RULE 342. BOILERS, STEAM GENERATORS, AND PROCESS HEATERS (5 MMBtu/hr and greater)
(Adopted 3/10/1992, revised 4/17/1997, 6/20/2019, 5/16/2024)

A. Applicability

This rule shall apply to any boiler, steam generator, or process heater with a rated heat input capacity greater than or equal to 5 million British thermal units per hour.

B. Exemptions

1. This rule shall not apply to:

    a. Boilers used by public electric utilities to generate electricity.

    b. Process heaters, kilns, and furnaces, where the products of combustion come into direct contact with the material to be heated.

    c. Waste heat recovery boilers that are used to recover or augment heat from the exhaust of combustion turbines or reciprocating internal combustion engines.

    d. Equipment that does not require a permit under the provisions of Rule 202, Exemptions to Rule 201. Notwithstanding the above, this exemption shall not apply to any AB 617 Industrial Unit.

2. Section D.1, D.3, and D.5 shall not apply to any unit while forced to burn non-gaseous fuel during times of public utility imposed natural gas curtailment. This exemption shall not exceed 168 cumulative hours of operation per calendar year excluding equipment testing time not exceeding 24 hours per calendar year.

3. The emission limits of Section D.1, D.3, and D.5 shall not apply during startup and shutdown periods provided that all of the following conditions are met:

    a. Each startup and shutdown period shall not exceed two hours, unless otherwise allowed in a District Permit to Operate. In no case shall the startup period exceed 12 hours or the shutdown period exceed 9 hours, and

    b. Startup or shutdown intervals shall not last longer than is necessary to reach stable temperatures and conditions, and

    c. All emission control systems shall be in operation and emissions shall be minimized, to the extent possible, during startup and shutdown periods.

4. Section D.4 and Section K shall not apply to an emission unit that has implemented District Best Available Control Technology (BACT) due to a permit revision or a new permit issuance since 2007.

C. Definitions

See Rule 102, Definitions, for definitions not limited to this rule. For the purposes of this rule, the following definitions shall apply:

"AB 617 Industrial Unit" means any unit located at a facility that, as of January 1, 2017, was subject to a market-based compliance mechanism adopted by the state board pursuant to Health and Safety Code §38562(c).

"Annual Heat Input" means the total heat input of fuels burned by a unit in a calendar year, as determined from the higher heating value and cumulative annual usage of each fuel.

"Boiler or Steam Generator" means any external combustion equipment fired with liquid and/or gaseous and/or solid fuel that is used to produce steam or to heat water. Boiler or Steam Generator does not include any fired or unfired waste heat recovery boiler that is used to recover or augment heat from the exhaust of any combustion equipment.

"Digester Gas" means gas derived from the decomposition of organic matter in a digester.

"Gaseous Fuel" means any fuel which is a gas at standard conditions.

"Landfill Gas" means gas derived from the decomposition of waste in a landfill.

"Modification" or "Modify" means any of the following actions:

1. Replacing a burner or burners on a unit; or

2. Removing a unit from the site of its original installation and installing it at a different location. A unit that is reinstalled within the same stationary source is not modified.

"Non-gaseous Fuel" means any fuel which is not a gas at standard conditions.

"Parts Per Million" or "ppm" means parts per million by volume expressed on a dry gas basis.

"Process Heater" means any external combustion equipment fired with liquid and/or gaseous and/or solid 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, baking, curing, cooking, calcinating or vitrifying or any unfired waste heat recovery heater that is used to recover sensible heat from the exhaust of any combustion equipment.

"Rated Heat Input Capacity" means the heat input capacity specified on the nameplate of the combustion unit, typically reported in million Btu per hour. If the combustion unit has been physically modified such that its maximum heat input is different than the heat input capacity specified on the nameplate, the modified maximum heat input shall be considered as the rated heat input. The new maximum heat input must be certified, in writing, by the manufacturer or installer and engineering calculations supporting the new maximum heat input rating must be submitted to and approved by the District. The District may require the modified maximum heat input capacity to be demonstrated by a fuel meter while operating the unit at maximum capacity.

