

Attachment E

Staff Report

Rules 411 and 301

**SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT**

STAFF REPORT

Rule 411, NOx from Boilers, Process Heaters and Steam Generators

Rule 301 – Permit Fees – Stationary Source

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BACKGROUND

The District is currently designated as a “serious” nonattainment area for the state ozone standard. Ozone is a strong irritant that attacks the respiratory system, leading to the damage of lung tissues. Ozone is a secondary pollutant formed from the reaction of volatile organic compounds (VOCs) and nitrogen oxides (NOx). Since NOx is a precursor to ozone, one of the strategies to control ozone is to reduce NOx emissions from existing stationary sources. The District is currently designated as a nonattainment area for the state and federal¹ PM10 standard and has been designated nonattainment for the state PM2.5 standard. Since NOx is a precursor to PM10 and PM2.5, one of the strategies to control particulate emissions is to reduce NOx emissions.

Rule 411: This rule was first adopted on February 2, 1995 and approved by EPA into the SIP on February 9, 1996. The Rule was created in response to the requirement of the Federal Clean Air Act Amendments of 1990 that the District submit NOx Reasonably Available Control Technology (RACT) rules for stationary sources. Rule 411 also fulfilled the requirement of Health and Safety Code section 40919(a)(3) that required the District to implement Best Available Retrofit Control Technology (BARCT) for all existing permitted stationary sources. The RACT/BARCT document produced by the California Air Resources Board (CARB) and the “California Clean Air Act Guidance for Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology” both provided technical guidance and direction for the development of Rule 411. This rule was included in the District’s plans for ozone and particulate matter, with the Triennial Report for ozone approved on April 28, 2005 and the Senate Bill 656 implementation schedule approved on July 28, 2005. Rule 411 applies to new and existing units (e.g., boilers, steam generators, process heater).

The proposed amendments to Rule 411 will:

1. Lower rule applicability from 5 million Btu per hour (mmBtu/hr) input to one mmBtu/hr input,
2. Set NOx emission levels for new and existing units rated at 1 mmBtu/hr to less than 5 mmBtu/hr,
3. Lower the NOx emissions limit for new and existing units rated at or above 5 mmBtu/hr input,
4. Require all new units to meet the proposed NOx limits regardless of their fuel usage level, and
5. For existing units, establish exemptions from the NOx limits at specified annual fuel usages.

Low NOx emission requirements for boilers, in some cases including small boilers, have been adopted by the following districts:

¹ Based on 1998-2000 monitoring data, EPA made a finding (February 15, 2002 Federal Register, Volume 67, Number 32 Page 7082 et.seq) that Sacramento County attained the federal ambient PM10 standard by the applicable December 31, 2000 attainment deadline. Note that this EPA finding did not redesignate the Sacramento district to attainment.

District	Rule(s) Number	Applicability mmBtu/hr Input	NOx Limit ppmvd
South Coast Air Quality Management District (SCAQMD)	Rules 1146, 1146.1, and 1146.2	>=75,000 Btu/hr input(See Applicability section in Appendix B for specific applicability limit for each rule)	30
Ventura County Air Pollution Control District (VCAPCD)	Rules 74.15.1, 74.11.1, and 74.15	>=75,000 Btu/hr input (See Applicability section in Appendix B for specific applicability limit for each rule)	30
San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD)	Rule 3046	>= 5	9-15
Santa Barbara Air Pollution Control District (SBPCD)	Rule 360, 342	>=75,000 Btu/hr input (See Applicability section in Appendix B for specific applicability limit for each rule)	30
Butte County Air Pollution Controlled District	Rule 250	>=1	70

Rule 301: This rule sets the permit fees required of stationary sources. The proposed change to this rule does not set new fees. It is only intended to clarify that for initial compliance with Rule 411, owners and operators of small units (i.e., boilers, steam generators and process heaters) that are rated below 5 mmBtu/hr input are only required to pay a \$284 fee (same as permit renewal fee) per unit if they have to replace or modify their units in order to comply with the requirements in Rule 411. Future modifications or additions of new units to the stationary source will be subject to the initial fee listed under Section 308.3 of Rule 301.

LEGAL MANDATES

Federal Mandate: The District is designated severe nonattainment for the federal one-hour ozone standard² and serious for the 8-hour ozone standard by the United States Environmental Protection Agency (EPA). Section 182 (c) of the federal Clean Air Act Amendments of 1990 requires all ozone nonattainment areas classified as “serious” and above to submit a State Implementation Plan revision by November 15, 1994 which

2 Although the federal 1-hour ozone standard was revoked for our area on June 15, 2005, “anti-backsliding” regulations (40 CFR 51.905) provide that requirements that arose from the 1-hour nonattainment designation remain in effect.

describes, in part, how the area will achieve the National Ambient Air Quality Standard for ozone and achieve actual VOC emission reductions of at least three percent per year (with NOx emission reductions being substituted for some of the required VOC emissions reductions) averaged over each consecutive 3-year period beginning November 1996. Section 182(d) requires the District to submit for adoption the proposed control measures in the District's State Implementation Plan (SIP). Section 172 (c)(1) requires the District to adopt Reasonable Available Control Technology for major stationary sources.

The 1994 Sacramento Area Regional Ozone Attainment Plan lists boiler NOx as one of the stationary source control measures for reducing NOx (1994 Attainment Plan, Appendix D-23). The original boiler rule satisfied the 1994 SIP commitment. These amendments may be needed to achieve the new 8-hour ozone standard by the 2013 deadline.

State Mandates:

Rule 411: The District is designated serious nonattainment for the state ozone standard. The California Clean Air Act requires areas designated as serious nonattainment for ozone to adopt control measures required in Sections 40913, 40914, and 40919 of the California Health and Safety Code. California Health and Safety Code Section 40913 requires districts to develop a plan to achieve California's ambient air quality standard by the earliest practicable date. The proposed amendments will help the District attain standards by the earliest possible date.

Rule 301: California Health and Safety Code Section 42311 of the California Health and Safety Code allows the District's board to adopt by regulation a schedule of annual fees for the evaluation, issuance, and renewal of permits to recover the cost of District programs related to stationary sources. The fees assessed under this section cannot exceed, for any fiscal year, the annual cost for District programs for the immediately preceding fiscal year with an adjustment not greater than the change in the annual California Consumer Price Index (CPI) as determined pursuant to Section 2212 of the Revenue and Taxation Code, for the preceding year. The proposed fees will not exceed the cost of implementing the requirements of this rule.

The District is required to hold two public hearing on any new proposed fees. The proposed changes to Rule 301 do not set new fees for sources affected by Rule 411 amendments. The amendments are only intended to clarify what fees will be required for modifying or replacing existing small units and therefore, the District does not need to conduct two public hearings in order to adopt the proposed changes to this rule.

All Feasible Measures Requirements: Health and Safety Code Section 40914 requires each district plan to demonstrate that the plan includes "every feasible measure." Districts must adopt the most effective control measures to reduce NOx emissions from boilers, steam generators, and process heaters. Staff evaluated the standards in the rule against similar requirements contained in the ARB feasible measure document titled "Identification of Achievable Performance Standards and Emerging Technologies for Stationary Sources", March 1998 and requirements recently adopted by SJVUAPCD, VCAPCD, SCAQMD, and VCAPCD, and SBAPCD. The results are summarized in Attachment B. Based on the findings in Attachment B, the proposed amendments to the rule are intended to satisfy the all feasible measures requirements.

Best Available Retrofit Requirements: Section 40919 requires districts with serious nonattainment for ozone to adopt Best Available Retrofit Control Technology (BARCT) for all existing sources. BARCT means an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of sources (CHSC Section 40406). Staff has found that the proposed NO_x requirements meet the BARCT requirement and therefore the proposed rule meets the requirements of CHSC Section 40919.

