

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES**

AIR POLLUTION CONTROL REGULATION NO. 27

CONTROL OF NITROGEN OXIDE EMISSIONS



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AUTHORITY: These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(s) and 23-23, as amended, and have been promulgated pursuant to the procedures set forth in the R.I. Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35.

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

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**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES
AIR POLLUTION CONTROL REGULATION NO. 27**

CONTROL OF NITROGEN OXIDES EMISSIONS

27.1 Definitions

Unless otherwise expressly defined in this section, the terms used in this regulation shall be defined by reference to the Rhode Island Air Pollution Control General Definitions Regulation. As used in this regulation, the following terms shall, where the context permits, be construed as follows:

27.1.1 **"Actual emissions"** means the actual rate of emissions of a pollutant from a piece of equipment or a pollutant-emitting activity as determined in accordance with Subsections (a) through (c) below:

- (a) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the unit actually emitted the pollutant during a two year period which precedes the particular date and which is representative of normal stationary source operation. Actual emissions shall be calculated using the equipment's or activity's actual operating hours, production rates and types of materials processed, stored or combusted during the selected time period;
- (b) The Director may presume that stationary source specific allowable emissions for the equipment or activity are equivalent to the actual emissions of the equipment or activity;
- (c) For any equipment or activity which has not begun normal operations on the particular date, actual emissions shall equal the potential to emit of the equipment or activity on that date.

27.1.2 **"Combined cycle gas turbine"** means any stationary gas turbine which recovers heat from the gas turbine exhaust gases to heat water or generate steam.

27.1.3 **"Combustion turbine"** means any simple cycle gas turbine or any combined cycle gas turbine including the duct burner portion thereof.

27.1.4 **"Emergency standby internal combustion engine"** means an internal combustion engine operated only as a mechanical or electrical power source for a stationary source when the primary power source has been rendered inoperable. This does not include power interruptions pursuant to an

interruptible power service agreement.

- 27.1.5 **"Equivalent control"** means a control system that may be substituted for the required control system(s). The stationary source applying to use an equivalent control must demonstrate to the satisfaction of the Director and EPA that the emission reductions achieved are equal to or greater than the emission reductions required by the regulation. Appropriate test methods or other replicable criteria in accordance with Department and EPA guidance must be used to demonstrate equivalence.
- 27.1.6 **"Industrial-Commercial-Institutional Boiler"** means a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This term does not include utility boilers used by electric utilities to generate electricity.
- 27.1.7 **"Internal combustion engine"** means any engine in which power, produced by heat and/or pressure developed in the engine cylinder(s) by burning a mixture of air and fuel, is subsequently converted to mechanical work by means of 1 or more pistons.
- 27.1.8 **"Lean-burn engine"** means an internal combustion engine where the amount of oxygen in the exhaust gases is 1% or more, by weight.
- 27.1.9 **"Liquified petroleum (LP) gas"** means liquified petroleum gas as defined by the American Society for Testing and Materials in ASTM D1835-13, "Standard Specification for Liquified Petroleum (LP) Gases".
- 27.1.10 **"Low NO_x burner"** means a commercially available modified combustion burner designed to minimize NO_x formation through low excess air firing, controlled mixing of primary combustion air and fuel (staged air or staged fuel), reducing peak furnace temperature or other burner designs judged to be low NO_x burners by the Director and EPA based on a review of evidence submitted by the subject stationary source.
- 27.1.11 **"Rich-burn engine"** means an internal combustion engine where the amount of oxygen in the engine exhaust gases is less than 1% by weight.
- 27.1.12 **"Simple cycle gas turbine"** means any stationary gas turbine which does not recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine, or which does not recover heat from the gas turbine exhaust gases to heat water or generate steam.
- 27.1.13 **"Utility boiler"** means a device, with a heat input capacity of 250 million Btu per hour or greater, that combusts any fuel and produces steam for the primary purpose of generating electricity. This term does not include combustion turbines.

27.2 Applicability and Exemptions

27.2.1 This regulation applies to all stationary sources which have or ever have had, since 1 January 1990, the potential to emit 50 tons of nitrogen oxides (NO_x) per year from all pollutant-emitting equipment or activities.

