percentage Change 97 vs 96	Percentage Change 97 vs NOAA
October	210	296	198	-33%	-6%
November	205	288	218	-24%	6%
December	356	377	313	-17%	-12%
January	452	405	348	-14%	-23%
February	318	303	221	-27%	-31%
March	217	302	174	-42%	-20%
April	134	180	159	-12%	19%
May	260	350	243	-31%	-7%
June	423	416	365	-12%	-14%
July	515	549	531	-3%	3%
August	502	445	485	9%	-3%
September	393	381	415	9%	6%
<b>Total</b>	<b>3,985</b>	<b>4,292</b>	<b>3,670</b>	<b>-14%</b>	<b>-8%</b>

JAN-SEPT 3214 2941 -8.5%

Firm KWH Sales

	Fiscal Year 1995/96	Fiscal Year 1996/97	Percentage Change 97 vs 96
<b>Total</b>	<b>10,110,464,307</b>	<b>10,023,800,060</b>	<b>-1.0%</b>

Average Number of Territorial Customers

	Fiscal Year to Date 1995/96	Fiscal Year to Date 1996/97	Percentage Change 97 vs 96
<b>Total</b>	<b>328,371</b>	<b>335,463</b>	<b>2.3%</b>





# JACKSONVILLE ELECTRIC AUTHORITY

21 WEST CHURCH STREET • JACKSONVILLE, FL 32202-3139



**RECEIVED**

FFR 18 1998

**BUREAU OF  
AIR REGULATION**

February 12, 1998

Mr. Clair H. Fancy, P.E.  
Chief, Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Subject: Request for PSD Determination

Dear Mr. Fancy:

On December 17, 1997, the Jacksonville Electric Authority (JEA) and Black & Veatch (JEA's air permitting consultant) met with the Florida Department of Environmental Protection (FDEP) to discuss air permitting issues associated with a potential new emission source. At the December 17 meeting, FDEP staff suggested that JEA submit information which would allow FDEP to make an official determination of Prevention of Significant Deterioration (PSD) applicability to this project. Therefore, this letter is submitted to FDEP to formally request such a determination.

JEA is proposing to install one simple cycle, 160 MW Frame F combustion turbine (CT) at the Kennedy Generating Station. This unit will be used primarily as a peaking unit, firing natural gas as its primary fuel and low sulfur distillate fuel oil as a backup fuel. Following the installation of the CT, the existing natural gas and residual oil-fired boiler KE10 will be taken out of service. Commensurate with PSD regulations and guidance, the determination of whether the proposed CT is a major modification to a major stationary source is based upon the potential emission increases from the new unit, combined with any contemporaneous increases or decreases in source emissions exceeding significant levels. Such a determination is often referred to as a "netting analysis". JEA has prepared a netting analysis in which past actual emissions from KE10 have been subtracted from the potential emission increases of the CT to determine the net emissions change. The assumptions and information used in this analysis are discussed in the following paragraphs.

Mr. Clair Fancy

February 12, 1998

Estimated CT Emission Increases

At this time, selection of a specific CT has yet to be completed. The range of choices has been narrowed to either a GE PG7241 FA or a Westinghouse 501F. Therefore, emissions from both of these CTs have been examined. In both cases, potential emissions of all PSD-regulated pollutants except lead have been calculated based on expected base load emissions data provided by the vendor. These data were developed based on ISO conditions (i.e., 59 F ambient temperature and 60% relative humidity). Lead emissions were based on AP-42 emission factors and the base load heat input rate.

The CT, once installed, will be used to supply peaking power. Therefore, JEA is proposing a reduced capacity factor for the CT. The proposed capacity factors, which are outlined in Table 1, would allow the project to "net out" of PSD review. As shown in the table, the specific limitations which would be imposed are dependent on the final turbine selection.

Table 1  
Proposed Operational Limitations for Combustion Turbine

	Maximum Natural Gas Firing (hours/year)	Maximum #2 Fuel Oil Firing (hours/year)	Fuel Oil Sulfur Content
GE PG7241 (FA)	3120 - 3.25X *	960	0.05 wt%
Westinghouse 501F	1841 - 2.63X *	700	0.05 wt%

\* X = hours of #2 fuel oil firing during the year

Contemporaneous Emission Decreases

Past actual KE10 emission estimates are presented in Table 2. These have been calculated based upon 1995 and 1996 operations. This satisfies PSD guidance, as these represent the two most recent available years of operational data which are representative of normal operation.