Transport Mitigation Emission Control Requirements: Districts within the areas of origin of transported air pollutants, as identified in section 70500(c), shall include sufficient emission control measures in their attainment plans for ozone adopted pursuant to Part 3, Chapter 10 (commencing with Section 40910) of Division 26 of the Health and Safety Code, to mitigate the impact of pollution sources within their jurisdictions on ozone concentrations in downwind areas commensurate with the level of contribution. An upwind district shall comply with the transport mitigation planning and implementation requirements set forth in this section regardless of its attainment status, unless the upwind district complies with the requirements of section 70601. At a minimum, the attainment/transport mitigation plans for districts within the air basins or areas specified below shall conform to the following requirements:

- (1) Broader Sacramento Area (as defined in section 70500(b)(3)) shall:
 - (A) require the adoption and implementation of all feasible measures as expeditiously as practicable.
 - (B) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable.
 - (C) require the implementation, by December 31, 2004, of a stationary source permitting program designed to achieve no net increase in the emissions of ozone precursors from new or modified stationary sources that emit or have the potential to emit 10 tons or greater per year of an ozone precursor.
 - (D) include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the Upper Sacramento Valley and that portion of the Mountain Counties Air Basin north of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border, except as provided in Health and Safety Code section 41503(d), during air pollution episodes which the state board has determined meet the following conditions:
 - (i) are likely to produce a violation of the state ozone standard in the Upper Sacramento Valley or that portion of the Mountain Counties Air Basin north of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border; and
 - (ii) are dominated by overwhelming pollutant transport from the Broader Sacramento Area; and
 - (iii) are not measurably affected by emissions of ozone precursors from sources located within the Upper Sacramento Valley or that portion of

the Mountain Counties Air Basin north of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border.

The proposed changes to Rule 411 are based on the all feasible control measures and BARCT requirements and therefore comply with this section.

Senate Bill (SB) 656: Senate Bill (SB656, Sher, 2003) requires ARB to adopt a list of feasible and most effective control measures to make progress towards state and federal PM10 and PM2.5 standards. Districts are then required to adopt an implementation schedule for measures by July 31, 2005. Because NOx contributes to particulate matter problems in certain areas, the measures included on ARB's draft list include SJVUAPCD Rule 4306 and SCAQMD Rules 1146.1 and 1146.2. Sacramento County has been designated nonattainment for both the state PM10 and PM2.5 standards. An ARB report³ "Characterization of Ambient PM10 and PM2.5 In California", estimates that 37 percent of wintertime PM2.5 concentrations in the Sacramento area are due to nitrates from motor vehicles and other combustion sources. The District's SB 656 program was adopted by the District's Board on July 28, 2005.

SUMMARY OF REQUIREMENTS

Rule 411: This rule currently applies to institutional, commercial, and industrial boilers, steam generators and process heaters (units) rated at five mmBtu/hr heat input or greater which are fired on gaseous, non-gaseous, or biomass fuels. The proposed amendments will lower the applicability level to one mmBtu/hr input and will require more stringent NOx emission limits for existing and new units. Units rated between 1 and 5 mmBtu/hr input are used to supply steam or hot water for use in space heating, food processing and manufacturing of chemical products. Process heaters are used in food processing (e.g., drying of fruits and vegetables), and manufacturing processes.

NOx Control Methods: Various control technologies presently exist for controlling the boiler emissions. These include Low-NOx burners, Flue Gas Recirculation systems, Selective Catalytic Reduction and Selective Non-Catalytic Reduction.

1. **Low NOx Burners:** Low NOx burners utilize one or a combination of control technologies (e.g., low excess air, fuel and/or air staging) in the design of the burner to reduce NOx emissions. Low excess air reduces the amount of oxygen available for combustion and thus reducing the number of oxygen atoms available to react with nitrogen to form NOx. Fuel staging, which is applicable to gas only, is done by burning part of the fuel at high excess air (low temperature) in a primary combustion zone. The remaining fuel is injected through another set of orifices or a gas gun into a secondary zone where combustion is complete at relatively low excess air. Since the inert products of combustion from the primary zone pass through the secondary zone, temperatures and NOx are reduced. In air staging, fuel is mixed with part of the air in a fuel rich primary combustion zone at low temperatures and without excess oxygen. Any remaining fuel burns completely with the remaining combustion

³ <http://www.arb.ca.gov/pm/pmcharacteristics2001.pdf>

air in the secondary combustion zone through which the inert products of combustion pass. Temperatures and NOx are reduced. NOx control efficiency for a Low NOx burner can range from 10 to 50%.

2. Flue Gas Recirculation Systems: Flue gas recirculation for NOx control consists of extracting a portion of the flue gas from the economizer outlet and returning it to the furnace, admitting the flue gas through the furnace windbox. Flue gas recirculation lowers the bulk furnace gas temperature and reduces oxygen concentration in the combustion zone.
3. Selective Catalytic Reduction: Selective catalytic reduction refers to a process that chemically reduces NOx with ammonia (NH3) from anhydrous ammonia or urea over a heterogeneous catalyst in the presence of oxygen. The process is termed selective because the reducing agent NH3 preferentially attacks NOx rather than O2.
4. Selective Noncatalytic Reduction: NH3 is injected into the hot flue gas by means of either air or steam carrier gas at a point in the flue specifically selected to provide optimum reaction temperature and residence time. In the temperature range of 1600 degrees Fahrenheit to 2200 degrees Fahrenheit, the reaction occurs through the injection of NH3 alone. NOx reductions of up to 90 percent have been demonstrated on oil field steam generators where favorable process conditions exist.

Proposed Emission Limits: The following table summarizes the current and proposed NOx emission limits for gaseous fuels in the rule.

Unit Size/Description (mmBtu/hr Input)	NOx Limits (ppmvd @ 3% O2)	
	Existing	Proposed
>= 1 - <5	-	30
>= 5 - <=20	30	15
>20	30	9
Load Following Units	30	15
Units Fired on natural gas and Landfill gas	30	15
Reforming Furnaces	30	30

Exemptions from Rule Requirements: The rule currently provides for an exemption from the existing NOx emission limits if the fuel usage for the unit is limited below 90,000 therms per year. The proposed amendments will provide four exemption levels from the new proposed limits depending on the unit size rating. Those exemption levels are listed in the table below:

Unit Size (mmBtu/hr Input)	Exemption Level (therms/yr)
1 - <2.5	40,000
2.5 - <5	70,000
>=5 - < 100	200,000
>=100	300,000

Sources can elect to take a fuel usage limit in lieu of complying with the proposed NOx limits. Sources electing to take the low fuel usage exemption are required to install a non-resetting hour or fuel meter and tune the equipment at least annually. For those units taking the new low fuel usage exemption, any requirements that are currently in place will stay in place.

Rule 301: This rule sets a schedule of initial and annual fees for the evaluation, issuance, and renewal of permits to recover the cost of District programs related to stationary sources. The amendments to this rule are intended to clarify that small units rated below 5 mmBtu/hr input will only be charged a permit fee of \$284 which is equal to the annual permit renewal fee in Schedule 308.3. The amendments will apply for initial compliance with the NOx limits proposed in Rule 411. Further modifications to permit will be subject to the initial fee schedule in Section 308.3.

SUMMARY OF CHANGES

Rule 411: The following are the main rule changes. Detailed listings of all of the changes are included in Attachment C to the staff report.

1. Lower rule applicability from 5 mmBtu/hr input to one mmBtu/hr input,
2. Set NOx emission levels for new and existing units rated at 1 mmBtu/hr to less than 5 mmBtu/hr,
3. Lower the NOx emissions limit for new and existing units rated at or above 5 mmBtu/hr input,
4. Require all new units to meet the proposed NOx limits regardless of their fuel usage level, and
5. For existing units, establish exemptions from the NOx limits at specified annual fuel usages.

Rule 301: Staff is proposing to add new Section 302.2 to collect fees equivalent to the renewal fee in Section 308.3 for replacement or modification of small units rated below 5 mmBtu/hr input that are subject to the requirements in Rule 411.

EMISSIONS IMPACT

Rule 411: Staff identified 554 units (this includes 473 permitted units and 41 unpermitted units identified through the most recent boiler survey, plus 40 unpermitted units subsequently identified) with heat input of one mmBtu/hr or greater in the District's records. The proposed rule amendments will affect all units rated at or above 1 mmBtu per hour input and will also exempt from the NOx emission limits units below specific annual fuel usages.