27.2.2 A stationary source with potential yearly emissions of 50 tons or more of NO_x, but with actual emissions not exceeding 50 tons per year of NO_x any time after 1 January 1990, may apply to the Director for an exemption from Sections 27.4 and 27.5 of this regulation. Application for an exemption must be submitted to the Director by 1 July 1994, and must include documentation of previous yearly NO_x emissions, in tons per year, since 1 January 1990. Exemption from Section 27.4 of this regulation will be in the form of an enforceable document issued by the Director which limits actual emissions to less than 50 tons per year of NO_x and shall include, but not necessarily be limited, to the following conditions:

- (a) Actual annual emissions shall not exceed 50 tons of NO_x per year, and
- (b) The stationary source shall meet the emission cap over every consecutive 12 month period. Recordkeeping to demonstrate compliance shall be conducted as provided in Section 27.6.9 and shall be kept on a monthly basis. The cap must be consistent with the anticipated level of emissions in the approved State Implementation Plan (SIP).

Any stationary source that has been issued an emissions cap and fails to meet the requirements of the enforceable document must immediately be in compliance with RACT.

27.2.3 Any emergency standby internal combustion engines which is operated less than 500 hours during any consecutive twelve (12) month period is exempt from Section 27.4 of this regulation. Recordkeeping shall be conducted as provided in Subsection 27.6.10.

Any emergency standby internal combustion engine operated under the provisions of this subsection must immediately be in compliance with RACT if the hours of operation in any twelve (12) month period exceeds 500.

27.3 Reasonably Available Control Technology (RACT) Plan Requirements

27.3.1 Any stationary source subject to the provisions of Section 27.4 of this regulation shall, by 3 October 1994 or six months after becoming a potential 50 tons per year NO_x stationary source, whichever is later, submit to the

Director a RACT proposal for approval which includes all information specified in Subsections 27.3.2 or 27.3.3.

27.3.2 All RACT proposals submitted to comply with Subsection 27.4.1, 27.4.2 or 27.4.3 shall include the following information:

- (a) an inventory of all NO_x - emitting equipment with a heat input capacity greater than or equal to one million Btu per hour at the stationary source
- (b) the maximum capacity, in millions of Btu per hour, of each piece of NO_x - emitting equipment
- (c) the type of fuel or fuels combusted in each piece of NO_x - emitting equipment
- (d) the maximum NO_x emission rate for each piece of NO_x - emitting equipment in lbs per million Btu for each fuel burned
- (e) the actual amount of NO_x emitted for each calendar year since 1 January 1990, from each piece of NO_x - emitting equipment
- (f) a summary of the applicable emission limits and requirements of this regulation and how the stationary source will comply
- (g) a schedule for the implementation of RACT, including dates for each of the following where applicable: completion of engineering, awarding of contracts, initiation of construction, completion of construction and final compliance with RACT
- (h) any additional information requested by the Director

27.3.3 All RACT proposals submitted to comply with Subsection 27.4.4 or 27.4.9 shall include the following information:

- (a) an inventory of all NO_x - emitting equipment with a heat input capacity greater than or equal to one million Btu per hour at the stationary source
- (b) the maximum capacity, in million of Btu per hour, of each piece of NO_x - emitting equipment
- (c) the type of fuel or fuels combusted in each piece of NO_x - emitting equipment
- (d) the maximum NO_x emission rate for each piece of NO_x - emitting

equipment, in lbs per million Btu, for each fuel burned

- (e) the actual amount of NO_x emitted for each calendar year since 1 January 1990, from each piece of NO_x - emitting equipment
- (f) an examination of the technical and economic feasibility of available NO_x control techniques for each piece of NO_x - emitting equipment with the potential to emit 10 tons or more of NO_x per year.
- (g) the control option or combination of control options selected as RACT, including emission limits and the test methods to be used to demonstrate compliance
- (h) the amount of reduction in NO_x emissions that will be associated with implementing the selected control option(s)
- (i) a schedule for the implementation of RACT, including dates for each of the following where applicable: completion of engineering, awarding of contracts, initiation of construction, completion of construction and final compliance with RACT
- (j) the testing, monitoring, record keeping and reporting procedures to be used to demonstrate continuous compliance
- (k) any additional information requested by the Director that is deemed necessary to determine RACT

27.3.4 After reviewing a RACT proposal submitted to comply with Subsection 27.4.1, 27.4.2 or 27.4.3 the Director will issue a final approval or disapproval of the proposal.

