

# *For Discussion Purposes Only*

(Adopted [Rule Adoption Date])

V090921

## **RULE 1147.2 NOX REDUCTIONS FROM METAL MELTING AND HEATING FURNACES**

(a) Purpose

The purpose of this rule is to reduce emissions of nitrogen oxide (NO<sub>x</sub>) from metal melting furnaces, metal heat treating furnaces, metal heating furnaces, and metal forging furnaces.

(b) Applicability

This rule applies to an owner or operator that operates a metal melting furnace, metal heat treating furnace, or metal heating and forging furnace. Staff is evaluating additional applicability criteria.

(c) Definitions

- (1) ALTERATION means any modification or change to an existing unit or replacement of an existing burner(s) with a new burner(s) in a manner that requires a permit modification.
- (2) BTU means British thermal unit or units.
- (3) CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) means the total combined equipment and systems, including the sampling interface, analyzers, and data acquisition and handling system, used to continuously determine air contaminants and diluent gas concentrations and/or mass emission rate of a source effluent (as applicable).
- (4) DECOMMISSIONED means a unit that has been disconnected from all fuel, air, and electricity sources, and that the owner or operator has surrendered the unit's applicable South Coast AQMD operating permit.
- (5) EXISTING UNIT means a unit that is in operation or has a permit to operate as of [Rule Adoption Date]
- (6) FORMER RECLAIM FACILITY means a facility, or any of its successors, that was in the Regional Clean Air Incentives Market as of January 5, 2018, as established in Regulation XX, that has received a final determination notification, and is no longer in the RECLAIM program.
- (7) METAL FORGING FURNACE means an enclosed structure which applies heat to a solid metal in order to improve workability for further physical processing, such as a billet furnace, drop forging furnace, and forging furnace.
- (8) METAL HEAT TREATING FURNACE means an enclosed structure where heat is applied to a solid metal in order to alter its chemical properties, alter the microstructure of to achieve desired mechanical properties (strength, hardness,

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toughness, ductility, and corrosion resistance), or alter surface chemistry, such as an aging furnace, annealing furnace, heat treating furnace, and homogenizing furnace.

- (9) METAL HEATING FURNACE means an enclosed structure where heat is applied to a solid metal in order to alter its physical properties such as a pre-heat furnace, re-heat furnace, and die furnace.
- (10) METAL MELTING FURNACE means an enclosed structure where metal is brought to a molten state such as a cupola furnace, pit furnace, pot furnace, refining kettle, reverberatory furnace, and sweat furnace.
- (11) NEW UNIT means a unit that is installed, relocated, or replaced after [Rule Adoption Date]
- (12) NON-RECLAIM FACILITY means a facility, or any of its successors, that was not in the Regional Clean Air Incentives Market as of January 5, 2018, as established in Regulation XX.
- (13) OPERATING HOURS means the number of hours in which fuel is burned by a unit, including during startup and shutdown periods.
- (14) OXIDES OF NITROGEN (NOX) EMISSIONS is the sum of nitrogen oxide and nitrogen dioxide emitted, collectively expressed as nitrogen dioxide emissions.
- (15) RADIANT-TUBE BURNER means an indirect-fired burner where combustion takes place in a tube to prevent contact between the products of combustion and the parts being heated.
- (16) RATED HEAT INPUT means the gross heat input of the combustion unit specified on a permanent rating plate attached by the manufacturer to the unit, or as approved by the Executive Officer.
- (17) RECLAIM FACILITY means a facility, or any of its successors, that was in the Regional Clean Air Incentives Market as of January 5, 2018, as established in Regulation XX.
- (18) REFRACTORY DRY-OUT means that period of time during which a unit is either curing or drying-out refractory lining as a result of a new unit installation, existing unit alteration, or existing unit repair.
- (19) SHUTDOWN means that period of time beginning when a unit is allowed to cool from operating temperature and ending when the unit reaches ambient temperature or, if equipped with an exhaust NO<sub>x</sub> emission control system, beginning when the

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exhaust NOx emission control system is no longer in full operation and ending when the unit reaches ambient temperature.

