



Air Pollution Control Board
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June 1, 1994

TO: Rule 69.2 (Industrial and Commercial Boilers, Process Heaters and
Steam Generators)
Workshop Participants and Other Interested Parties

FROM: Richard J. Smith
Deputy Director

RULE 69.2 - FINAL RULE AND WORKSHOP REPORT

Attached for your review are the Workshop Report and the final Rule 69.2 (Industrial and Commercial Boilers, Process Heaters and Steam Generators) that will be considered for adoption by the Air Pollution Control Board. The socioeconomic impact assessment is being presently conducted and will be provided to you as soon as possible. The rule will likely be scheduled for public hearing in September, 1994.

Please note, that in response to ARB comments on the exemption level for the low usage equipment subject to this rule, the District has committed to closely monitor the number of boilers operating below 220,000 therms annual heat input and below 10% annual capacity factor. The District will also monitor fuel usage and emissions from such boilers. If it appears that the number of boilers using this exemption and their emissions are significantly increasing, the District will reevaluate the effectiveness of the rule and revise the rule accordingly.

If you have any questions, please call Natalie Zlotin at (619) 694-3312 or me at (619) 694-3303.

RICHARD J. SMITH
Deputy Director

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Attachments

**AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO**

WORKSHOP REPORT

**RULE 69.2
INDUSTRIAL AND COMMERCIAL BOILERS, PROCESS HEATERS
AND STEAM GENERATORS**

A workshop notice was mailed to owners and operators of industrial and commercial boilers, process heaters and steam generators in San Diego County. Notices were also mailed to all Economic Development Corporations and Chambers of Commerce in San Diego County, the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and other interested parties.

The workshop was held on November 19, 1993 and was attended by 32 people. The comments received and District responses are as follows:

1. WORKSHOP COMMENT:

Some boilers do not have a dedicated fuel meter to indicate fuel usage. How will owners and operators prove the past history or past operation of their boilers?

DISTRICT RESPONSE:

Without a dedicated fuel meter, a facility would initially have to estimate a boiler's annual fuel usage from fuel purchase records. In the application for an Authority to Construct, the owner or operator will indicate the anticipated annual heat input or annual capacity factor to determine the appropriate level of control. The rule has been revised to require fuel meters for boilers which will be expected to operate below 220,000 therms or 10% capacity factor, and for dual-fuel boilers which burn liquid fuels for periods other than emergencies, natural gas curtailment or maintenance.

2. WORKSHOP COMMENT:

Does the proposed rule make any distinction between low-pressure and high-pressure boilers?

DISTRICT RESPONSE:

No, the rule applies to any boiler with a rated heat input of 5 MM Btu/hr and greater regardless of pressure rating.

3. WORKSHOP COMMENT:

Rule 69.2 exempts boilers with an annual heat input less than or equal to 220,000 therms from the emission standards requirements. How many non-exempt boilers would have to install control equipment in order to comply with the emission standards of the rule?

DISTRICT RESPONSE:

Due to the limited information available on fuel usage for each potentially affected boiler, the District at this time cannot provide the exact number of boilers that would require the installation of control equipment. In addition, some boilers with a heat input rating less than 50 MM Btu/hr are

currently exempt from permit requirements pursuant to Rule 11 and, therefore, are not in the District's general permit file. The District estimates that about 50 boilers will be subject to the emission standard requirements of Rule 69.2.

4. WORKSHOP COMMENT:

The standards of Subsection (d)(1) do not apply to boilers 50 MM Btu/hr and smaller with less than 220,000 therms annual heat input, or to boilers greater than 50 MM Btu/hr and less than 10% annual capacity factor. How were these exemption levels determined?

DISTRICT RESPONSE:

These exemption levels were based on the cost-effectiveness of NOx controls. The exemption based on an annual heat input of 220,000 therms was determined from the District's evaluation of the appropriate NOx control technology for 5 and 10 MM Btu/hr boilers, the smallest boilers subject to the rule, operating at various annual heat input levels. The exemption based on an annual capacity factor of 10% was determined using information supplied by the affected industry for large boilers greater than 50 MM Btu/hr. It was shown that for small boilers operating below 220,000 therms annual heat input, and for large boilers operating at less than 10% capacity factor, the cost-effectiveness exceeds \$7 per pound of NOx reduced. This represents the maximum cost-effectiveness that the District believes is appropriate and corresponds to the upper range of the estimated cost-effectiveness of proposed District Rule 69 for Electric Utility Boilers.

5. WORKSHOP COMMENT:

Will agricultural boilers be affected by the rule?

DISTRICT RESPONSE:

No. Section 42310 of the California Health & Safety Code exempts any equipment used in agricultural operations from permit requirements. The rule has been revised to specifically exempt such boilers.

6. WORKSHOP COMMENT:

Do Subsections (h)(2) and (h)(3) require that emissions from boilers not affected by the rule be included in calculations of the total emissions from a stationary source? In addition, the term "all units" should be clarified in these subsections.

DISTRICT RESPONSE:

Subsections (h)(2) and (h)(3) have been revised. Total emissions from the stationary source are no longer included in the requirements of the proposed rule.

7. WORKSHOP COMMENT:

Would a heat recovery steam generator (HRSG) from a turbine be affected by the rule?

DISTRICT RESPONSE:

No. Subsection (b)(1)(ii) specifically exempts "waste heat recovery boilers that are used to recover heat from the exhaust of gas turbines...". The definition of boiler, Subsection (c)(2), also excludes HRSGs.

8. WORKSHOP COMMENT:

Would a boiler with a rated heat input of less than 5 MM Btu/hr, operating more than 220,000 therms per year, be subject to the rule?

DISTRICT RESPONSE:

No. Boilers with a rated heat input less than 5 MM Btu/hr, regardless of the annual heat input, are exempt from all requirements of Rule 69.2.

9. WORKSHOP COMMENT:

Does this rule apply to the boiler output or to the burner rated input?

DISTRICT RESPONSE:

The rule applies to the rated heat input of the burner or combination of burners.

10. WORKSHOP COMMENT:

Can burners be derated to less than 5 MM Btu/hr?