There are 132 permitted boilers that are rated at or above 5 mmBtu/hr. The total estimated NOx emissions from these boilers are 56.1 tons per year. There are 5 boilers in this size range that already comply with the proposed emission standards (based on information in

the Permit to Operate and manufacturer's data). It is anticipated that an additional 36 of the permitted boilers will have to comply with the proposed emission standards. The remaining 91 boilers have fuel usages below the exemption level in the rule. Based on fuel usage data collected by the District, Staff estimates that the proposed amendments will result in approximately 41% overall reduction in NOx emissions from these units, or 22.9 tons per year of NOx reductions⁴ from the 5 mmBtu/hr or greater units.

There are 310 permitted units that have a size rated from 1 – <5 mmBtu/hr. The total estimated NOx emissions from these boilers are 37.8 tons per year. Seventy-four boilers in this size range already comply with the proposed emissions limit (based on information in the Permit to Operate and manufacturer's data). It is anticipated that an additional 35 boilers will have to comply with the proposed emission standards. The remaining 201 boilers are expected to be exempt from the proposed emission standards because they have fuel usages below those proposed in the rule. Staff estimates that the proposed amendments will result in approximately 28% overall reduction in NOx emissions from these units, or 10.6 tons per year reductions in NOx emissions from the 1-<5 mmBtu/hr units (based on surveyed fuel usage data).

There are 112 additional units for which sufficient fuel usage data are not available. All but two of these units are rated below 5 mmBtu/hr input. There are 28 of these boilers that are under construction. Of these 28 boilers, 27 of them comply with the proposed limits.

There may be additional boilers in the District that have not been permitted because either they never applied for a permit to operate from the District, or were exempt from permitting requirements when they were originally installed and did not apply for a permit to operate when the exemption level was lowered by the District in 1991. Regardless of the circumstances, operating a boiler greater than or equal to one mmBtu/hr input without a permit is a violation of District rules. The potential NOx emission reductions from these units have not been calculated since no information is available to Staff at this time that identifies the annual fuel usage for these units.

The total estimated NOx emission reductions anticipated from this rule is 33.5 tons per year. The NOx emission reductions will increase as additional boilers are identified.

Rule 301: This rule is an administrative rule and does not impact emissions.

COST IMPACT

Section 40703 of the California Health and Safety code requires that the District consider and make public its finding relating to the cost effectiveness of implementing an emission control measure.

⁴ Staff assumed that owners or operators of all units that currently have annual fuel usages less than the exemption levels will choose to limit their annual fuel usage in order to be exempt from the proposed requirements. NOx reductions may be higher if the owners or operators of these units elect to retrofit their units so that they are not limited to a lower annual fuel usage limit.

Cost to Businesses: The rule amendments proposed here will require retrofitting or replacing existing units to meet the proposed NOx emission limits. The amendments will also require units installed after the amendments of the rule to meet the NOx limits in the rule. Staff analyzed the cost impact for:

1. Cost of retrofitting or replacing the existing unit,
2. Cost differential of installing new compliant units;
3. Cost for initial source testing and source test monitoring,
4. Cost for fuel meter and equipment tuning if it is exempt based on annual fuel usage, and
5. Authority to Construct and Permit to Operate modification fee.

Boilers 1 – <5 mmBtu/hr

Exempt Units: There are one time capital costs for boilers that choose to limit their fuel usage rather than retrofit to comply with the proposed emission limits. These costs are associated with installing a fuel meter and modifying their permit to add the fuel limitation. The estimated cost for installing a fuel meter is \$1,500 and the permit modification cost is \$567. Sources would also have the option of using a non-resetting hour meter rather than a fuel meter which is estimated to cost \$400 (Staff used the cost of the fuel meter rather than the cost of the hour meter when calculating the cost impacts). There is, in addition, a \$600 per year cost for performing the annual tune-up if electing not to comply with the 3% O2 limit. Staff assumed that sources will elect the tune up option over the 3% O2 option.

Non-exempt Units: There are three categories of cost impacts for these boilers.

First Category: The first category is those units that potentially already comply with the proposed NOx limit of 30 ppm. These units would have a one time cost for demonstrating that they meet the 30 ppm NOx limit, and possibly a permit modification fee of \$567. NOx emissions can be verified by performing a source test or by using a portable analyzer. The cost of a source test by an independent contractor is estimated to be \$1,500, plus a district fee of \$1,134 for the source test observation and report evaluation. Alternatively, NOx emissions can be verified by a boiler service technician, using a portable analyzer, at a cost of about \$500. Sources with several units may achieve a cost savings by purchasing and using their own portable analyzer. The cost of the analyzer varies from \$2,800 to \$5,800, depending on the manufacturer and the number of attachments. The annualized costs for units in this category were calculated assuming that sources will elect to have a boiler service technician verify NOx emissions with a portable analyzer.

Second Category: The second category is those units that will need to be retrofitted to meet the 30 ppm limit. Some of these units may not be retrofitted because of equipment age and design and will have to be replaced with new units. In estimating the total cost effectiveness it was assumed that all of the boilers in this size range that need to be retrofitted would be replaced as a worst case scenario since the number of units that can be retrofitted is unknown. The estimated cost for a new unit including installation ranges from \$36,000 - \$80,000. There is also a permit fee of \$284 if the unit is replaced. Units in this category would incur a one time cost for demonstrating compliance with the 30 ppm NOx limit, either with a source test or a portable analyzer. The options and costs for verifying NOx emissions

are identical to those presented previously for the first category. The annualized costs for units in the second category were calculated assuming that sources will elect to have a boiler service technician verify NOx emissions with a portable analyzer, at a cost of \$500.

Third Category: The third category is the new units that will be installed after adoption of the rule. Any new units that are added after adoption of the rule will be required to meet the 30 ppm limit regardless of their fuel usages. The cost impacts from these units will be the incremental cost between installing a compliant unit and a non-compliant unit. There are no additional installation or permit costs due to complying with the proposed rule. The estimated incremental equipment costs range from \$18,000-\$40,000. Units in this category would incur a one time cost for demonstrating compliance with the 30 ppm NOx limit, either with a source test or a portable analyzer. The options and costs for verifying NOx emissions are identical to those presented previously for the first and second categories. The annualized costs for units in the third category were calculated assuming that sources will elect to have a boiler service technician verify NOx emissions with a portable analyzer, at a cost of \$500.

Summary of costs for 1-<5 mmBtu/hr boilers

	Costs		Annualized Cost
Exempt Units	Fuel meter	\$400 - \$1,500	\$706 - \$827
	Permit Modification	\$567	
	Annual Tune-up	\$600	
Already Complies with proposed limit	Permit Modification	\$567	\$117
	Source Testing Or	\$2,634	
	Portable Analyzer (Purchase/Use)	\$2,800 - \$5,800 ⁵	
	Or Service Technician w/portable analyzer	\$500 ⁵	
Retrofit/Replace to comply with proposed limit	Equipment/Installation Costs	Retrofit: \$28,000 - \$56,000 Replace: \$36,000 - \$80,000	Retrofit
	Permit Modification	\$284 - \$567	\$3,191 - \$6,266
	Source Testing Or	\$2,634	Replace: \$4,039 - \$8,870
	Portable Analyzer (Purchase/Use)	\$2,800 - \$5,800 ⁵	
	Or Service Technician w/portable analyzer	\$500 ⁵	
New Boilers	Incremental Costs for Equipment	\$18,140 - \$40,141	\$2,047 - \$4,462
	Source Testing Or	\$2,634	
	Portable Analyzer (Purchase/Use)	\$2,800 - \$5,800 ⁵	
	Or Service Technician w/portable analyzer	\$500 ⁵	

Boilers 5 mmBtu/hr and greater

Exempt Units: There are three categories of exempt equipment.

First Category: The first category is the boilers that have in place a 90,000-therm limitation from the current version of the rule. These boilers would already have a fuel/hour meter and are already required to meet the annual tune-up or the 3% O₂ requirements. There are no additional costs for these boilers from the proposed amendments to the rule.

5 NOx emissions can be verified using a portable analyzer instead of a source test. The annualized cost was calculated assuming that the verification will be performed by a boiler service technician using a portable analyzer. Sources with multiple units may achieve a cost savings by purchasing and using their own portable analyzer, the cost of which varies depending on the analyzer manufacturer and options. There may be some cost recovery for District staff time for reviewing portable analyzer.

Second Category: The second category is the boilers that are not currently exempt but already have a fuel/hour meter. For these boilers there is the one time permit modification cost of \$567. There is, in addition, a \$600 per year cost for performing the annual tune-up if electing not to comply with the 3% O₂ limit. Staff assumed that all exempt units will be tuned annually.

