

**REGULATION 9  
INORGANIC GASEOUS POLLUTANTS  
RULE 10  
NITROGEN OXIDES AND CARBON MONOXIDE FROM BOILERS,  
STEAM GENERATORS AND PROCESS HEATERS IN PETROLEUM  
REFINERIES**

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**REFINERIES**

(Adopted January 5, 1994)

**9-10-100 GENERAL**

**9-10-101 Description:** This Rule limits the emissions of nitrogen oxides and carbon monoxide from boilers, steam generators, and process heaters in petroleum refineries.

**9-10-110 Exemptions:** The requirements of this Rule shall not apply to the following:

110.1 Boilers, steam generators, and process heaters with a rated heat input less than 10 million BTU/hour, if fired exclusively with natural gas, liquefied petroleum gas, or any combination thereof;

110.2 Boilers, steam generators, and process heaters with a rated heat input less than 1 million BTU/hour fired with any fuel;

110.3 Waste heat recovery boilers that are used to recover sensible heat from the exhaust of combustion turbines or reciprocating internal combustion engines;

110.4 Boilers, steam generators, and process heaters processing hydrogen sulfide process flue gas in sulfur recovery plants and their tail-gas treating units, or sulfuric acid manufacturing plants.

110.5 Boilers, steam generators, and process heaters fired on non-gaseous fuel when natural gas is unavailable for use.

**9-10-111 Limited Exemption, Small Units:** The requirements of Sections 9-10-301, 302, 303, and 305 shall not apply to the use of any small units, provided the requirements of Section 9-10-306 are satisfied.

**9-10-112 Limited Exemption, Low Fuel Usage:** The requirements of Sections 9-10-301, 302, 303, and 306 shall not apply to the use of any boiler, steam generator, or process heater that has an annual heat input less than 90,000 therms during each consecutive 12-month period or that accepts a condition in their operating permit limiting the annual heat input to less than 90,000 therms, provided the requirements of Sections 9-10-306 and 502.2 are satisfied.

**9-10-200 DEFINITIONS**

**9-10-201 Affected Unit:** Any refinery boiler, steam generator, and process heater not exempted under Sections 9-10-110, 111, and 112.

**9-10-202 Boiler or Steam Generator:** Any combustion equipment used to produce steam or heat water.

**9-10-203 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.

**9-10-204 CO Boiler:** Any boiler or furnace which processes the off-gases from a catalytic cracking unit regenerator or a coker burner.

**9-10-205 Combustion Modification:** Any modification of the burner, combustion air flow (including flue-gas recirculation), or fuel-flow system which reduces nitrogen oxide emissions.

**9-10-206 Heat-Input:** The heat of combustion released due to burning a fuel in a source, using higher heating value of the fuel. This does not include the sensible heat of incoming combustion air. In the case of carbon monoxide boilers, the heat input includes the sensible heat of regenerator off-gases and the heat of combustion of the incoming carbon monoxide and of the auxiliary fuel.

- 9-10-207 Higher Heating Value (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 resultant products are brought to their standard states at standard conditions per Section 9-10-604.
- 9-10-208 Natural Gas:** Any mixture of gaseous hydrocarbons containing at least 80 percent methane by volume, as determined according to Standard Method ASTM D1945-64.
- 9-10-209 Nitrogen Oxides (NO<sub>x</sub>):** The sum of nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) in the flue gas, collectively expressed as nitrogen dioxide.
- 9-10-210 Non-Gaseous Fuel:** Any fuel which is not a gas at 68<sup>o</sup> F and one atmosphere.
- 9-10-211 Operating Day:** 24 hours from midnight to midnight.
- 9-10-212 Out of Service:** The period of time during which a unit is in an inactive state following shutdown.
- 9-10-213 Petroleum Refinery:** Any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, or other products through distillation of petroleum or through redistillation, cracking, or reforming of unfinished petroleum derivatives.
- 9-10-214 Process Heater:** Any combustion equipment that transfers heat from combustion gases to water or process streams.
- 9-10-215 Rated Heat Input:** The heat input capacity specified on the nameplate of the combustion source. If the combustion source has been physically modified and/or operated in such a manner that its maximum heat input is different from the heat input capacity specified on the nameplate, then the modified maximum heat input per Section 9-10-503 shall be considered as the rated heat input.
- 9-10-216 Refinery-wide Emission Rate:** The ratio of the total mass of discharge into the atmosphere of nitrogen oxides, in pounds, from affected units, excluding CO boilers, to the sum of the actual heat input to those units in million BTU, calculated over a twenty-four (24) hour operating day.
- 9-10-217 Small Unit:** Any refinery boiler, steam generator, or process heater with a rated heat input less than 10 million BTU/hour but greater than or equal to 1 million BTU/hour that has the capability of firing any fuel other than natural gas or liquefied petroleum gas.
- 9-10-218 Start-up or Shutdown:** Start-up is that period of time, not to exceed twelve (12) hours unless specifically extended by a permit condition, during which a unit is brought up to its normal operating temperature from a cold start, initially at zero fuel flow, by following a prescribed series of separate steps or operations. Shutdown is that period of time, not to exceed nine (9) hours unless specifically extended by a permit condition, during which a unit is taken out of service from a normal operating mode to an inactive status following a prescribed series of separate steps or operations.
- 9-10-219 Therm:** One hundred thousand (100,000) BTUs.
- 9-10-220 Unit:** Any petroleum refinery boiler, steam generator, or process heater, as defined in Sections 9-10-202 and 214 of this Section, having an Authority to Construct or a Permit to Operate prior to January 5, 1994.

