

**PROPOSED RULE 1179.1 NOX EMISSION REDUCTIONS FROM
COMBUSTION EQUIPMENT AT PUBLICLY
OWNED TREATMENT WORKS FACILITIES**

(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, and emissions of NO_x, CO, and Volatile Organic Compounds (VOCs) from engines, located at publicly owned treatment works (POTW) facilities.

(b) Applicability

This rule applies to the following equipment located at a POTW facility:

- (1) Digester gas and dual fuel boilers and process heaters over 400,000 Btu/hr;
- (2) Digester gas and dual fuel turbines less than 0.3 MW;
- (3) Turbines greater than or equal to 0.3 MW; and
- (4) Digester gas and dual fuel engines greater than 50 rated brake horsepower.

(c) Definitions

- (1) ANNUAL HEAT INPUT is the total heat input to a unit during a calendar year.
- (2) BOILER is any combustion equipment fired with a liquid or gaseous fuel and used to produce steam or to heat water, and that is not used exclusively to produce electricity for sale. 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) BREAKDOWN is a physical or mechanical failure or malfunction of an engine, air pollution control equipment, or related operating equipment that is not the result of operator error, neglect, improper operation or improper maintenance procedures, which leads to excess emissions beyond rule related emission limits or equipment permit conditions.
- (4) BTU is British thermal unit(s).

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- (5) COMBINED CYCLE TURBINE is a turbine that recovers heat from the gas turbine exhaust.
- (6) CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) is 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).
- (7) DIGESTER GAS is gas that is produced by anaerobic decomposition of organic material.
- (8) DIGESTER GAS UNIT is any combustion equipment subject to this rule permitted to fire digester gas exclusively.
- (9) DUAL FUEL UNIT is any combustion equipment subject to this rule permitted to fire digester gas and another fuel.
- (10) ENGINE is any internal combustion equipment that is spark- or compression ignited and burns liquid and/or gaseous fuel to create heat that move pistons to do work.
- (11) LEAN-BURN ENGINE is an engine that operates with high levels of excess air and an exhaust oxygen concentration of greater than 4 percent.
- (12) NATURAL GAS is 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.
- (13) OXIDES OF NITROGEN (NO_x) EMISSIONS is the sum of nitric oxides and nitrogen dioxides emitted, collectively expressed as nitrogen dioxide emissions.
- (14) POST-COMBUSTION CONTROL is any air pollution control equipment which eliminates, reduces, or controls the issuance of air contaminants after combustion.
- (15) PROCESS HEATER is 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.
- (16) PUBLICLY OWNED TREATMENT WORKS FACILITY OR POTW FACILITY is a wastewater treatment or reclamation plant owned or operated by

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a public entity, including all operations within the boundaries of the wastewater and sludge treatment plant.

- (17) **RATED BRAKE HORSEPOWER (bhp)** is the rating specified by the manufacturer, without regard to any derating, and listed on the engine nameplate.
 - (18) **RATING OF A TURBINE** is 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.
 - (19) **RICH-BURN ENGINE** is an engine designed to operate near stoichiometric conditions.
 - (20) **SELECTIVE CATALYTIC REDUCTION (SCR)** is a post-combustion control that reduces NO_x with catalyst and a reducing agent.
 - (21) **SHUTDOWN** is the time period that begins when an operator reduces load and which ends in a period of zero fuel flow.
 - (22) **SIMPLE CYCLE TURBINE** is a turbine that does not recover heat from the combustion turbine exhaust gases to heat water or generate steam.
 - (23) **STARTUP** is the time period that begins when a unit combusts fuel after a period of zero fuel flow and which ends when the unit reaches stable operating conditions.
 - (24) **THERM** is 100,000 Btu.
 - (25) **TUNING** is 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.
 - (26) **TURBINE** is 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.
 - (27) **UNIT** is a boiler, turbine, or engine subject to this rule.
- (d) Emission Limits

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- (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, CO, or VOC 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 CONCENTRATION LIMITS			
DIGESTER GAS AND DUAL FUEL BOILERS AND PROCESS HEATERS			
EQUIPMENT CATEGORY	NO_x (ppm)¹	CO (ppm)¹	COMPLIANCE DATE
Rated heat input capacity > 2 MMBtu/hr and firing 90% digester gas or more ²	15	400	On or before [<i>Date of Adoption</i>]
Rated heat input capacity > 2 MMBtu/hr and firing 100% natural gas	9		On or before [<i>Date of Adoption</i>]
Rated heat input capacity ≤ 2 MMBtu/hr	30		On or before [<i>Date of Adoption</i>]
TURBINES			
EQUIPMENT CATEGORY	NO_x (ppm)³	CO (ppm)³	COMPLIANCE DATE
Rating ≥ 0.3 MW and firing 60% digester gas ⁴ or more	18.8	130	On or before [<i>Date of Adoption</i>]
Simple cycle with rating ≥ 0.3 MW and firing 100% natural gas	2.5		On or before [<i>Date of Adoption</i>]
Combined cycle with rating ≥ 0.3 MW and firing 100% natural gas	2		On or before [<i>Date of Adoption</i>]
Rating < 0.3 MW	9		On or before [<i>Date of Adoption</i>]
DIGESTER GAS AND DUAL FUEL ENGINES			

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EQUIPMENT CATEGORY	NO _x (ppm) ⁵	CO (ppm) ⁵	VOC (ppm) ⁶	COMPLIANCE DATE
Engines > 50 bhp	11	250	30	On or before [Date of Adoption]

¹ All parts per million (ppm) emission limits are referenced at 3% volume stack gas oxygen on a dry basis and averaged over 15 minutes.

² Percent digester gas is based on the flowrates and higher heating values of the fuels.

³ All parts per million (ppm) emission limits are referenced at 15% volume stack gas oxygen on a dry basis and averaged over 1 hour.

⁴ Percent digester gas is based on volume averaged over a 24 hour period.

⁵ All parts per million (ppm) emission limits are referenced at 15% volume stack gas oxygen on a dry basis and averaged over 15 minutes.

⁶ Parts per million (ppm) emission limit referenced at 15% volume stack gas oxygen on a dry basis, measured as carbon, and averaged over the sampling time required by the test method.

(2) An owner or operator of a dual fuel boiler simultaneously firing digester gas and more than 10 percent but less than 100 percent natural gas, based on the flowrates and higher heating values of the fuels used, 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 boiler using the weighted emission limit shall obtain flowrates 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 Executive Officer, at the time of compliance determination.