- (20) STARTUP means that period of time beginning when a unit is allowed to heat up from ambient temperature and ending when the unit reaches operating temperature or, if equipped with an exhaust NOx emission control system, beginning when the unit is at ambient temperature and ending when the exhaust NOx emission control system is in full operation.
- (21) THERM means 100,000 Btu.
- (22) UNIT means any metal melting furnace, metal heat treating furnace, metal heating furnace, or metal forging furnace.

(d) Requirements

- (1) An owner or operator of a Non-RECLAIM facility shall not operate a unit in a manner that exceeds a NOx emission limit of 60 ppm, corrected to 3% oxygen, dry, unless the unit meets the NOx limits in Table 1 or Table 2 as applicable.
- (2) An owner or operator of a Former RECLAIM facility shall not operate a unit in a manner that exceeds a NOx emission limit of 102 ppm, corrected to 3% oxygen, dry, unless the unit meets the NOx limits in Table 1 or Table 2 as applicable.
- (3) An owner or operator of a unit shall submit a permit application to include a permit condition that meets the NOx limits in Table 1, except during periods of startup and shutdown, by the compliance date in Table 3.
- (4) An owner or operator of an unit with a rated heat input of less than 40 million Btu per hour that has a permit condition, or submits a permit application by July 1, 2022 to change the unit's permit condition, that limits NOx emissions to the alternative NOx emission limits in Table 2, shall meet the NOx emission limits in Table 1, except during periods of startup and shutdown, based on the implementation schedule specified in Table 4.

**Table 1 – NOx Emission Limits**

Unit Size	Furnace Type	Temperature	NOx Limit <sup>1</sup>
< 40 million Btu per hour	Metal Melting	All Temperatures	40 ppm
	Metal Heat Treating, Metal Heating, and Metal Forging (Existing Units)	≤ 1,200 °F	40 ppm
		> 1,200 °F	50 ppm
	Metal Heat Treating, Metal Heating, and Metal Forging	All temperatures	50 ppm

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	with Radiant-Tube Burners (Existing Units)		
	Metal Heat Treating, Metal Heating, and Metal Forging (New Units)	≤ 1,200 °F	30 ppm
		> 1,200 °F	40 ppm
Metal Heat Treating, Metal Heating, and Metal Forging with Radiant- Tube Burners (New Units)	All temperatures	40 ppm	
≥ 40 million Btu per hour	All Units	All Temperatures	15 ppm

<sup>1</sup> Corrected to 3% oxygen, dry

**Table 2 – Alternative NO<sub>x</sub> Emission Limits**

Unit Size	Furnace Type	Temperature	NO <sub>x</sub> Limit <sup>1</sup>
< 40 million Btu per hour	Metal Melting	All Temperatures	50 ppm
	Metal Heat Treating, Metal Heating, and Metal Forging (Existing Units)	≤ 1,200 °F	50 ppm
		> 1,200 °F	60 ppm
	Metal Heat Treating, Metal Heating, and Metal Forging with Radiant-Tube Burners (Existing Units)	All temperatures	60 ppm

<sup>1</sup> Corrected to 3% oxygen, dry

**Table 3 – Implementation Schedule**

Unit Size	Furnace Type	Permit Application Submittal Date	Compliance Date
< 40 million Btu per hour	Metal Melting	On or before July 1 after the burner turns 12 years old	Within 12 months after Permit to Construct is Issued; Upon issuance of Permit to Operate
	Metal Heat Treating, Metal Heating, and Metal Forging (Existing Units)	On or before July 1 after the burner turns 12 years old	
	Metal Heat Treating, Metal Heating, and Metal Forging with Radiant-Tube Burners (Existing Units)	On or before July 1 after the burner turns 12 years old	
	Metal Heat Treating, Metal Heating, and Metal Forging (New Units)	Required per Rule 201 prior to whenever new or replacement unit is proposed	
	Metal Heat Treating, Metal Heating, and Metal Forging	Required per Rule 201 prior to whenever new or replacement unit is proposed	