DISTRICT RESPONSE:

Yes, the District would allow a facility to derate a burner below 5 MM Btu/hr provided that the modifications are permanent.

11. WORKSHOP COMMENT:

If a boiler is currently exempt from permit requirements, would an application for an authority to construct (A/C) be required to derate the boiler to less than 5 MM Btu/hr?

DISTRICT RESPONSE:

No, an application to derate a non permitted boiler will not be necessary at the present time. However, in order to implement and enforce Rule 69.2, Rule 11, Exemption from Permit Requirements, will be amended to require permits for all boilers 5 MM Btu/hr and greater. The effective date for these amendments to Rule 11 will occur before the due date that applications should be submitted to the District. Before that time, an application will not be required provided that modifications to derate the boiler are permanent and are completed prior to the effective date of Rule 11 amendments.

In the future, the District may determine that boilers less than 5 MM Btu/hr must be registered or permitted.

12. WORKSHOP COMMENT:

Will proposed Rule 69.2 be submitted as a revision to the State Implementation Plan (SIP)?

DISTRICT RESPONSE:

Yes. Some facilities subject to Rule 69.2 are major sources of NOx emissions (25 tons per year or more). The Federal Clean Air Act requires the District to adopt rules reflecting reasonably available control technology (RACT) for all major sources of NOx emissions and submit them as a SIP revision before October 15, 1994. Rule 69.2 meets these requirements.

13. WORKSHOP COMMENT:

Will amendments to Rule 68 be submitted to EPA to satisfy federal requirements of reasonably available control technology (RACT)?

DISTRICT RESPONSE:

Yes. The District continues to work on these amendments and will submit amended Rule 68 to EPA as a SIP revision before October 21, 1994.

14. WORKSHOP COMMENT:

Is there a certain season when ozone levels are higher during which it may be more beneficial to control NOx emissions?

DISTRICT RESPONSE:

Typically, ozone levels are higher in the summer and early fall than in the winter or spring. However, federal and state laws require the District to implement year round control measures to reduce emissions of ozone precursors such as nitrogen oxides. These requirements apply regardless of the season.

15. WORKSHOP COMMENT:

Will rental units be subject to the rule?

DISTRICT RESPONSE:

Yes, any rental unit larger than 5 MM Btu/hr will be affected by the rule. The owner of a rental unit will be responsible for compliance with applicable provisions of the rule. In addition, proposed revisions to the District's New Source Review rules regarding portable equipment will also apply.

16. WRITTEN COMMENT:

Some companies in California offer a low-nitrogen fuel oil. The amount of fuel-bound nitrogen is about 10 ppm. The use of this fuel may significantly reduce NOx emissions.

DISTRICT RESPONSE:

Low-nitrogen fuel oil can be used as a part of a strategy to comply with the emission standards of Rule 69.2. Other NOx emission reduction measures, in addition to low-nitrogen fuel oil, will likely also be needed to comply with Rule 69.2.

17. WRITTEN COMMENT:

Subsections (g)(1) and (g)(2) require the warm-up procedure to hold the boiler at 80% heat input for two hours with interruptions less than 30 minutes in aggregate. A cyclically operating boiler cannot meet this requirement. Subsections (g)(1) and (g)(2) should be amended to include the statement "boiler must operate normally for an aggregate four-hour period."

DISTRICT RESPONSE:

Subsections (g)(1) and (g)(2) contain separate requirements. Subsection (g)(2) does not require that the boiler be held at 80% heat input during the warm-up procedure. Regarding the cyclically operating boiler in question, the District has obtained information from the operator of this boiler and has determined that it can comply with requirements of these subsections.

18. WRITTEN COMMENT:

A cyclically operating boiler might not be able to operate for 15 consecutive minutes. Subsection (g)(3) should be amended to state "based on a 15-minute averaging period, samples will be taken at five consecutive data sets while the boiler is operating at 80% heat input or better."

DISTRICT RESPONSE:

As discussed in Comment #17 above, the District has determined that a revision of this subsection is not necessary.

19. WRITTEN COMMENT:

Section (j), "Tuning Procedure," indicates that the tune-up procedure should not result in any unsafe condition, or violate any safety or fire regulation. Therefore, Section (j) should be amended to allow for a facility to use the manufacturer's recommended tune-up procedure, as approved by the District.

DISTRICT RESPONSE:

The District agrees. Language has been added to allow for alternative tune-up procedures as recommended by the boiler manufacturer, provided that the procedure has been approved by the District prior to being used.

20. WRITTEN COMMENT:

For boilers which burn liquid fuel, the cost-effectiveness determination should include expenses for conversion to low-nitrogen fuel oils. This option may be desirable for certain industrial/commercial operations and is potentially a significant cost consideration which should be weighed in determining the cost effectiveness of the rule. Industry should be given wide latitude in as many compliance options as possible.

DISTRICT RESPONSE:

The proposed rule does not preclude the use of low-nitrogen fuels for those sources which elect that option. The District did evaluate the cost-effectiveness of converting to low-nitrogen fuel oils and found the cost-effectiveness to be significantly higher than \$7/lb of NOx reduced. However, most of the boilers in San Diego County burn liquid fuel only as a backup and would not need to convert to low-nitrogen fuels. Therefore, such conversion costs were not included in the cost-effectiveness evaluation. In addition, the rule provides for exemption from the emission standards during natural gas curtailment, emergencies and equipment testing of the backup fuel system.

21. WRITTEN COMMENT:

Several factors, such as economic downturns and customer needs, greatly influence the capacity factor of a boiler. Boilers which operate with annual heat inputs close to 220,000 therms may require control equipment, even though the annual heat input may be less than 220,000 therms. It is suggested to raise the exemption level cutoff from 220,000 therms to 250,000 therms or more.

DISTRICT RESPONSE:

The District disagrees. As was stated in Comment #4, the 220,000 therms exemption level cutoff was based on a cost-effectiveness analysis. That analysis does not indicate that an exemption level greater than 220,000 therms can be justified based on cost-effectiveness, nor would such an exemption level be approvable by ARB.

