

For Discussion Purposes Only

(PR 1150.3, JULY 2020)

PROPOSED RULE 1150.3 EMISSIONS OF OXIDES OF NITROGEN FROM COMBUSTION EQUIPMENT AT LANDFILLS

(a) Purpose

The purpose of this rule is to reduce emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO) from boilers and turbines located at Municipal Solid Waste (MSW) landfills and landfill gas to energy facilities.

(b) Applicability

This rule applies to the following equipment located at MSW landfills and landfill gas to energy facilities:

- (1) Boilers or steam generators with a rated heat input greater than 2 MMBtu/hr, fueled by landfill gas or a landfill gas blend; and
- (2) Turbines with a rated output less than 0.3 MW fueled by landfill gas or a landfill gas blend and turbines with a rated output greater than or equal to 0.3 MW fueled by natural gas, landfill gas, or a landfill gas blend.

(c) Definitions

- (1) **BOILER or STEAM GENERATOR** means any combustion equipment fired with a liquid or gaseous fuel and that is used to produce steam or to heat water. Boiler or Steam Generator does not include any open heated tank, adsorption chiller unit, or waste heat combustion turbine or any unfired waste heat recovery boiler that is used to recover sensible heat from the exhaust of any combustion equipment.
- (2) **BTU** means British thermal unit(s).
- (3) **COMBINED CYCLE TURBINE** means a turbine that recovers heat from the gas turbine exhaust.
- (4) **CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)** means the total combined unit and systems required to continuously determine air contaminants and diluent gas concentrations and/or mass emission rate of a source effluent (as applicable). The CEMS consists of three major subsystems: sampling interface, analyzer and data acquisition system.
- (5) **LANDFILL GAS** means any gas derived through a natural process from the decomposition of waste deposited in an MSW landfill.

- (6) LANDFILL GAS BLEND means a fuel blend of landfill gas combined with natural gas or another gaseous fuel.
- (7) LANDFILL GAS TO ENERGY FACILITY means a facility that receives and processes landfill gas to generate electricity for sale. Landfill gas to energy facility does not include MSW landfills.
- (8) MUNICIPAL SOLID WASTE or MSW LANDFILL means an entire disposal facility in a contiguous geographical space where solid waste is placed in or on land. An MSW landfill may be active, inactive, or closed.
 - (A) Active MSW landfill means a Municipal Solid Waste landfill that has received solid waste on or after November 8, 1987.
 - (B) Inactive MSW landfill means a Municipal Solid Waste landfill that has not accepted solid waste after November 8, 1987 and subsequently no further solid waste disposal activity has been conducted within the disposal facility.
 - (C) Closed MSW landfill means a Municipal Solid Waste landfill that has ceased accepting solid waste for disposal and the closure was conducted in accordance with all applicable federal, state and local statutes, regulations, and ordinances in effect at the time of closure.
- (9) NATURAL GAS means a mixture of gaseous hydrocarbons, with at least 80 percent methane by volume, and of pipeline quality, such as the gas sold or distributed by any utility company regulated by the California Public Utilities Commission.
- (10) OXIDES OF NITROGEN (NO_x) means nitric oxide and nitrogen dioxide. NO_x emissions means the sum of nitric oxides and nitrogen dioxides emitted, collectively expressed as nitrogen dioxide emissions.
- (11) POST-COMBUSTION CONTROL means air pollution control equipment which eliminates, reduces or controls the issuance of air contaminants after combustion.
- (12) RATED HEAT INPUT CAPACITY means the heat input capacity as specified by the permit issued by the South Coast AQMD, or if not specified on the permit, as specified on the nameplate of the combustion unit. If the combustion unit has been altered or modified such that its maximum heat input is different than the heat input capacity specified on the nameplate, the new maximum heat input shall be considered as the rated heat input capacity. Heat input means the chemical heat released due to assumed complete combustion of fuel in a unit, using the higher heating value of the fuel. This

does not include the sensible heat of incoming combustion air.