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	with Radiant-Tube Burners (New Units)		
≥ 40 million Btu per hour	All Units	On or before July 1, 2022	Within 18 months after Permit to Construct is Issued; Upon issuance of Permit to Operate

**Table 4 – Alternative Implementation Schedule**

Unit Size	Furnace Type	Permit Application Submittal Date	Compliance Date
< 40 million Btu per hour	Metal Melting	On or before July 1 after the burner turns 32 years old	Within 12 months after Permit to Construct is Issued; or Upon issuance of Permit to Operate
	Metal Heat Treating, Metal Heating, and Metal Forging (Existing Units)	On or before July 1 after the burner turns 32 years old	
	Metal Heat Treating, Metal Heating, and Metal Forging with Radiant-Tube Burners (Existing Units)	On or before July 1 after the burner turns 32 years old	

- (5) An owner or operator of a unit meeting the requirements in paragraph (d)(3) shall not operate a unit unless the unit meets a CO limit of 800 ppm, corrected to 3% oxygen, dry, and shall demonstrate compliance concurrently with any NOx compliance demonstration.
- (6) An owner or operator of a unit with a rated heat input less than 40 million Btu per hour subject to Table 3 with burner age greater than or equal to 12 years or subject to Table 4 with burner age greater than 32 years shall submit a permit application on or before July 1, 2022 to include a permit condition to meet the applicable NOx limit in Table 1 or Table 2, as applicable.
- (7) An owner or operator of a unit with a rated heat input less than 40 million Btu per hour that fails to meet the requirements in paragraphs (d)(3) or (d)(6) shall not operate the unit unless the unit meets the NOx limits in Table 1 no later than 30 months after the applicable permit application submittal date in Table 3 and demonstrates compliance pursuant to subdivisions (g) and (h).
- (8) An owner or operator of a unit with a rated heat input greater than or equal to 40 million Btu per hour that that fails to meet the requirements in paragraph (d)(3) shall not operate the unit unless the unit meets the NOx limits in Table 1 no later than 36 months after the applicable permit application submittal date in Table 3 and demonstrates compliance pursuant to subdivision (g) and (h).

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- (9) An owner or operator of a unit equipped with an exhaust emission control system that utilizes a catalytic reduction mechanism shall install and maintain a calibrated temperature indicating device for the exhaust emission control system.
- (10) An owner or operator of a unit that is subject to paragraph (d)(1), (d)(2), or (d)(3) without any physical alterations to the unit and that does not have a permit limit at or below the emission limits specified in Table 1 shall submit permit applications to modify the existing Permit to Operate consistent with Table 3 and demonstrate compliance pursuant to subdivisions (g) and (h).
- (11) An owner or operator of a unit shall demonstrate compliance pursuant to subdivisions (g) and (h) within 12 months from the date a permit is issued by the Executive Officer.
- (12) In lieu of meeting the requirements in paragraph (d)(3), an owner or operator that elects to decommission a unit shall notify the Executive Officer in writing on or before the permit application submittal date in Table 3 that the unit will be decommissioned no later than 30 months after the permit application submittal date.
- (13) An owner or operator of a unit that is subject to paragraph (d)(12) and that is not decommissioned within 30 months after the permit application submittal date shall not operate the unit unless:
  - (A) The owner or operator notifies the Executive Officer in writing no later than 12 months after the permit application submittal date in Table 3, that the unit subject to paragraph (d)(12) will not be decommissioned; and
  - (B) The owner or operator of a unit subject to paragraph (d)(12) demonstrates compliance with the NO<sub>x</sub> limit in Table 1 no later than 30 months after the permit application submittal date in Table 3.
- (14) **Implementation Schedule for Facilities with Two or More Units**

An owner or operator of a facility with two or more units, each with a rated heat input of less than 40 million Btu per hour, shall not operate the units unless:

  - (A) The owner or operator notifies the Executive Officer in writing on or before July 1, 2022 of the intent to comply with the implementation schedule in Table 5 in lieu of Table 3 or Table 4;
  - (B) The owner or operator submits permit application(s) for unit(s) needed to meet the minimum percentage of the total rated heat input of units required to submit an application for permit by July 1, 2022, rounded up to the

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nearest whole unit in Table 5, to include a permit condition to meet the applicable NO<sub>x</sub> limits in Table 1 by the dates specified in Table 5;

### **Table 5 – Multiple Unit Implementation Schedule**

Staff is evaluating additional details regarding the multiple unit implementation schedule.