"Shutdown Period" means the period of time during which a unit is taken from an operational to a non-operational status by allowing it to cool down from its operating temperature to a cold or ambient temperature as the fuel supply is turned off.

"Startup Period" means the period of time during which a unit is brought from a shutdown status to its operating temperature and pressure.

"Unit" means any boiler, steam generator, or process heater.

D. Requirements – Emission Standards

1. For units that are installed prior to January 1, 2020 with a permitted annual heat input of greater than or equal to 9 billion British thermal units, oxides of nitrogen (NO_x) emissions shall not exceed the following limits:

a. 30 parts per million at 3 percent oxygen or 0.036 pounds per million British thermal units of heat input when operated on gaseous fuel; and

b. 40 parts per million at 3 percent oxygen or 0.052 pounds per million British thermal units of heat input when operated on non-gaseous fuel; and

c. the heat-input weighted average of the limits specified in D.1.a and D.1.b when operated on combinations of gaseous and non-gaseous fuel.

d. Emissions from units shall not exceed a carbon monoxide (CO) concentration of 400 parts per million at 3 percent oxygen.

2. Units that are installed prior to January 1, 2020 with a permitted annual heat input of less than 9 billion British thermal units shall be:

a. operated in a manner that maintains stack-gas oxygen concentrations at less than 3.00 percent by volume on a dry basis; or

b. operated with a stack-gas oxygen trim system set at 3.00 ±0.15 percent oxygen by volume on a dry basis; or

c. tuned at least once every twelve months in accordance with the procedure described in Attachment 1; or

d. operated in compliance with the applicable emission limits specified in Section D.1.

3. On or after January 1, 2020, no owner or operator shall install or modify any unit unless the unit complies with the emission limits set forth in Table 1 below.

Table 1: Emission Limits for Units Installed On or After January 1, 2020

Rated Heat Input (million Btu/hr)	Fuel Type	NOx Emission Limit (ppm at 3% O_2)	CO Emission Limit (ppm at 3% O_2)
5 - 20	Gaseous, except landfill or digester gas	9	400
> 20	Gaseous, except landfill or digester gas	7	400
≥ 5	Landfill Gas	25	400
≥ 5	Digester Gas	15	400
≥ 5	Non-gaseous	40	400
≥ 5	Multiple Fuels	heat-input weighted average limit	400

4. On or before December 31, 2023, all AB 617 Industrial Units that have an annual heat input of greater than or equal to 9 billion British thermal units shall operate in compliance with the emission limits specified in Section D.3.

5. In lieu of meeting the requirements of Section D.3, any boiler that directs the exhaust gases into a greenhouse as a means of supplementing carbon dioxide (CO_2) to a crop shall operate in compliance with the following emission limits:

a. 30 parts per million oxides of nitrogen (NOx) at 3 percent oxygen; and

b. 10 parts per million carbon monoxide (CO) at 3 percent oxygen.

E. Requirements – Equipment

1. Owners or operators of units which simultaneously fire combinations of different fuels and are subject to the requirements of Section D.1, D.3, or D.5 shall install totalizing mass or volumetric flow rate meters in each fuel line. Gas flow rate meters shall be installed in conjunction with temperature and pressure probes.

2. Owners or operators of units which employ flue-gas NO_x reduction technology and are subject to the requirements of Section D.1, D.3, or D.5 shall install meters as applicable to allow instantaneous monitoring of the operational characteristics of the NO_x reduction equipment.

3. On or after March 10, 1992, no person shall install an anhydrous ammonia system to meet the requirements of this rule.

F. Requirements – Compliance Determination

1. All emission determinations shall be made in the as-found operating condition, at the maximum attainable firing rate allowed by the District permit. No determination of compliance with the requirements of Section D.1, D.3, or D.5 shall be established during unit startup, shutdown, or under breakdown conditions. Compliance determinations shall be conducted at least 250 operating hours or at least thirty days after the tuning or servicing of the unit, unless it is an unscheduled repair.

