

For Discussion Purposes Only

(PR 1150.3, DECEMBER 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, process heaters, 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) Landfill gas and dual fuel boilers and process heaters with a rated heat input capacity greater than 2 MMBtu/hr;
- (2) Landfill gas and dual fuel turbines rated less than 0.3 MW; and
- (3) Landfill gas, dual fuel, and other gaseous or liquid fuel turbines rated greater than or equal to 0.3 MW.

(c) Definitions

- (1) ANNUAL HEAT INPUT means the total heat input to a unit during a calendar year.
- (2) BOILER means any combustion equipment fired with a liquid or gaseous fuel and used to produce steam or to heat water. Boiler does not include any open heated tank, adsorption chiller unit, or waste heat recovery boiler that is used to recover sensible heat from the exhaust of a combustion turbine or any unfired waste heat recovery boiler that is used to recover sensible heat from the exhaust of any combustion equipment.
- (3) BTU means British thermal unit(s).
- (4) COMBINED CYCLE TURBINE means a turbine that recovers heat from the gas turbine exhaust.
- (5) CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) means the total combined equipment and systems, including the sampling interface, analyzers, and data acquisition and handling system, required to continuously determine air contaminants and diluent gas concentrations and/or mass emission rate of a source effluent (as applicable).

- (6) DUAL FUEL UNIT means any combustion equipment subject to this rule permitted to fire landfill gas and another fuel.
- (7) LANDFILL GAS means any gas derived through a natural process from the decomposition of waste deposited in an MSW landfill.
- (8) LANDFILL GAS TO ENERGY FACILITY means a facility that receives and processes landfill gas to generate electricity for sale.
- (9) 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.
- (10) 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.
- (11) 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.
- (12) POST-COMBUSTION CONTROL means air pollution control equipment which eliminates, reduces or controls the issuance of air contaminants after combustion.
- (13) PROCESS HEATER means any combustion equipment fired with liquid and/or gaseous fuel and which transfers heat from combustion gases to water or process streams. Process Heater does not include any kiln or oven used for drying, curing, baking, cooking, calcining, or vitrifying; or any unfired waste heat recovery heater that is used to recover sensible heat from the exhaust of any combustion equipment.
- (14) 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.

- (15) **RATING OF A TURBINE** means the continuous MW (megawatt) rating or mechanical equivalent by a manufacturer for a turbine without 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.
- (16) **SHUTDOWN** means time period that begins when an operator reduces load and which ends in a period of zero fuel flow.
- (17) **SIMPLE CYCLE TURBINE** means a turbine that does not recover heat from the combustion turbine exhaust gases to heat water or generate steam.
- (18) **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.
- (19) **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 and as applicable, when the emission control system reaches full operation.
- (20) **TUNING** means adjusting, optimizing, rebalancing, or other similar operations to a unit or an associated control device. Tuning does not include normal operations to meet load fluctuations.
- (21) **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.
- (22) **TURBINE REPLACEMENT** means installing new equipment with the same function in place of currently installed equipment. Replacement does not include turbine overhauls that do not trigger New Source Performance Standards requirements, and overhauls in which the original turbine unit returns to operation at the facility within 90 days.
- (23) **UNIT** means a boiler, process heater, 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)(5). Compliance with the emission limits in Table 1 shall be demonstrated with all applicable compliance tests as required by this rule.

TABLE 1
NO_x AND CO CONCENTRATION LIMITS

BOILERS AND PROCESS HEATERS			
Equipment Category	Compliance Schedule	NO_x (ppmv)¹	CO (ppmv)¹
Rated heat input capacity > 2 MMBtu/hr and firing exclusively landfill gas or dual fuel simultaneously firing landfill gas and natural gas	On and after [Date of Adoption]	25	400
	On and after January 1, 2031	9	
Rated heat input capacity > 2 MMBtu/hr and < 75 MMBtu/hr and firing exclusively natural gas	On and after [Date of Adoption]	9	
Rated heat input capacity ≥ 75 MMBtu/hr and firing exclusively natural gas	On and after [Date of Adoption]	5	
TURBINES			
Equipment Category	Compliance Schedule	NO_x (ppmv)²	CO (ppmv)²
Rated output < 0.3 MW and firing exclusively landfill gas or dual fuel	On and after [Date of Adoption]	9	130
Rated output ≥ 0.3 MW with post-combustion control and firing ≥ 75% landfill gas ³	On and after [Date of Adoption]	25	
Rated output ≥ 0.3 MW without post-combustion control and firing ≥ 75% landfill gas ³	On and after [Date of Adoption]	12.5 ⁴	