27.3.5 After reviewing a RACT proposal submitted to comply with Subsection 27.4.4, the Director, in consultation with the EPA, shall prepare a proposed enforceable document specifying RACT for the stationary source. The enforceable document shall be subject to a thirty day public comment period. A public hearing for interested persons to appear and to submit written or oral comments on the enforceable document shall be held upon request. The Director may also hold a hearing at his or her discretion, whenever he or she believes there is a significant degree of public interest in the proposed action. If held, a hearing shall take place no earlier than thirty (30) days nor later than sixty (60) days following initial public notice. Comments from the stationary source and/or any interested persons shall be recorded at the public hearing. Written comments, to be considered part of the record, must be submitted during the public comment period. The public comment period shall commence on the date of initial public notice. The public comment period shall close thirty (30) days later, if no public hearing is held. If a

public hearing is held, the public comment period shall close at the close of the public hearing or on a later date set by the Director. The final enforceable document shall be submitted to the EPA for approval as a source specific revision to the State Implementation Plan.

27.4 Reasonably Available Control Technology (RACT) Requirements

27.4.1 Utility Boilers

On and after 31 May 1995, no person shall cause or allow the emission of NO_x from any utility boiler in excess of the following emission limitations:

- (a) 0.20 lbs per million Btu of actual heat input when operated on natural gas or liquified petroleum gas (LP)
- (b) 0.25 lbs per million Btu of actual heat input when operated on fuel oil

27.4.2 Industrial - Commercial - Institutional Boilers

- (a) On and after 31 May 1995, no person shall cause or allow the emission of NO_x from any Industrial - Commercial - Institutional boiler, fired with natural gas or distillate oil, with a heat input capacity of 50 million Btu per hour or greater, in excess of the following emission limitations:
 - 1. 0.10 lbs per million Btu of actual heat input when operated on natural gas
 - 2. 0.12 lbs per million Btu of actual heat input when operated on distillate oil or liquified petroleum gas (LP)
- (b) On and after 31 May 1995, no person shall cause or allow the emission of NO_x from any Industrial - Commercial - Institutional boiler, fired with residual oil, with a heat input capacity of 50 million Btu per hour or greater, unless the boiler is equipped with low - NO_x burners and flue gas recirculation (with a minimum of 10% flue gas recirculation) or equivalent control.
- (c) On and after 31 May 1995, no person shall cause or permit the emission of NO_x from any Industrial - Commercial - Institutional boiler, with a heat input capacity of 1 million Btu per hour or greater, but less than 50 million Btu per hour, unless the boiler is tuned at least once every two years in accordance with the procedure described in Appendix A. The tune-up procedure specified in 40 CFR 63.11223 (b)(1) through (7) is an acceptable substitute

procedure for the procedure specified in Appendix A.

The annual tune-up procedure specified in 40 CFR 63.7540(a)(10)(i) through (vi) is an acceptable substitute procedure for the procedure specified in Appendix A for those stationary sources subject to 40 CFR 63, Subpart DDDDD.

27.4.3 Internal Combustion Engines

On and after 31 May 1995, no person shall cause or permit the emission of NO_x from any internal combustion engine, capable of producing 400 horsepower (HP) or more, in excess of the following emission limitations:

- (a) Rich-burn Engines
 - 1. 1.5 grams per brake horsepower-hour when operated on natural gas
- (b) Lean-burn Engines
 - 1. 2.5 grams per brake horsepower-hour when operated on natural gas
 - 2. 9.0 grams per brake horsepower-hour when operated on fuel oil

27.4.4 Miscellaneous Stationary Sources

- (a) Any stationary source, equipment or pollutant emitting activity, with the potential to emit 10 tons or more of NO_x per year, that is not covered by Subsection 27.4.1, 27.4.2 or 27.4.3 shall install and operate in compliance with RACT, as specified in an enforceable document issued by the Director, by 31 May 1995.
- (b) Any stationary source that becomes a potential 50 ton per year NO_x stationary source after 30 November 1993 shall install and operate in compliance with RACT, within 18 months of the date that the stationary source first becomes a potential 50 ton per year NO_x stationary source. RACT shall be specified in an enforceable document issued by the Director.

27.4.5 The RACT requirements in Subsections 27.4.1 - 27.4.4 do not apply to equipment and pollutant - emitting activities that have been determined to be BACT or LAER in any permit issued by the Director pursuant to Air Pollution Control Regulation No. 9 since 15 November 1992.

27.4.6 The RACT requirements in Subsection 27.4.3 or 27.4.4 do not apply to equipment and pollutant emitting activities listed below, that have been issued a permit for the construction/installation of new equipment by the Director, pursuant to Air Pollution Control Regulation No.9, since the indicated date.