**9-10-300 STANDARDS**

- 9-10-301 Emission Limit For Facility, NO<sub>x</sub>:** Except as provided in Section 9-10-403, effective July 1, 1997, a person shall not exceed a refinery-wide emission rate from affected units, excluding CO boilers, of 0.033 pounds NO<sub>x</sub> per million BTU of heat input, based on an operating-day average. Affected units that are undergoing start-up or shutdown and affected units that are out of service are included in the refinery-wide emission rate as follows:
- 301.1 Units in Start-up or Shutdown: For the purposes of determining compliance with the emission limit of Section 9-10-301, the contribution of each affected unit that is in a start-up or shutdown period shall be calculated from the unit's NO<sub>x</sub> emission rate, as measured by the initial source test required by Section 9-10-501 or a more recent compliance source test, for that unit at the capacity during the source test.

301.2 Units Out of Service: For the purposes of determining compliance with the emission limit of Section 9-10-301, the contribution of each affected unit that is out of service for repairs, maintenance, and/or inspection shall be taken as the operating-day average of NO<sub>x</sub> emissions at the average heat input over the previous thirty (30) day period. This calculation procedure shall be utilized no more than sixty (60) days for any one unit in a calendar year.

301.3 Units Test-Fired On Non-Gaseous Fuel: For the purposes of determining compliance with the emission limit of Section 9-10-301, the contribution of each affected unit that is fired on non-gaseous fuel for equipment testing shall be taken as the operating-day average of NO<sub>x</sub> emissions at the average heat input over the previous thirty (30) day period. Equipment testing shall not exceed a total of forty-eight (48) hours during any calendar year for any one unit.

**9-10-302 Interim Emission Limit For Facility:** Effective July 1, 2000, NO<sub>x</sub> emissions from affected units, excluding CO boilers, that represent at least 50 percent of the total heat input capacity shall average less than or equal to 0.033 pound per million BTU. This Section applies only to those refineries that meet the compliance date extension allowance requirements of Section 9-10-403.

**9-10-303 Interim Emission Limit For Facility (Federal Requirements):** Effective May 31, 1995, a person shall not exceed a refinery-wide emission rate from affected units, excluding CO boilers, of 0.20 pounds NO<sub>x</sub> per million BTU of heat input, based on an operating-day average.

303.1 Effective May 31, 1995, except during start-up and shutdown, a person shall not shall not operate a CO boiler unless the emissions of nitrogen oxides (NO<sub>x</sub>) do not exceed 300 ppm, dry at 3% oxygen, based on an operating-day average.

**9-10-304 Emission Limit For CO Boilers, NO<sub>x</sub>:** Except as provided in Section 9-10-403, effective July 1, 1997, except during start-up and shutdown, a person shall not operate a CO boiler unless at least one of the following is met:

304.1 Emissions of nitrogen oxides (NO<sub>x</sub>) do not exceed 150 ppm, dry at 3% oxygen, based on an operating-day average; or

304.2 Emissions of nitrogen oxides (NO<sub>x</sub>) are controlled by an emission control system with a NO<sub>x</sub> control efficiency of at least 50 percent by weight.