Table 2  
Estimated Average KE10 Emissions During 1995-96

Pollutant	KE10 1995-96 Average Emissions (ton/year)
NO <sub>x</sub>	115.9
CO	14.8
VOC	1.0
SO <sub>2</sub>	128.2
PM <sub>10</sub> (front half)	11.5
Lead	0.001
H <sub>2</sub> SO <sub>4</sub>	5.7

Emissions of the PSD-regulated pollutants (excluding NO<sub>x</sub>) from residual oil and natural gas combustion were calculated using emission factors from Sections 1.3 and 1.4, respectively, of AP-42 (fifth edition, including supplements). Relevant operational data were taken from Steam-Electric Plant Operation and Design Reports for 1995 and 1996 operations, submitted to the U.S. Department of Energy. Emission calculations for a given year were based on actual fuel usage, weighted average heating values, and weighted average residual oil sulfur content for that year, as reported on the Operation and Design Reports. SO<sub>2</sub> emissions from natural gas combustion were based on an average sulfur content of 2000 grains/10<sup>6</sup> SCF, as suggested by AP-42, Section 1.4. H<sub>2</sub>SO<sub>4</sub> emissions from residual oil combustion have been estimated using the emission factor for SO<sub>3</sub> emissions (taken from AP-42 Section 1.3), and assuming that all SO<sub>3</sub> is eventually converted to H<sub>2</sub>SO<sub>4</sub>.

The NO<sub>x</sub> emission factors for fuel oil firing and natural gas firing were obtained from stack testing data. Several stack tests were reviewed to determine which provided the most realistic and time-representative information. Isolated tests were performed on the unit in the early nineties at part-load operations. Testing was again performed at numerous loads for both oil and gas firing in December 1994. This testing was part of the Acid Rain Part 75 certification tests. Because the 1994 testing represents the most recent and comprehensive testing at all loads, the emission factors derived from the testing were utilized to calculate NO<sub>x</sub> emissions for KE10.

The December 1994 stack test data are believed to provide a good representation of KE10 NO<sub>x</sub> emissions during steady state operation. However, these data do not account for unsteady state operations such as startup, shutdown, load changes and malfunctions. Due largely to the age of the unit, KE10 air emissions are thought to be much higher during these conditions than during steady-state operation. Furthermore, the

Mr. Clair Fancy

February 12, 1998

time required to bring the unit and its associated emissions to steady state conditions following an unsteady state event is greater than would be expected with a newer unit. Since KE10 has been operated primarily as a peaking unit over the past several years, unsteady state operations occurred more often than would be expected with a baseload unit. As the December 1994 stack test results do not take into account unsteady state operation, annual emission estimates based on the stack testing are believed to be conservatively low.

In addition, while the December 1994 stack test data do suggest slightly higher NO<sub>x</sub> emissions from residual oil combustion than AP-42 (0.472 lb/10<sup>6</sup> Btu from the testing versus ~0.441 lb/10<sup>6</sup> Btu from AP-42 Section 1.3 for normal firing), the NO<sub>x</sub> emission rate derived from the stack tests during natural gas firing is less than the appropriate AP-42 emission factor by 0.31 lb/10<sup>6</sup> Btu. Consequently, the stack test results lead to annual emission estimates which are notably lower than if AP-42 factors were used.

Since the NO<sub>x</sub> emission estimates are believed to be of a conservative nature, and the magnitude of annual NO<sub>x</sub> emissions is relatively low, the JEA proposes that the NO<sub>x</sub> emissions calculation approach described above be used to determine baseline NO<sub>x</sub> emissions.

Attachment 1 outlines the net emission calculations for this project, considering both the GE and Westinghouse CTs. Based upon the assumptions and operational limits proposed above, the data presented in Attachment 1 demonstrate that the proposed project will not trigger PSD review. Attachment 2 contains detailed spreadsheet calculations which support the values reported in Attachment 1.

If you have any questions on this issue, please contact me at (904) 632-6247.