Rated output ≥ 0.3 MW with post-combustion control and firing ≥ 75% landfill gas ³	Upon turbine replacement	12.5 ⁴	130
Rated output ≥ 0.3 MW and firing < 75% landfill gas ³	On and after [Date of Adoption]	Limit in Paragraph (d)(2)	
Combined cycle with a rated output ≥ 0.3 MW and firing exclusively natural gas	On and after [Date of Adoption]	2	
Simple cycle with a rated output ≥ 0.3 MW and firing exclusively natural gas	On and after [Date of Adoption]	2.5	

- ¹ All parts per million by volume (ppmv) emission limits are referenced at 3% volume stack gas oxygen on a dry basis and averaged over 15 minutes.
- ² All parts per million by volume (ppmv) emission limits are referenced at 15% volume stack gas oxygen on a dry basis and averaged over 1 hour.
- ³ Percent of landfill gas shall be based on the total heat input on a rolling 12-month basis.
- ⁴ Concentration limit applicable to turbines operating at a load of 55% rated output or greater.

(2) An owner or operator of a dual fuel turbine simultaneously firing landfill gas and more than 25 percent but less than 100 percent natural gas, based on the total heat input on a rolling 12-month basis, shall comply with the natural gas emission limit in Table 1 or the weighted emission limit calculated by Equation 1. The owner or operator of a turbine using the weighted emission limit shall obtain flow rates and higher heating values by the following methods:

- (A) Measure the flow of each fuel used with a non-resettable totalizing fuel flow meter as approved by the South Coast AQMD, at the time of compliance determination.
- (B) Measure the higher heating value of landfill gas using a monitoring procedure approved by the South Coast AQMD. The landfill gas sample used to obtain the higher heating value shall be collected no earlier than 30 days before compliance is determined.

$$\text{Weighted Limit} = \frac{(CL_A \times Q_A \times V_A) + (CL_B \times Q_B \times V_B)}{(Q_A \times V_A) + (Q_B \times V_B)} \quad (\text{Equation 1})$$

Where:

CL_A = compliance limit in Table 1 when firing 75% landfill gas or more

Q_A = higher heating value of landfill gas in Btu per standard cubic foot (scf)

V_A = flow rate of landfill gas in scf per unit of time

CL_B = compliance limit in Table 1 when firing exclusively natural gas

Q_B = higher heating value of natural gas in Btu per scf

V_B = flow rate of natural gas in scf per unit of time

- (3) An owner or operator of a turbine rated ≥ 0.3 MW without post-combustion control or installed after [Date of Adoption], firing $\geq 75\%$ landfill gas, based on the total heat input on a rolling 12-month basis, shall not exceed the following NOx concentration limits when operating at a load of less than 55 percent rated output, excluding start-up and shutdown periods as specified pursuant to paragraph (d)(5):
- (A) 25 ppmv; and
 - (B) 12.5 ppmv after 300 hours of operation at a load of less than 55 percent rated output per calendar year.
- (4) Averaging Times for Units with CEMS
- (A) An owner or operator of a boiler or process heater shall meet the applicable emission limits specified in Table 1 averaged over a fixed interval of 1 clock hour.
 - (B) An owner or operator of a turbine shall meet the applicable emission limits specified in Table 1 or paragraph (d)(2), if applicable, averaged over a fixed interval of 1 clock hour.
- (5) Startup and Shutdown
- An owner or operator of a unit shall meet the following startup and shutdown requirements for that unit, if NOx or CO is discharged into the atmosphere in excess of the limits specified in Table 1 or paragraph (d)(2):
- (A) Startup of a boiler or process heater shall not exceed the time period necessary for proper operation of the boiler or process heater or for temperatures to be reached for the proper operation of the emission control equipment. Startup or shutdown shall not exceed 6 six hours.
 - (B) An owner or operator of a boiler or process heater with a rated heat input capacity greater than or equal to 5 MMBtu/hr shall submit to the South Coast AQMD by January 1 of each year, a plan of scheduled startup and shutdown events for that year.
 - (i) The number of scheduled startups/shutdowns for a boiler or process heater with a rated heat input capacity of 5 MMBtu/hr to 40 MMBtu/hr shall not exceed 10 per month.