22. WRITTEN COMMENT:

The calculation of annual heat input should exclude the use of liquid fuel during natural gas curtailment periods. This would be consistent with the exemption for boilers operating on liquid fuels during certain emergency or testing periods as contained in Subsections (b)(2)(i) and (b)(2)(ii).

DISTRICT RESPONSE:

The District agrees. Subsection (c)(1) has been revised to exclude the use of liquid fuel during emergencies, during natural gas curtailment and during equipment testing of the fuel oil back-up system.

23. WRITTEN COMMENT:

For boilers with an annual heat input less than 220,000 therms per year, the Workshop Notice and proposed Rule 69.2 cite different requirements with respect to compliance with the NOx emission standards. The Workshop Notice states that such boilers would have to comply only with the NOx emission standards. Rule 69.2, Subsection (d)(2)(iv), states that both NOx and carbon

monoxide (CO) emission standards would have to be met. Please clarify which operational standard is intended: keeping only the NOx below 30 ppm, or also keeping the CO below 400 ppm.

DISTRICT RESPONSE:

For boilers operating below 220,000 therms per year, boiler owners and operators can choose one of four options available as indicated in Subsection (d)(2). These options include the following: maintain stack-gas oxygen concentration to 3% by volume; use an oxygen trim system to maintain stack-gas oxygen concentration to 3% by volume; conduct annual tune-ups; or comply with the NOx and CO emission standards as indicated in Subsections (d)(1) and (d)(3). If an owner or operator chooses to meet the emission standards, then the rule requires that such boilers meet both NOx and CO emission concentration limits. The requirement to comply with the CO emission standard was inadvertently omitted from the Workshop Notice.

24. WRITTEN COMMENT:

If a boiler with an annual heat input less than 220,000 therms per year must also meet the CO emission standard, then there is no difference in the requirements for boilers with low annual heat input. All boilers would require annual source testing to meet the standards of Subsections (d)(1) and (d)(3).

DISTRICT RESPONSE:

As discussed in Comment #23, there are a total of four options in Subsection (d)(2) available for boilers operating below 220,000 therms per year. The provision to comply with the NOx and CO emissions standards is one option and only applies if a facility chooses to meet the emission standards pursuant to Subsection (d)(2)(iv).

25. WRITTEN COMMENT:

There appears to be a contradiction between the exemption for process heaters and the definition, (c)(11), for "Process Heater." Specifically, Subsection (b)(1)(iii) exemption allows for direct contact between materials being heated and combustion gases and Subsection (c)(11) definition does not.

DISTRICT RESPONSE:

The intent of the exemption, Subsection (b)(1)(iii), and of the definition of "process heater," Subsection (c)(11), was to ensure that the rule would not apply to combustion equipment in which the products of combustion are in direct contact with materials being heated. Subsection (b)(1)(iii) has been revised to clarify the intent.

26. WRITTEN COMMENT:

Definitions for "furnace" and "kiln" should be added to the rule.

DISTRICT RESPONSE:

The District disagrees. As discussed in Comment #25 above, the revision to Subsection (b)(1)(iii) clarifies that furnaces and kilns where the products of combustion are in direct contact with materials being heated are exempt from the rule.

27. WRITTEN COMMENT:

The rule should specifically exempt a rotary kiln used in a waste recycling operation.

DISTRICT RESPONSE:

As discussed above in Comment #26, a rotary kiln used in a waste recycling operation would be exempt from the rule based on the definition of "process heater," Subsection (c)(12).

28. WRITTEN COMMENT:

Fuel consumption can be determined by a calculation based on operating hours (at full load) in lieu of installing fuel flow meters for each boiler, process heater and/or steam generating unit. This will reduce the costs of compliance for most facilities. A main fuel flow meter for the facility can be used to verify the accuracy of fuel usage. Rule 69.2 should allow for this option.

DISTRICT RESPONSE:

The District disagrees. Using operating hours to determine fuel usage would only be valid when the boiler operates at full load unless there is a definitive method to measure the operating load of the boiler. Most boilers do not operate at full load. The District estimates the cost of fuel meters to be approximately \$2500, including installation, for a boiler with both liquid fuel and natural gas capability. Including the costs of fuel meters increases the cost-effectiveness for a 5 MM Btu/hr boiler at 220,000 therms by only \$0.28 per pound of NO_x reduced.

As discussed in Comment #1, the rule has been revised to require fuel meters for boilers which will be expected to operate below 220,000 therms or 10% capacity factor, and for dual-fuel boilers which burn liquid fuels for periods other than emergencies, natural gas curtailment or maintenance.

29. WRITTEN COMMENT:

The District should generate a standardized form for boiler tune-up procedures. This form should include the steps for complying with tune-up requirements along with a sample of a properly filled-out form for comparison. This will help ensure consistency for all sources choosing to comply with Rule 69.2 using the tune-up option.

DISTRICT RESPONSE:

The District agrees. The standardized form will be sent along with an advisory notice to all sources subject to the requirements of Rule 69.2 approximately six months before applications for an Authority to Construct are due. A draft of the proposed form will be made available in advance to affected industry.

30. WRITTEN COMMENT:

The frequency of required source testing cannot be accomplished on an annual basis for all affected sources due to the lack of available and qualified source testing resources, both public and private. Furthermore, the cost to a facility will be unnecessarily high and only serve to aggravate an already depressed total economy. It is recommended that an initial source test be performed prior to the final compliance date as per Section (h) of this rule with subsequent testing once every five (5)

years. For major sources, this would concur with the Title V permit renewal cycles. This testing schedule would reduce the cost of meeting annual source testing requirements for all affected sources. For smaller sources, the cost burden of annual source testing might be overwhelming.

DISTRICT RESPONSE:

The ARB RACT/BARCT Guidance Document states that source testing shall be performed at least once every 12 months, and other districts have adhered to this requirement. The District has provided affected sources with some flexibility as indicated in Subsection (g)(4). In order to adequately determine the frequency of future renewal source testing, the District will have to address several issues such as the applicability of Title V requirements, the compliance history of a boiler, and the availability of certified source testing companies. It should also be noted that the cost of annual source testing was included in the cost-effectiveness evaluation of Rule 69.2.