- (13) RATED OUTPUT means the continuous MW (megawatt) rating or mechanical equivalent by a manufacturer for a turbine including the increase in the turbine shaft output and/or the decrease in turbine fuel consumption by the addition of energy recovered from exhaust heat.
 - (14) REPLACEMENT means installing new equipment with the same or similar function in place of currently installed equipment. Replacement does not include turbine overhauls.
 - (15) SHUTDOWN means time period that begins when an operator with the intent to shut down a unit reduces load and which ends in a period of zero fuel flow, unless otherwise defined in the South Coast AQMD permit to operate.
 - (16) SIMPLE CYCLE TURBINE means a turbine that does not recover heat from the combustion turbine exhaust gases to heat water or generate steam.
 - (17) SOLID WASTE means all decomposable and non-decomposable solid, semisolid and liquid wastes including garbage, trash, refuse, paper, rubbish, ashes, industrial waste, manure, vegetable or animal solid and semisolid waste.
 - (18) STARTUP means the time period that begins when a unit combusts fuel after a period of zero fuel flow and which ends when the unit reaches steady operating conditions.
 - (19) TUNING means adjusting optimizing, rebalancing, or other similar operations to a unit or an associated control device or otherwise as defined in the South Coast AQMD permit to operate. Tuning does not include normal operations to meet load fluctuations.
 - (20) TURBINE means any internal combustion equipment that burns liquid and/or gaseous fuel to create hot gas that expands to move a rotor assembly, with vanes or blades, to do work.
 - (21) UNIT means a boiler or turbine subject to this rule.
- (d) Emission Limits
- (1) On and after the compliance date specified in Table 1, an owner or operator shall not operate a unit in a manner that discharges NO_x or CO into the atmosphere in excess of the limits specified in Table 1, excluding start-up and shutdown periods as specified pursuant to paragraph (d)(4). Compliance shall be demonstrated with a source test conducted pursuant to subdivision (e), CEMS under subdivision (f), or a diagnostic emission check conducted pursuant to subdivision (g), if required.

TABLE 1- CONCENTRATION LIMITS

LANDFILL GAS OR LANDFILL GAS BLEND WITH 75% LANDFILL GAS OR MORE			
Equipment Category	Compliance Schedule	NOx (ppmv)	CO (ppmv)
Boilers ¹	On or before [<i>Date of Adoption</i>]	24	400
	On or before 1/1/2030	9	
Turbines ² \geq 0.3 MW with post-combustion control	On or before [<i>Date of Adoption</i>]	25	130
Turbines ² \geq 0.3 MW without post-combustion control	On or before [<i>Date of Adoption</i>]	12.5 ³	
Turbines ² \geq 0.3 MW	Upon turbine replacement		
Turbines ² $<$ 0.3 MW	On or before [<i>Date of Adoption</i>]	9	
NATURAL GAS OR LANDFILL GAS BLEND WITH LESS THAN 75% LANDFILL GAS			
Equipment Category	Compliance Schedule	NOx (ppmv)	CO (ppmv)
Combined Cycle Turbine ² \geq 0.3 MW	On or before [<i>Date of Adoption</i>]	2	130
Simple Cycle Turbine ² \geq 0.3 MW	On or before [<i>Date of Adoption</i>]	2.5	

¹ All parts per million volume (ppmv) emission limits are referenced at 3% volume stack gas oxygen on a dry basis.

² All parts per million volume (ppmv) emission limits are referenced at 15% volume stack gas oxygen on a dry basis.

³ Concentration limit applicable to turbines operating at a load of 60% rated output or greater.

(2) An owner or operator shall not operate a turbine for more than 250 hours per calendar year at a load of less than 60% rated output, and shall not exceed a 25 ppmv NOx concentration limit.

(3) Averaging Times for Units with CEMS

(A) An owner or operator of a boiler shall meet the emission limits specified in Table 1 averaged over a fixed interval of 1 hour.

(B) An owner or operator of a turbine shall meet emission limits specified in Table 1 averaged over a rolling period of 1 hour.

(4) Startup and Shutdown

An owner or operator of a unit shall meet the following startup and shutdown requirements for that unit, if NO_x or CO is discharged into the atmosphere in excess of the limits specified in Table 1:

- (A) An owner or operator shall not startup a boiler for a time period longer than is necessary for the proper operation of the emission control equipment. Startup or shutdown shall not exceed 6 six hours.
- (B) An owner or operator shall not startup a turbine for a time period longer than is necessary for the proper operation of the emission control equipment. Startup or shutdown shall not exceed 30 minutes for turbines without post-combustion controls and shall not exceed 1 hour for turbines with post-combustion controls.