- (a) Combustion turbine facilities - 6 January 1989
- (b) Internal combustion engines - 28 September 1989
- (c) Fluidized bed boilers - 11 March 1991

27.4.7 The RACT requirements in Subsection 27.4.1 do not apply to any utility boiler that commits, by 3 October 1994, in an enforceable document, to either permanently shut down and dismantle that existing utility boiler by 31 May 1995 or replace that existing utility boiler by 31 December 1996 as part of a repowering project. The repowered emissions unit(s) must meet a NO_x emission limitation that has been determined to be BACT or LAER in a permit issued by the Director pursuant to Air Pollution Control Regulation No. 9. In addition to the commitment, the source must comply with the alternative RACT requirements of 27.4.8. The final enforceable document and the alternative RACT determination shall be submitted to the EPA for approval as a source specific revision to the State Implementation Plan (SIP).

27.4.8 Alternative RACT

- (a) The RACT requirements in Subsection 27.4.1 -27.4.3 may be relaxed on a case-by-case basis, if by 3 October 1994 or six months after becoming a potential 50 ton per year NO_x stationary source, the owner or operator makes application to the Director for an alternative RACT determination. An application for an alternative RACT determination must include the following:
 1. an inventory of all NO_x - emitting equipment with a heat input capacity greater than or equal to one million Btu per hour at the stationary source
 2. the maximum capacity, in million of Btu per hour, of each piece of NO_x - emitting equipment
 3. the type of fuel or fuels combusted in each piece of NO_x - emitting equipment
 4. the maximum NO_x emission rate for each piece of NO_x - emitting equipment, in lbs per million Btu, for each fuel burned

5. the actual amount of NO_x emitted for each calendar year since 1 January 1990, from each piece of NO_x - emitting equipment
 6. economic and/or technical documentation that demonstrates to the satisfaction of the Director and EPA that the applicable emission limitations cannot feasibly be met.
 7. an examination of the technical and economic feasibility of alternative NO_x control techniques for each piece of NO_x emitting equipment
 8. The control option or combination of control options proposed as alternative RACT, including emission limits and test methods to demonstrate compliance.
 9. The amount of reduction in NO_x emissions that will be associated with implementing the selected control option(s).
 10. A schedule for the implementation of alternative RACT, including dates for each of the following where applicable: completion of engineering, awarding of contracts, initiation of construction, completion of construction and final compliance with alternative RACT by 31 May 1995.
 11. The testing, monitoring, recordkeeping and reporting procedures to be used to demonstrate continuous compliance.
 12. Any additional information requested by the Director that is deemed necessary to determine alternative RACT.
- (b) Any alternative RACT determination will not become final until approved by EPA as a source specific State Implementation Plan (SIP) revision;
- (c) The stationary source shall conduct a RACT review every three years after the final compliance date until the RACT requirements in Subsections 27.4.1, 27.4.2 or 27.4.3 are achieved. This RACT review must include the same information required in an application for an alternative RACT determination. This RACT review will not become final until approved by EPA as a source specific State Implementation Plan (SIP) revision.

27.4.9

Fuel Switching

Any facility subject to the RACT requirements in Subsections 27.4.1 - 27.4.4 may propose to comply with those requirements by fuel switching. Fuel switching refers to instances where a piece of NO_x emitting equipment historically burned one primary fuel, such as residual oil, and under a fuel switching program, the equipment would burn a cleaner fuel, such as natural gas, during the ozone season (May 1 - September 30) and may switch back to the historic fuel for some or all of the non-ozone season.

- (a) The owner or operator of a stationary source proposing a fuel switching program must file an application with the Office of Air Resources for approval of a fuel switching program no later than 3 October 1994 or six months after becoming a potential 50 ton per year NO_x facility, whichever is later.
- (b) An application for approval of a fuel switching program must demonstrate that the NO_x reductions achieved will be the equivalent of that which would be achieved if the stationary source were operating in compliance with its applicable emission limitations throughout the year.
- (c) An application for approval of a fuel switching program must demonstrate that the program uses a long term emissions averaging approach consistent with the Environmental Protection Agency's guidance. This guidance is contained in a 30 July 1993 memo from Michael Shapiro entitled "Fuel Switching to Meet the Reasonably Available Control Technology Requirements for Nitrogen Oxides".
- (d) Any fuel switching program will not become final until approved by EPA as a source specific State Implementation Plan (SIP) revision.