Third Category: The third category is the boilers that are not currently exempt and do not have a fuel/hour meter. There are one time costs for installing a fuel meter and modifying their permit to add the fuel limitation. The estimated average cost for a fuel meter is \$1,500 and the permit modification cost is \$567. Sources would also have the option of using a non-resetting hour meter rather than a fuel meter which is estimated to be \$400 (Staff used the cost of the fuel meter rather than the cost of the hour meter when calculating the cost impacts). There is, in addition, a \$600 per year cost for performing the annual tune-up if electing not to comply with the 3% O₂ limit. (Staff assumed these units will be tuned annually)

Non-exempt Units: There are three categories of cost impacts for these boilers.

First Category: The first category is the boilers that already comply with the proposed limits. These boilers would already be subject to existing source testing requirements. The lowering of the annual source testing requirement from units rated at 25 mmBtu/hr to 20 mmBtu/hr will only affect 2 units. These 2 units would have an independent source test cost of \$1,500 and a source test observation and report evaluation fee of \$1,134 yearly rather than every other year.

Second Category: The second category is the boilers that will need to retrofit to meet the proposed limits. The estimated cost for equipment and installation ranges from \$65,000 - \$442,000 for most facilities based on cost information submitted by boiler manufacturers. There is however, one facility in the District with multiple boilers each rated at 100 mmBtu/hr input that submitted actual cost estimates which were provided to them by a boiler manufacturer that will have higher costs than those supplied to the District. The estimated capital cost for that facility was around \$488,000 per boiler. Another facility with a 32 mmBtu/hr thermal heater also submitted cost data for retrofitting their existing unit. The retrofit cost for that unit was \$380,000. Staff revised the cost estimate to include the actual costs submitted by these two facilities. In addition to the cost discussed above, there is also a permit modification cost of \$567.

Third Category: The third category is the new boilers that will be installed after adoption of the rule. Any new boilers that are added after adoption of the rule will be required to meet the proposed limit regardless of their fuel usage. The cost impacts from these boilers will be the incremental cost between installing a compliant unit and a non-compliant unit. There are no additional installation permit costs or source testing cost due to complying with the proposed rule because they are already required. The incremental equipment cost ranges from \$10,000 to \$125,000.

Summary of costs for 5 mmBtu/hr boilers and greater

	Costs		Annualized Cost	
Currently Exempt Units	Requirements already in place	\$0	\$0	
Exempt Units (with hour/fuel meter in place)	Fuel meter (in place)	\$0	\$662	
	Permit Modification	\$567		
	Annual Tune-up	\$600		
Exempt Units (with no hour/fuel meter in place)	Fuel meter (in place)	\$400 - \$1,500	\$706 - \$827	
	Permit Modification	\$567		
	Annual Tune-up	\$600		
Already Complies with proposed limit	Independent Source Test currently required	\$0	\$0 - \$289	
	Source Test, Monitoring and Evaluation currently required for units rated at or above 25 mmBtu/hr. Annual testing is now required for units rated at or above 20 mmBtu/hr input.	\$2,634		
Retrofit/Replace to comply with proposed limit	Equipment/Installation Costs	Retrofit	\$65,000 - \$442,000	\$7,199 - \$48,591
		Replace	\$135,000 - \$750,000	
	Permit Modification	Retrofit	\$567	\$14,885 - \$82,843
		Replace	\$567 - \$4,533	
New Boilers	Incremental Costs for Equipment	\$10,000 - \$125,000	\$1,098 - \$13,724	
	Independent Source Test	0		
	Source Test Monitoring/Evaluation	0		

Overall Rule Cost Effectiveness: The prior sections summarized the costs and reported the cost effectiveness for retrofitting and replacing existing boilers. The overall rule cost effectiveness includes the costs imposed on both exempt and non-exempt units and includes both small and large boilers. This analysis is based on the data for permitted and unpermitted boilers described in the emissions impact section. The analysis does not include potential cost for other unpermitted boilers/process heaters that may exist nor for those boilers/process heaters for which the District does not have fuel usage data.

The total lifetime cost for existing boilers/process heaters is \$13.9 million (\$6.2 million for small units 1-<5 mmBtu/hr + \$7.7 million for units \geq 5mmBtu/hr). Financing for the capital costs is expected to result in total annualized costs of \$929,753 (\$411,878 for small units 1-<5 mmBtu/hr + \$517,875 for units \geq 5mmBtu/hr). The total emission benefits are 33.5 tons per year or 67,000 pounds per year (10.6 tons/year for small units 1-<5 mmBtu/hr + 22.9 tons/year for units \geq 5 mmBtu/hr). The overall cost effectiveness for the proposed rule amendments is be estimated to be \$13.90/lb-NOx. To put these costs into perspective with costs imposed by other regulations, it is useful to compare the cost effectiveness for other rules. At the high end of the range, the cost effectiveness of the gasoline dispensing regulations (Rule 449, Transfer of Gasoline into Vehicle Fuel Tanks; 12/17/1991 rule amendments) was \$17/lb-VOC in today's dollars. At the low end of the range was Rule 452, Can Coating (8/21/1990 rule amendments), at a cost of \$1/lb-VOC in today's dollars. Therefore, the cost effectiveness of this rule is near the upper end of the range of costs imposed on other businesses.

Rule 301: The cost impact is discussed under Rule 411 cost impacts.

Cost to the District: The cost to the District consists of the additional staff time needed to evaluate the applications for Authority to Construct and Permit to Operate for retrofitting the existing units and the time needed to observe and later evaluate the initial source tests. Staff estimates the proposed amendments will result in additional need for one FTE (one full time equivalent) in the Permitting section and 0.65 in the Field Operations Section. The permitting impact should be limited in time until all permits are processed (12 months after date of amending this rule).

SOCIOECONOMIC IMPACT

CHSC Section 40728.5 requires a district to perform an assessment of the socioeconomic impacts before adopting, amending, or repealing a rule that will significantly affect air quality or emission limitations. The District Board is required to actively consider the socioeconomic impacts of the proposal and make a good faith effort to minimize adverse socioeconomic impacts.

CHSC Section 40728.5 defines "socioeconomic impact" to mean the following:

1. The type of industry or business, including small business, affected by the proposed rule or rule amendments.
2. The impact of the proposed rule or rule amendments on employment and the economy of the region.
3. The range of probable costs, including costs to industry or business, including small business.
4. The availability and cost-effectiveness of alternatives to the proposed rule or rule amendments.
5. The emission reduction potential of the rule or regulation.
6. The necessity of adopting, amending, or repealing the rule or regulation to attain state and federal ambient air standards.

Type of industry or business, including small business, affected by the rule amendments: Rule 411 applies to boilers, steam generators and process heaters. These units are used by large and small businesses. Examples of large businesses are major sources such as chemical production plants, food processors, hospitals, hotels, colleges, and office buildings. Examples of small businesses are drycleaners, motels, and small bakeries. Some of the public schools also have units between 1 and 5 mmBtu/hr input although most schools appear to be exempt. In addition, some of public schools have replaced their existing units with furnaces and water heaters that are rated below one mmBtu/hr input.

Impact of Rule 411 amendments on employment and the economy in the District: Approximately 554 units will be subject to the rule. Based on current information, Staff estimated that 71 permitted units will require retrofit or replacement. Another 292 units are expected to qualify for an exemption due to low annual fuel usage. Some sources in the District (e.g., schools, hospitals, hotels) have multiple units. Most of the schools will be exempt from the rule requirements because of low fuel usage. Staff has learned recently that some the larger school districts have many boilers that were either exempt from permitting requirements at the time of installation or were installed without a permit from the District. The initial cost to public schools will be the cost of the fuel meter and the permit modification cost. In addition, there will be annual tune-up cost for each boiler at a cost of \$600/boiler.

The lifetime cost for compliance with the rule amendments is estimated to be \$13.9 million. This includes the costs for retrofitting/replacing existing units, fuel meters, testing, and permit modifications. Most of the work for retrofitting/replacing and testing the units will be performed by manufacturers that are located outside the District. Some of the supporting work, however, may be performed by local businesses.