31. WRITTEN COMMENT:

The District should develop a uniform test protocol for all sources subject to this rule.

DISTRICT RESPONSE:

The District agrees. A uniform test protocol will be developed and made available approximately two years after the adoption date of the rule. This would coincide with the compliance schedule in the rule when applications for Authorities to Construct should be submitted to the District.

32. WRITTEN COMMENT:

The District should allow a source test to be performed on one unit if a stationary source has multiple, identical units subject to this rule. This test would be representative for all those identical units.

DISTRICT RESPONSE:

The District disagrees. Although combustion in boilers is generally fairly stable, several factors can influence boiler emissions such as boiler age, operating history, and proper tuning. Identical boilers can perform differently under source test conditions. The frequency and scope of retesting may consider comparable NOx and CO control performance of identical boilers.

33. WRITTEN COMMENT:

The District should publish a guideline fee schedule for permitting costs and permit processing times associated with this rule.

DISTRICT RESPONSE:

The District will revise the appropriate fee schedules contained in Rule 40 prior to the date when applications for an Authority to Construct are due. The fees will be determined in accordance with the District's established methods for fee calculations and will either be fixed or based on the actual time expended on processing each application.

34. WRITTEN COMMENT:

Every effort should be made to streamline the review and approval of the applications for an Authority to Construct and compliance plans. Affected industries are willing to assist the District to achieve these goals.

DISTRICT RESPONSE:

The District welcomes the offer of assistance from affected industries to streamline the permitting process for this rule. The District intends to form a work group within the next year to accomplish this.

35. WRITTEN COMMENT:

The estimated average cost-effectiveness of Rule 69.2 is \$6 to \$7/lb of NO_x reduction, but may be much higher in some cases. By contrast, the estimated cost-effectiveness of draft Rule 69 (Electrical Generating Boilers) is \$3.86/lb. It is suggested to amend Rule 69.2 to ensure that its cost-effectiveness is comparable to Rule 69.

DISTRICT RESPONSE:

The cost-effectiveness of recently adopted Rule 69 varies depending on future operations of the system of utility boilers. The upper range of Rule 69 cost-effectiveness is approximately \$6 to \$7 per pound of NO_x reduced. The maximum cost-effectiveness of control equipment for Rule 69.2 is comparable. As discussed in Comment #4, it corresponds to the worst case scenario: the cost of meeting the emission standards of the rule for small boilers (5 and 10 MM Btu/hr) with an annual heat input of 220,000 therms, and for boilers greater than 50 MM BTU/hr with an annual capacity factor of 10%. The cost-effectiveness of boilers operating at higher capacities are expected to be lower.

36. WRITTEN COMMENT:

Rule 69.2 should be revised to include an exemption level cutoff for large boilers based on a 10% annual capacity factor. For boilers greater than 150 MM Btu/hr at 220,000 therms (1.3% capacity factor), the cost-effectiveness was calculated to be \$34.71/lb. The APCD has estimated an average cost-effectiveness for Rule 69.2 of \$6 to \$7/lb.

DISTRICT RESPONSE:

The District agrees. The rule has been revised to exempt boilers greater than 50 MM Btu/hr and operating less than 10% capacity factor from complying with the emission standards of the rule. This exemption level cutoff was based on a cost-effectiveness analysis which evaluated the cost of the control technology at various capacity factors from 1 to 50%.

37. WRITTEN COMMENT:

The present draft of Rule 69.2 exempts gas turbine waste heat recovery boilers, and auxiliary boilers that are used in conjunction with utility boilers, which are regulated under Rule 69. Auxiliary boilers, such as a package boiler that is a backup unit for a gas turbine waste heat boiler, should also be exempted.

DISTRICT RESPONSE:

The District disagrees. A package boiler such as that described is a stand-alone unit and does not qualify as an auxiliary boiler for a utility boiler. An auxiliary boiler subject to Rule 69 is located at the same site as the utility boiler and augments the steam produced by the utility boiler.

38. WRITTEN COMMENT:

Rule 69.2 should include a provision for Alternative Emission Control Plans (AECPs). This would allow each site, or each owner, to combine, or "bubble," its emissions in order to obtain the required emission reductions in the most cost-effective manner. The principle of aggregating emissions from several units, in order to reduce the cost of control, has been recognized in the Acid Rain provisions of the FCAA, Rule 69, SCAQMD's Reclaim program and other NOx emission reduction rules.

AECPs have been accepted by ARB in order to meet the BARCT requirements of the California Clean Air Act. Although the EPA imposed stringent requirements on AECPs proposed as part of earlier VOC regulations, Rule 69.2 may not require EPA approval.

DISTRICT RESPONSE:

Rule 69.2 will be submitted to EPA as a part of the revised State Implementation Plan (SIP), and, therefore, will have to comply with federal requirements. However, the District agrees with the concept suggested and intends to revise Rule 67.1, Alternative Emission Control Plans, to also include sources subject to rules for NOx emission sources.

39. WRITTEN COMMENT:

The rule effectively prohibits the burning of fuel oil in boilers using only liquid fuel, because it requires substituting the current fuel oil with a low-nitrogen fuel oil in addition to control equipment. The calculations show that for any such boiler, the cost-effectiveness is about \$100/lb for all annual heat inputs. By contrast, Rule 69.2 has an estimated average cost-effectiveness of \$6 to \$7/lb.

DISTRICT RESPONSE:

The District agrees that converting a boiler using a conventional liquid fuel to low-nitrogen fuel oil is not cost-effective. However, it may be advisable to convert such a boiler to natural gas. The District evaluated the cost-effectiveness of converting a liquid fuel-fired boiler to natural gas, combined with control equipment such as low-NOx burners. For a 150 MM Btu/hr boiler, the cost-effectiveness at 10% capacity factor was found to be \$8.90/lb of NOx reduced. Therefore, the proposed rule has been revised to exempt large boilers operating below 10% annual capacity factor from the emission standard requirements.

There are only two existing, permitted boilers in San Diego County which burn liquid fuel only. Both operate below 10% capacity factor. With the revision to Rule 69.2, these boilers would not be required to meet the emission standards of the rule.