Sincerely,



N. Bert Gianazza, P.E.  
Environmental Health & Safety Group

Enclosures

cc: Amy Carlson, Black & Veatch  
Marty Costello, FDEP

### PSD Netting Analysis Summaries

#### GE PG7241(FA)

	Combustion Turbine Potential Emissions (ton/year)	KE10 Average Emissions 1995- 96 (ton/year)	Net Emission Increase (ton/year)	PSD Significant Emission Rate (ton/year)	PSD Significant?
NOx	154.560	115.940	38.620	40	No
CO	74.880	14.777	60.103	100	No
VOC	4.368	1.008	3.360	40	No
SO2	45.648	128.229	-82.581	40	No
PM10 Front Half	14.040	11.507	2.533	15	No
Lead	0.051	0.001	0.050	0.6	No
H2SO4	4.800	5.696	-0.896	7	No

#### Westinghouse 501F

	Combustion Turbine Potential Emissions (ton/year)	KE10 Average Emissions 1995- 96 (ton/year)	Net Emission Increase (ton/year)	PSD Significant Emission Rate (ton/year)	PSD Significant?
NOx	154.000	115.940	38.060	40	No
CO	75.481	14.777	60.704	100	No
VOC	6.650	1.008	5.642	40	No
SO2	31.150	128.229	-97.079	40	No
PM10 Front Half	24.624	11.507	13.117	15	No
Lead	0.033	0.001	0.031	0.6	No
H2SO4	3.271	5.696	-2.425	7	No

NOTE: Combustion turbine emissions have been calculated based on the proposed operational limitations.

### GE PG7241(FA) Potential Emissions

Potential emissions have been calculated based on the proposed operational limitations. For each pollutant, the range of operational scenarios was examined, and the scenario producing the highest annual emission rate is presented below for each pollutant.

Hourly emission rates reflect base load operation.

	Combustion Turbine Emissions [GE PG7241 (FA)]								Allowable Emissions			
	Natural Gas Firing				Fuel Oil Firing				Total Emissions (ton/yr)	KE10 Average 95-96 Emissions (ton/yr)	PSD Significant Emission Rate (ton/yr)	Allowable CT Emission Rate (ton/yr)
	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)				
NOx	99.00	GE Data	0	0	322	GE Data	960	154.56	154.56	115.9396	40	155.9396
CO	48	GE Data	3120	74.88	97	GE Data	0	0	74.88	14.7773	100	114.7773
VOC	2.8	GE Data	3120	4.368	7.5	GE Data	0	0	4.368	1.0078	40	41.0078
SO2	22.8603	Note 1	0	0.0000	95.1	GE Data	960	45.648	45.6480	128.2288	40	168.2288
PM10	9	GE Data	3120	14.04	17	GE Data	0	0	14.04	11.5072	15	26.5072
Lead	4.18E-04	Note 2	0	0.0000	0.10629	AP-42 Table 3.1-4	960	0.0510	0.0510	0.0013	0.6	0.6013
H2SO4 Mist					10	GE Data	960	4.8	4.8	5.6962	7	12.6962

- NOTES:
- 1) Based upon AP-42 Table 3.1-1 emission factor, 0.015 wt% sulfur in fuel, and maximum heat input as reported by G.E.
  - 2) Based upon AP-42 Table 1.4-5 emission factor, 1050 Btu/SCF fuel heating value, and base load heat input as reported by G.E.

Westinghouse 501F Potential Emissions

Potential emissions have been calculated based on the proposed operational limitations. For each pollutant, the range of operational scenarios was examined, and the scenario producing the highest annual emission rate is presented below for each pollutant.

Hourly emission rates reflect base load operation.

	Combustion Turbine Emissions								Allowable Emissions			
	Natural Gas Firing				Fuel Oil Firing				Total Emissions (ton/yr)	KE10 Average 95-96 Emissions (ton/yr)	PSD Significant Emission Rate (ton/yr)	Allowable CT Emission Rate (ton/yr)
	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)	Expected Emissions (lb/hr)	Reference	Operating Hours	Annual Emissions (ton/yr)				
NOx	167.00	Westinghouse data	0	0.0000	440	Westinghouse data	700	154	154.0000	115.9396	40	155.9396
CO	82	Westinghouse data	1841	75.4810	166	Westinghouse data	0	0	75.4810	14.7773	100	114.7773
VOC	7	Westinghouse data	0	0.0000	19	Westinghouse data	700	6.65	6.6500	1.0078	40	41.0078
SO2	20	Note 1	0	0.0000	89	Westinghouse data	700	31.15	31.1500	128.2288	40	168.2288
PM10	19	Westinghouse data	0	0.0000	70.355	Note 3	700	24.62425	24.6243	11.5072	15	26.5072
Lead	4.19E-04	Note 2	0	0	0.093032	AP-42 Table 3.1-4	700	0.0325612	0.0326	0.0013	0.6	0.6013
H2SO4 Mist					9.345	Note 4	700	3.27075	3.2708	5.6962	7	12.6962

- NOTES:
- 1) Emission rate reflects 10 times the rate predicted by vendor data.
  - 2) Based upon AP-42 Table 1.4-5 emission factor, 1050 Btu/SCF fuel heating value, and base load heat input (LHV).
  - 3) Reflects Westinghouse data for front + back half PM, less estimated H2SO4 emission rate.
  - 4) Estimated from available vendor data as follows: ratio of H2SO4/SO2 mass emission rates for GE turbine used to estimate H2SO4 emissions from Westinghouse turbine by multiplying SO2 mass emission rate for Westinghouse turbine by the GE turbine ratio.