(B) Measure the higher heating value of digester gas using a monitoring procedure approved by South Coast AQMD. The digester 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:

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CL_A = compliance limit in Table 1 when firing 90% digester gas or more
 Q_A = higher heating value of digester gas in Btu per standard cubic foot (scf)
 V_A = flowrate of digester gas in scf per unit of time
 CL_B = compliance limit in Table 1 when firing 100% natural gas
 Q_B = higher heating value of natural gas in Btu per scf
 V_B = flowrate of natural gas in scf per unit of time

- (3) An owner or operator of a dual fuel turbine simultaneously firing digester gas and more than 40 percent but less than 100 percent natural gas, based on volume averaged over 24 hours, shall comply with the weighted emission limit calculated by Equation 2. The owner or operator of a turbine using the weighted emission limit shall obtain flowrates 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 Executive Officer, at the time of compliance determination.
 - (B) Measure the higher heating value of the digester gas using a monitoring procedure approved by South Coast AQMD. The digester gas sample used to obtain the higher heating value shall be collected no earlier than 30 days before compliance is determined..

$$\text{Weighted limit} = \frac{((CL_A + 18.1) \times Q_A \times V_A) + (CL_B \times Q_B \times V_B)}{(Q_A \times V_A) + (Q_B \times V_B)} \quad (\text{Equation 2})$$

Where:

CL_A = compliance limit in Table 1 when firing 60% digester gas or more
 Q_A = higher heating value of digester gas in Btu per scf
 V_A = flowrate of digester gas in scf per unit of time
 CL_B = compliance limit in Table 1 when firing 100% natural gas
 Q_B = higher heating value of natural gas in Btu per scf
 V_B = flowrate of natural gas in scf per unit of time

- (4) Averaging Times for Units with CEMS
- (A) An owner or operator of a boiler shall meet the applicable emission limits specified in Table 1 or paragraph (d)(2), averaged over a fixed interval of 1 hour.

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- (B) An owner or operator of a turbine shall meet the applicable emission limits specified in Table 1 or paragraph (d)(3), averaged over a rolling period of 1 hour.
 - (C) An owner or operator of an engine shall meet the applicable emission limits specified in Table 1 averaged over one of the following interval periods:
 - (i) A fixed interval of 1 hour;
 - (ii) A fixed interval of 24 hours when meeting the emission limits at or below 11 ppmvd for NO_x and 250 ppmvd for CO (if CO is selected for averaging), each corrected to 15% oxygen, with the emission limits and averaging time specified in the permit to operate for the engine on or before November 1, 2019; or
 - (iii) A fixed interval of 48 hours when meeting the emission limits at or below 9.9 ppmvd for NO_x and 225 ppmvd for CO (if CO is selected for averaging), each corrected to 15% oxygen, with emission limits and averaging time specified in the permit to operate for the engine.
- (5) Startup and Shutdown
- An owner or operator of a unit shall meet the following startup and shutdown requirements for that unit, if NO_x, CO, or VOC is discharged into the atmosphere in excess of the limits specified in Table 1, paragraph (d)(2), or paragraph (d)(3):
- (A) Startup of a boiler shall not exceed the time period necessary for proper operation of the boiler or for temperatures to be reached for the proper operation of the emission control equipment. Startup or shutdown shall not exceed 6 hours.
 - (B) An owner or operator of a boiler ≥ 5 MMBtu/hr shall submit to the Executive Officer by January 1 of each year, a schedule plan of startup and shutdown events for that year.
 - (i) The number of scheduled startups/shutdowns for a boiler $\geq 5 - 40$ MMBtu/hr shall not exceed 10 per month.
 - (ii) The number of scheduled startups/shutdowns for a boiler > 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 in a timely manner and form

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as specified by the Executive Officer. Shutdowns and startups must 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 Executive Officer.
- (D) Startup of a turbine shall not exceed the time at which control equipment is properly operating. Startup or shutdown shall not exceed 2 hours for turbines with SCR and shall not exceed 3 hours for turbines without SCR.
- (E) For engines:
- (i) Startup shall not exceed the time period necessary for operating temperatures to be reached for the proper operation of the emission control equipment, or the tuning of the engine and/or emission control equipment. Startup or shutdown shall not exceed 30 minutes, unless the Executive Officer approves in writing a longer period, not to exceed 2 hours, and that period is specified by permit conditions;
 - (ii) Startup after an engine overhaul or major repair requiring removal of a cylinder head or for the installation or the replacement of catalytic emission control equipment shall not last longer than 4 operating hours.
- (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 for the following equipment and applicable pollutants in accordance with the schedule in Table 2.

TABLE 2 SOURCE TESTING SCHEDULE
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Equipment Category	Frequency	Pollutant	Elapsed Time Prior to Conducting Source Test¹
Boilers \geq 10 MMBtu/hr	Every 3 years from the date the previous source test was required, no later than the last day of the calendar month that the test is due	NOx, CO	At least 250 operating hours or at least 30 calendar days
Boilers < 10 MMBtu/hr and > 2 MMBtu/hr	Every 5 years from the date the previous source test was required, no later than the last day of the calendar month that the test is due		
Turbines with output capacity rating \geq 2.9 MW	Every year from the date the previous source test was required, no later than the last day of the calendar month that the test is due		At least 40 operating hours or at least 7 calendar days
Turbines with output capacity rating < 2.9 MW	Every 3 years from the date the previous source test was required, no later than the last day of the calendar month that the test is due or every 8,760 operating hours, whichever occurs later		
Engines	Every 2 years from the date the previous source test was required, no later than the last day of the calendar month that the test is due, or every 8,760 operating hours, whichever occurs first ²	NOx, CO, and VOC reported as carbon	

¹ Elapsed time subsequent to any tuning or servicing, unless tuning or servicing is due to an unscheduled repair.

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- ² Frequency may be reduced once every 3 years if the engine has operated less than 2,000 hours since the last source test. If the engine has not been operated before the date a source test is due, the source test shall be conducted by the end of 7 consecutive days or 15 cumulative days of resumed operation. An owner or operator of the engine shall keep sufficient operating records to demonstrate that it meets the requirements for extension of the source testing deadlines.
- (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 by the Executive Officer is electronically distributed.
 - (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 Executive Officer.
 - (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, 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.
 - (A) For engines, an owner or operator shall also include in the protocol the required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels. A description of the parameters to be measured in accordance with the Inspection & Monitoring (I&M) plan requirements of this rule shall also be included in the protocol.
 - (5) No later than 30 days prior to conducting a source test, an owner or operator shall notify the Executive Officer of the scheduled source test date. If a scheduled source test is delayed, an owner or operator shall notify the Executive Officer within 24 hours from the time that 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 Executive Officer by mutual agreement.