27.5 Compliance Testing and Emission Monitoring Requirements

- 27.5.1 Compliance with Subsections 27.4.1 and 27.4.9 shall be demonstrated by installation calibration, maintenance and operation of a continuous emission monitoring system for NO_x and O₂ or CO₂.
- 27.5.2 Compliance with Subsections 27.4.2(a) - (b), 27.4.3, 27.4.4, and 27.4.8 shall be demonstrated either by emission testing or by installation calibration, maintenance and operation of a continuous emission monitoring system for NO_x and O₂ or CO₂.
- 27.5.3 Compliance with Subsection 27.4.2 (c) shall be demonstrated by record keeping as specified in Subsection 27.6.8.
- 27.5.4 Compliance with the emission limitations in Subsections 27.4.1 shall be based on 24 hour average concentrations.

27.5.5 Compliance with the emission limitations in Subsections 27.4.2 and 27.4.3 shall be based on one hour average concentrations. Emission testing shall consist of 3 - one hour test runs. Compliance with the emission limitation must be demonstrated utilizing the arithmetic mean of the three test runs.

27.5.6 Continuous emission monitoring systems shall comply with the following requirements:

- (a) Performance specification, monitor location, calibration and operating procedures, quality assurance procedures for each monitor and a sample calculation showing how the concentrations from the NO_x CEMs will be converted in to the applicable units and averaging time of the emission limit must be submitted to the Office of Air Resources for review and approval at least 180 days prior to expected installation.
- (b) All emission data shall be continuously monitored and recorded.
- (c) The continuous emission monitors must satisfy the requirements of 40 CFR 60 Appendix B, Performance Specification 2.
- (d) The continuous emission monitors must satisfy the quality assurance requirements of 40 CFR 60, Appendix F.
- (e) The continuous emission monitoring system will be used to determine compliance with the applicable allowable NO_x emission rates.
- (f) The stationary source shall have the capability of transmitting all of the collected continuous emission monitoring data to the Office of Air Resources via a telemetry system.
- (g) Each continuous emission monitoring system shall be operated at all times except for periods of CEMs calibration checks, zero and span adjustment and preventative maintenance. Notwithstanding such exceptions, in all cases valid CEMs data shall be obtained for at least 75% of the hours per day, 75% of the days of the month and 90% of the hours per quarter that the stationary source is operating.

27.5.7 Emissions testing shall comply with the following requirements:

- (a) Emissions testing shall be conducted by 30 November 1995, initially and at least once every five years thereafter to demonstrate compliance with the applicable NO_x emission limitation

- (b) An emissions testing protocol shall be submitted to the Office of Air Resources for review a minimum of sixty days (60) prior to the performance of any tests. The Office of Air Resources shall be notified at least 60 days prior to any emissions test.
- (c) All test procedures used for emissions testing shall be in accordance with the methods set forth in Appendix A of 40 CFR 60 or another method approved by the Director and the EPA.
- (d) The owner or operator of the stationary source shall install any and all test ports or platforms necessary to conduct the required emissions testing, provide safe access to any platforms and provide the necessary utilities for sampling and testing equipment.
- (e) All testing shall be conducted under operating conditions deemed acceptable and representative for the purpose of assessing compliance with the applicable emission limitation.
- (f) All emissions testing must be observed by a representative of the Office of Air Resources to be considered acceptable, unless the Office of Air Resources provides prior written authorization to the owner or operator to conduct the testing without an observer present.
- (g) A final report of the results of emissions testing shall be submitted to the Office of Air Resources no later than 60 days following completion of the testing.

27.6 Recordkeeping and Reporting Requirements

- 27.6.1 A record of all measurements, performance evaluations, calibration checks, and maintenance or adjustments for each continuous emission monitor shall be maintained.
- 27.6.2 A written report of excess emissions, as measured by a continuous emission monitor shall be submitted to the Office of Air Resources for every calendar quarter. All quarterly reports shall be received no later than 30 days following the end of each calendar quarter and shall include the following information:
 - (a) The date and time of commencement and completion of each period of excess emissions and the magnitude of the excess emissions
 - (b) Identification of the suspected reason for the excess emissions and any corrective action taken.
 - (c) The date and time period any continuous emission monitor was

inoperative, except for zero and span checks and the nature of system repairs or adjustments.

- (d) The date and time periods of any missing data or periods where compliance could not be determined and the steps taken to cure the cause of the missing data.

In the event none of the above items have occurred such information shall be stated in the report.