- (C) The units meet the applicable NO<sub>x</sub> limit in Table 1 no later than 12 months after the permit to construct is issued and demonstrate compliance pursuant to subdivisions (g) and (h).
- (D) An owner or operator that elects to meet the requirements of subparagraph (d)(14)(B) by decommissioning a unit that is subject to the multiple unit implementation schedule in Table 5 shall:
  - (i) Notify the Executive Officer in writing on or before the permit application submittal date in Table 5;
  - (ii) Decommission the unit within 30 days of the notification specified in clause (d)(13)(D)(i); and
  - (iii) May credit that unit towards compliance with subparagraph (d)(14)(B).
- (15) An owner or operator of a unit that is subject to more than one NO<sub>x</sub> emission limit shall comply with the higher NO<sub>x</sub> emission limit.
- (e) Demonstration of Less than 1 Pound NO<sub>x</sub> per Day
  - (1) An owner or operator demonstrating compliance with NO<sub>x</sub> emissions of less than 1 pound per day shall:
    - (A) Install and maintain a non-resettable time meter on the unit and operate the unit no more than the specified number of hours per month in Table 6;

**Table 6 – Less than 1 Pound per Day Monthly Operating Limits\***

Unit Rated Heat Input (Btu/hr)	Monthly Hour Limit
≥ 325,000 to < 500,000	480
≥ 500,000 to < 1,000,000	240
≥ 1,000,000 to < 1,500,000	160
≥ 1,500,000 to < 2,000,000	120

\* Table 6 is based on an emission factor of 130 lbs/MMScf and 100% rated heat input over 30 days

- (B) Calculate monthly operating hours and comply with Table 6 by using Equation 1:

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$$\text{Monthly Operating Hours} = 1 \div [R \times (EF \div HHV)] \times 30 \quad (\text{Eq. 1})$$

Where,

R = Rated Heat Input (MMBtu/hr),

EF = Emission Factor (lbs NO<sub>x</sub>/MMScf natural gas)

HHV = Higher Heating Value of Natural Gas (1,050 MMBtu/MMScf)

30 = Conversion to monthly hours

If the unit does not have a permit emission factor, multiply the unit's NO<sub>x</sub> permit limit (ppm @ 3% oxygen on a dry basis) by 1.276 to use as the unit's emission factor.

- (C) Install and maintain a non-resettable fuel meter on the unit and consume no more than 2,400 therms of natural gas per month; or
- (D) Calculate monthly therms of natural gas and demonstrate consumption of no more than 2,400 therms per month by using Equation 2:

$$\text{Monthly Therms of Natural Gas} = (1 \div EF) \times HHV \times 300 \quad (\text{Eq. 2})$$

Where,

EF = Emission Factor (lbs NO<sub>x</sub>/MMScf natural gas)<sup>1</sup>

HHV = Higher Heating Value of Natural Gas (1,050 MMBtu/MMScf)

300 = Conversion to monthly average from MMBtu to therms

<sup>1</sup> To convert a NO<sub>x</sub> concentration value, given in units of ppm, to a NO<sub>x</sub> emission factor, given in units of lbs NO<sub>x</sub>/MMScf, multiply the NO<sub>x</sub> concentration value by 1.276

- (2) An owner or operator of a unit subject to paragraph (e)(1) that exceeds the applicable limit in subparagraphs (e)(1)(A) through (e)(1)(D) shall:
  - (A) Submit a permit application to meet the emission limits within 6 months of the failed occurrence; and
  - (B) Meet the applicable NO<sub>x</sub> limit in Table 1 within 12 months after a Permit to Construct is issued or upon issuance of a Permit to Construct/Permit to Operate.
- (f) Determination of Burner Age
  - (1) Burner age for units with a rated heat input of less than 40 million Btu per hour and equipped with burners of varying ages shall be based on the oldest burner.

