RULE 361. SMALL BOILERS, STEAM GENERATORS, AND PROCESS HEATERS. (Adopted [date of adoption])

A. Applicability

This rule shall apply to any boiler, steam generator, and process heater with a rated heat input capacity of greater than 2 million British thermal unit per hour and less than 5 million British thermal unit per hour.

B. Exemptions

1. The provisions of this rule shall not apply to:
   a. process heaters, kilns, furnaces, and dryers, where the products of combustion come into direct contact with the material to be heated.
   b. equipment that does not require a permit under the provisions of Rule 202.G.
   c. existing units until March 15, 2016.

2. Section D requirements shall not apply to any dual fuel unit while forced to burn nongaseous 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.

C. Definitions

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

“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 combustion equipment permitted to be fired with liquid and/or gaseous and/or solid fossil fuel, used to produce steam or to heat water. Boiler or Steam Generator does not include any unfired waste heat recovery boiler that is used to recover sensible heat from the exhaust of any combustion equipment.

“Existing Unit” means any unit installed prior to [date of adoption] which is not a modified unit as defined herein.

“Higher Heating Value (HHV)” means the total heat liberated per mass of fuel burned (British thermal unit per pound), when fuel and dry air at standard conditions undergo complete combustion and all resulting products are brought to their standard states at standard conditions.

“Modified Unit” means any unit that has a burner or burners replaced or where the unit is replaced in its entirety on or after [date of adoption]. Modified units are considered new units.

“New Unit” means any unit that is not an existing unit. A modified unit is considered a new unit.

“Process Heater” means any external combustion equipment permitted to be fired with liquid and/or gaseous fuel and/or solid fuel 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” (million British thermal units per hour) means the heat input capacity specified on the manufacturer’s nameplate of the combustion unit. 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.

“Unit” means any boiler, steam generator, or process heater.

“Utility Natural Gas” means natural gas supplied by a public gas utility company that meets Public Utility Commission quality pipeline standards as specified in General Order 58-A.

D. Requirements – Emission Standards

1. No owner or operator shall operate any new or modified unit or, after January 1, 2020, any existing unit, in excess of the following limits, subject to Section D.2 below:
   a. Oxides of Nitrogen emissions shall not exceed 30 parts per million by volume at 3 percent oxygen.
   b. Carbon Monoxide emissions shall not exceed 400 parts per million by volume at 3 percent oxygen.

2. The provisions of Section D.1 shall not apply to any existing unit that meets the following:
   a. The existing unit operates with an annual heat input, from all fuels, at or below 1.8 billion British thermal units per calendar year as verified by a District approved non-resettable temperature and pressure corrected totalizing fuel meter that is installed no later than December 31, 2016; and
   b. The owner or operator implements the District approved Rule 361 Compliance Plan required under Section K.3 for the life of the unit; and
   c. The owner or operator demonstrates to the Control Officer compliance with the requirements specified in Sections F, G, H and I.

E. Requirement - Loss of Low Use Exemption

Any owner or operator of any existing unit claiming the Section D.2 low use exemption where the unit’s annual heat input in any calendar year exceeds 1.8 billion British thermal units shall comply with the following:

1. Within 120 days after the end of the calendar year during which the unit exceeded 1.8 billion British thermal units of annual heat input, submit an Authority to Construct permit application for installation of control equipment or a replacement unit; and

2. Within 365 days after the end of the calendar year during which the unit exceeded 1.8 billion British thermal units of annual heat input, demonstrate to the Control Officer and maintain compliance with Section D.1 for the life of the unit; and

3. Maintain compliance with requirements of Section D.2 until compliance with Section D.1 is achieved.
F. **Requirements – Compliance Determination**

1. Any owner or operator of any unit fired exclusively on utility natural gas and any unit subject to Section D.2 shall be tuned-up pursuant to the requirements of Section I. The District may, at its discretion, require any owner or operator of any unit subject to this rule to perform a source test per the test methods listed in Section J. An owner or operator may choose to comply with this section by performing District-approved source testing in lieu of tune-ups.