40. WRITTEN COMMENT:

It may be desirable to convert a boiler using liquid fuel to natural gas. This will require a change to the Permit to Operate. Although emissions would not increase, the provisions of APCD Rule 20.2(d) might require Lowest Achievable Emission Rate (LAER), or Best Available Control Technology (BACT), and to reduce emissions below those required by Rule 69.2. The rule should be revised to ensure that the fuel change, from oil to natural gas, does not require BACT or LAER.

DISTRICT RESPONSE:

The conversion from liquid fuel to natural gas is not expected to result in an emissions increase. Proposed revisions to New Source Review rules, specifically, proposed Rule 20.1(b)(2)(iv), exempts the use of alternate fuels provided that there is no emissions increase. Therefore, New Source Review rules should not apply.

41. WRITTEN COMMENT:

The District should encourage owners to reduce emissions before the effective dates of Rule 69.2, by allowing banking of additional emission reductions as Emission Reduction Credits (ERCs). However, Rule 26.0 (c)(3), Rule 26.2 (a)(2) and Rule 26.9 (b) impose restrictions on ERC banking for emissions control measures that are included in the State Implementation Plan (SIP).

DISTRICT RESPONSE:

Under the current banking rules, if emissions are reduced prior to adoption of Rule 69.2, then ERCs may be eligible for banking. Since Rule 69.2 will be submitted to EPA as a SIP revision, then temporary ERCs may be issued under Rule 26.9, provided that ERCs occur two years before the applicable compliance date.

However, such ERCs would only be valid up to the compliance date of Rule 69.2 and cannot be used to permanently offset emission increases from new and modified sources.

42. ARB COMMENT:

Subsection (b)(1)(iv) exempts thermal oxidizers and associated waste-heat recovery equipment. This exemption should either be eliminated, or be allowed only for specified equipment where NOx emission control is not technologically feasible or cost-effective.

DISTRICT RESPONSE:

The District disagrees. The function and operation of thermal oxidizers differs from boilers. The main purpose of a thermal oxidizer is to combust an organic-laden gas stream, not to generate steam or hot water. A waste heat recovery steam generator is placed in the exhaust duct simply to recoup some of the energy costs.

In addition, an organic-laden gas stream is in direct contact with the products of combustion from a thermal oxidizer. Both the RACT/BARCT Guidance Document and proposed Rule 69.2 exempt combustion equipment where the material being heated is in direct contact with the products of combustion.

It should also be noted that there are only three thermal oxidizers in San Diego County. NOx emissions from these thermal oxidizers are estimated at less than 0.5 ton/year.

(Following the workshop, ARB has since concurred that the rule will not apply to thermal oxidizers.)

43. ARB COMMENT:

Section (d), Standards, requires units with annual heat inputs of 220,000 therms or more to comply with emission standards and units with annual heat inputs of less than 220,000 therms to comply with operational procedures. This cutoff is much higher than the annual heat input cutoffs contained in the adopted rules of other districts and the best available retrofit control technology (BARCT) determination for industrial boilers. At this level, the cost-effectiveness is within the range specified in the District's 1991 Regional Air Quality Strategy. Therefore, we recommend that the annual heat input exemption level cutoff be 90,000 therms.

DISTRICT RESPONSE:

The District disagrees. The range of cost-effectiveness values in the RAQS was obtained considering all technologically feasible control measures regardless of their economic viability. The RAQS specifically states that some cost-effectiveness estimates represent control alternatives unlikely to be implemented by affected industries because of their costs.

The District provided to the ARB a thorough economic analysis of the anticipated cost of the control technology using the cut-off limit suggested in the RACT/BARCT Determination. It showed that the cost-effectiveness of emission control at this level will be between \$14 and \$17 per pound of NO_x reduced which is much higher than the cost-effectiveness of other District rules, or the highest value adopted in California as indicated in the ARB Cost-Effectiveness Guidance Document. In addition, the air quality benefit of such an expensive control measure would be minimal. At the cut-off level suggested by ARB staff, the incremental amount of NO_x emissions reduced will be only five tons per year, or less than 2% of the total NO_x emissions from industrial and commercial boilers.

The cut-off level of 220,000 therms corresponds to a cost-effectiveness of \$6 to \$7/lb of NO_x reduced for 5 to 10 MM Btu/hr boilers. Likewise, the cut-off level of 10% annual capacity factor for boilers greater than 50 MM Btu/hr corresponds to a cost-effectiveness of \$6 to \$7/lb of NO_x reduced. This is comparable to the upper range of cost-effectiveness of District Rule 69 for utility boilers. Considering the present economic situation in California and the growing public concern with the economic burden of environmental regulations, the District believes that the proposed rule represents a prudent balance between regulatory costs and anticipated air quality benefits.

The District will closely monitor the number of boilers operating below 220,000 therms annual heat input and below 10% annual capacity factor. The District will also monitor fuel usage and emissions from such boilers. If it appears that emissions from such boilers are increasing significantly, then the District will reevaluate the effectiveness of the rule and revise the rule accordingly. It should be noted that a new boiler installed after adoption of the rule would be subject to New Source Review (NSR) rules and would likely have best available control technology. NSR would assist in limiting emissions growth from such boilers.

As discussed in Comment #1, the rule has been revised to require fuel meters for boilers operating below the indicated exemption levels. These fuel meters will be instrumental in recording fuel usage to develop the needed information.

44. EPA COMMENT:

Continuous monitors must satisfy the federal requirements for installation, calibration, and maintenance as found in 40 CFR 51, Appendix P, since stack-gas oxygen content will be used as an operational parameter to indicate compliance. Other requirements for continuous monitors are found in 40 CFR 60.13. Subsection (e)(2) should be revised to include federal requirements.

DISTRICT RESPONSE:

Subsections (e)(2) and (f)(3) have been revised to ensure that continuous monitors will be installed in accordance with all federal, state and local regulations.

45. EPA COMMENT:

The annual heat input de minimis level of 220,000 therms is inconsistent with the level of 90,000 therms established by the RACT/BARCT Guidance Document for boilers, steam generators, and process heaters.

