

RULE 4352 SOLID FUEL FIRED BOILERS, STEAM GENERATORS AND PROCESS HEATERS (Adopted September 14, 1994; Amended October 19, 1995; Amended May 18, 2006; Amended December 15, 2011; Amended [rule adoption date])

1.0 Purpose

The purpose of this rule is to limit emissions of oxides of nitrogen (NO_x), ~~and~~ carbon monoxide (CO), particulate matter (PM10), and oxides of sulfur (SO_x) from solid fuel fired boilers, steam generators and process heaters.

2.0 Applicability

This rule applies to any boiler, steam generator or process heater fired on solid fuel. Heat may be supplied by liquid or gaseous fuels for start-ups, shutdowns, and during other flame stabilization periods, as deemed necessary by the owner/operator.

3.0 Definitions

3.1 Air Pollution Control Officer (APCO): as defined in Rule 1020 (Definitions).

3.2 ARB: California Air Resources Board.

3.3 Block 24-hour Average: the arithmetic average of the hourly emission rates of a unit as measured over 24 one-hour periods, daily, from 12:00 AM to 11:59 PM, excluding periods of system calibration.

3.4 Boiler or Steam Generator: any combustion equipment fired directly or indirectly with any solid fuel used to produce hot water or steam.

3.5 British Thermal Unit (Btu): the amount of heat required to raise the temperature of one pound of water from 59°F to 60°F at one atmosphere.

3.6 Carbon Monoxide (CO): emissions of carbon monoxide, a colorless and odorless gas resulting from incomplete combustion of fuel.

3.67 EPA: United States Environmental Protection Agency.

3.78 Flame Stabilization: any period in which supplemental use of a liquid or gaseous fuel is required in instances including control of one or more pollutants, or to alleviate or prevent unanticipated equipment outages or emergencies, directly affecting the public health, safety, or welfare, which would result from electric power outages.

3.89 Gaseous Fuel: any fuel which is a gas at standard conditions.

- 3.10 gr/dscf: grains of particulate matter per dry standard cubic foot.
- 3.911 Heat Input: the heat of combustion released due to burning a fuel in a unit, based on the higher heating value of the fuel, not including the sensible heat of incoming combustion air and fuel.
- 3.102 Higher Heating Value (~~hhv~~HHV): the total heat liberated per mass of fuel burned (Btu per pound), when fuel and dry air at standard conditions undergo complete combustion and all resulting products are brought to their standard states at standard conditions.
- 3.143 Hot Standby Condition: a condition in which all fuel feed has been curtailed and the boiler is secured at a temperature greater than the current ambient temperature.
- 3.124 Liquid Fuel: any fuel which is a liquid at standard conditions.
- 3.135 NOx Emissions: the sum of oxides of nitrogen (NO) in the flue gas, collectively expressed as nitrogen dioxide.
- 3.146 Potential to Emit: as defined in Rule 2201 (New and Modified Stationary Source Rule).
- 3.17 PM10: as defined in Rule 1020 (Definitions).
- 3.158 Process Heater: any combustion equipment fired on solid fuel, which transfers heat from combustion gases to water or process streams. Process heaters exclude kilns or ovens used for drying, baking, cooking, calcining, heat treating or vitrifying.
- 3.169 Rated Heat Input (million Btu per hour or MMBtu/hr): the heat input capacity specified on the nameplate of the unit. If the unit has been physically modified such that its maximum heat input differs from what is specified on the nameplate, the modified maximum heat input shall be considered as the rated heat input and made enforceable by Permit to Operate.
- 3.1720 Shutdown: the period of time during which a unit is taken from operational to non-operational status by allowing it to cool down from its operating temperature and pressure to an ambient temperature, or to a hot standby condition. Duration of shutdown shall not exceed 12 hours unless a longer time has been authorized under Section 5.3.4.
- 3.1821 Solid Fuel: any fuel which is a solid at standard conditions.
- 3.22 SOx: emissions of sulfur dioxide (SO₂).
- 3.1923 Standard Conditions: defined in Rule 1020 (Definitions).

- 3.204 Start-up: the period of time during which a unit is heated to the operating temperature and pressure from a shutdown status or hot standby condition.
- 3.215 Stationary Source: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.226 Unit: any boiler, steam generator or process heater as defined in this rule. For the purpose of this rule, two boilers, two steam generators, or two process heaters may be considered as one unit, if, they are operated as one single unit sharing a single common stack and have been issued only one District Permit to Operate (PTO).

4.0 Exemptions

Except for complying with the recordkeeping requirements of Section 6.1, this rule shall not apply to units operated at a Stationary Source that has a potential to emit less than 10 tons per year of oxides of nitrogen (NOx) or volatile organic compounds (VOC).