2. All parts per million emission limits specified in Section D.1, D.3, and D.5 are referenced at dry stack-gas conditions and 3.00 percent by volume stack-gas oxygen. Emission concentrations shall be corrected to 3.00 percent oxygen as follows:

$$[\text{ppm } NO_x]_{\text{corrected}} = \frac{20.95\% - 3.00\%}{20.95\% - [\% O_2]_{\text{measured}}} \text{ X } [\text{ppm } NO_x]_{\text{measured}}$$

$$[\text{ppm CO}]_{\text{corrected}} = \frac{20.95\% - 3.00\%}{20.95\% - [O_2]_{\text{measured}}} \text{ X } [\text{ppm CO}]_{\text{measured}}$$

3. All pounds-per-million-British thermal unit NO_x emission rates shall be calculated as pounds of nitrogen dioxide per million British thermal unit of heat input.

4. All heat input weighted average NOx limits shall be calculated as follows:

$$\text{Weighted Limit} = \frac{(CL_A \text{ x } Q_A) + (CL_B \text{ x } Q_B)}{Q_A + Q_B}$$

Where: CL_A = compliance limit for fuel A
CL_B = compliance limit for fuel B
Q_A = annual heat input from fuel A
Q_B = annual heat input from fuel B

G. Requirements – Source Testing

1. All units subject to Sections D.1, D.2.a, D.2.b, D.2.d, D.3, D.4, and D.5 shall be tested for compliance not less than once every 24 months.

2. The owner or operator of any unit subject to the source testing provisions of this rule shall submit a Source Test Plan to the District and obtain District written approval prior to the start of any source test. The Source Test Plan shall be filed with the District at least 30 days before the start of each source test. The District shall be notified of the date of source testing at least 14 days prior to testing to arrange a mutually agreeable test date.

3. Source testing shall be performed by a source test contractor certified by the California Air Resources Board. District required source testing shall not be performed by an owner or operator unless approved by the Control Officer.

4. The owner or operator of any unit which is found to be in noncompliance with Section D as a result of a source test shall comply with the following:

    a. A repeat source test shall be performed to demonstrate compliance with Section D within the time period specified by the District.

    b. Annual source tests shall be conducted on any noncompliant unit until two consecutive tests demonstrate compliance with Section D. When the unit is demonstrated to be in compliance with Section D by two consecutive source tests, the unit shall comply with the provisions of Section G.1.

5. All source tests shall consist of a minimum of three 40 minute tests. The average concentration from the test runs shall be used for determining compliance.

H. Test Methods

1. The owner or operator of any unit subject to the source test requirements of this rule shall use the test methods and procedures listed below:

    a. Oxides of Nitrogen - Environmental Protection Agency Method 7E or California Air Resources Board Method 100.

    b. Carbon Monoxide - Environmental Protection Agency Method 10 or California Air Resources Board Method 100.

    c. Stack Gas Oxygen - Environmental Protection Agency Method 3 or 3A or California Air Resources Board Method 100.

    d. NO_x Emission Rate (Heat Input Basis) - Environmental Protection Agency Methods 2 and 4 if applicable, or Method 19.

2. 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:

    a. For solid fuels: ASTM D5865-13 "Standard Method for Gross Calorific Value of Coal and Coke;"

    b. For liquid hydrocarbon fuels: ASTM D240-17, "Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuel by the Bomb Calorimeter," or ASTM D4809-13 "Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method);" or

c. For gaseous fuels: ASTM D1826-94 (2010), “Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter,” or ASTM D1945-14, “Standard Test Method for Analysis of Natural Gas by Gas Chromatography,” in conjunction with ASTM D3588-98 (2011), “Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels.”

I. Requirements – Recordkeeping

All owners or operators of units subject to this rule shall keep all records listed below onsite for a period of five years and the records shall be made readily available to the District upon request:

1. *Rule 342 Tune-Up Reports*.

2. Source test reports.

3. The cumulative annual fuel usage and the Higher Heating Value of each fuel used.

4. Records of emergency non-gaseous fuel use per Section B.2. These records shall include the dates, operating hours, and volumes of non-gaseous fuel used.

J. Requirements – Reporting

1. The records required pursuant to Section I.1, I.3, and I.4 shall be submitted to the District by March 1st for the prior calendar year.

2. Source test reports required pursuant to Section I.2 shall be submitted to the District within 45 days of test completion.