DISTRICT RESPONSE:

Please refer to the response to Comment #43 above.

46. EPA COMMENT:

Subsection (d)(i)(iii) should refer to Subsections (d)(1)(i) and (d)(1)(ii) instead of (d)(2)(i) and (d)(2)(ii).

DISTRICT RESPONSE:

The rule has been revised as suggested.

47. EPA COMMENT:

In Subsection (d)(1)(iii), parentheses should be placed around H_g and H_l in the equation for heat-input weighted average, to clearly indicate multiplication by the emission limits.

DISTRICT RESPONSE:

Parentheses have been added for clarity.

48. EPA COMMENT:

In Subsection (e)(2), reference should be made to Subsection (e)(3) because it is the provision that requires a record of the higher heating value be made and not (e)(2)(ii).

DISTRICT RESPONSE:

The rule has been revised as suggested.

49. EPA COMMENT:

The language in Subsection (g)(3) suggests that a minimum of five instantaneous measurements shall be made at three minute intervals, which could produce significant scatter and error. EPA requires a minimum of 30 measurements in a sampling run. Each interval should contain a discrete number of measurements or be an integration.

DISTRICT RESPONSE:

Subsection (g)(3) has been revised to reflect that continuous sampling will be conducted. This will be consistent with District Method 20 which is required in Subsection (f)(1) and has been approved by the EPA. Method 20 uses continuous emissions monitors and requires a continuous, permanent recording of the data. A fully annotated chart recording or data log printout is required for each test. Therefore, the five data sets are not instantaneous measurements, but are the consecutive, average measurements recorded during each continuous three minute interval. One average measurement during each three minute interval should be sufficient for a 15-minute sampling run.

05/24/94
KC:jo

**AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO**

NEW PROPOSED RULE 69.2

New proposed Rule 69.2 is to read as follows:

**RULE 69.2 INDUSTRIAL AND COMMERCIAL BOILERS, PROCESS
HEATERS AND STEAM GENERATORS**

(a) APPLICABILITY

This rule shall apply to any boiler, process heater, or steam generator with a heat input rating of 5 million Btu per hour or more.

(b) EXEMPTIONS

(1) The provisions of this rule shall not apply to the following:

(i) Electricity-generating steam boilers with a heat input rating of 100 million Btu per hour or more including auxiliary boilers used in conjunction with such boilers.

(ii) Waste heat recovery boilers that are used to recover heat from the exhaust of gas turbines or internal combustion engines.

(iii) ~~Process heaters, f~~ Furnaces, and kilns, and any combustion equipment where the material being heated is in direct contact with the products of combustion.

(iv) Thermal oxidizers and associated waste heat recovery equipment.

(v) Boilers, process heaters and steam generators used exclusively in connection with a structure that is designed for and used exclusively as a dwelling for not more than four families.

(vi) Boilers, process heaters and steam generators used in agricultural operations in the growing of crops or the raising of fowl or animals.

(2) The provisions of Subsection (d)(1)(ii) and (e)(1) shall not apply to any unit which burns liquid fuel only during periods of natural gas curtailment, during emergencies, or during equipment testing for the purpose of maintaining the fuel oil back-up system, provided that both of the following conditions are met:

(i) Total cumulative operation during curtailment periods or emergencies shall not exceed 168 hours per calendar year. It is the responsibility of any person claiming this exemption to keep records in accordance with Subsection (e)(4) of this rule.

(ii) Liquid fuel firing for equipment testing shall not exceed 48 hours per calendar year. It is the responsibility of any person claiming this exemption to keep records in accordance with Subsection (e)(5) of this rule.

(3) The provisions of Subsections (d)(2)(iii) and (g)(4) shall not require the firing of liquid fuel for any unit which otherwise burns liquid fuel only during periods of natural gas curtailment, during emergencies, or during equipment testing for the purpose of maintaining the fuel oil back-up system, provided that operation on liquid fuel complies with Subsections (b)(2)(i) and (ii).

(c) **DEFINITIONS**

For the purposes of this rule, the following definitions shall apply:

(1) "Annual Capacity Factor" means the ratio of the amount of fuel burned by a unit in a calendar year to the amount of fuel it could have burned if it had operated at the heat input rating for 8,760 hours during the calendar year.

~~(1)~~ (2) "Annual Heat Input" means the actual, 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. Annual heat input shall not include the heat input from fuels used during natural gas curtailment, during an emergency, or during equipment testing for the purpose of maintaining the fuel oil back-up system.

~~(2)~~ (3) "Boiler" or "Steam Generator" means any combustion equipment fired with gaseous and/or liquid fuel and used to produce steam or to heat water. "Boiler" or "Steam Generator" shall not include waste heat recovery boilers that are used to recover heat from the exhaust of gas turbines or internal combustion engines, or any unfired waste heat recovery boiler that is used to recover sensible heat from the exhaust of any combustion equipment.

(3) (4) "Btu" means British thermal unit.

(4) (5) "Emergency" means an unforeseen disruption or interruption in the supply of gaseous fuel to the unit.

(5) (6) "Existing Unit" means any unit which was installed and operating on or before (date of adoption).

(6) (7) "Heat Input" means the heat derived from combustion of a fuel in a unit, calculated using the higher heating value, excluding the heat input from preheated combustion air, recirculated flue gases, or exhaust gases from other sources, including but not limited to, gas turbines, internal combustion engines and kilns.

(7) (8) "Heat Input Rating" means the maximum steady state heat input capacity of a unit, in Btu per hour, as specified by the manufacturer, or as limited by a District Authority to Construct or a Permit to Operate.

(8) (9) "Higher Heating Value" means the total heat liberated, including the heat of condensation of water, per mass of fuel burned (Btu per pound) when fuel and dry air at standard conditions undergo complete combustion and all resultant products are brought to standard conditions.

~~(9)~~ (10) **"Natural Gas Curtailment"** means a shortage in the supply of natural gas, due solely to limitations or restrictions in distribution pipelines by the utility supplying the gas, and not due to the cost of natural gas.