Jacksonville Electric Authority - Kennedy Generating Station  
KE10 Emissions Calculations

Natural Gas Firing

	Emission Factor				1995			1996		
	Value	Reference	Justification	Fuel Use (M ft3)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)	Fuel Use (M ft3)	Fuel Heating Value (Btu/SCF)	Emissions (ton/year)	
NOx	0.2119	lb / MBtu Note 1	Note 2	666.9	1048	74.0498	344.4	1051	38.3501	
CO	40	lb / M ft3 Note 3, 4	Standard reference	666.9	1048	13.9782	344.4	1051	7.2383	
VOC	1.411	lb / M ft3 Note 4, 5	Standard reference	666.9	1048	0.4931	344.4	1051	0.2554	
SO2	0.6	lb / M ft3 Note 3, 4	Standard reference	666.9	1048	0.2997	344.4	1051	0.1086	
PM10 Front Hall	5	lb / M ft3 Note 4, 6	Standard reference	666.9	1048	1.7473	344.4	1051	0.9049	
Lead	2.71E-04	lb / M ft3 Note 4, 7	Standard reference	666.9	1048	9.47E-05	344.4	1051	4.905E-05	
H2SO4										

Fuel Oil Firing

	Emission Factor				1995				1996			
	Value	Reference	Justification	Fuel Use (kgal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)	Fuel Use (kgal)	Fuel Sulfur Content, S (%)	Fuel Heating Value (Btu/gal)	Emissions (ton/year)	
NOx	0.47155	lb/MBtu Note 1	Note 9	184.8		151869	6.6171	3150		151964	112.8624	
CO	5	lb/kgal AP-42, Table 1.3-1	Standard reference	184.8			0.4620	3150			7.8750	
VOC	0.76	lb/kgal AP-42, Table 1.3-2	Standard reference	184.8			0.0702	3150			1.1970	
SO2	157'S	lb/kgal AP-42, Table 1.3-1	Standard reference	184.8	0.969		14.0571	3150	0.979		242.0822	
PM10 Front Hall	9.19'S+3.22	lb/kgal AP-42, Table 1.3-1	Standard reference	184.8	0.969		1.1204	3150	0.979		19.2416	
Lead	1.51E-03	lb/kgal AP-42, Table 1.3-10	Standard reference	184.8			0.0001	3150			0.0034	
H2SO4	0.983'S	lb/kgal Note 8	Standard reference	184.8	0.969		0.6252	3150	0.979		10.7673	

Total Emissions

	1995	1996	95-96 Average
	Emissions (ton/year)	Emissions (ton/year)	Emissions (ton/year)
NOx	80.6668	151.2125	115.9396
CO	14.4402	15.1143	14.7773
VOC	0.5633	1.4524	1.0078
SO2	14.2668	242.1908	128.2288
PM10 Front Hall	2.8676	20.1487	11.5072
Lead	0.0002	0.0024	0.0013
H2SO4	0.6252	10.7673	5.6962

NOTES

- 1) Stack test data for KE10 dated 12/04.
- 2) Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions; note that this emission factor is lower than the AP-42 factor of ~0.55 lb/MBtu.
- 3) AP-42, Table 1.4-1.
- 4) Factor shown is based on natural gas heating value of 1000 Btu/SCF; for emission calculations, factor is raised to reflect actual heating value shown.
- 5) AP-42, Table 1.4-3.
- 6) AP-42, Table 1.4-2.
- 7) AP-42, Table 1.4-5.
- 8) H2SO4 emissions from fuel oil combustion calculated as follows: AP-42, Table 1.3-1 Factor used to estimate SO3 emissions. All SO3 assumed to convert to H2SO4.
- 9) Of available data, the stack test results shown are believed to provide the most accurate estimate of unit emissions; note that this emission factor is almost equal to the AP-42 factor of ~0.47 lb/MBtu.