Businesses affected by the new regulations may respond in a variety of ways when faced with new regulatory costs. Some businesses may absorb the cost, pass their costs onto their customers, reduce their workforce or shutdown their operations. Some affected businesses may pursue alternative compliance under Rule 107 instead of retrofitting or replacing their existing units. One facility in the District indicated the proposed regulations may limit their future expansion since the monies will be diverted to pay for retrofitting their boilers. None of the businesses have indicated to staff that they will shutdown their operations as a result of this rule.

A socioeconomic impact analysis was performed by SJVUAPCD for the amendments to their boiler NOx regulations. The analysis included the following economic sectors: crude oil/natural gas production and pipeline industries; oil refining industry; food production industries, government; and other industries. The analysis document stated that industry groups seeing more than a 10% cost impact to profits would be most likely to experience serious economic effects, from possible layoffs to possible plant closures. The food production and crude oil industries both had more than 10% cost impact to their profits. The job loss in the food production sector was estimated to range from 0.3% to 1% (9 – 25 induced job losses), while the job loss in the crude oil sector was expected to range from 0% to 18%. Staff estimates that the impact of Rule 411 on food production sector employment

within the District will be similar to that estimated by SJVUAPCD. There are no crude oil businesses within the District.

Range of probable costs of Rule 411 amendments: The ranges of annualized costs for units identified within the District are listed in the table below. The costs for units rated below 5 mmBtu/hr input are based on the cost of replacing the units with new ones. The costs for units at or above 5 mmBtu/hr input are based on retrofitting the units with low NOx technologies.

Unit Size Range (mmBtu/hr Input)	Annualized Cost Range (\$/year)
1 - < 5	\$4,039 - \$8,870
5 - <10	\$7,199 - \$8,516
10 - <50	\$8,845 - \$13,787
50 - <100	\$14,885 - \$27,182
>=100	\$48,591 - \$53,642

Availability and cost-effectiveness of alternatives to the Rule 411 amendments: One alternative to the proposed rule changes is not to adopt the proposed amendments. The NOx emission reductions will assist the District in meeting federal and state ozone and state PM10 and PM2.5 air quality attainment goals.

Another alternative to this rule is to require SCR in addition to the proposed requirements. Staff performed incremental cost effectiveness analysis for this control option and does not recommend this option at this time due to the high costs. (See next section "Incremental Cost Effectiveness Analysis").

Another alternative is to set lower annual fuel usage for exemption levels. Setting of lower exemption levels will result in higher cost and consequently will adversely impact sources in the District.

Another alternative is to set higher exemption level. Setting higher exemption levels will result in more sources qualifying for exemptions from the rule and this will lower the emission reduction benefits from the rule.

The emission reduction potential of Rule 411 amendments: The proposed amendments will achieve a minimum emission reduction of 33.5 tons per year of NOx (See discussion under Emissions Impact).

The necessity of adopting, amending, or repealing the rule or regulation to attain state and federal ambient air standards: The proposed amendments to Rule 411 are necessary to comply with all feasible measures requirements and provide additional NOx emission reductions that contribute to attainment of both the state and federal ozone and state particulate matter standards.

INCREMENTAL COST EFFECTIVENESS ANALYSIS

Pursuant to Health and Safety Code Section 40920.6(a)(3), the District is required to perform incremental cost effectiveness analysis for requirements for Best Available Retrofit Control Technology (BARCT). The District is required to identify one or more potential control options that achieve the emission reduction objectives for the regulation, determine the cost-effectiveness for each option, and calculate the incremental cost-effectiveness for each option.

The incremental cost effectiveness analysis performed for this rule is based on the Discounted Cash Flow cost analysis method to compute the present value of the proposed rule's costs over a 15-year period (the assumed equipment lifetime), using a 7% interest rate (based on a U.S. Treasury Security maturing in 10 years plus two percent.) The incremental cost effectiveness analysis was performed for the following:

1. Proposed NOx emission limits;
2. Air pollution control equipment (i.e., SCR); and
3. Proposed NOx emission limits and air pollution control equipment.

Since there are many different size units affected by the proposed regulations and the cost variation, Staff performed an incremental cost effectiveness analysis for a 31.5 mmBtu/hr input boiler since actual air pollution control data was available from the South Coast Air Quality Management District BACT determination clearinghouse. The costs for retrofitting the boiler and the air pollution control equipment are based on actual cost data from boilers that have been retrofitted with SCR systems in the South Coast Air Quality Management District. Staff also evaluated the alternative control options for different sizes and found that alternatives to the proposed control option are not cost effective. An example of the incremental cost effectiveness analyses is summarized in the table below.

Control Option	Present Value of Control Cost (\$)	Total NOx Emission Reductions (Tons)
Meeting proposed NOx emission limits	\$157,500.00	3.52
Adding APC Control Equipment (SCR)	\$282,173.64	4.53
Meeting proposed NOx limits and adding control equipment	\$439,673.64	4.88

The incremental cost effectiveness was performed for the following control options:

1. Proposed NOx limits vs. air pollution control equipment
2. Use of control equipment vs. air pollution control equipment and proposed NOx limits.

The following equation was used to calculate the incremental cost:

$$IC / E(\$ / ton) = \left(\frac{PV_{option2} - PV_{option1}}{TER_{option2} - TER_{option1}} \right)$$

Where: IC = Incremental Cost (\$)
 E = Emissions reductions (tons)
 PV_{option 2} = Present value of control costs for option 2 (\$/yr)
 PV_{option 1} = Present value of control costs for option 1 (\$/yr)
 TER_{option2} = Total emission reductions for option2 over a 10-year period (tons)
 TER_{option1} = Total emissions reductions for option 1 over a 10-year period (tons)

The following table lists the incremental costs of these control options:

Option	IC/E (\$/ton)	IC/E (\$/lb.)
Incremental cost between meeting the limit and just adding control equipment	\$123,852.60	61.93
Incremental control between just adding control equipment and both meeting these limits and adding control equipment	\$415,282.06	\$207.64

OTHER FACTORS:

Technological Feasibility: Staff evaluated the technological feasibility of the proposed NOx limits by consulting with boiler and burner manufacturers. Based on the information received, Staff has determined that the technology exists for achieving the proposed NOx levels. In some cases depending on the boiler and burner manufacturers and the boiler type (forced draft or atmospheric), it may be difficult to retrofit an existing unit and may require replacing the entire boiler.

Enforceability: Source testing (initial testing for small units, biennial for units rated at 5-<20 mmBtu/hr input, and annual for units rated at 20 mmBtu/hr input or greater), and tune-up requirements and fuel usage meters and permit modifications for low usage units have been included in the rule for enforceability.

Public Acceptability: The rule has a future compliance timeline to allow time for affected businesses to purchase new equipment or retrofit their existing equipment. These compliance timelines were extended in response to public comments. The costs and cost effectiveness of this proposed rule are in the range of costs from prior rule requirements.

SECTION 40727.2(a) ANALYSIS OF RULE 411

Section 40727.2(a) of the Health and Safety Code mandates that the District prepare a written analysis of the Rule proposed for amendment. Section 40727.2(a) also allows the District to put this analysis in a matrix form. The matrix analysis of Rule 411 is presented as Attachment A at the end of this document.

PUBLIC COMMENTS

Staff held a public workshop to discuss the amendments to Rule 411 on December 1, 2004. Staff received several comments at the workshop and written comments after the public workshop. Staff made changes to the staff report to address these comments where possible. A list of all comments and their responses are listed as Attachment E to the staff report.

ENVIRONMENTAL REVIEW AND COMPLIANCE

The amendments to Rule 411 do not create new requirements that may have an adverse effect on the environment. Pursuant to state CEQA Guidelines, the District's Environmental Coordinator finds that the adoption of the proposed rule is exempt from CEQA (Class 8 Categorical Exemption, Action by Regulatory Agencies for Protection of the Environment; §15308 State CEQA Guidelines).

California Public Resources Code (Section 21159) requires an environmental analysis of the reasonably foreseeable methods of compliance. The proposed amendments to Rule 411 will not increase emissions and will not cause any significant adverse effects on the environment; therefore the Environmental Coordinator has concluded that no environmental impacts will be caused by compliance with the proposed rule.