27.6.3 The fuel used in each combustion unit subject to RACT must be measured and recorded monthly.

As an alternative to measuring and recording fuel used in each combustion unit, a stationary source may petition the Director to use one of the following methods to demonstrate compliance with RACT:

- (a) The fuel used in multiple combustion units which have equivalent NO_x emission rates may be measured and recorded monthly using a single metering device. If more than one type of fuel is used in the multiple combustion units the amount of each type fuel must be measured and recorded monthly;
- (b) The fuel used in multiple combustion units which have different NO_x emission rates may be measured and recorded monthly using a single metering device. If more than one type of fuel is used in the multiple combustion units the amount of each type fuel must be measured and recorded monthly. The total NO_x emissions for these units will be determined using the emission rate of the highest NO_x emitting combustion unit.

27.6.4 Stationary sources subject to Subsection 27.4.2 (a)(2) shall obtain a certification from the fuel supplier for each shipment of distillate oil that includes the following information:

- (a) The name of the oil supplier, and;
- (b) That the oil complies with the specification for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials in ASTM D396-13c "Standard Specification for Fuel Oils"

27.6.5 All stationary sources combusting residual fuel oil shall obtain a certification from the fuel supplier for each shipment of residual oil that includes the following information:

- (a) The name of the oil supplier;

- (b) The nitrogen content of the oil from which the shipment came or of the shipment itself;
- (c) The method used to determine the nitrogen content of the oil. ASTM test methods D3228-08, D4629-12, or any other method approved by the Director and the EPA may be used; and,
- (d) The location of the oil when the sample was drawn for analysis to determine the nitrogen content of the oil, specifically including whether the oil was sampled as delivered to the stationary source or whether the sample was drawn from oil in storage at the oil supplier's or oil refiner's facility or another location.

27.6.6 As an alternative to the fuel supplier certification required in Subsection 27.6.5, a stationary source may elect to sample the fuel oil prior to combustion. Sampling and analysis shall be conducted after each new shipment of residual oil is received. Samples shall be collected from the fuel tank immediately after the fuel tank is filled and before any oil is combusted. The residual oil must be sampled and analyzed according to ASTM methods which have the prior approval of or are required by the Director.

27.6.7 Copies of all fuel supplier certifications or fuel oil analyses shall be maintained at the facility and be made accessible for review by the Director or the designated personnel of the Director and EPA. These records shall include a certified statement, signed by the owner or operator of the stationary source, that the records represent all of the fuel combusted during the quarter.

27.6.8 All stationary sources subject to Subsection 27.4.2 (c) shall maintain records verifying that a tune-up has been performed in accordance with the procedure described in Appendix A that includes the following information:

- (a) The date the tune-up was performed;
- (b) The name of the person who performed the tune-up; and,
- (c) The final excess oxygen setting.
- (d) The O₂/CO curve or O₂/smoke curve that has been developed as part of this procedure.

27.6.9 Stationary sources subject to an emissions cap pursuant to the provisions of Subsection 27.2.2 shall:

- (a) Measure and record monthly the fuel used in each combustion unit

with a heat input capacity greater than or equal to one million Btu per hour;

- (b) On a monthly basis, no later than fifteen (15) days after the first of each month, determine the fuel usage and quantity of NO_x emitted for the previous twelve (12) month period for each combustion unit or for the stationary source;
- (c) Notify the Office of Air Resources, in writing within 30 days of the end of the month, whenever NO_x emissions exceed the emissions cap; or,
- (d) As an alternative to measuring and recording fuel used in each combustion unit as required in 27.6.9 (a), a stationary source may petition the Director to use one of the following methods to demonstrate compliance with an emissions cap:
 - (1) The fuel used in multiple combustion units which have equivalent NO_x emission rates may be measured and recorded monthly using a single metering device. If more than one type of fuel is used in the multiple combustion units the amount of each type fuel must be measured and recorded monthly;
 - (2) The fuel used in multiple combustion units which have different NO_x emission rates may be measured and recorded monthly using a single metering device. If more than one type of fuel is used in the multiple combustion units the amount of each type fuel must be measured and recorded monthly. The total NO_x emissions for these units will be determined using the emission rate of the highest NO_x emitting unit.