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- (6) An owner or operator shall conduct the source testing 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 Methods 3.1 or 100.1
VOC	South Coast AQMD Test Methods 25.1 or 25.3, excluding ethane and methane

- (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) For boilers and turbines, the LAP contractor conducting the source test shall make emissions 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) For engines, the LAP contractor shall conduct source testing for at least 30 minutes during normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. In addition, the LAP contractor shall conduct source testing for NO_x and CO emissions for at least 15 minutes at: an engine's actual peak load, or the maximum load that can be practically achieved during the test; and at actual minimum load, excluding idle, or the minimum load that can be practically achieved during the test. These additional two tests are not required if the permit limits the engine to operating at one defined load, ±10 percent. The LAP contractor shall not conduct any pre-tests for compliance. If an emission

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exceedance is found during any of the three phases of the test, that phase shall be completed and reported. An operator shall correct the exceedance, and the source test shall be immediately resumed.

- (10) An owner or operator shall submit all source test reports, including a description of the unit tested, to the Executive Officer within 60 days of completion.
- (11) An owner or operator may use a relative accuracy test audit (RATAs) required by Rule 218.1, 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, in lieu of a source test for those pollutants monitored by a CEMS and for all operating loads required by the source test, provided that the RATA is conducted within the same calendar year the source test is required.

(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(s)
Boilers	Rated heat input capacity > 40 MMBtu/hr and an annual heat input > 200 x 10 ⁹ Btu per year	NO _x
Turbines	Output capacity rating ≥ 2.9 MW	NO _x
Engines	Capacity rating ≥ 1000 bhp and operating more than 2 million bhp-hr per calendar year	NO _x , CO
	Combined capacity rating ≥ 1500 bhp and a combined fuel usage of > 16 x 10 ⁹ Btu per year, for engines at the same location ¹	

¹ Effective October 1, 2007, engines located within 75 feet of another engine (measured from engine block to engine block) are considered to be at the same location.

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

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- (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 NO_x emissions, as applicable;
 - (B) Elapsed time of operation; and
 - (C) Turbine output in MW.
- (2) An owner or operator of an engine shall meet the following requirements:
- (A) A CO CEMS shall not be required for lean-burn engines.
 - (B) The following engines shall not be counted towards the combined rating of 1500 bhp or greater and combined fuel usage of more than 16×10^9 Btu per year (higher heating value) of engines at the same location:
 - (i) Engines rated at less than 500 bhp;
 - (ii) Standby engines that are limited by permit conditions to only operate when other primary engines are not operable;
 - (iii) Engines that are limited by and in compliance with permit conditions to operate less than 1000 hours per year or a fuel usage of less than 8×10^9 Btu per year (higher heating value of all fuels used);
 - (iv) Engines with an output capacity rating ≥ 1000 bhp and operating more than 2 million bhp-hr per calendar year required to have a CEMS; and
 - (v) Engines in compliance with permit conditions that limit the simultaneous use of the engines at the same location in a manner to limit the combined rating of all engines in simultaneous operation to less than 1500 bhp.
 - (C) In lieu of complying with the CEMS requirements of this subdivision, an owner or operator of an engine 1000 bhp or greater and less than 1200 bhp, or engines at the same location with a combined output capacity rating of 1500 bhp or greater and a combined fuel usage of $> 16 \times 10^9$ Btu per year (higher heating value), may alternatively comply with the I&M plan requirements, pursuant to subdivision (g), provided an owner or operator conducts diagnostic emission checks at least weekly or every 150 operating hours, whichever occurs later.
 - (i) If the engine is found to exceed an applicable NO_x or CO limit by a source test or a South Coast AQMD test using a portable analyzer on 3 or more combined occasions in any 12-month

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period, an owner or operator shall comply with the CEMS requirements of this subdivision and shall submit a CEMS application to the Executive Officer within 6 months of the third exceedance and obtain final approval of the CEMS within 1 year from the initial approval.

- (D) An owner or operator of any engine initially exempt from CEMS by the low-use criterion in Table 4 that later exceeds that criterion, shall install CEMS on that engine. The owner or operator shall submit an application for CEMS within 6 months after the conclusion of the first 12-month period for which the engine(s) exceed the criterion, and shall obtain final approval for the CEMS within 1 year from the initial approval.
- (E) An owner or operator may take an existing NO_x CEMS out of service for up to two weeks (cumulative) in order to modify the CEMS to add CO monitoring.
- (F) Notwithstanding the requirements of Rules 218, 218.1, or any applicable South Coast AQMD rule for CEMS certification, operation, monitoring, reporting, and notification, an owner or operator of an engine required to install a CEMS may:
 - (i) Store data electronically without a strip chart recorder, but there shall be redundant data storage capability for at least 15 days of data. An operator shall demonstrate that both sets of data are equivalent.
 - (ii) Conduct relative accuracy testing, as required by Rule 218.1, any applicable South Coast AQMD rule for CEMS certification, operation, monitoring, reporting, and notification, or 40 CFR Part 75 Subpart E, on the same schedule for source testing, as specified in Table 2, instead of annually. The minimum sampling time for each test is 15 minutes.
- (G) An owner or operator of a new engine shall not install an engine farther than 75 feet from another engine unless the owner or operator demonstrates to the Executive Officer that operational needs or space limitations require it.
- (H) An owner or operator of any new engine issued a permit to construct after *[Date of Adoption]* shall comply with the applicable CEMS requirements of this subdivision when engine operation commences.

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(g) Inspection and Monitoring (I&M) Plans

An owner or operator of an engine shall comply with the following requirements for submitting I&M plans:

(1) An owner or operator of an engine without a NO_x and CO CEMS shall submit to the Executive Officer an I&M plan for approval. One plan application is required for each facility that does not have a NO_x and CO CEMS for each engine. If an engine has a NO_x CEMS and does not have a CO CEMS, it is subject to this subdivision as it pertains to CO only. The I&M plan shall include all items listed in Attachment 1. An owner or operator may request an alternative item(s) in Attachment 1 that is determined by the Executive Officer to be equivalent in meeting the same objectives.

(A) Upon written approval by the Executive Officer, an owner or operator shall implement the I&M plan as approved.