Rule 301 is a fee rule. Public Resources Code section 21080(b)(8) and section 15273 of the state CEQA Guidelines provide that the adoption or amendments of fee rules are not subject to CEQA. To claim this exemption, the District must find that the amendment is for the purpose of meeting operating expenses. The purpose of the fees specified in Rule 301 is to recover the cost of administering the permit program; therefore, the Environmental Coordinator finds that the adoption of the proposed amendments to Rule 301 is exempt from CEQA.

FINDINGS

The California Health and Safety Code, Division 26, Air Resources, require local Districts to comply with a rule adoption protocol as set forth in Section 40727 of the Code. This section has been revised through legislative mandate to contain six findings that the District must make when developing, amending, or repealing a rule. These findings, effective January 1, 1992, and their definitions are listed in the table below.

Rule 411:

FINDING	FINDING DETERMINATION
Authority: The District must find that a provision of law or of a state or federal regulation permits or requires the District to adopt, amend, or repeal the rule.	California Health and Safety Code, Sections 40000, 40001, 40702, 40716, 40961, and 41010. (Health and Safety Code Section 40727(b)(2)).
Necessity: The District must find that the rulemaking demonstrates a need exists for the rule, or for its amendment or repeal.	It is necessary for the District to adopt this amended rule in order to achieve additional NOx emission reductions from the boilers. The additional NOx reductions will assist the District in its effort to attaining air quality standards and to comply with state all feasible measures requirements (Health and Safety Code 40914 and California Code of Regulations, Section 40601). (Health and Safety Code Section 40727(b)(1))
Clarity: The District must find that the rule is written or displayed so that its meaning can be easily understood by the persons directly affected by it.	There is no indication at this time that this rule is not written in such a manner that the person affected by the amendments can easily understand them. (Health and Safety Code Section (40727(b)(3))
Consistency: The rule is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.	The District has found the requirements of this rule are consistent with the state and federal guidelines. (Health and Safety Code Section 40727(b)(1))
Non-Duplication: The District must find that either: 1) The rule does not impose the same requirements as an existing state or federal regulation; or (2) that the duplicative requirements are necessary or proper to execute the powers and duties granted to, and imposed upon the District.	The rule imposes similar requirements as which duplicate existing state BARCT/RACT and federal regulations (40 CFR Part 60 Subpart Db). The rule, however, imposes more stringent requirements than those adopted by existing state and federal regulations.
Reference: The District must refer to any statute, court decision, or other provision of law that the District implements, interprets, or makes specific by adopting, amending or repealing the rule.	California Clean Air Act of 1988 (California Health and Safety Code Section 40914); California Health and Safety Code Sections 40910, 40913, 40914, 40919(a)(3); Section 70500(c); Sections 70500, 70600, and 70601 of Title 17 of the California Code of Regulations; Sections 182(c), 182(d), and 182(f) of the Federal Clean Air Act Amendments of 1990.
Additional Informational Requirements: In complying with HSC Section 40727.2, the District must identify all federal requirements and District rules that apply to the same equipment or source type as the proposed rule or amendments.	The matrix attached (Attachment A) contains a comparison of other requirements that apply to boilers.

Rule 301:

FINDING	FINDING DETERMINATION
Authority: The District must find that a provision of law or of a state or federal regulation permits or requires the District to adopt, amend, or repeal the rule.	The District is authorized to adopt rules and regulations by Health and Safety Code Sections 40001, 40702, 41010 and 42311. (Health and Safety Code Section 40727(b)(2)).
Necessity: The District must find that the rulemaking demonstrates a need exists for the rule, or for its amendment or repeal.	The rule amendment is required in order to recoup costs of the District's operation as described in California Health and Safety Code 41080. (Health and Safety Code Section 40727(b)(1))
Clarity: The District must find that the rule is written or displayed so that its meaning can be easily understood by the persons directly affected by it.	The District has reviewed the rule and determined that it is clear. In addition, there is no evidence that the persons affected by the rule can not understand the rule. (Health and Safety Code Section (40727(b)(3))
Consistency: The rule is in harmony with, and not in conflict with or contradictory to, existing statues, court decisions, or state or federal regulations.	The proposed rule does not conflict with and is not contradictory to existing statues, court decisions, or state or federal regulations. (Health and Safety Code Section 40727(b)(4))
Non-Duplication: The District must find that either: 1) The rule does not impose the same requirements as an existing state or federal regulation; or (2) that the duplicative requirements are necessary or proper to execute the powers and duties granted to, and imposed upon the District.	The District has found this rule amendment does not duplicate any existing state or federal regulations. It is an administrative change only. (Health and Safety Code Section 40727(b)(5)).
Reference: The District must refer to any statue, court decision, or other provision of law that the District implements, interprets, or makes specific by adopting, amending or repealing the rule.	Health and Safety Code Sections 41080, 41512(a), 41512.7(b), 42311, and 42371. (Health and Safety Code Section 40727(b)(6)).
Additional Informational Requirements: In complying with HSC Section 40727.2, the District must identify all federal requirements and District rules that apply to the same equipment or source type as the proposed rule or amendments.	Rule 301 is a fee rule and does not affect emissions. Therefore, a written analysis of federal regulations and other District rules is not required. (Health and Safety Code Section 40727.2(g)).

Attachment A
40727.2 Matrix for Proposed Amendments to Rule 411, Boiler NOx

			Comparative Requirements	
Elements of Comparison	Specific Provisions	Proposed Rule 411	Best Available Control Technology (BACT)	40CFR60 Subpart Db
Exemptions		Annual heat input less than the levels specified in Section 113 of the rule.		Heat input capacity \leq 29 megawatts
Averaging Provisions				
Units		ppmv	ppmv	Lbs/mmBtu
Emissions Limits		<p>Gaseous Fuel Firing (BARCT): 1-<5 mmBtu/hr input: <30 ppmv NOx 400 ppm CO over 15 min., @ 3% O2.</p> <p>=5 – 20 mmBtu/hr input: <15 ppm NOx and <400 ppm CO over 15 min., @ 3% O2.</p> <p>>20 mmBtu/hr input: <9 ppm NOx and <400 ppm CO over 15 min., @ 3% O2.</p> <p>Nongaseous Fuel Firing (BARCT):</p> <p>1-5 mmBtu/hr input: <40 ppmv NOx, <400 ppmv CO over 15 min., @ 3% O2.</p> <p>=5 – 20 mmBtu/hr input: <40 ppmv NOx, <400ppmv CO over 15 min., @ 3% O2.</p> <p>>20 mmBtu/hr input: <20 ppmvd NOx, 400 ppmv Co over 15 min.,</p> <p>Biomass Fuel Firing (BARCT): <70ppmv NOx and <400ppmv CO, rolling 3 hr. avg., @ 12% CO2.</p>	<p><16.7 MMBTU/Hr: \leq20 ppmv NOx and \leq50 ppmv (firetube type) or \leq100 ppmv (watertube type) CO, @ 3% O2</p> <p>\geq16.7 MMBTU/Hr: \leq5 ppmv NOx and \leq50 ppmv CO, @ 3% O2.</p> <p>Biomass Fuel Firing: \leq70 ppmv NOx, rolling 3 hr. Avg., @ 12% CO2. \leq173 ppmv CO, rolling 3 hr. avg., @ 12% CO2.</p>	<p>Natural Gas & Distillate Oil: \leq0.10 lb-NOx/mmBtu/hr (low heat) \leq0.10 lb-NOx/mmBtu/hr (high heat)</p> <p>Residual Oil: \leq0.30 lb-NOx/mmBtu/hr NOx(low heat) \leq0.40 lb-NOx/mmBtu/hr NOx(high heat)</p> <p>Coal: \leq0.50 lb-NOx/mmBtu/hr NOx(Mass-feed stoker) \leq0.60 lb-NOx/mmBtu/hr NOx (Spreader stoker) \leq0.70 lb-NOx/mmBtu/hr NOx(Pulverized Coal) \leq0.60 lb-NOx/mmBtu/hr NOx(Lignite) \leq0.80 lb-NOx/mmBtu/hr NOx(Lignite mined in ND, SD, or MO and combusted in a slag tap furnace)</p>
	Compliance alternatives		Limit fuel usage below the levels specified in the rule and either tune the boiler at least once per year or maintain O2 stack level of less than 3%; Install air pollution control equipment to reduce NOx and Co emissions; apply for SEED Credits	