K. Compliance Schedule – AB 617 Industrial Units

1. The owner or operator of any AB 617 Industrial Unit that has a Permit to Operate shall apply for an Authority to Construct permit prior to January 30, 2023. This provision shall not apply to any unit that already meets the requirements in Section D.4, as listed in the unit’s Permit to Operate.

2. The owner or operator of any AB 617 Industrial Unit that does not have a Permit to Operate shall submit a *Rule 342 Compliance Plan* for District review and approval prior to January 30, 2023 or 90 days prior to unit installation, whichever occurs earlier. All costs incurred by the District for the review and enforcement of the *Rule 342 Compliance Plan* shall be reimbursable costs pursuant to Rule 210, Fees. The *Rule 342 Compliance Plan* shall include:

   a. The company name, facility address, and facility contact information.

   b. A list of all subject units with their rated heat input capacity.

   c. Any proposed modifications to the unit so that the unit complies with the requirements in Section D.4 of this rule by December 31, 2023 and for the remaining life of the unit.

   d. For gaseous fuels, the proposed non-resettable temperature and pressure corrected totalizing fuel meter(s) specifications. For liquid fuels, the proposed non-resettable totalizing fuel meter(s) specifications. For solid fossil fuels, provide the methods of fuel throughput monitoring to be used that will achieve the same level of fuel monitoring accuracy as the meters required for the measurement of gaseous and liquid fuels described above. Include the fuel meter manufacturer, model number, technical brochure, and manufacturer recommended calibration schedule.

3. On or before December 31, 2023, the owner or operator of any AB 617 Industrial Unit shall operate in compliance with the requirements in Section D.4.

4. For AB 617 Industrial Units that are exempt from the requirements of Section D.4 on December 31, 2023 because they have an annual heat input of less than 9 billion British thermal units, but that subsequently no longer qualify for that exemption, the owner or operator shall submit an Authority to Construct permit application within 30 days of exceeding the threshold and shall operate in compliance with the requirements in Section D.4 within one year of exceeding the threshold.

ATTACHMENT 1

SBCAPCD Rule 342 Tune-Up Procedures [1]

PROCEDURE A
Equipment Tuning Procedure for Forced Draft-Fired Equipment

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.

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 gaseous fuels) or smoke-spot number[2] (for liquid fuels), and observe flame conditions after unit operation stabilizes at the firing rate selected. Note these readings in the *Rule 342 Tune-Up Report* as the *"Initial As-Found Conditions."* If the excess oxygen in the stack is at the lower end of the range of typical minimum values[3], and if the CO emissions are low and there is no smoke, the unit is probably operating at near optimum efficiency at this particular firing rate. However, complete the remaining portion of this procedure to determine whether still lower oxygen levels are practical.

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 observe flame conditions for these higher oxygen levels after boiler operation stabilizes.

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.

5. Continue to reduce combustion air flow stepwise until one of these limits in 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.

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

[2] The smoke-spot number can be determined with ASTM Test Method D2156-09 (2013), "Standard Test Method for Smoke Density Flue Gases from Burning Distillate Fuels," or with the Bacharach method.

[3] Typical minimum oxygen levels for boilers at high firing rates are:
a. For natural gas: 0.5% - 3%
b. For liquid fuels: 2% - 4%

6. Develop an oxygen/CO curve (for gaseous fuels) or oxygen/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.

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:

Fuel	**Measurement**	**Value**
Gaseous	CO Emissions	400 ppm
#1 & #2	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 threshold, 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 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, 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 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. Take a final combustion analysis for carbon monoxide concentration and oxygen concentration (also record the smoke-spot number for liquid fuels only). Note these readings, as well as the stack temperature and flame condition, in the *Rule 342 Tune-Up Report* as the *"Final As-Tuned Conditions."*

12. When the above checks and adjustments have been made, prepare a *Rule 342 Tune-Up Report*. The report shall include all recorded data and combustion analysis data for the unit; the name, title, signature, company name, and contact information of person performing the tune-up; and date the tune-up was performed. The *Rule 342 Tune-Up Report* shall clearly indicate the *"Initial As-Found Conditions"* and the *"Final As-Tuned Conditions"* and shall (if applicable) state whether the Carbon Monoxide emission standards were met.