5.0 Requirements

- 5.1 The owner/operator of a boiler, steam generator or process heater shall not operate such a unit in a manner that results in NO_x, and CO, PM₁₀, and SO_x emissions exceeding the limits specified in Table 1. The emission limits measured in parts per million by volume (ppmv), grains per dry standard cubic foot (gr/dscf), or pounds per million british thermal units (lbs/MMBtu) are referenced at dry stack gas conditions and shall be corrected to the applicable percent O₂ or CO₂ specified in Table 1 in accordance with EPA Method 19.

Table 1 – NO_x and CO Emission Limits

Fuel Type	Emission Limits effective until December 31, 2012		Emission Limits effective on and after January 1, 2013	
	NO _x Limit	CO Limit	NO _x Limit	CO Limit
Municipal Solid Waste	200 ppmv corrected to 12% CO ₂	400 ppmv corrected to 3% O ₂	165 ppmv corrected to 12% CO ₂	400 ppmv corrected to 3% O ₂
Biomass	115 ppmv corrected to 3% O ₂		90 ppmv corrected to 3% O ₂	
All Others	115 ppmv corrected to 3% O ₂		65 ppmv corrected to 3% O ₂	

Table 1 – NO_x, CO, PM₁₀, and SO_x Emission Limits

Fuel Type	Emission Limits effective on and after January 1, 2013		Emission Limits effective on and after December 31, 2023				
	NO _x Limit	CO Limit	NO _x Limit	CO Limit	PM ₁₀ Limit	SO _x Limit	
<u>Municipal Solid Waste</u>	<u>165 ppmv corrected to 12% CO₂^A</u>	<u>400 ppmv corrected to 3% O₂^A</u>	<u>110 ppmv corrected to 12% CO₂^A</u> <u>90 ppmv corrected to 12% CO₂^C</u>	<u>400 ppmv corrected to 3% O₂^A</u>	<u>0.04 lbs/MMBtu</u> <u>or</u> <u>0.02 gr/dscf @ 12% CO₂</u>	<u>0.03 lbs/MMBtu^C</u> <u>or</u> <u>12 ppmv @ 12% CO₂^C</u> <u>0.064 lbs/MMBtu^A</u> <u>or</u> <u>25 ppmv @ 12% CO₂^A</u>	
<u>Biomass</u>	<u>90 ppmv corrected to 3% O₂^A</u>		<u>65 ppmv corrected to 3% O₂^A</u>			<u>0.03 lbs/MMBtu</u>	<u>0.02 lbs/MMBtu^B</u> <u>0.035 lbs/MMBtu^A</u>
<u>All Others</u>	<u>65 ppmv corrected to 3% O₂^A</u>		<u>65 ppmv corrected to 3% O₂^A</u>			<u>0.03 lbs/MMBtu</u>	<u>0.02 lbs/MMBtu^B</u> <u>0.035 lbs/MMBtu^A</u>

^A Block 24-hour average

^B Rolling 30-day average

^C Rolling 12-month average

5.2 ~~All NO_x and CO emission limits shall be based on a block 24-hour average.~~ A violation of the emission limits as measured by the test methods listed in Section 6.3 shall constitute a violation of this rule.

5.3 Start-up and Shutdown Provisions

The applicable emission limits of Section 5.1 shall not apply during start-up or shutdown provided an operator complies with the requirements specified below.

- 5.3.1 The duration of each shut down shall not exceed 12 hours, except as provided in Section 5.3.4.
- 5.3.2 Except as provided in Section 5.3.4, the duration of each start-up shall not exceed 96 hours. If curing of the refractory is required after a modification to the unit is made, the duration of start-up shall not exceed 192 hours, except as provided in Section 5.3.4.
- 5.3.3 The emission control system shall be in operation and emissions shall be minimized insofar as technologically feasible during start-up or shutdown.
- 5.3.4 Notwithstanding the requirements of Section 5.3.1 or Section 5.3.2, the APCO, ARB, and EPA may approve a longer start-up or shutdown duration, if an operator submits an application for a Permit to Operate which provides a justification for the requested additional duration.
 - 5.3.4.1 The maximum allowable duration of start-up or shutdown will be determined by the APCO, ARB, and EPA.
 - 5.3.4.2 At a minimum, a justification for increased start-up or shutdown duration shall include the following:
 - 5.3.4.2.1 A clear identification of the control technologies or strategies to be utilized; and
 - 5.3.4.2.2 A description of what physical conditions prevail during start-up or shutdown periods that prevent the controls from being effective; and
 - 5.3.4.2.3 A reasonably precise estimate as to when the physical conditions will have reached a state that allows for the effective control of emissions; and
 - 5.3.4.2.4 A detailed list of activities to be performed during start-up or shutdown and a reasonable explanation for the length of time needed to complete each activity; and
 - 5.3.4.2.5 A description of the material process flow rates and system operating parameters, etc., the owner/operator plans to evaluate during the process optimization; and an explanation of how the activities and process flow affect the operation of the emissions control equipment; and

- 5.3.4.2.6 Basis for the requested additional duration of start-up or shutdown.