- (ii) The number of scheduled startups/shutdowns for a boiler or process heater with a rated heat input capacity greater than 40 MMBtu/hr shall not exceed 10 per year.
- (C) An owner or operator of a unit subject to subparagraph (d)(5)(B) shall submit prior notification of scheduled shutdowns and scheduled startups following scheduled shutdowns as required by subparagraph (d)(5)(B) in a form as specified by the South Coast AQMD. Shutdowns and startups shall be scheduled in pairs with scheduled dates for each. Notification of scheduled startups and shutdowns is required only if an exemption from the emission limit is required. This notification shall contain the following information:
 - (i) Dates and times of the scheduled startup and shutdown and its duration; and
 - (ii) Any other process variables that are appropriate as determined by the South Coast AQMD.
- (D) Startup of a turbine shall not exceed the time period necessary for the proper operation of the turbine or for temperatures to be reached for the proper operation of the emission control equipment. Startup or shutdown shall not exceed 30 minutes for turbines without post-combustion control and shall not exceed 1 hour for turbines with post-combustion control.
- (6) An owner or operator of any turbine shall not burn liquid fuel.
- (e) **Source Testing**
 An owner or operator of a unit shall meet the following source test requirements:
 - (1) An owner or operator of a unit shall conduct source tests of NO_x and CO emissions not monitored by a CEMS in accordance with the schedule in Table 2 no later than the last day of the calendar month that the test is due.

**TABLE 2
NO_x AND CO SOURCE TESTING SCHEDULE**

Equipment Category	Frequency	Elapsed Time Prior to Conducting Source Test¹
Boilers and process heaters with a rated heat input capacity > 2 MMBtu/hr and <10 MMBtu/hr	Every 5 years from the date of the previous source test	At least 250 operating hours or at least 30 calendar days

Boilers and process heaters with a rated heat input capacity \geq 10 MMBtu/hr	Every 3 years from the date of the previous source test	At least 250 operating hours or at least 30 calendar days
Turbines with a rated output < 2.9 MW	Every 3 years from the date of the previous source test	At least 40 operating hours or at least 7 calendar days
Turbines with a rated output \geq 2.9 MW	Every year from the date of the previous source test	At least 40 operating hours or at least 7 calendar days

- 1 Elapsed time subsequent to any tuning or servicing, unless tuning or servicing is due to an unscheduled repair.
 - (A) An owner or operator of a turbine rated less than 2.9 MW may conduct a source test every 8,760 operating hours, in lieu of conducting a source test in accordance with the frequency in Table 2, provided the owner or operator installs a non-resettable hour meter or alternative device which continuously records unit operating hours as approved by the South Coast AQMD.
 - (B) If a unit is not in operation on the date the source test is due, an owner or operator shall conduct a source test by the end of seven consecutive days or 15 cumulative days of resumed unit operation.
- (2) An owner or operator of any unit previously not required to conduct an initial source test shall conduct a source test within 12 months from [*Date of Adoption*].
- (3) An owner or operator shall submit a source test protocol for approval no later than 60 days prior to a scheduled source test date and conduct the source test within 90 days after a written approval of the source test protocol is electronically distributed by the South Coast AQMD.
 - (A) An owner or operator of a unit subject to a previously approved source test protocol shall submit a subsequent protocol if the unit has been altered in a manner that requires a permit alteration, if emission limits for the unit have changed since the previous source test, or if requested by the South Coast AQMD.
- (4) 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(s), the application and permit number(s), a copy of the current valid approved permit(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.

- (5) 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, unless otherwise approved in writing by the South Coast AQMD. If a scheduled source test is delayed, an owner or operator shall notify the South Coast AQMD within 48 hours from the time an owner or operator knew of the delay. An owner or operator shall provide at least 7 days prior notice of the rescheduled date of the source test or arrange a rescheduled date with the South Coast AQMD by mutual agreement.
- (6) An owner or operator shall conduct the source tests using a South Coast AQMD approved contractor under the Laboratory Approval Program (LAP) 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

- (7) An owner or operator shall provide source testing facilities as follows:
 - (A) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that pollutant concentrations can be accurately determined by applicable test methods;
 - (B) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders; and
 - (C) Utilities for sampling and testing equipment.
- (8) The LAP contractor conducting the source test shall make emission determinations in the as-found operating conditions and shall conduct the source test for at least 15 minutes. No compliance determination shall be made during startup, shutdown, or under breakdown conditions.
- (9) An owner or operator shall submit all source test reports, including a description of the unit tested, to the South Coast AQMD within 60 days of completion.