**9-10-305 Emission Limit For Each Affected Unit, CO:** Except as provided in Section 9-10-403, effective July 1, 1997, a person shall not operate an affected unit unless carbon monoxide emissions of 400 ppmv, dry at 3% oxygen, based on an operating-day average, are not exceeded.

**9-10-306 Small Unit Requirements:** Except as provided in Section 9-10-403, effective July 1, 1997, a person shall not operate a small unit unless at least one of the following is met:

306.1 Operate in a manner that maintains stack-gas oxygen concentrations at less than or equal to 3 percent by volume on a dry basis; or

306.2 Tune at least once every twelve (12) months, or within two weeks of unit start-up if not operated in the last twelve (12) months, by a technician in accordance with the procedure specified in Section 9-10-605; or

306.3 Meet the emission limits specified in Sections 9-10-301 and 305.

#### **9-10-400 ADMINISTRATIVE REQUIREMENTS**

**9-10-401 Control Plan Submittal:** A person subject to Sections 9-10-301, 302, 304, and 305 of this Rule shall comply with the following increments of progress:

401.1 No later than twenty-four (24) months prior to the respective dates of Sections 9-10-301, 302, 304, and 305, submit to the APCO a control plan detailing the proposed measures to be taken in order to meet the requirements of Sections 9-10-301, 302, 304, and 305. The control plan shall contain, at a minimum:

1.1 A list of all affected units, including the manufacturer, model number, and the maximum rated capacity for each unit.

- 1.2 A description of each affected unit and the Nox control system proposed for each unit, including type and design principles, as well as a description of any ancillary equipment related to the control emissions. Data on the expected performance of the NO<sub>x</sub> control system shall also be included;
  - 1.3 The proposed mass rate of nitrogen oxides emissions for each affected unit, excluding CO boilers, that will achieve the refinery-wide emission rate specified in Section 9-10-301;
  - 1.4 The proposed mass rate of nitrogen oxides emissions for each CO boiler that will achieve the emission rate specified in Section 9-10-304; and
  - 1.5 A proposed implementation schedule for each affected unit, including but not limited to specific dates for the following events: final engineering, contract award, construction, and final compliance.
- 401.2 No later than eighteen (18) months prior to the respective dates of Sections 301, 302, 304, and 305, submit applications for all Authorities to Construct required for compliance with the respective sections of this Rule.

**9-10-402 Control Plan Submittal, Small Units:** A person subject to Section 9-10-306 of this Rule shall comply with the following increments of progress:

- 402.1 No later than twelve (12) months prior to the compliance date of Section 306, submit to the APCO a plan to comply with the requirements of Section 9-10-306. The plan shall contain, at a minimum:
  - 1.1 A list of all sources with the rated heat input capacities; and
  - 1.2 A selection on one of the three options specified in Subsection 306.1, 306.2 and 306.3.

**9-10-403 Compliance Date, Clean-Fuel Extension Allowance:** Notwithstanding the effective dates specified in Sections 9-10-301, 304, 305, and 306, affected facilities that are in the process of, or have completed, making modifications to comply with the State Phase II Reformulated Gasoline Requirement (California Code of Regulations, Section 2260 et seq.) and the Federal Reformulated Gasoline Requirement (1990 Clean Air Act, 42 U.S.C.A., Section 7545) shall meet a compliance date of July 1, 2002. Effective July 1, 1997, any affected facility not producing the state and federal clean fuels shall comply with the effective dates in Sections 9-10-301, 304, 305, and 306.

- 403.1 Commencing six (6) months after January 5, 1994, and every six months thereafter until clean-fuels project completion, facilities shall submit a status report verifying progress toward compliance with state and federal clean-fuel requirements.

## **9-10-500 MONITORING AND RECORDS**

**9-10-501 Initial Demonstration of Compliance:** All units identified in the control plan of Section 9-10-401 shall be tested for nitrogen oxide and carbon monoxide emissions while firing gaseous fuel and non-gaseous fuel, if applicable, at the maximum rated capacity or as near thereto as practicable. Such tests shall be performed:

- 501.1 Within one hundred and eighty (180) days after completion of modifications, but no later than thirty (30) days prior to the respective dates of Sections 301,304, and 305 for units which are to be modified with nitrogen oxide control equipment; and
- 501.2 No later than six (6) months prior to the respective dates of Sections 301, 304, and 305 for units which do not require modification.