(5) An owner or operator of any turbine shall not burn liquid fuel.

(e) Source Testing

An owner or operator of a unit without CEMS, or an alternative monitoring system, shall meet the following source test requirements:

- (1) An owner or operator of a unit shall conduct source tests for the following equipment and applicable pollutants in accordance with the schedule in Table 2.

TABLE 2- SOURCE TESTING SCHEDULE

Equipment Category	Frequency	Pollutant
Boilers >2 MMBtu/hr and <10 MMBtu/hr ¹	Every 5 years from the date the previous source test was required	NO _x and CO
Boilers ≥ 10 MMBtu/hr ¹	Every 3 years from the date the previous source test was required	
Turbines emitting < 25 tons of NO _x per year		
Turbines emitting ≥ 25 tons NO _x per year	Once every calendar year	

¹ All emissions determinations for boilers shall be conducted at least 250 operating hours, or at least thirty days subsequent to the tuning or servicing of any boiler, unless it is an unscheduled repair.

- (2) No later than 60 days prior to a scheduled source test date, an owner or operator shall submit a source test protocol and receive written approval from the South Coast AQMD before conducting the test.

- (A) If the scheduled source test cannot be conducted due to a delay in the approval of the source test protocol by the South Coast AQMD, the owner or operator shall conduct the source test within 90 days of the approval.
- (B) An owner or operator shall submit subsequent protocols if an equipment alteration has resulted in a permit modification or emission limits have changed, since the last source test, or at the request of the South Coast AQMD.
- (3) An owner or operator shall include in the protocol the name, address and phone number of the unit operator and the South Coast AQMD-approved source testing contractor that will conduct the test, the application and permit number(s), emission limits, a description of the unit(s) to be tested, the test methods and procedures to be used, the number of tests to be conducted and under what loads.
- (4) No later than 30 days prior to conducting a source test, an owner or operator shall notify the South Coast AQMD of the scheduled source test date. If a scheduled test is delayed, an owner or operator shall notify the South Coast AQMD within 24 hours from the time an owner or operator knew of the delay and provide a rescheduled date.
- (5) An owner or operator shall conduct the source testing using a South Coast AQMD approved contractor under the Laboratory Approval Program according to the procedures in Table 3.

TABLE 3- SOURCE TESTING METHODS

Pollutant	Test Methods
NO _x	South Coast AQMD Test Methods 100.1 or 7.1
CO	South Coast AQMD Test Methods 100.1 or 10.1, or EPA Test Method 10
CO ₂ and O ₂	South Coast AQMD Test Method 3.1 or 100.1

- (6) The approved contractor conducting the source test shall make emissions determinations in the as-found operating condition, except no compliance determination shall be made during startup, shutdown, or under breakdown conditions.
- (7) An owner or operator shall submit the results of the completed source test to the South Coast AQMD within 60 days of completion.

(8) In lieu of conducting a source test, an owner or operator of boilers may conduct periodic monitoring or testing as required in a Title V permit pursuant to Regulation XXX.

(f) **CEMS**

An owner or operator of the following equipment shall install, operate, and maintain in calibration a CEMS, or an equivalent verification system, that complies with Rules 218 and 218.1, or any applicable South Coast AQMD Rule for CEMS certification, operation, monitoring, reporting, and notification.

TABLE 4 - UNITS REQUIRING CEMS

Equipment Type	Threshold	Pollutant
Boilers	Rated heat input capacity ≥ 40 MMBtu/hr and Annual heat input $> 200 \times 10^9$ Btu per calendar year	NOx
Turbines	Rated output ≥ 2.9 MW	NOx

(1) For turbines, the CEMS shall measure the flowrate of gases and the ratio of water or steam to fuel added to the combustion chamber or to the exhaust for the reduction of NOx emissions, elapsed time of operation, and turbine output in MW.