(B) An owner or operator shall submit an I&M plan for approval to the Executive Officer for a plan revision before any change in I&M plan operations can be implemented. The operator shall apply for a plan revision prior to any change in emission limits or control equipment.

(C) An owner or operator of any new engine issued a permit to construct after [*Date of Adoption*] shall comply with the applicable I&M plan requirements of this subdivision when engine operation commences. If applicable, an owner or operator shall provide the required information in this subdivision to the Executive Officer prior to the issuance of the permit to construct so that the I&M procedures can be included in the permit.

(h) Diagnostic Emission Checks for Boilers and Engines

An owner or operator shall perform diagnostic emissions checks of NO_x and CO emissions for pollutants not monitored by a CEMS, with a portable NO_x, 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.

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(1) Boilers

- (A) For boilers greater than or equal to 5 MMBtu/hr, an owner or operator shall perform diagnostic emission checks at least monthly or every 750 boiler operating hours, whichever occurs later. If a boiler is in compliance for 3 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.
- (B) 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 for 4 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 unit operating hours, whichever occurs later, until the diagnostic emission check exceeds the applicable limit.
- (C) 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 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.

(2) Engines

An owner or operator shall perform diagnostic emission checks at least weekly or every 150 hours, whichever occurs later. No engine or control system, maintenance or tuning, may be conducted within 72 hours prior to the diagnostic emission check, unless it is an unscheduled, required repair.

- (A) If an engine is in compliance for 3 consecutive diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the engine may be checked monthly or every 750 engine operating hours, whichever occurs later, until there is a noncompliant diagnostic emission check or, for rich-burn engines with a catalytic control device

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that simultaneously reduces emissions of NO_x, CO, and VOC, until the oxygen sensor is replaced. When making adjustments to the oxygen sensor set points that are not within 72 hours prior to the diagnostic emission check, returning to a more frequent diagnostic emission check schedule is not required if the engine is in compliance with the applicable emission limits prior to and after the set point adjustments.

- (B) For lean-burn engines that have a NO_x CEMS, and that are subject to a CO limit more stringent than 2000 ppmvd, an owner or operator shall perform a CO diagnostic emission check at least quarterly, or every 2,000 engine operating hours, whichever occurs later.
 - (C) For lean-burn engines that have a NO_x CEMS and that are not subject to a CO limit more stringent than 2000 ppmvd, diagnostic emission checks are not required.
 - (D) A diagnostic emission check that finds the emissions in excess of those allowed by this rule or a permit condition shall meet the requirements in subparagraph (k)(1)(A).
- (i) Recordkeeping
- An owner or operator of a boiler > 2 MMBtu/hr, turbine, or engine, shall keep and maintain all data logs, monitoring records, including CEMS data, source test reports, 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 Executive Officer upon request.
- (1) Boilers
 - (A) The owner or operator of a boiler ≥ 5 MMBtu/hr shall maintain and keep records of startup and shutdown events.
 - (B) The owner or operator of a boiler ≥ 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 Executive Officer, 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

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gas), cumulative hours of operation to date for the calendar year, and the actual startup and shutdown times on a daily basis.

- (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 any engine shall maintain a monthly operating log that includes total hours of operation, type of fuel used, fuel consumption (cubic feet of gas), and cumulative hours of operation since the last source test.
 - (4) An owner or operator of a unit required to conduct a source test, pursuant to Table 2, shall maintain records of any tuning or servicing of the unit and hours of operation subsequent to any tuning or servicing, until a source test is conducted.
- (j) Other Requirements for Boilers
- (1) 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.
 - (2) An owner or operator of a boiler less than or equal to 2 MMBtu/hr shall perform maintenance in accordance with the manufacturer's schedule and specifications as identified in a manual and other written materials supplied by the manufacturer or distributor. The owner or operator shall maintain on site a copy of the manufacturer's and/or distributor's written instructions and retain a record of the maintenance activity for a period of 3 years.
- (k) Other Requirements for Engines
- (1) Requirements for responding to, diagnosing and correcting breakdowns, faults, malfunctions, alarms, diagnostic emission checks finding emissions in excess of rule or permit limits, and parameters out-of-range.
 - (A) For any diagnostic emission check or breakdown that results in emissions in excess of those allowed by this rule or a permit condition, an owner or operator shall correct the problem as soon as possible and demonstrate compliance with another diagnostic emission check, or shutdown an engine by the end of an operating cycle, or within 24 hours from the time the owner or operator knew of the breakdown or

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excess emissions, or reasonably should have known, whichever is sooner.

- (B) For excess emissions due to breakdowns that result in NOx or CO emissions greater than the concentrations specified in Table 5, an owner or operator shall not be considered in violation of this rule if the operator demonstrates the all of the following: (1) compliance with subparagraph (k)(1)(A), (2) compliance with the reporting requirements of paragraph (k)(4), and (3) the engine with excess emissions has no more than 3 incidences of breakdowns with emissions exceeding Table 5 limits in the calendar quarter.

TABLE 5		
EXCESS EMISSION CONCENTRATION THRESHOLDS FOR BREAKDOWNS		
Equipment Category	NOx (ppmvd) ¹	CO (ppmvd) ¹
Lean-Burn Engines	45	250
Rich-Burn Engines	150	2000

¹ Corrected to 15% oxygen.

- (C) Any emission check conducted by South Coast AQMD staff that finds excess emissions will be treated as a violation.
 - (D) For other problems, such as parameters out-of-range, an owner or operator shall correct the problem and demonstrate compliance with another diagnostic emission check within 48 hours of the owner or operator first knowing of the problem.
- (2) An owner or operator shall maintain an operational non-resettable totalizing time meter to determine the engine elapsed operating time.
 - (3) An owner or operator of a spark-ignited engine without a Rule 218-approved CEMS shall maintain the air-to-fuel ratio controller and oxygen sensor and feedback control system, or other equivalent technology approved by the Executive Officer, CARB, and EPA.
 - (4) Reporting Requirements
 - (A) An owner or operator shall report to the Executive Officer, by telephone (1-800-CUT-SMOG or 1-800-288-7664) or other South Coast AQMD-approved method, any breakdown resulting in emissions in excess of rule or permit emission limits within 1 hour of

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such noncompliance or within 1 hour of the time the owner or operator knew or reasonably should have known of its occurrence. Such report shall identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the noncompliance, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the 1-hour limit, the Executive Officer may extend the time for the reporting of required information provided the owner or operator has notified the Executive Officer of the noncompliance within the 1-hour limit.