5.4 Monitoring Provisions

The owner/operator of any unit using ammonia injection as a NO_x control technique, shall operate a Continuous Emissions Monitoring system (CEM) to monitor and record NO_x concentrations, CO₂ or O₂ concentrations, as well as the NO_x emission rate. Continuous Emission Monitoring systems shall be operated, maintained, and calibrated pursuant to the requirements of 40 CFR 60.7 (c) and 60.13. CEMs must also satisfy the Performance Specifications of 40 CFR 60 Appendix B and the Relative Accuracy Test Audit of Appendix F.

6.0 Administrative Requirements

6.1 Recordkeeping

- 6.1.1 Except for municipal solid waste (MSW) fired units; the owner/operator of any unit subject to the requirements of this rule shall maintain, on a monthly basis, an operating log for each unit that includes the following information:

6.1.1.1 Type and quantity of fuel used.

6.1.1.2 The higher heating value (~~hhv~~HHV) of each fuel as determined by Section 6.3, or as certified by a third party fuel supplier.

- 6.1.2 The records required by Section 6.1.1 shall be retained on site for a period of five years, and shall be made available to the APCO, ARB, and EPA upon request.

6.2 Compliance Source Testing

- 6.2.1 Each unit subject to the requirements of this rule shall be tested at least once every 12 months, to determine compliance with the applicable short term emission limit (i.e. the applicable emission limit with the shortest averaging period) requirements of Section 5.0.

6.2.2 All emission measurements shall be made with the unit operating either at conditions representative of normal operations or conditions specified in the Permit to Operate.

6.2.3 No compliance determination shall be established within two hours after a period in which fuel flow to the unit is zero, or is shut off for 30 minutes or longer.

6.3 Test Methods

6.3.1 Compliance with the requirements of Section 5.0 shall be determined in accordance with the following source test procedures unless otherwise approved by the APCO, ARB, and EPA:

6.3.1.1 Oxides of nitrogen (ppmv) – EPA Method 7E, or ARB Method 100.

6.3.1.2 Carbon monoxide (ppmv) - EPA Method 10, or ARB Method 100.

6.3.1.3 Stack gas oxygen - EPA Method 3-~~or~~3A, or ARB Method 100.

6.3.1.4 NOx emission rate (Heat input basis) - EPA Method 19.

6.3.1.5 PM10 - EPA Method 201A/EPA Method 202, EPA Method 5/EPA Method 202, or EPA Method 5/CARB Method 5.

6.3.1.6 SOx – EPA Method 6, EPA Method 6C, EPA Method 8, or CARB Method 100.

6.3.1.~~57~~ Stack gas velocities - EPA Method 2.

6.3.1.~~68~~ Stack gas moisture content - EPA Method 4.

6.3.1.~~79~~ Solid fuel higher heating value (~~hhv~~HHV) - ~~ASTM Method D 5865-10, or~~ ASTM D2015, or ASTM E711.

~~6.3.1.8 Solid fuel higher heating value (hhv) – ASTM Method E 711-87.~~

6.3.1.~~910~~ Gaseous fuel higher heating value (HHV) - ASTM D 1826-94 or ASTM D-1945-96 in conjunction with ASTM D3588-98 for gaseous fuels.

6.3.1.11 Carbon dioxide - ARB Method 100 or EPA Method 3A.

7.0 Compliance Schedule

Solid fuel fired boilers subject to the requirements of Section 5 shall comply with applicable emission limits in accordance to the schedule below:

7.1 Emission Limits

<u>Table 2: NOx Compliance Schedule</u>		
<u>Emission Level</u>	<u>Authority to Construct</u>	<u>Compliance Deadline</u>
<u>Emission Limits prior to December 31, 2023</u>	<u>N/A</u>	<u>January 1, 2013</u>
<u>Emission Limits on and after December 31, 2023</u>	<u>June 1, 2022</u>	<u>January 1, 2024</u>

<u>Table 3: PM10 and SOx Compliance Schedule</u>		
<u>Emission Level</u>	<u>Authority to Construct</u>	<u>Compliance Deadline</u>
<u>Emission Limits on and after December 31, 2023</u>	<u>June 1, 2022</u>	<u>January 1, 2024</u>

7.2 As shown in Table 2 and Table 3, the columns labeled:

“Authority to Construct” identifies the date by which the operator shall submit an Authority to Construct (if needed) for each unit subject to Table 1 emission limits.

“Compliance Deadline” identifies the date by which the operator shall demonstrate that each unit is in compliance with Table 1 emission limits as applicable.