~~(10)~~ (11) **"New Unit"** means a unit installed after (*date of adoption*).

~~(11)~~ (12) **"Process Heater"** means any combustion equipment fired with liquid and/or gaseous fuel and which transfers heat from the combustion gases to water or process streams. Heaters used for swimming pools, ~~Jaeuzzis spas~~ and/or therapy pools shall be considered process heaters. "Process Heater" shall not include any combustion equipment where the material being heated is in direct contact with the products of combustion, such as furnaces or kilns, or any unfired waste heat recovery heater that is used to recover sensible heat from the exhaust of any combustion equipment.

~~(12)~~ (13) **"Stack-Gas Oxygen Trim System"** means a system of monitors that is used to maintain excess air at the desired level. A typical system consists of a flue gas oxygen and/or carbon monoxide monitor that automatically provides a feedback signal to the combustion air controller.

~~(13)~~ (14) **"Therm"** means 100,000 Btu.

~~(14)~~ (15) **"Thermal Oxidizer"** means combustion equipment fired with gaseous fuel and used to control emissions of air contaminants from industrial or commercial processes.

~~(15)~~ (16) **"Unit"** means any boiler, steam generator or process heater.

(d) **STANDARDS**

(1) For any unit with a heat input rating less than or equal to 50 million Btu/hr and an annual heat input of 220,000 therms or more, or for any unit with a heat input rating greater than 50 million Btu/hr and an annual capacity factor 10% or greater, emissions of oxides of nitrogen, calculated as nitrogen dioxide at 3% oxygen on a dry basis, shall not exceed the following levels:

(i) 30 parts per million by volume when operated on a gaseous fuel.

(ii) 40 parts per million by volume when operated on a liquid fuel.

(iii) The heat-input weighted average of the limits specified in Subsections ~~(d)(2)(1)(i)~~ and ~~(d)(2)(1)(ii)~~ when operated on combinations of a gaseous and a liquid fuel. The heat-input weighted average is calculated using the following equation:

Heat-input weighted average, ppmv = $\{[H_g] (30 \text{ ppmv}) + [H_l] (40 \text{ ppmv})\} / (H_g + H_l)$

where:

H_g = the actual heat input of gaseous fuel to a unit, in Btu per hour.

H_l = the actual heat input of liquid fuel to a unit, in Btu per hour.

(2) Any unit with a heat input rating less than or equal to 50 million Btu/hr and an annual heat input of less than 220,000 therms, or any unit with a heat input rating greater than 50 million Btu/hr and an annual capacity factor less than 10%, shall comply with one of the following provisions:

(i) The unit shall be operated in a manner to maintain stack-gas oxygen concentration at less than or equal to 3.00 percent by volume on a dry basis; or

(ii) The unit shall be operated with a stack-gas oxygen trim system to maintain stack-gas oxygen concentration at 3.00 ± 0.15 percent by volume on a dry basis; or

(iii) The unit shall be tuned at least once per year in accordance with the tuning procedure in Section (j), or in accordance with the manufacturer's recommended tuning procedure, provided such procedure has been approved in advance by the Air Pollution Control Officer; or

(iv) The unit shall be operated in compliance with the applicable emission standards of Subsections (d)(1) and (d)(3).

(3) For any unit with a heat input rating less than or equal to 50 million Btu/hr and an annual heat input of 220,000 therms or more, or for any unit with a heat input rating greater than 50 million Btu/hr and an annual capacity factor 10% or greater, emissions of carbon monoxide shall not exceed 400 parts per million by volume, calculated at 3% oxygen on a dry basis.

(e) MONITORING AND RECORDKEEPING REQUIREMENTS

(1) An owner or operator of a unit which ~~simultaneously burns~~ is capable of burning both gaseous and liquid fuel and is subject to the requirements of Subsection (d)(1) shall install one of the following:

(i) A non-resettable, totalizing meter in each fuel line to measure the mass flow rate of each fuel to the unit; or

(ii) A non-resettable, totalizing meter in each fuel line to measure the volumetric flow rate, temperature and pressure of each fuel to the unit.

(2) An owner or operator of a unit which is subject to the requirements of Subsection (d)(1) shall install continuous monitors to allow for instantaneous monitoring of the

operational characteristics of the unit and of the flue-gas NO_x reduction system, as applicable. Examples of operational characteristics include, but are not limited to, the following:

- (i) Stack-gas oxygen content.
- (ii) Percentage of flue gas recirculated.

Continuous monitors shall be installed, calibrated and maintained in accordance with all applicable local, state and federal regulations and procedures approved by the Air Pollution Control Officer.

(3) An owner or operator of a unit which is subject to the requirements of Subsection (d)(2) shall monitor and record the higher heating value and annual usage of each fuel.

(4) An owner or operator of any unit which is burning liquid fuel during natural gas curtailment or an emergency shall monitor and record the cumulative annual hours of operation on liquid fuel. At a minimum, these records shall include the dates and times of operation on liquid fuel and any corresponding totalizer readings.

(5) An owner or operator of any unit which is burning liquid fuel for equipment testing purposes shall monitor and record the cumulative annual hours of operation on liquid fuel. At a minimum, these records shall include the dates and times of operation on liquid fuel and any corresponding totalizer readings.

(6) An owner or operator of a unit complying with Subsection (d)(2)(iii) shall maintain documentation verifying the required annual tuneups.

(7) The owner or operator of any unit subject to this rule shall maintain all records required by Section (e) for a minimum of three calendar years. These records shall be maintained on the premises and made available to the District upon request.

(f) TEST METHODS

(1) To determine compliance with Section (d), measurement of oxides of nitrogen, carbon monoxide, and stack-gas oxygen content shall be conducted in accordance with San Diego Air Pollution Control District Method 20 as approved by the EPA and ARB.

(2) Certification of the higher heating value of a fuel as required by Subsection (e)(3) ~~(2)(ii)~~, if not provided by a third party fuel supplier, shall be determined by one of the following methods:

- (i) ASTM Test Method D240-87 or D2382-88 for liquid hydrocarbon fuels.
- (ii) ASTM Test Method D1826-88, or D1945-81, in conjunction with ASTM D3588-89 for gaseous fuels.