2. Except for units subject to Section D.2, any owner or operator of any unit not fired exclusively on utility natural gas shall perform District-approved source testing not less than once every 24 months using the source test methods listed in Section J. After the third required compliance source test, the District may, at its discretion, allow the owner or operator of the unit to perform tune-ups in lieu of source testing per the requirements of Section I.

3. All emission determinations shall be made in the as-found operating condition, except no compliance determination shall be established during unit start up, shutdown, or under breakdown conditions. Start up or shutdown intervals shall not last longer than is necessary to reach stable temperatures and conditions.

4. Any owner or operator of any unit found not to be in compliance with Section D.1 requirements as a result of the tune-up procedure shall notify the District in writing within 7 days. The notification shall include a copy of the Rule 361 Tune-Up Report, the actions taken to get the unit into compliance, and the next steps to achieve compliance. Failure to bring the unit into compliance with the requirements of Section D.1 within 15 days of the initial tune-up attempt shall constitute a violation of this rule.

G. **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 be made available to District upon request.

1. Maintain Rule 361 Tune-Up Reports and test-firing records.

2. Source test reports.

3. For existing units subject to Section D.2:
   a. Monthly and annual fuel use logs for each fuel type.
   b. Meter calibration records.

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 and documentation of fuel sulfur content.

H. **Requirements – Reporting**

1. The records required pursuant to Section G shall be submitted to the District by March 1st for the prior calendar year.

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

I. **Requirements – Unit Tuning**

The owner or operator of any unit subject to the tune-up requirements of this rule shall comply with the following requirements:
1. Perform tuning at least twice per year, (at intervals from 4 to 8 months apart) in accordance with the procedures described in the attached District Rule 361 Tune-Up Procedures. Units subject to Section D.1 emission standards shall follow the procedure requirements to measure oxides of nitrogen and carbon monoxide levels using a District-approved calibrated portable analyzer.

2. If the unit does not operate throughout a continuous six-month period within a calendar year, then only one tune-up is required for that calendar year.

3. No tune-up is required during a calendar year for any unit that is not operated during that calendar year; this unit may be test fired to verify availability of the unit for its intended use but once test firing is completed it shall be shutdown. If test firing exceeds 24 hours per year, then tune-ups shall follow the requirements of Section I.1.

J. Requirements - Source Testing

1. The owner or operator of any unit subject to this Rule shall perform an initial source test on each unit at the time of installation and modification to verify compliance with the oxides of nitrogen and the carbon monoxide emission limits of Section D.1.a and D.1.b. After the initial source test, source tests shall be performed biennially to demonstrate compliance with Section D.1.a and Section D.1.b. For facilities with more than 10 units subject to Section D.1.a and Section D.1.b requirements, the Control Officer may, on a case-by-case basis, approve an alternate source test schedule for up to one half of the units every other year. Such a request shall be submitted with the Plan required in Section J.2.

2. The owner or operator of any unit subject to 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 approved 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 a unit 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 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 subject to source test requirements of this rule shall use the test methods and procedures below:
   a. Oxides of Nitrogen: Environmental Protection Agency Method 10 or Air Resources Board Method 100.
   b. Carbon monoxide: Environmental Protection Agency Method 7E or Air Resources Board Method 100.
   c. Fuel rate: District-approved metering system, calibrated within 60 calendar days of the test date. Public Utility Company regulated fuel meters relied on by operators for testing may be allowed an alternative calibration schedule upon approval by the Control Officer. Results must be corrected for pressure and temperature to standard conditions.
   d. Determination of the stack gas smoke-spot number using one of the following methods:
      2. Bacharach True Spot® Smoke Test Kit.
3. Alternative methods for determining the stack gas smoke-spot number approved by the Control Officer in writing.

e. Any alternative source test method approved in writing by the Control Officer that is found to be comparable in accuracy to the procedure in this Section and approved by the Air Resources Board and the Environmental Protection Agency.

f. At a minimum, three 30 minute test runs shall be performed for compliance with Sections J.4.a and J.4.b. The average concentration from the three test runs shall be used for determining compliance.