- (B) Within 7 calendar days after the reported breakdown has been corrected, but no later than 30 calendar days from the initial date of the breakdown, unless an extension has been approved in writing by the Executive Officer, an owner or operator shall submit a written breakdown report to the Executive Officer which includes:
- (i) An identification of the equipment involved in causing, or suspected of having caused, or having been affected by the breakdown;
 - (ii) The duration of the breakdown;
 - (iii) The date of correction and information demonstrating that compliance is achieved;
 - (iv) An identification of the types of excess emissions, if any, resulting from the breakdown;
 - (v) A quantification of the excess emissions, if any, resulting from the breakdown and the basis used to quantify the emissions;
 - (vi) Information substantiating whether the breakdown resulted from operator error, neglect or improper operation or maintenance procedures;
 - (vii) Information substantiating that steps were immediately taken to correct the condition causing the breakdown, and to minimize the emissions, if any, resulting from the breakdown;
 - (viii) A description of the corrective measures undertaken and/or to be undertaken to avoid such a breakdown in the future; and
 - (ix) Pictures of any equipment which failed, if available.

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- (C) Within 15 days of the end of each calendar quarter, an owner or operator shall submit to the Executive Officer a report that lists each occurrence of a breakdown, fault, malfunction, alarm, engine or control system operating parameter out of the acceptable range established by an I&M plan or permit condition, or a diagnostic emission check that finds excess emissions. Such report shall be in a South Coast AQMD-approved format, and for each incident shall identify the time of the incident, the time the operator learned of the incident, specific location, equipment involved, responsible party to contact for further information, to the extent known the causes of the event, the time and description of corrective actions, including shutting an engine down, and the results of all portable analyzer NO_x and CO emissions checks done before or after the corrective actions. An owner or operator shall also report if no incidents occurred.
- (l) 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 applications for each existing unit subject to this rule, and applications for I&M plans, if applicable.
 - (2) An owner or operator of a non-Title V facility shall:
 - (A) Submit an application for each existing boiler > 2 MMBtu/hr subject to this rule on or before January 1, 2023.
 - (B) Submit an application for each existing boiler ≤ 2 MMBtu/hr subject to this rule on or before July 1, 2023.
 - (C) Submit an application for each existing engine subject to this rule and an I&M plan application for each facility with an existing engine subject to this rule on or before January 1, 2024.
 - (D) Submit an application for each existing turbine subject to this rule on or before July 1, 2024.
- (m) Exemptions
 - (1) The emission limits in Table 1 or paragraph (d)(2) of this rule do not apply to any boiler 5 MMBtu/hr or greater in operation prior to September 5, 2008 with an annual heat input of less than or equal to 90,000 therms per year. An owner or operator of such boiler shall not operate the boiler in a manner that exceeds NO_x emissions of 30 ppm corrected to three percent oxygen on a dry basis. In

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lieu of complying with the applicable emission limits specified in Table 1 or paragraph (d)(2), the owner or operator shall:

- (A) Tune the unit(s) at least twice per year, (at intervals from four to eight months apart) in accordance with the procedure described in Attachment 2 or the unit manufacturer's specified tune-up procedure. If a different tune-up procedure from that described in Attachment 2 is used then a copy of this procedure shall be kept on site. The owner or operator of any unit(s) selecting the tune-up option shall maintain records for a rolling 24-month period verifying that the required tune-ups have been performed. If the unit does not operate throughout a continuous 6-month period within a 12-month period, only one tune-up is required for the 12-month period that includes the entire period of non-operation. For this case, the tune-up shall be conducted within 30 days of startup. No tune-up is required during a rolling 12-month period for any unit that is not operated during that rolling 12-month period; this unit may be test fired to verify availability of the units for its intended use but once the test firing is completed the unit shall be shutdown. Records of test firings shall be maintained for a rolling 24-month period, and shall be made accessible to an authorized South Coast AQMD representative upon request.
- (B) Any boiler subject to the requirements specified in paragraph (m)(1) that exceeds 90,000 therms of annual heat input from all fuels used shall constitute a violation of this rule. In addition, the owner or operator shall:
 - (i) Within four months after exceeding 90,000 therms of annual heat input, submit required applications for permits to construct and operate; and
 - (ii) Within 18 months after exceeding 90,000 therms of annual heat input, demonstrate and maintain compliance with all applicable requirements of this rule.
- (2) An owner or operator of any turbine ≥ 0.3 MW claiming any of 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.

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- (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 the provisions of this rule, 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 a usage of less than 200 hours of operation per calendar year.
- (C) If the hour-per-year limit in clause (m)(2)(B)(iii) is exceeded, the exemption shall be automatically and permanently withdrawn, and the owner or operator shall:
 - (i) Notify the Executive Officer 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 Executive Officer.
- (3) This rule does not apply to any boiler, turbine < 0.3 MW, or engine that is not permitted to fire digester gas or digester gas and another fuel. An owner or operator of a boiler or engine permitted to fire exclusively non-digester gas fuels shall comply with the following rules:
 - (A) For boilers, Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters, Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, and Rule 1146.2 – Emission of

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Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters; and

- (B) For engines, Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines.
- (4) This rule does not apply to emergency standby engines, engines used for fire-fighting and flood control, and any other emergency engines approved by the Executive Officer, which have permit conditions that limit operation to 200 hours or less per year as determined by an elapsed operating time meter, provided that an owner or operator:
 - (A) Installs and maintains in proper operation a non-resettable engine hour meter; and
 - (B) Maintains an operating log that includes cumulative hours of operation to date for the calendar year.
- (5) This rule does not apply to:
 - (A) Laboratory engines used in research and testing purposes;
 - (B) Engines operated for purposes of performance verification and testing of engines;
 - (C) Auxiliary engines used to power other engines or gas turbines during start-ups;
 - (D) Portable engines that are registered under the state registration program pursuant to Title 13, Article 5 of the CCR;
- (6) This rule does not apply to any turbine < 0.3 MW that was in operation prior to May 3, 2013.
- (7) The emission limits in Table 1 or paragraph (d)(2) do not apply to any existing boiler ≤ 2 MMBtu/hr without a NO_x concentration limitation specified in the permit.
- (8) The emission limits in Table 1 or paragraph (d)(3) do not apply to the initial commissioning of a new engine or turbine for the period specified by permit conditions.
 - (A) The commissioning of a new engine shall not exceed 150 operating hours.
 - (B) The commissioning of a new turbine shall not exceed 150 operating hours, unless the Executive Officer approves in writing a longer time period and that time period is specified in the permit to operate.
- (9) The natural gas emission limits in Table 1 do not apply to boilers ≤ 2 MMBtu/hr that are demonstrated to use less than 9,000 therms of natural gas

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during every calendar year. Compliance with the exemption limit shall be demonstrated by a calculation based on the annual fuel consumption recorded by an in line fuel meter or the annual operating hours recorded by a timer and using one of the following methods.