(f) CEMS

An owner or operator of a unit that meets the criterion in Table 4 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 and process heaters	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	

(1) An owner or operator of a turbine required to install a CEMS shall also install equipment that measures and records the following:

- (A) Flowrate of fuel 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, as applicable;
- (B) Elapsed time of operation; and
- (C) Turbine output in MW.

(g) Diagnostic Emissions Checks for Boilers and Process Heaters

An owner or operator shall perform diagnostic emissions checks of NOx and CO emissions 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 or process heaters with a rated heat input capacity greater than or equal to 5 MMBtu/hr, an owner or operator shall perform diagnostic emission

checks at least monthly or every 750 boiler or process heater operating hours, whichever occurs later. If a boiler or process heater is in compliance with the applicable limit in Table 1 for 3 consecutive diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the boiler or process heater may be checked quarterly or every 2,000 boiler or process heater operating hours, whichever occurs later, until the resulting diagnostic emission check exceeds the applicable limit.

- (2) For boilers or process heaters with a rated heat input capacity less than 5 MMBtu/hr and greater than 2 MMBtu/hr, an owner or operator shall perform diagnostic emission checks at least quarterly or every 2,000 boiler or process heater operating hours, whichever occurs later. If a boiler or process heater is in compliance with the applicable limit in Table 1 for 4 consecutive required diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the boiler or process heater may be checked semi-annually or every 4,000 boiler or process heater operating hours, whichever occurs later, until the diagnostic emission check exceeds the applicable limit.
- (3) A diagnostic emission check that finds the emissions in excess of those allowed by this rule or a permit condition shall not constitute a violation of this rule if an owner or operator corrects the problem and demonstrates compliance with another emission check within 72 hours from the time an owner or operator knew of excess emissions, or reasonably should have known, or shutdown the boiler or process heater by the end of an operating cycle, whichever is sooner. Any diagnostic emission check conducted by South Coast AQMD staff that finds emissions in excess of those allowed by this rule or a permit condition is a violation.

(h) Recordkeeping

An owner or operator of a unit shall keep and maintain all data logs, monitoring records, including CEMS data, source test reports, and diagnostic emission checks, maintenance, service, and tuning records, and any other information required by this rule, on-site for 5 years. Records shall be made available to the South Coast AQMD upon request.

- (1) Boilers and Process Heaters
 - (A) The owner or operator of a boiler or process heater with a rated heat input capacity greater than or equal to 5 MMBtu/hr shall maintain and keep records of startup and shutdown events.

- (B) The owner or operator of a boiler or process heater with a rated heat input capacity greater than or equal to 5 MMBtu/hr with CEMS shall keep records of startup and shutdown events that include hour-by-hour fuel gas firing rates, flue gas temperatures, NO_x emissions, and any process variables that are appropriate as determined by the South Coast AQMD, during startup and shutdown periods.
 - (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 55% rated output pursuant to the requirements of paragraph (d)(3), if applicable.
 - (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.
 - (3) An owner or operator of a unit required to conduct a source test, pursuant to paragraph (e)(1), shall maintain records of the hours of operation subsequent to any tuning or servicing, until a source test is conducted.
 - (4) An owner or operator of a unit required to conduct diagnostic emission checks, pursuant to subdivision (g), shall maintain records of the hours of operation between diagnostic emission checks. The records shall contain the date(s) of the diagnostic emission checks, adjustments to the oxygen sensor set points, and any exceedances of the applicable emission limit in Table 1.
- (i) Other Requirements
- (1) An owner or operator of a boiler, process heater, or turbine rated greater than or equal to 0.3 MW shall install and maintain in proper operation a non-resettable hour meter or alternative device which continuously records unit operating hours as approved by the South Coast AQMD.

- (j) Schedule for Permit Revisions
 - (1) No later than the date a facility's next Title V permit renewal application is due, an owner or operator of a Title V facility shall submit all applicable applications for each existing unit subject to this rule to reflect current rule requirements.
 - (2) An owner or operator of a non-Title V facility shall submit all applicable permit applications for each existing unit subject to this rule on or before July 1, 2024 to reflect current rule requirements.
- (k) Exemptions
 - (1) An owner or operator of any turbine rated greater than or equal to 0.3 MW claiming the following exemptions shall provide verification of meeting the applicable criteria. All records shall be kept on-site for 5 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) through (j) 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.
 - (iv) If the hour-per-year limit in clause (k)(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 7 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 equipment 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) This rule does not apply to any turbine that is permitted to fire exclusively non-landfill gas fuels and is not located at an MSW landfill.

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