27.6.10 All stationary sources with emergency standby internal combustion engines satisfying the provisions of Subsection 27.2.3 shall:

- (a) Notify the Office of Air Resources, in writing, by 31 May 1995 of:
 - (1) the maximum capacity, in millions of Btu per hour, of each emergency standby internal combustion engine at the stationary source; and,
 - (2) the type of fuel or fuels combusted in each engine;
- (b) Install and maintain a non-resettable elapsed time meter to indicate, in cumulative hours, the elapsed engine operating time;

- (c) On a monthly basis, no later than fifteen (15) days after the first of each month, determine and record the hours of operation for each engine for the previous twelve (12) month period; and
- (d) Notify the Office of Air Resources, in writing, whenever the hours of operation in any twelve (12) month period exceeds 500 hours.

27.6.11 All records required in this Subsection shall be maintained at the stationary source for a minimum of five (5) years and shall be made available to representatives of the Department or EPA upon request.

27.7 General Provisions

27.7.1 Purpose

The purpose of this regulation is to limit emissions of nitrogen oxides from stationary sources

27.7.2 Authority

These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(s) and 23-23, as amended, and have been promulgated pursuant to the procedures set forth in the R.I. Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35

27.7.3 Application

The terms and provisions of this regulation shall be liberally construed to permit the Department to effectuate the purposes of state law, goals and policies.

27.7.4 Severability

If any provision of this regulation or the application thereof to any person or circumstance, is held invalid by a court of competent jurisdiction, the validity of the remainder of the regulation shall not be affected thereby.

27.7.5 Effective Date

The foregoing regulation, "Control of Nitrogen Oxide Emissions", as amended, after due notice, is hereby adopted and filed with the Secretary of State this 20th day of December, 2016, in accordance with the provisions of Chapters 23-23, 42-35, 42-17.1, 42-17.6, of the General Laws of Rhode Island of 1956, as amended.

Janet Coit, Director
Department of Environmental Management

Notice Given on: **May 5, 2016**
Filing Date: **December 20, 2016**
Effective Date: **January 9, 2017**

APPENDIX A

EQUIPMENT TUNING PROCEDURE¹

Nothing in this Equipment Tuning Procedure shall be construed to require any act or omission that would result in unsafe conditions or would be in violation of any regulation or requirement established by Factory Mutual, National Fire Prevention Association, the Rhode Island Department of Labor (Division of Occupational Safety), the Federal Occupational Safety and Health Administration or other relevant regulations or requirements.

1. Operate the unit at the firing rate most typical of normal operation. If the unit experiences significant load variations during normal operation, operate it at its average firing rate.
2. At this firing rate, record stack gas temperature, oxygen concentration and CO concentration (for gaseous fuels) or smoke-spot number² (for liquid fuels) and observe flame conditions after the unit stabilizes at the firing rate selected. If the excess oxygen in the stack gas is at the lower end of the range of typical minimum values³, and if the CO emissions are low and there is no smoke, the unit is probably operating at near optimum efficiency - at this particular firing rate. However, complete the remaining portion of this procedure to determine whether still lower oxygen levels are practical.
3. Increase combustion air flow to the furnace until stack gas oxygen levels increase by one to two percent over the value measured in Step 2. As in Step 2, record the stack gas temperature, CO concentration (for gaseous fuels) or smoke-spot number (for liquid fuels) and observe flame conditions for these higher oxygen levels after boiler operation stabilizes.
4. Decrease combustion air flow until the stack gas oxygen concentration is at the level measured in Step 2. From this level gradually reduce the combustion air flow in small increments. After each increment, record the stack gas temperature, oxygen concentration, CO concentration (for gaseous fuels) and smoke-spot number (for liquid fuels). Also observe the flame and record any changes in its condition.
5. Continue to reduce combustion air flow stepwise until one of these limits is reached:
 - a. Unacceptable flame conditions - such as flame impingement on furnace walls or burner parts, excessive flame carryover or flame instability.
 - b. Stack gas CO concentration greater than 400 ppm.
 - c. Smoking at the stack.
 - d. Equipment related limitations - such as low windbox/furnace pressure differential, built in air flow limits, etc.
6. Develop an O₂/CO curve (for gaseous fuels) or O₂/smoke curve (for liquid fuels) similar to those in Figures 1 and 2 using the excess oxygen and CO or smoke-spot number data

obtained at each combustion air flow setting.

7. From the curves prepared in Step 6, find the stack gas oxygen levels where the CO emissions or smoke-spot number equal the following values:

| <u>Fuel</u> | <u>Measurement</u> | <u>Value</u> |
|--------------|--------------------|--------------|
| Gaseous | CO emissions | 400 ppm |
| #1 & #2 oils | smoke-spot number | number 1 |
| #4 oil | smoke-spot number | number 2 |
| #5 oil | smoke-spot number | number 3 |
| #6 oil | smoke-spot number | number 4 |

The above conditions are referred to as CO or smoke threshold, or as the minimum excess oxygen level.