- (A) Annual therm usage recorded by fuel meter and corrected to standard pressure; or
 - (B) Amount of fuel (i.e., in thousand cubic feet of gas corrected to standard pressure) converted to therm using the higher heating value of the fuel; or
 - (C) Annual therm usage calculated by multiplying the number of hours fuel is burned by the rated heat input capacity of the unit converted to therms.
- (10) This rule shall not apply to engines owned and operated by San Bernardino City Municipal Water Department that are subject to the variance issued by the South Coast Air Quality Management District Hearing Board on December 20, 2018 during the term of that variance. The engines shall remain subject to Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines and the variance for its duration.

ATTACHMENT 1

An I&M plan submitted to the Executive Officer for approval and implementation shall include:

- A. Identification of engine and control equipment operating parameters necessary to maintain pollutant concentrations within the rule and permit limits. This shall include, but not be limited to:
 1. Procedures for using a portable NO_x, CO and oxygen analyzer to establish the set points of the air-to-fuel ratio controller (AFRC) at 25%, 60% and 95% load (or fuel flow rate), $\pm 5\%$, or the minimum, midpoint and maximum loads that actually occur during normal operation, $\pm 5\%$, or at any one load within the $\pm 10\%$ range that an engine permit is limited to in accordance with (h)(2)(C)(ii) of the rule;
 2. Procedures for verifying that the AFRC is controlling the engine to the set point during the daily monitoring required by subdivision D of this attachment;
 3. Procedures for reestablishing all AFRC set points with a portable NO_x, CO and oxygen analyzer whenever a set point must be readjusted, within 24 hours of an oxygen sensor replacement, and, for rich-burn engines with a catalytic control device that simultaneously reduces emissions of NO_x, CO, and VOC, between 100 and 150 engine operating hours after an oxygen sensor replacement;
 4. For engines with catalysts, the maximum allowed exhaust temperature at the catalyst inlet, based on catalyst manufacturer specifications;
 5. For lean-burn engines with SCR, the minimum exhaust temperature at the catalyst inlet required for reactant flow (ammonia or urea), and procedures for using portable NO_x and oxygen analyzer to establish the acceptable range of reactant flow rate, as a function of load.

Parameter monitoring is not required for diesel engines without exhaust gas recirculation and catalytic exhaust control devices.

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- B. Procedures for alerting the operator to emission control malfunctions. Engine control systems, such as air-to-fuel ratio controllers, shall have a malfunction indicator light and audible alarm.
- C. Procedures for diagnostic emission checks conducted by a portable NO_x, CO, and oxygen analyzer per the requirements of clause (h)(2)(D)(ii) of the rule.
- D. Procedures for at least daily monitoring, inspection and recordkeeping of:
 - 1. engine load or fuel flow rate;
 - 2. the set point, maximums and acceptable ranges of the parameters identified by subdivision A of this attachment, and the actual values of the same parameters;
 - 3. the engine elapsed time meter operating hours;
 - 4. the operating hours since the last diagnostic emission check required by clause (h)(2)(D)(ii) of the rule;
 - 5. for rich-burn engines with three-way catalysts, the difference of the exhaust temperatures (ΔT) at the inlet and outlet of the catalyst (changes in the ΔT can indicate changes in the effectiveness of the catalyst);
 - 6. engine control system and AFRC system faults or alarms that affect emissions.

The daily monitoring and recordkeeping may be done in person by the operator, or by remote monitoring.

- E. Procedures for responding to, diagnosing and correcting breakdowns, faults, malfunctions, alarms, diagnostic emission checks finding emissions in excess of rule or permit limits, and parameters out-of-range, per the requirements of clause (h)(2)(D)(iii) of the rule.
- F. Procedures and schedules for preventative and corrective maintenance.
- G. Procedures for reporting noncompliance to the Executive Officer in accordance with subparagraph (h)(2)(H) of the rule.
- H. Procedures and format for the recordkeeping of monitoring and other actions required by the plan.

ATTACHMENT 2

A. Equipment Tuning Procedure¹ for Forced-Draft Boilers, Steam Generators, and Process Heaters.

Nothing in this Equipment Tuning Procedure shall be construed to require any act or omission that would result in unsafe conditions or would be in violation of any regulation or requirement established by Factory Mutual, Industrial Risk Insurers, National Fire Prevention Association, the California Department of Industrial Relations (Occupational Safety and Health Division), the Federal Occupational Safety and Health Administration, or other relevant regulations and requirements.

Should a different tuning procedure be used, a copy of this procedure should be kept with the unit records for two years and made available to the South Coast AQMD personnel on request.

1. Operate the unit at the firing rate most typical of normal operation. If the unit experiences significant load variations during normal operation, operate it at its average firing rate.
2. At this firing rate, record stack gas temperature, oxygen concentration, and CO concentration (for gases fuels) or smoke-spot number² (for liquid fuels), and observe flame conditions after unit operation stabilizes at the firing rate selected. If the excess oxygen in the stack gas at the lower end of the range of typical minimum values³, and if CO emissions are low and there is not smoke, the unit is probably operating at near optimum efficiency - at this particular firing rate.
3. Increase combustion air flow to the furnace until stack gas oxygen levels increase by one to two percent over the level measured in Step 2. As in Step 2, record the stack gas temperature, CO concentration (for gaseous fuels) or smoke-spot number (for liquid fuels), and observed flame conditions for these higher oxygen levels after boiler operation stabilizes.

¹ This tuning procedure is based on a tune-up procedure developed by KVB, Inc. for the United States EPA

² The smoke-spot number can be determined with ASTM Test Method D-2156 or with the Bacharach method. ASTM Test Method D-2156 is included in a tuneup kit that can be purchased from the Bacharach Company.

³ Typical minimum oxygen levels for boilers at high firing rates are:

1. For natural gas: 0.5% - 3%
2. For liquid fuels: 2% - 4%

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However, complete the remaining portion of this procedure to determine whether still lower oxygen levels are practical.