(g) **Diagnostic Emissions Checks for Boilers**

An owner or operator shall perform diagnostic emissions checks of NOx and CO emissions for pollutants not monitored by a CEMS, with a portable NOx, CO, and oxygen analyzer that is calibrated, maintained and operated in accordance with manufacturers specifications and recommendations and the South Coast AQMD Combustion Gas Periodic Monitoring Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Combustion Sources Subject to Rules 1110.2, 1146 and 1146.1. The portable analyzer diagnostic emission checks shall only be conducted by a person who has completed an appropriate South Coast AQMD-approved training program in the operation of portable analyzers and has received a certification issued by South Coast AQMD.

(1) For boilers greater than or equal to 5 MMBtu/hr, an owner or operator shall perform checks at least monthly or every 750 boiler operating hours, whichever occurs later. If a boiler is in compliance with the applicable limit in Table 1 for three consecutive diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the boiler may be checked

quarterly or every 2,000 boiler operating hours, whichever occurs later, until the resulting diagnostic emission check exceeds the applicable limit.

- (2) For boilers less than 5 MMBtu/hr and greater than 2 MMBtu/hr, an owner or operator shall perform checks at least quarterly or every 2,000 boiler operating hours, whichever occurs later. If a boiler is in compliance with the applicable limit in Table 1 for four consecutive required diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the boiler may be checked semi-annually or every 4,000 boiler operating hours, whichever occurs later, until the diagnostic emission check exceeds the applicable limit.

(h) Recordkeeping

An owner or operator shall keep all data monitoring records, including CEMS, source tests, and diagnostic emission checks, and all maintenance, service, and tuning records on-site for 5 years. Records shall be made available to the Executive Officer upon request.

(1) Boilers

An owner or operator shall maintain a daily operating log of the total hours of operation.

(2) Turbines

(A) An owner or operator shall maintain an operating log that includes total hours of operation, type of fuel used, fuel consumption (cubic feet of gas), cumulative hours of operation to date for the calendar year, and the actual startup and shutdown times on a daily basis. The operating log shall specify the daily hours of operation, including the cumulative hours of operation to date for the calendar year, at a load less than 60% rated output, pursuant to the requirements of paragraph (d)(2).

(B) For emission control systems used to comply with this rule, an owner or operator shall maintain daily records of system operation and maintenance that demonstrates continuous operation and compliance of an emission control device during periods of emission producing activities.

(i) Other Requirements for Boilers

An owner or operator shall not lower the rated heat input capacity of a boiler to less than or equal to 2 MMBtu/hr. The lowered rated heat input capacity shall be based on manufacturer's identification or rating plate or permit condition.

(j) Exemptions

- (1) An owner or operator of any turbine ≥ 0.3 MW claiming the following exemptions in subparagraphs (j)(1)(A) or (j)(1)(B) shall provide verification of meeting the applicable criteria. All records shall be kept on-site for five years and made available to South Coast AQMD staff upon request.
 - (A) The provisions of this rule shall not apply to turbines operated exclusively for firefighting and/or flood control.
 - (B) A turbine that operates only as a power source for a facility when the primary power source has been rendered inoperable, except it may not be used for power interruption pursuant to an interruptible power supply agreement, shall not be subject to subdivisions (d), (e), (f), and (h) for that turbine, provided that an owner or operator:
 - (i) Installs and maintains in proper operation a non-resettable engine hour meter;
 - (ii) Maintains an operating log that includes, on a daily basis, the total hours of operation, type and quantity of fuel used, cumulative hours of operation to date for the calendar year, and the actual startup and shutdown times; and
 - (iii) Demonstrates less than 200 hours of operation per calendar year.
 - (C) If the hour-per-year limit in clause (j)(1)(B)(iii) is exceeded, the exemption shall be automatically and permanently withdrawn, and the owner or operator shall:
 - (i) Notify the South Coast AQMD within seven days of the date the hour-per-year limit is exceeded; and
 - (ii) Within 30 days after the date the hour-per-year limit is exceeded, submit a permit application for modification to turbine to meet the applicable compliance limit within 24 months of the date the hour-per-year limit is exceeded. Included with this permit application, an owner or operator shall submit an emission control plan including a schedule of increments of progress for

the installation of the required control equipment. This plan shall be subject to the review and approval of the South Coast AQMD.

- (2) An owner or operator of a boiler permitted to only fire 100 percent natural gas shall comply with Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters, or Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, as applicable.

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