<u>*NOTE*</u>
The owner/operator may propose an alternative tuning procedure that meets the same basic requirements of the procedure outlined above for District review and approval. The District may assess fees to reimburse its costs associated with the review of the alternative procedure under the cost reimbursement provisions of Rule 210, Fees. District approval of the alternative tuning procedure must be obtained prior to its use.

Figure 1 - Oxygen/CO Characteristic Curve

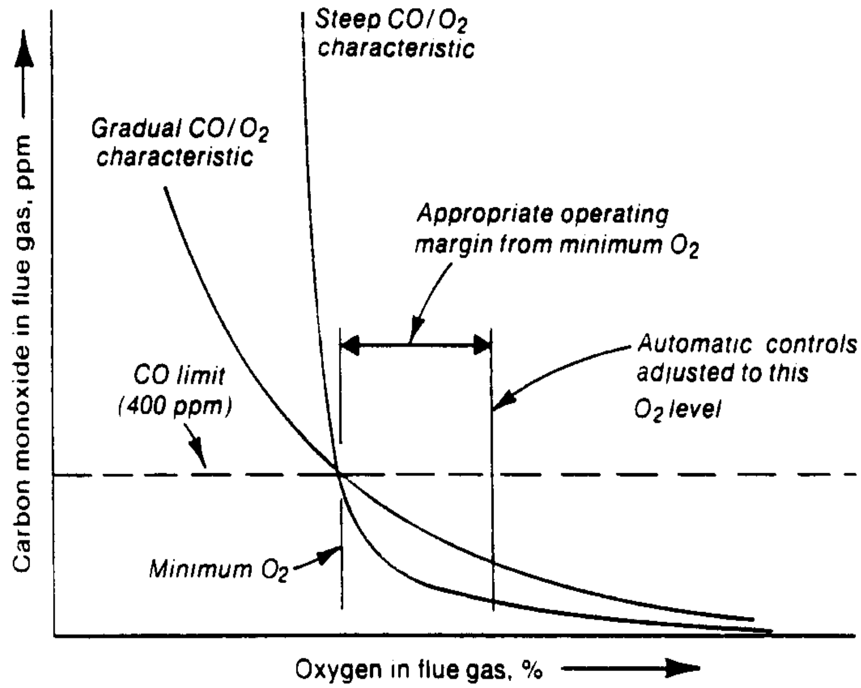
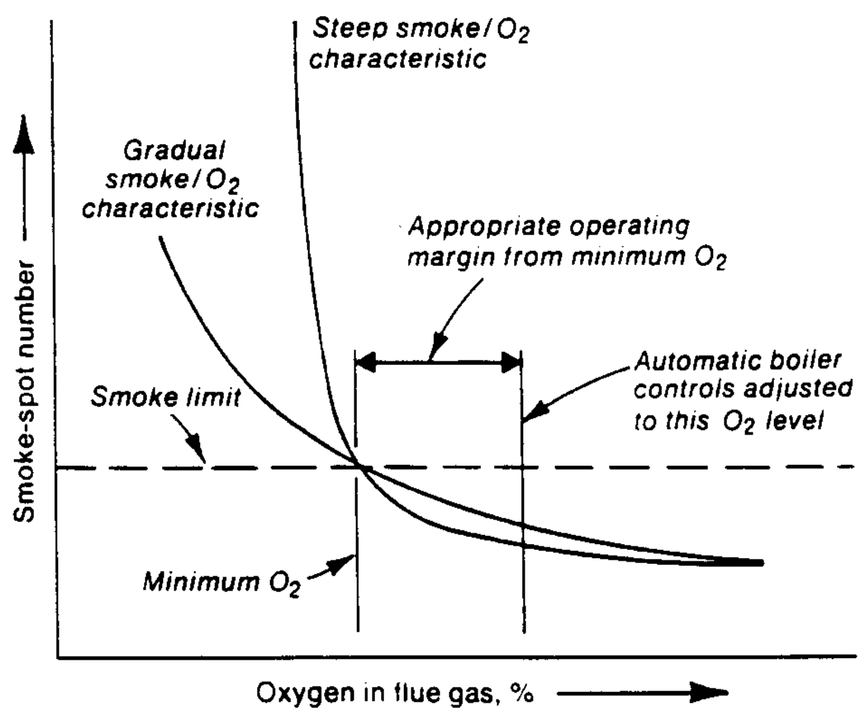


Figure 2 - Oxygen/Smoke Characteristic Curve



PROCEDURE B
Equipment Tuning Procedure for Natural Draft-Fired Equipment

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.