K. Compliance Schedule

The owner or operator of any unit subject to this rule shall meet the following compliance schedule:

1. Existing units shall apply for a Permit to Operate by [90 days from date of adoption] in accordance with Rule 202.

2. Obtain an Authority to Construct permit prior to installation or modification of any new or modified unit.

3. The owner or operator of any unit requesting the low use exemption in Section D.2 shall comply with the requirement to submit a Rule 361 Compliance Plan for District review and approval prior to March 15, 2016. The District approved fuel meters shall be installed by no later than December 31, 2016. The Rule 361 Compliance Plan shall include:
   a. The company name, District Facility ID number, facility address, current operating permit number, facility contact information.
   b. A list of all subject units with their rated heat input capacity, District Device ID number, anticipated annual heat input.
   c. 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.
   d. For each unit, identify which Rule 361 Tuning Procedure will be used (see Attachment).

4. On or before January 30, 2019, the owner or operator of any existing unit shall:
   a. For units subject to Section D.1 emission standards, apply for an Authority to Construct permit.
   b. For units subject to the Section D.2 low use provision, provide the annual fuel heat input data for years 2017 and 2018.

5. On or before January 1, 2020, the owner or operator of any unit shall demonstrate final compliance with this Rule.

L. Rule Effective Date

This rule is effective [date of adoption].
**ATTACHMENT**

**SBCAPCD Rule 361 Tune-Up Procedures**

**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.

As used in this procedure, the requirement to measure Oxides of Nitrogen (NOx) readings is only required if the unit being tuned is subject to the requirements of Section D.1 (i.e., 30 ppmvd at 3% oxygen [O2]). Only District-approved portable NOx and CO analyzers may be used. The analyzer shall be calibrated per ATSM Test Method D-6522-00 (reapproved 2005) prior to each use. Calibration records shall be submitted as part of the Rule 361 Tune-Up Report. Analyzer readings shall be taken pursuant to ATSM Test Method D-6522-00 (reapproved 2005). Steps in the Tune-Up Procedure below not applicable to specific units may be omitted.

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 carbon monoxide concentration and NOx concentration (also record the smoke-spot number for liquid fuels only) and the observed flame condition after unit operation stabilizes at the firing rate selected. Note these readings in the Rule 361 Tune-Up Report as the “Initial As-Found Conditions”. If the excess oxygen in the stack gas is at the lower end of the range of typical minimum values, and if the carbon monoxide emissions are low and there is not 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. For units subject to Section D.1, note whether the NOx and carbon monoxide values comply with the applicable limits.

---

1. These Rule 361 tune-up procedures differ from SCAQMD Rule 1146.1 and Ventura Rule 74.15.1 (e.g., NOx (as NO2) readings are required to be taken in addition to the CO reading if the unit is subject to Section D.1).

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


4. Typical minimum oxygen levels for boilers at high firing rates are:
   a. For natural gas: 0.5% - 3%
   b. For liquid fuels: 2% - 4%
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, oxygen concentration, carbon monoxide concentration, NOx concentration (also record the smoke-spot number5 for liquid fuels only), and the observed flame condition 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, carbon monoxide concentration, NOx concentration, smoke-spot number (for liquid fuels) and the observed flame 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 carbon monoxide concentrations greater than 400 ppmvd or NOx concentrations greater than 30 ppmvd (as corrected to 3% O2).
   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 oxygen/carbon monoxide curve (for gaseous fuels) or oxygen/smoke curve (for liquid fuels) similar to those shown in Figures 1 and 2 using the excess oxygen, carbon monoxide 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 carbon monoxide emissions or smoke-spot number equal the following values:

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaseous</td>
<td>carbon monoxide Emissions</td>
<td>400 parts per million</td>
</tr>
<tr>
<td>#1 &amp; #2 oils</td>
<td>smoke-spot number</td>
<td>number 1</td>
</tr>
<tr>
<td>#4</td>
<td>oil smoke-spot number</td>
<td>number 2</td>
</tr>
<tr>
<td>#5</td>
<td>oil smoke-spot number</td>
<td>number 3</td>
</tr>
<tr>
<td>Other oils</td>
<td>smoke-spot number</td>
<td>number 4</td>
</tr>
</tbody>
</table>

The above conditions are referred to as carbon monoxide 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 non-repeatability 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 4 result, reset the combustion controls to provide a slightly higher level of excess oxygen at the affect 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 NOx concentration, carbon monoxide concentration and oxygen concentration. Note these readings, as well as the stack temperature and flame condition, in the Rule 361 Tune-Up Report as the “Final As-Tuned Conditions”. Confirm that the final settings result in compliance with the regulatory limits. If compliance with Section D.1 is not achievable, takes actions and provide notification to the District pursuant to the requirements of Section F.4.

12. When the above checks and adjustments have been made prepare a Rule 361 Tune-Up Report. The report shall include all recorded data and combustion analysis data for the unit; the manufacturer, model number and serial number of the portable NOx/CO analyzer; the name, title, signature, company name, and contact information of person performing the tune-up; and date the tune-up was performed. The Rule 361 Tune-Up Report shall clearly indicate the “Initial As-Found Conditions” and the “Final As-Tuned Conditions” and shall (if applicable) state whether Section D.1 emission standards for NOx and carbon monoxide were met. Calibration records shall be submitted as part of the Rule 361 Tune-Up Report.

**NOTE**
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 using either Section I.C.d or Section III.C of Rule 210. District approval of the alternative tuning procedure must be obtained prior to its use.
Figure 1
Oxygen/Carbon Monoxide 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.

As used in this procedure, the requirement to measure Oxides of Nitrogen (NO\textsubscript{x}) readings is only required if the unit being tuned is subject to the requirements of Section D.1 (i.e., 30 ppmvd at 3% oxygen [O\textsubscript{2}]). Only District-approved portable NO\textsubscript{x} and CO analyzers may be used. The analyzer shall be calibrated per ATSM Test Method D-6522-00 (reapproved 2005) prior to each use. Calibration records shall be submitted as part of the Rule 361 Tune-Up Report. Analyzer readings shall be taken pursuant to ATSM Test Method D-6522-00 (reapproved 2005). Steps in the Tune-Up Procedure below not applicable to specific units may be omitted.

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, NO\textsubscript{x} 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 361 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. 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.

   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.

c. 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, NOx 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 361 Tune-Up Report* as the “Final As-Tuned Conditions”. Also record the following:

- i. Inlet fuel pressure at burner at high 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.

If the unit is subject the Section D.1 limits for NOx (30 ppmvd at 3% O2) and carbon monoxide (400 ppmvd at 3% O2), confirm that the final settings result in compliance with the regulatory limits. **If compliance is not achievable, takes actions and provide notification to the District pursuant to the requirements of Section F.4.**

6. **Rule 361 Tune-Up Report**

When the above checks and adjustments have been made, prepare a *Rule 361 Tune-Up Report*. The report shall include all recorded data and combustion analysis data for the unit; the manufacturer, model number and serial number of the portable NOx/CO analyzer; the name, title, signature, company name and contact information of person performing the tune-up; and date the tune-up was performed. The *Rule 361 Tune-Up Report* shall clearly indicate the “Initial As-Found Conditions” and the “Final As-Tuned Conditions” and shall (if applicable) state whether Section D.1 emission standards for NOx and CO were met. Calibration records shall be submitted as part of the *Rule 361 Tune-Up Report*.

**NOTE**
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 using either Section I.C.d or Section III.C of Rule 210. Control Officer approval of the alternative tuning procedure must be obtained in writing prior to its use.