(3) Certification of continuous monitors shall be conducted in accordance with all applicable local, state and federal regulations and procedures approved by the Air Pollution Control Officer.

(g) SOURCE TEST REQUIREMENTS

(1) Source testing shall be performed at no less than 80% of the heat input rating.

(2) Source testing shall be preceded by a minimum of two hours of combustion in the unit. Interruptions in combustion within the two hours shall be allowed provided that interruptions total less than 30 cumulative minutes.

(3) Measurement of emission concentrations shall be based on a 15 continuous consecutive- minutes averaging sampling period. For the purpose of averaging, a minimum of five data sets with sampling averaging intervals no greater than three minutes shall be used.

(4) A unit subject to the requirements of Subsections (d)(1), (d)(2)(i), (d)(2)(ii), (d)(2)(iv), or (d)(3) shall be tested for compliance ~~for each fuel burned~~ at least once every 12 months, unless otherwise approved directed in writing by the Air Pollution Control Officer. Testing shall be conducted in accordance with Section (f) and a source test protocol approved in writing by the Air Pollution Control Officer. Test reports shall include the operational characteristics, as listed in Subsection (e)(2)(i), of the unit and of all flue-gas NOx control systems.

(h) COMPLIANCE SCHEDULE

(1) No later than *(2 years after date of adoption)*, an owner or operator of an existing unit subject to the provisions of this rule shall submit an application for an Authority to Construct the air pollution control and monitoring equipment and any unit modification(s) necessary to meet the requirements of Sections (d) and (e) of this rule. The following information shall be submitted with the application:

(i) A list of all units, the anticipated annual heat input of each unit, the heat input rating as specified by the manufacturer, and the heat input rating as stated in a District Authority to Construct or a Permit to Operate.

(ii) For each unit listed, the selected method for meeting the applicable requirements of Section (d).

(2) An owner or operator of an existing unit, ~~located at a stationary source where the actual emissions of oxides of nitrogen from all units combined is 25 tons or more per calendar year,~~ shall be in compliance with all applicable provisions of this rule no later than *(3- 4 years after date of adoption)*.

(3) ~~An owner or operator of an existing unit, located at a stationary source where the actual emissions of oxides of nitrogen from all units combined is less than 25 tons per~~

~~calendar year, shall be in compliance with all applicable provisions of this rule no later than (4 years after date of adoption).~~

(4) (3) Any person installing a new unit subject to the provisions of this rule shall comply with the applicable provisions of Section (d) upon initial installation and startup.

(4) On or after (2 years after date of adoption), if a unit subject to Subsection (d)(2) exceeds the specified annual heat input or annual capacity factor, the owner or operator of such unit shall notify the Air Pollution Control Officer of the exceedance in writing within seven days following the date of the exceedance. Within 120 days following the date of the exceedance, the owner or operator shall submit an Authority to Construct the air pollution control and monitoring equipment and any unit modification(s) necessary to meet all applicable provisions of the rule including, but not limited to, Subsections (d)(1) and (d)(3). Such unit shall be in compliance with all applicable provisions as soon as practicable, but no later than two years after the date that the exceedance occurred.

(j) TUNING PROCEDURE

The owner or operator of a unit subject to Subsection (d)(2)(iii) of this rule shall comply with the following tuning procedure.

(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 (for liquid fuels), and observe flame conditions after unit operation stabilizes at the firing rate selected. If the excess oxygen in the stack gas is at the lower end of the range of typical minimum excess oxygen values, and if 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.

(i) The smoke-spot number can be determined with ASTM test method D-2156 or with the Bacharach method. The Bacharach method is included in a tune-up kit that can be purchased from the Bacharach Company.

(ii) Typical minimum oxygen levels for boilers at high firing rates are:

1. For natural gas: 0.5 - 3%
2. 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, 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 is reached:

(i) Unacceptable flame conditions - such as flame impingement on furnace walls or burner parts, excessive flame carryover, or flame instability.

(ii) Stack gas CO concentrations greater than 400 ppm.

(iii) Smoking at the stack.

(iv) 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.

(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>Fuels</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 levels.

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 mix, thereby allowing operations 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, setting should optimize conditions at the 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.

Nothing in this 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.

FIGURE 1: OXYGEN/CO CHARACTERISTIC CURVE

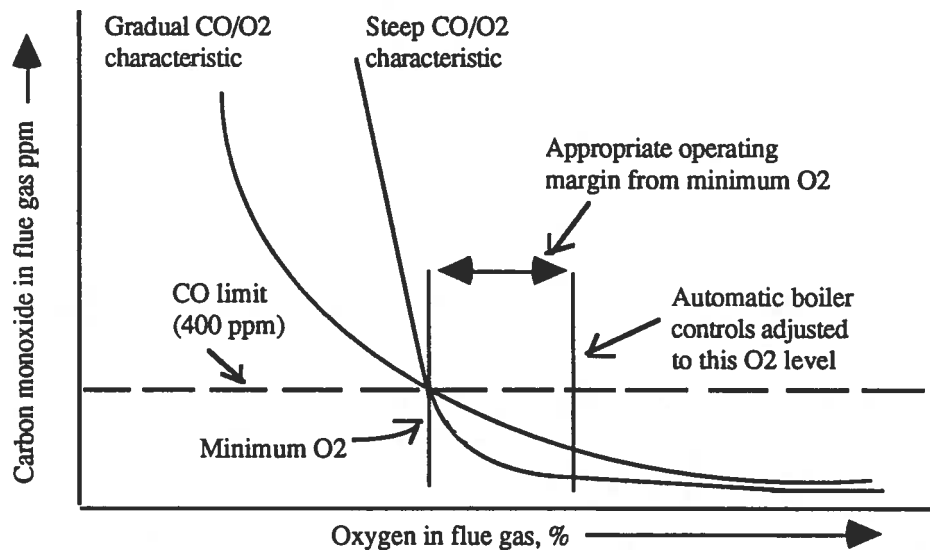


FIGURE 2: OXYGEN/SMOKE CHARACTERISTIC CURVE