Compare this minimum value of excess oxygen to the expected value provided by the combustion unit manufacturer. If the minimum value found is substantially higher than the value provided by the combustion unit manufacturer, burner adjustments shall be made to improve fuel and air mixing, thereby allowing operation with less air.

8. Add 0.5 to 2.0 percent to the minimum excess oxygen level found in Step 7 and reset burner controls to operate automatically at this higher stack gas oxygen level. This margin above the level accounts for fuel variations, variations in atmospheric conditions, load changes and non repeatability or play in automatic controls.
9. If the load of the combustion unit varies significantly during normal operation, repeat Steps 1-8 for firing rates that represent the upper and lower limits of the range of the load. Because control adjustments at one firing rate may affect conditions at other firing rates, it may not be possible to establish the optimum excess oxygen level at all firing rates. If this is the case, choose the burner control settings that give the best performance over the range of firing rates. If one firing rate predominates, settings should optimize conditions at that rate.
10. Verify that the new settings can accommodate the sudden changes that may occur in daily operation without adverse affects. Do this by increasing and decreasing load rapidly while observing the flame and stack. If any of the conditions in Step 5 result, reset the combustion controls to provide a slightly higher level of excess oxygen at the affect firing rates. Next, verify these new settings in a similar fashion. Then make sure that the final control settings are recorded at steady state operating conditions for future reference.

1. *This tuning procedure is based on a tune-up procedure developed by KVB Inc. for the EPA.*
2. *The smoke-spot number can be determined with ASTM Test Method D-2156 or with the Bacharach method. ASTM Test Method D-2156 is included in a tune-up kit that can be purchased from the Bacharach Company*
3. *Typical minimum oxygen levels for boilers at high firing rates are:*

For natural gas: 0.5% - 3.0%

For liquid fuels: 2.0% - 4.0%

Figure 1
Oxygen/CO Characteristic Curve

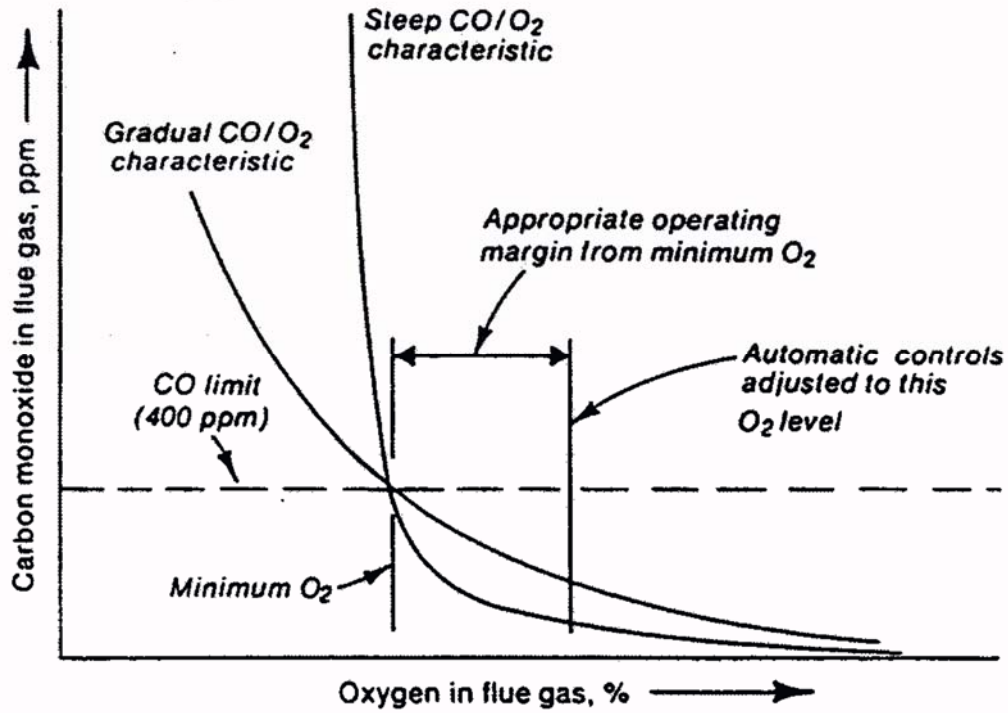


Figure 2
Oxygen/Smoke Characteristic Curve