**9-10-502 Monitoring:** A person subject to Sections 9-10-301, 304, and 305 shall submit to the APCO a monitoring plan to provide, properly install, maintain in good working order, and operate the following equipment:

- 502.1 An in-stack nitrogen oxide (NO<sub>x</sub>), carbon monoxide (CO), and oxygen (O<sub>2</sub>) continuous emission monitoring system (CEMS), or equivalent verification system. The CEMS must meet the requirements of the District Manual of

Procedures, Volume V, Continuous Emission Monitoring, Policy and Procedures.

502.2 A fuel-flow meter in each fuel line for each affected unit.

**9-10-503 Modified Maximum Heat Input:** Any unit that has been physically modified such that its maximum heat input is different than the heat input specified on the nameplate shall demonstrate to the APCO the maximum heat input while operating the source at maximum capacity.

**9-10-504 Records:** A person subject to the requirements of Sections 9-10-301, 304, and 305 shall maintain permanent hourly continuous emission monitoring or equivalent system parameter records and fuel-rate records, in a form suitable for inspection for a period of at least two (2) years. Such records shall be retained for a minimum of twenty-four (24) months from date of entry and made available to the APCO upon request. These records shall include, but are not limited to:

504.1 The continuous emission monitoring measurements or equivalent system parameters for NO<sub>x</sub>, CO, and O<sub>2</sub> in ppmv and lb/hour;

504.2 The type, quantity (BTU/hr), and higher heating value of fuel burned and the injection rate for any reactant chemicals used by the emission control system(s) on a daily basis.

504.3 The date, time, and duration of any start-up, shutdown or malfunction in the operation of any unit, emission control equipment, or emission monitoring equipment; and

504.4 The results of performance testing, evaluations, calibrations, checks, adjustments, and maintenance of any continuous emission monitors that have been installed pursuant to Section 9-10-502 of this Rule.

**9-10-505 Reporting Requirements:** A person subject to the requirements of Sections 9-10-301, 304, and 305 shall meet the following reporting requirements:

505.1 Report to the APCO any violation of Section 9-10-301, 304 and/or 305, in writing within ninety-six (96) hours after such occurrence.

505.2 Submit a written report for each calendar quarter to the APCO. The report shall be due on the 30th day following the end of the calendar quarter and shall include:

2.1 A summary of the data obtained from the CEMS and the fuel meters installed pursuant to Section 9-10-502; and

2.2 The date, time, duration, and magnitude of emissions in excess of the appropriate standards required by Sections 9-10-301 and 304; the nature and cause of the excess (if known); the corrective actions taken; and the preventive measure adopted.

## **9-10-600 MANUAL OF PROCEDURES**

**9-10-601 Determination of Nitrogen Oxides:** Compliance with the nitrogen oxide emission requirements of Sections 9-10-301 and 304 shall be determined by continuous emission monitors that have been installed, or by equivalent verification system pursuant to Section 9-10-502, and meet the requirements of Volume V of the District Manual of Procedures. CEMS shall be verified by source test as set forth in the District Manual of Procedures, Volume IV, ST-13A or B (nitrogen oxides) and ST-14 (oxygen).

**9-10-602 Determination of Carbon Monoxide and Stack-Gas Oxygen:** Compliance with the carbon monoxide emission requirements of Sections 9-10-305 shall be determined by continuous emission monitors that have been installed, or by equivalent verification system pursuant to Section 9-10-502, and meet the requirements of Volume V of the District Manual of Procedures. CEMS shall be verified by source test as set forth in the District Manual of Procedures, Volume IV, ST-6 (carbon monoxide) and ST-14 (oxygen).

**9-10-603 Compliance Determination:** All emission determinations shall be made in the as-found operating condition, except during periods of start-up or shutdown as specified by Section 9-10-218. In addition to any continuous monitoring system (CEMS)

required by Sections 9-10-502, 601, and 602, emission determinations shall include at least one source test, as specified in Section 9-10-501.

**9-10-604 Determination of Higher Heating Value:** If certification of the higher heating value is not provided by the third-party fuel supplier, it shall be determined by one of the following test methods: (1) ASTM D2015-85 for solid fuels; (2) ASTM D240-87 or ASTM D2382-88 for liquid hydrocarbon fuels; or (3) ASTM D1826-88 or ASTM D1945-81 in conjunction with ASTM D3588-89 for gaseous fuels.

**9-10-605 Tune-Up Procedures:** The tuning procedure required by Section 9-10-306.2 shall be performed in accordance with the procedure set forth in the District Manual of Procedures, Volume I, Chapter 5.