1. PRELIMINARY ANALYSIS

   a. Verify that the boiler, steam generator, or process heater (unit) is operating at the lowest pressure or temperature that will satisfy load demand. This pressure or temperature will be used as a basis for comparative combustion analysis before and after tune-up.

   b. Verify that the unit operates for the minimum number of hours and days necessary to perform the work required.

   c. Verify that the size of air supply openings is in compliance with applicable codes and regulations. Air supply openings must be fully open when the burner is firing and air flow must be unrestricted.

   d. Verify that the vent is in good condition, properly sized and free from obstruction.

   e. Perform an as-found (i.e., prior to any adjustments) combustion analysis for carbon monoxide concentration, oxygen concentration and measure the stack temperature and note the flame condition at both high and low fire, if possible. Note these readings in the *Rule 342 Tune-Up Report* as the *"Initial As-Found Conditions"*. Also record the following:

      (1) Inlet fuel pressure at burner at high and low firing rates.

      (2) Pressure above draft hood or barometric damper at high, medium, and low firing rates.

      (3) Steam pressure, water temperature, or process fluid pressure or temperature entering and leaving the unit.

      (4) Inlet fuel use rate if meter is available.

2. CHECKS AND CORRECTIONS

   a. Clean all dirty burners or burner orifices. Verify that fuel filters and moisture traps are in place, clean, and operating properly. Confirm proper location and orientation of burner diffuser spuds, gas canes, etc. Replace or repair all damaged or missing burner parts.

   b. Remove external and internal sediment and scale from heating surfaces.

   c. Verify that the necessary water or process fluid treatment is being used to minimize scale and corrosion. Confirm flushing and/or blowdown schedule.

   d. Repair all leaks. In addition to the high-pressure lines, check the blow-off, drain, safety valve, bypass lines, and, if used, the feed pump.

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 setting and verify that the setting is consistent with unit load requirements.

e. Check limit safety control and spill switch.

4. ADJUSTMENTS

Perform the following checks and adjustments on a warm unit at high fire:

a. Adjust unit to fire at the maximum inlet fuel use rate: record fuel manifold pressure.

b. Adjust draft and/or fuel pressure to obtain acceptable, clean combustion at high, medium, and low firing rates. The carbon monoxide value should not exceed 400 parts per million at 3% oxygen.

c. Verify that unit light-offs are smooth and safe. Perform a reduced fuel pressure test at both high and low firing rates in accordance with the manufacturer's instructions.

d. Check and adjust the modulation controller. Verify proper, efficient, and clean combustion through the range of firing rates.

When optimum performance has been achieved, record all data.

5. FINAL TEST

After adjustments, perform a final combustion analysis for carbon monoxide concentration, oxygen concentration, and measure the stack temperature and note the flame condition on the warm unit at high, medium, and low firing rates, if possible. Note these readings in the *Rule 342 Tune-Up Report* as the "*Final As-Tuned Conditions*". Also record the following:

i. Inlet fuel pressure at burner at high, medium, and low firing rates.

ii. Pressure above draft hood or barometric damper at high, medium, and low firing rates.

iii. Steam pressure, water temperature, or process fluid pressure or temperature entering and leaving the unit.

iv. Inlet fuel use rate if meter is available.

<u>*NOTE*</u>
The owner or operator may propose an alternative tuning procedure that meets the same basic requirements of the procedure outlined above for review and approval by the Control Officer. The District may assess fees to reimburse its costs associated with the review of the alternative procedure under the cost reimbursement provisions of Rule 210, Fees. Control Officer approval of the alternative tuning procedure must be obtained in writing prior to its use.