Staff Report
 Rule 411 & Rule 301
 Attachment A
 40727.2 Matrix for Proposed Amendments to Rule 411, Boiler NOx
 October 27, 2005, Page 2

			Comparative Requirements	
Elements of Comparison	Specific Provisions	Proposed Rule 411	Best Available Control Technology (BACT)	40CFR60 Subpart Db
Operating Parameters				30 day averaging (daily emission rates averaged over 30 days)
Work Practice Requirements		none		none
Monitoring/Records	Recordkeeping	Emergency Nongaseous Fuel Firing: record cumulative annual hours of operation on each non-gaseous fuel. Keep records of most recent 2 years and have available on request. Low Fuel Usage\Removal From Service: record HHV and cumulative gaseous and non-gaseous fuel usage. Keep record of most recent 2 years and have available on request. CEMS System: one cycle of operation (sampling, analyzing, and data recording) every 15 minutes.		Owner/operator submit notification of date of initial startup, submit performance test data from initial performance test and performance evaluation of CEMS. Affected facilities shall keep records for each steam-generating unit operating day. Submit excess emission reports for any calendar quarter where there are excess emissions or submit a report stating the absence of excess emissions. All records kept for two years. Submit quarterly report.
	Frequency	Initial testing to verify compliance with proposed NOx and CO emission limits; After this, unit rated at ≥ 20 million BTU an hour: source test annually. Units rated at >5 million Btu an hour but <20 million BTU an hour: source test biennially.		Heat input capacity >250 million Btu's: Initial performance test; subsequent performance test each calendar year or every 400 hours. Heat input capacity < 250 million Btu's: Initial performance test; as requested thereafter.
Monitoring/Testing	Test Methods	All emission determination made in as-found operating condition, except no determination during startup, shutdown, or malfunction. Test methods: -Oxide of Nitrogen: ARB Method 100 or EPA Method 7E -Carbon Monoxide: ARB Method 100 or EPA		Emission standards apply at all times except during startup, shutdown, or malfunction. Test methods: -NOx: Continuous system -NOx with duct burners used in combined cycle systems: Method 20

Staff Report
 Rule 411 & Rule 301
 Attachment A
 40727.2 Matrix for Proposed Amendments to Rule 411, Boiler NOx
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			Comparative Requirements	
Elements of Comparison	Specific Provisions	Proposed Rule 411	Best Available Control Technology (BACT)	40CFR60 Subpart Db
		Method 10 -Stack Gas Oxygen: ARB Method 100 or EPA method 3A -Carbon Dioxide: ARB Method 100 or EPA Method 3A.		-NOx for facilities with heat input capacity > 250 million Btu/hour: Method 7, 7A or 7E.

Attachment B

All Feasible Measures Requirements Rule 411, Boiler NOx

The following is a comparison with the proposed requirements in Rule 411 and those adopted by other districts. The table below lists these requirements:

	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
Applicability	New and existing units rated at or above one mmBtu/hr input.	<p>Rule 74.11.1 New units rated at or above 75,000 Btu/hr input and <= 2 mmBtu/hr input</p> <p>Rule 74.15 New and existing units rated at or above 5 mmBtu/hr input</p> <p>Rule 74.15.1 New and existing units rated at or above 1 mmBtu/hr input and less than 5 mmBtu/hr input.</p>	<p>Rule 1146.2 January 2000 – Type 2 units (units rated >400,000 Btu/hr input and <=2 mmBtu/hr input) manufactured after January 2000</p> <p>January 2001 - Type 1 units (units rated >=75,000 Btu/hr input and <=400,000 Btu/hr input) manufactured after January 2001</p> <p>July 2002 – Units rated > 1 mmBtu/hr input and <=2 mmBtu/hr input manufactured prior to January 1992</p> <p>January 2005 – Units rated >1 mmBtu/hr input and <= 2 mmBtu/hr input manufactured between 1992 and 1999</p> <p>January 2006 – Units rated >400,000 Btu/hr input and <= 1 mmBtu/hr input manufactured prior to January 2000</p>	New and existing units > 5 mmBtu/hr input	<p>Rule 360 New units >=75,000 therms – 2 mmBtu/hr input installed after 10/17/2003</p> <p>Rule 342 Units rated at or above 5 mmBtu/hr input</p>

Staff Report
 Rule 411 & Rule 301
 Attachment B
 All Feasible Measures requirements
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	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
			<p>Rule 1146.1</p> <p>New and existing units rated > 2 mmBtu/hr input and <5 mmBtu/hr input</p> <p>Rule 1146</p> <p>New and existing units rate at or above 5 mmBtu/hr input</p>		
Conclusion – Rule Applicability	Staff did not propose setting the rule applicability to units rated below one mmBtu/hr input at this time since these units will be addressed under a separate rule applying to small boilers and large water heaters.				
Exemptions	<p>Units with < 1 mmBtu/hr heat input</p> <p>1- <2.5 mmBtu/ hr – 40,000 therms/yr</p> <p>2.5 <5 mmBtu/ hr – 70,000 therms/yr</p> <p>>=5 - <100 mmBtu/hr – 200,000 therms/yr</p> <p>>=100 mmBtu/hr 300,000 therms/year</p>	<p>Rule 74.11.1</p> <p>Units installed prior to December 31, 1999.</p> <p>Rule 74.15.1</p> <p>Fuel usage <18,000 therms Alternate fuel use if used less than 50 hours per year Alternate fuel use due to the curtailment of natural gas service by the natural gas supplier (Rule 74.15.1)</p>	<p>Rule 1146.2</p> <p>Units rated >1 mmBtu/hr input and less than 2 mmBtu/hr with fuel usage <9,000 therms per year – Effective January 2001</p> <p>Units rated below 400,000 Btu/hr input and <= 1 mmBtu/hr input with fuel usage <9,000 therms – Effective January 2005</p> <p>No low fuel usage exemption is provided for units with heat input <= 400,000 Btu/hr</p>	<p>Burning of fuels other than natural gas during natural gas curtailment. This is limited to 168 hours per year plus 48 hours for equipment testing.</p> <p>Units with annual heat input of >=90,000 and <=300,000 therms</p>	<p>Rule 360</p> <p>No fuel usage exemption is provided</p> <p>Rule 342</p> <p>Burning of fuels other than natural gas during natural gas curtailment. This is limited to 168 hours per year plus 24 hours for equipment testing.</p> <p>Units with annual heat input of >=90,000 therms</p>

Staff Report
 Rule 411 & Rule 301
 Attachment B
 All Feasible Measures requirements
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	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
		Rule 74.15 Fuel usage <90,000 therms/year Alternate fuel use if used less than 50 hours per year Alternate fuel use due to the curtailment of natural gas service by the natural gas supplier	Units used in recreational vehicles Units used in mobile homes Units located at RECLAIM facilities Rule 1146.1 Units with annual fuel usage of <= 18,000 therms Rule 1146 <=90,000 therms per year for units with rated heat input of >= 5 mmBtu/hr and < 40 mmBtu/hr <=200,000 therms per year for units rated heat input at or above 40 mmBtu/hr		
Conclusion – Exemptions	SCAQMD and VCAPCD have the most stringent fuel usage for exemption from the rule requirements. SCAMD required existing small units to be retrofit/replaced (The final compliance date is 1/2005). The BACT level in SCAQMD is zero pounds per day for ozone precursors where it is 10 pounds/day for our district. In addition, these small units were required to meet 30 ppm NOx limit at the time of installation as BACT. Therefore, the total retrofit costs were lower in a relative sense in the SCAQMD. Staff established exemption levels based on costs for permitted and unpermitted units using specific data from sources in Sacramento.				
Source Testing Requirement	Annual for units at or above 20 mmBtu/hr Biennial for units at or above 5 mmBtu/hr and less than 20 mmBtu/hr	Rule 74.11.1 Initial certification by the equipment manufacturer	Rule 1146.2 A certification source test required of the equipment manufacturer	CEMS or an approved alternate motoring system which required periodic monitoring Annual testing may be used as an alternative to	Rule 360 Initial source test for equipment certification Rule 342