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- (2) Burner age shall be based on the original date of installation as determined by:
  - (A) Invoice from burner manufacturer for purchase of burner equipment;
  - (B) Information submitted to the South Coast AQMD with prior applications for permit for the specific burner;
  - (C) Original unit manufacturer's identification or rating plate permanently fixed to the unit; or
  - (D) The burners shall be deemed by the South Coast AQMD to be 32 years old as of January 1, 2022.
  
- (g) Compliance Determination
  - (1) An owner or operator of a unit subject to paragraph (d)(1), (d)(2), (d)(3), or (d)(5) shall:
    - (A) For units with a rated heat input of less than 10 million Btu per hour, conduct a source test pursuant to subdivision (h) no later than 60 calendar months from the previous source test; or
    - (B) For units with a rated heat input greater than or equal to 10 million Btu per hour and less than 40 million Btu per hour, conduct a source test pursuant to subdivision (h) no later than:
      - (i) 60 calendar months from the previous source test for units with an annual heat input of less than or equal to 23 billion Btu per year; or
      - (ii) 36 calendar months from the previous source test for units with an annual heat input of greater than 23 billion Btu per year in any year.
  - (2) An owner or operator of a unit shall conduct an initial source test within 12 months of [Date of Rule Adoption] or use the results of a previous source tests conducted between January 1, 2018 and [Date of Rule Adoption] and establish the date of this source test as the basis for subsequent testing frequency.
  
- (h) Monitoring and Source Testing Requirements
  - (1) An owner or operator of a unit shall submit a source test protocol to the Executive Officer for approval no later than 90 days prior to the scheduled source test and conduct the source test within the 90-day period.

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- (2) An owner or operator of a unit that has a previously approved protocol pursuant to paragraph (h)(1) may use the previously approved protocol if the burner or unit has not been altered.
- (3) Staff is evaluating additional details concerning when in a unit's process a source test shall be conducted. Any compliance demonstration shall use a South Coast AQMD-approved contractor under the Laboratory Approval Program according to the following procedures:
  - (A) South Coast AQMD Source Test Method 100.1 – Instrumental Analyzer Procedures for Continuous Gaseous Emission Sampling (March 1989);
  - (B) South Coast AQMD Source Test Method 7.1 – Determination of Nitrogen Oxide Emissions from Stationary Sources (March 1989) and South Coast AQMD Source Test Method 10.1 - Carbon Monoxide and Carbon Dioxide by Gas Chromatograph/Non-Dispersive Infrared Detector (GC/NDIR) - Oxygen by Gas Chromatograph-Thermal Conductivity (GC/TCD) (March 1989); or
  - (C) Any alternative test method submitted in writing to, and pre-approved by, the Executive Officer of the South Coast AQMD, the California Air Resources Board, and the United States Environmental Protection Agency.
- (4) Source test reports, including a description of the equipment tested, shall be submitted to the Executive Officer within 60 days of completion of the source test.
- (5) An owner or operator of a unit shall conduct a source test:
  - (A) After at least 40 operating hours, or at least 7 consecutive days, after any unit tuning, whichever is longer;
  - (B) By the end of 7 consecutive days, or 15 cumulative days, of resumed operation for a unit that is not in operation on the date the source test is due. The owner or operator of the unit shall maintain sufficient operating records to demonstrate that the unit complies with the requirements for extension of the source test deadline; and
  - (C) No later than within the calendar month that a previous source test was completed pursuant to paragraph (g)(1).
- (6) An owner or operator of a unit with a rated heat input greater than or equal to 40 million Btu per hour shall:
  - (A) For units located at a Non-RECLAIM Facility or Former RECLAIM Facility, install, certify, operate, and maintain a CEMS to measure NOx