4. Decrease combustion air flow until the stack gas oxygen concentration is at the level measured in Step 2. From this level gradually reduce the combustion air flow, in small increments. After each increment, record the stack gas temperature, oxygen concentration, CO concentration (for gaseous fuels) and smoke-spot number (for liquid fuels). Also observe the flame and record any changes in its condition. Also observe the flame and record any changes in its condition.
5. Continue to reduce combustion air flow stepwise, until one of these limits reached:
 - a. Unacceptable flame conditions – such as flame impingement on furnace walls or burner parts, excessive flame carryover, or flame instability.
 - b. Stack gas CO concentrations greater than 400 ppm
 - c. Smoking at the stack
 - d. Equipment-related limitations – such as low windbox/furnace pressure differential, built in air-flow limits, etc.
6. Develop an O₂/CO curve (for gaseous fuels) or O₂/smoke curve (for liquid fuels) similar to those shown in Figures 1 and 2 using the excess oxygen and CO or smoke-spot number data obtained at each combustion air flow setting.

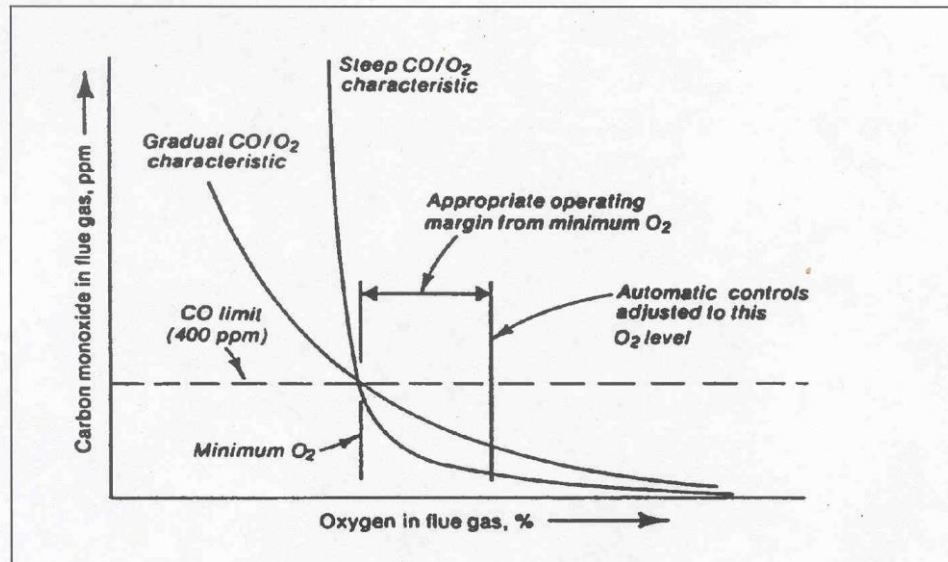


Figure 1 Oxygen/CO Characteristic Curve

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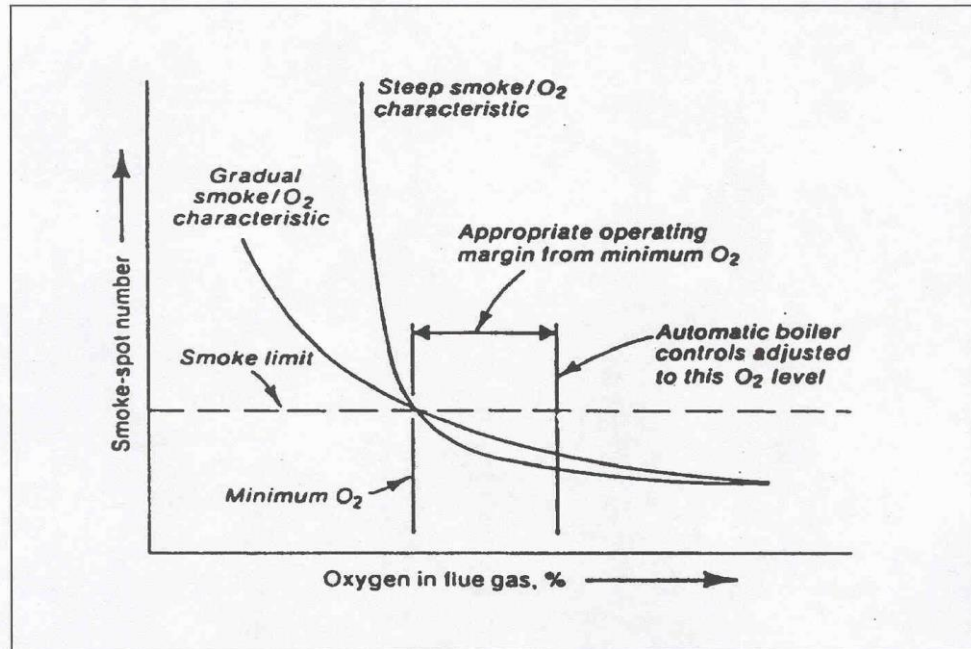


Figure 2 Oxygen/Smoke Characteristic Curve

7. From the curves prepared in Step 6, find the stack gas oxygen levels where the CO emissions or smoke-spot number equal the following values:

<u>Fuel</u>	<u>Measurement</u>	<u>Value</u>
Gaseous	CO Emissions	400 ppm
#1 and #2 oils	smoke-spot number	number 1
#4 oil	smoke-spot number	number 2
#5 oil	smoke-spot number	number 3
Other oils	smoke-spot number	number 4

The above conditions are referred to as the CO or smoke thresholds, or as the minimum excess oxygen level.

Compare this minimum value of excess oxygen to the expected value provided by the combustion unit manufacturer. If the minimum level found is substantially higher than the value provided by the combustion unit manufacturer, burner adjustments can probably be made to improve fuel and air mixing, thereby allowing operation with less air.

8. Add 0.5 to 2.0 percent O₂ to the minimum excess oxygen level found in Step 7 and reset burner controls to operate automatically at this higher stack gas oxygen level. This margin above the minimum oxygen level accounts for fuel variations,

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variations in atmospheric conditions, load changes, and nonrepeatability or play in automatic controls.