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- and oxygen pursuant to the applicable Rule 218.2 and Rule 218.3 requirements to demonstrate compliance with the emission limits in Table 1 at the corresponding oxygen correction and averaging times;
- (B) An owner or operator of a unit equipped with a certified CEMS to measure NO<sub>x</sub> emissions shall be exempt from NO<sub>x</sub> source testing requirements;
  - (C) An owner or operator of a unit equipped with a certified CEMS to measure CO emissions shall be exempt from CO source testing requirements; and
  - (D) Conduct an annual relative accuracy test audit (RATA) required by any applicable South Coast AQMD rule for CEMS certification, operation, monitoring, reporting, and notification; 40 CFR Part 75 Subpart E; or 40 CFR Part 60 Appendix B Specification 2, for those pollutants monitored by a CEMS.
- (7) An owner or operator of a unit with an exhaust emission control system that utilizes ammonia shall:
- (A) Conduct source tests quarterly to demonstrate compliance with the unit's ammonia permit limit, according to the procedures in District Source Test Method 207.1 – Determination of Ammonia Emissions from Stationary Sources, as specified by a permit condition or within 12 months of a permit being issued, whichever is sooner;
  - (B) Conduct annual source tests to demonstrate compliance with the unit's ammonia permit limit, if the unit has demonstrated compliance with subparagraph (h)(7)(A) for 4 consecutive quarterly source tests;
  - (C) Return to original schedule to conduct source tests quarterly pursuant to subparagraph (h)(7)(A) if a unit fails to demonstrate compliance with subparagraph (h)(7)(B); or
  - (D) For units located at a Non-RECLAIM Facility or Former RECLAIM Facility, install, certify, operate, and maintain a CEMS to measure ammonia and oxygen pursuant to any applicable South Coast AQMD rule for CEMS certification, operation, monitoring, reporting, and notification to demonstrate compliance with the unit's ammonia permit limit at the corresponding oxygen correction and averaging times; or
  - (E) For units located at a RECLAIM Facility install, certify, and operate a CEMS to measure ammonia and oxygen pursuant to Rule 2012 to

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demonstrate compliance with the unit's ammonia permit limit at the corresponding oxygen correction and averaging times.

- (i) **Labelling Requirements**
  - (1) An owner or operator of a unit shall display the model number and rated heat input of the unit burner on a permanent rating plate.
  - (2) The owner or operator of an altered unit shall:
    - (A) Display the new rated heat input on a new permanent supplemental rating plate installed in an accessible location on the unit or burner; and
    - (B) Determine the date of unit alteration pursuant to subdivision (f).
- (j) **Recordkeeping Requirements**
  - (1) An owner or operator shall maintain on-site, for at least 5 years and make available to the Executive Officer upon request, source test reports and, if applicable, monthly records demonstrating compliance with subdivision (e).
  - (2) An owner or operator shall maintain records on-site identifying the rated heat input for any unit subject to this rule and make such records available to the Executive Officer upon request.
  - (3) An owner or operator of an altered unit subject to this rule shall maintain records on-site to include the name of the company and person altering the unit, a description of all alterations, the date(s) the unit was altered, and a calculation of the rated heat input and make such records available to the Executive Officer upon request.
  - (4) An owner or operator of a unit equipped with a CEMS shall maintain records on-site in compliance with any applicable South Coast AQMD Rule for CEMS certification, operation, monitoring, reporting, and notification or any applicable permit condition, for at least 5 years and make records available to the Executive Officer upon request.
- (k) **Exemptions**
  - (1) The provisions of subdivision (d) shall not apply to units during periods of refractory dry-out.
  - (2) The provisions of this rule shall not apply to electrically-powered units.
  - (3) Units emitting less than 1 pound per day of NO<sub>x</sub> pursuant to subdivision (e) shall only be subject to subdivisions (i) and (j).