9. If the load of the combustion unit varies significantly during normal operation, repeat Steps 1-8 for firing rates that represent the upper and lower limits of the range of the load. Because control adjustments at one firing rate may affect conditions at other firing rates, it may not be possible to establish the optimum excess oxygen level at all firing rates. If this is the case, choose the burner control settings that give best performance over the range of firing rates. If one firing rate predominates, settings should optimize conditions at that rate.
10. Verify that the new settings can accommodate the sudden load changes that may occur in daily operation without adverse effects. Do this by increasing and decreasing load rapidly while observing the flame and stack. If any of the conditions in Step 5 result, reset the combustion controls to provide a slightly higher level of excess oxygen at the affected firing rates. Next, verify these new settings in a similar fashion. Then make sure that the final control settings are recorded at steady-state operating conditions for future reference.
11. When the above checks and adjustments have been made, record data and attach combustion analysis data to boiler, steam generator, or heater records indicating name and signature of person, title, and the date the tune up was performed

B. Equipment Tuning Procedure for natural Draft-Fired Boilers, Steam Generators, and Process Heaters.

Nothing in this Equipment Tuning Procedure shall be construed to require any act or omission that would result in unsafe conditions or would be in violation of any regulation or requirement established by Factory Mutual, Industrial Risk Insurers, National Fire Prevention Association, the California Department of Industrial Relations (Occupational Safety and Health Division), the Federal Occupational Safety and Health Administration, or other relevant codes, regulations and equipment manufacturers specifications and operating manuals.

Should a different tuning procedure be used, a copy of this procedure should be kept with the unit records for two years and made available to the South Coast AQMD personnel on request.

1. **PRELIMINARY ANALYSIS**
 - a. **CHECK THE OPERATING PRESSURE OR TEMPERATURE.**
Operate the boiler, steam generator, or heater at the lowest acceptable

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pressure or temperature that will satisfy the load demand. This will minimize heat and radiation losses. Determine the pressure or temperature that will be used as a basis for comparative combustion analysis before and after tuneup.

b. **CHECK OPERATING HOURS.**

Plan the workload so that the boiler, steam generator, or process heater operates only the minimum hours and days necessary to perform the work required. Fewer operating hours will reduce fuel use and emissions. For units requiring a tuneup to comply with the rule, a totalizing non-resettable fuel meter will be required for each fuel used and for each boiler, steam generator, and heater to prove fuel consumption is less than the heat input limit in therms per year specified in the rule.

c. **CHECK AIR SUPPLY.**

Sufficient fresh air supply is essential to ensure optimum combustion and the area of air supply openings must be in compliance with applicable codes and regulations. Air openings must be kept wide open when the burner is firing and clear from restriction to flow.

d. **CHECK VENT**

Proper venting is essential to assure efficient combustion. Insufficient draft or overdraft promotes hazards and inefficient burning. Check to be sure that vent is in good condition, sized properly and with no obstructions.

e. **COMBUSTION ANALYSIS**

Perform an "as is" combustion analysis (CO, O₂, etc.) with a warmed up unit at high and low fire, if possible. In addition to data obtained from combustion analysis, also record the following:

- i. Inlet fuel pressure at burner (at high & low fire)
- ii. Draft at inlet to draft hood or barometer damper
 - 1) Draft hood: high, medium, and low
 - 2) Barometric Damper: high, medium, and low
- iii. Steam pressure, water temperature, or process fluid pressure or temperature entering and leaving the boiler, steam generator, or process heater.
- iv. Unit rate if meter is available.

With above conditions recorded, make the following checks and corrective actions as necessary:

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2. CHECKS & CORRECTIONS

a. CHECK BURNER CONDITION.

Dirty burners or burner orifices will cause boiler, steam generator, or process heater output rate and thermal efficiency to decrease. Clean burners and burner orifices thoroughly. Also, ensure that fuel filters and moisture traps are in place, clean, and operating properly, to prevent plugging of gas orifices. Confirm proper location and orientation of burner diffuser spuds, gas canes, etc. Look for any burned-off or missing burner parts, and replace as needed.

b. CHECK FOR CLEAN BOILER, STEAM GENERATOR, OR PROCESS HEATER TUBES & HEAT TRANSFER SURFACES.

External and internal build-up of sediment and scale on the heating surfaces creates an insulating effect that quickly reduces unit efficiency. Excessive fuel cost will result if the unit is not kept clean. Clean tube surfaces, remove scale and soot, assure proper process fluid flow and flue gas flow.

c. CHECK WATER TREATMENT & BLOWDOWN PROGRAM.

Soft water and the proper water or process fluid treatment must be uniformly used to minimize scale and corrosion. Timely flushing and periodic blowdown must be employed to eliminate sediment and scale build-up on a boiler, steam generator or process heater.

d. CHECK FOR STEAM, HOT WATER OR PROCESSFLUID LEAKS.

Repair all leaks immediately since even small high-pressure leaks quickly lead to considerable fuel, water and steam losses. Be sure there are no leaks through the blow-off, drains, safety valve, by-pass lines or at the feed pump, if used.

3. SAFETY CHECKS

a. Test primary and secondary low water level controls.

b. Check operating and limit pressure and temperature controls.

c. Check pilot safety shut off operation.

d. Check safety valve pressure and capacity to meet boiler, steam generator or process heater requirements.

e. Check limit safety control and spill switch.

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4. ADJUSTMENTS

While taking combustion readings with a warmed up boiler, steam generator, or process heater at high fire perform checks and adjustments as follows:

- a. Adjust unit to fire at rate; record fuel manifold pressure.
- b. Adjust draft and/or fuel pressure to obtain acceptable, clean combustion at both high, medium and low fire. Carbon Monoxide CO value should always be below 400 parts per million (PPM) at 3% O₂. If CO is high make necessary adjustments.

Check to ensure boiler, steam generator, or process heater light offs are smooth and safe. A reduced fuel pressure test at both high and low fire should be conducted in accordance with the manufacturer's instructions and maintenance manuals.

- c. Check and adjust operation of modulation controller. Ensure proper, efficient and clean combustion through range of firing rates.

When above adjustments and corrections have been made, record all data.

5. FINAL TEST

Perform a final combustion analysis with a warmed up boiler, steam generator, or process heater at high, medium and low fire, whenever possible. In addition to data from combustion analysis, also check and record:

- a. Fuel pressure at burner (High, Medium, and Low).
- b. Draft above draft hood or barometric damper (High, Medium, and Low).
- c. Steam pressure or water temperature entering and leaving boiler, steam generator, or process heater.
- d. Unit rate if meter is available.

When the above checks and adjustments have been made, record data and attach combustion analysis data to boiler, steam generator, or process heater records indicating name and signature of person, title, company name, company address and date the tuneup was performed.