	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
	<p>Initial testing only to verify compliance with the proposed NOx limits for 1-5 mmBtu/hr. Testing can be either a formal source test using ARB or EPA approved test methods or by using a portable analyzer.</p> <p>Annual tune-up or 3% O2 for exempt equipment</p>	<p>Rule 74.15.1</p> <p>Annual testing</p> <p>3% O2 or biannual tune-up for exempt equipment</p>	<p>Rule 1146.1</p> <p>An initial source test is required</p> <p>Biannual tune-up or 3% O2 for exempt equipment</p> <p>Rule 1146</p> <p>Initial source testing is required</p> <p>Units below 10 mmBtu/hr – source testing is required every 3 years</p> <p>Units above 10 mmBtu/hr – source testing is required every year</p> <p>Biannual tune-up or 3% O2 for exempt equipment</p>	<p>CEMS</p> <p>Units with low fuel usage exemption – monthly monitoring of the operational characteristics of the unit as recommended by the unit manufacturer</p> <p>Biannual tune-up or 3% O2 for exempt equipment</p> <p>Triennial testing if units demonstrate compliance on a consecutive 2 year period.</p> <p>Testing of similar units may be achieved by testing on unit.</p>	<p>Biennial source testing</p>
Conclusion - Testing	<p>Some districts require biannual tune-up or 3% O2 for exempt equipment if they are operated year-round. Some districts require annual testing for units rated above 10 mmBtu/hr input. Rule 411 requires annual tune-up for exempt equipment unless meeting 3% O2 , initial testing for units rated >-1 mmBtu/hr and below 5 mmBtu/hr, biennial testing for units rated at or above 5 mmBtu/hr and less than 20 mmBtu/r, annual testing for units rated at or above 20 mmBtu/hr. Staff did not require biannual tune-up for exempt equipment since most of these units are operated less than 6 months per year. While staff increased the testing frequency to annual for 20-25 mmBtu/hr Staff also did not set the annual testing requirements at units rated above 10 mmBtu/hr input to minimize the cost impact of affected sources.</p>				

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 Rule 411 & Rule 301
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 All Feasible Measures requirements
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	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
Equipment Requirements	Hour meter or fuel meter for exempt equipment	Rule 74.11.1 No equipment is specified Rule 74.15.1 Non-totalizing fuel meter 74.15 Same as Rule 74.15.1	Rule 1146.2 No fuel or hour meter is required Rule 1146.1 For exempt units - Non-resetting totalizing fuel meter for exempt equipment Rule 1146 Same as Rule 1146.1	Totalizing mass or flow meter for exempt equipment.	Rule 360 No fuel or hour meter is required Rule 342 Totalizing mass or flow meter for exempt equipment
Conclusion – Equipment Requirements	Equipment is being required to support enforcement of exemption levels. Without a fuel meter or hour meter, staff will not be able to verify the annual fuel usage for the exempt equipment.				
Permit Modification Requirements	Permit modification required for exempt equipment because of low fuel usage applied for within one year of adoption. For non-exempt units, no explicit permit modification is specified.	Rule 74.11.1 No explicit permit modification is specified Rule 74.15.1 No explicit permit modification is specified. Rule 74.15 Permit modification is specified AC application by March 1990 for units rated above 10 mmBtu/hr input	Rule 1146.2 No explicit permit modification is required Rule 1146.1 Permit modification is required AC application by January 1993 Rule 1146 No explicit permit modification is specified.	Permit modification is required. A compliance plan is required, but no explicit date for AC application submittal is specified.	Rule 360 No explicit permit modification is required. Rule 342 Permit modification is required with a compliance plan. AC application by March 1994.

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	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
		AC application by March 1991 for units rated from 5 – 10 mmBtu/hr input			
Conclusion – Modification	A permit application is required for exempt equipment to add the fuel limitation and any fuel meter/tune-up requirements that are necessary. However, no explicit application for modification is required by Rule 411 for non-exempt units because Rule 201, General Permit Requirements, Section 301 requires modification of the permit to include the requirements of Rule 411 in the Permit to Operate. Not all of the other districts require actual modification of the Permit to Operate, but instead they require recordkeeping to be kept to verify compliance. In other Districts, equipment modifications would trigger requirements through their permitting regulations also.				

	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
Emission Limits	<p>Gaseous Fuels:</p> <p>NOx Limit</p> <p>30 ppmv (1-<5 mmBtu/hr) 15 ppmv >=5 - <= 20 mmBtu/hr 9 ppmv >20 mmBtu/hr</p> <p>Load following units: 15 ppmv</p> <p>Reforming Furnace: 30 ppmv</p> <p>Landfill gas 15 ppmv</p> <p>Nongaseous Fuels:</p> <p>40 ppmv</p>	<p>Rule 74.11</p> <p>Gaseous Fuels:</p> <p>Units with rated capacity >=75,000 therms and <= 400,000 therms</p> <p>NOx limit – 55 ppm</p> <p>Units with rated capacity >400,000 therms and <= 2 mmBtu/hr</p> <p>NOx limit – 30 ppm</p> <p>Nongaseous Fuels:</p> <p>Same as gaseous fuels</p> <p>Rule 74.15.1</p> <p>NOx Limit – 30 ppm</p> <p>Rule 74.15</p> <p>Gaseous & Nongaseous Fuels</p> <p>NOx Limit – 30 ppm</p>	<p>Rule 1146.2</p> <p>Gaseous Fuels:</p> <p>NOx Limit - 30 ppmv</p> <p>Nongaseous Fuels:</p> <p>Same as gaseous fuels</p> <p>Rule 1146.1</p> <p>Gaseous Fuels:</p> <p>NOx Limit - 30 ppmv</p> <p>Nongaseous Fuels:</p> <p>Same as gaseous fuels</p> <p>Rule 1146</p> <p>Gaseous Fuels</p> <p>NOx Limit – 30 ppmv</p> <p>Nongaseous Fuels:</p> <p>Same as gaseous fuels</p>	<p>Gaseous Fuels:</p> <p>NOx Limit –</p> <p>15 ppmv >=5 - <= 20 mmBtu/hr 9 ppmv >20 mmBtu/hr</p> <p>Weighted limit for units that burns a combination of gaseous and nongaseous fuels</p> <p>Nongaseous Fuels:</p> <p>NOx Limit – 40 ppm</p>	<p>Rule 360</p> <p>Gaseous Fuels</p> <p>NOx Limit</p> <p>75,000 therms – 400,000 therms – 55 ppm</p> <p>>400,000 therms – 2 mmBtu/hr – 30 ppm</p> <p>Nongaseous Fuels – No specific limit provided – assumed same as gaseous fuels.</p> <p>Rule 342</p> <p>Gaseous Fuels</p> <p>NOx Limit – 30 ppm</p> <p>Nongaseous Fuels</p> <p>NOx Limit – 40 ppm</p>
Conclusion – Emission Limits	Emission limits for gaseous fuels are consistent with those adopted in other districts. Other districts such as VCAPCD and SCAQMD have lower limits for small units fired on non-gaseous fuels. VAPCD, SBAPCD, and SJVUAPCD exempt units from the NOx requirements if non-gaseous fuel is used on standby basis. Therefore, staff did not propose a lower NOx limit for non-gaseous fuel firing. The only non-gaseous fuel use in the District is for standby purposes.				

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	Proposed SMAQMD Rule 411	VCAPCD (Rule 74.11.1, 9/14/1999) (Rule 74.15.1, 6/13/2000) Rule 74.15, 11/8/1994)	SCAQMD (Rule 1146.2; 1/9/1998); (Rule 1146.1; 5/13/1994); (Rule 1146; 6/16/2000)	SJVUAPCD (Rule 4306, 9/18/2003)	SBAPCD (Rule 360, 10/17/2002) (Rule 342, 4/17/1997)
Compliance Dates	Two years after rule adoption for two units or less Four years after rule adoption for multiple units (3 or more units)	Rule 74.11.1 (December 2000 for units less than 400,000 Btu/hr input; December 1999 for unit more than 400,000 Btu/hr input) Rule 74.15.1 (Final compliance date is June 2000) Rule 74.15 Final compliance date is March 1992)	Rule 1146.2 (Compliance Dates are: January 2000, January 2001, July 2002, January 2005, and January 2006 depending on the unit size and manufacturing date) Rule 1146.1 (Compliance Timelines are: January 2003 for AC application submittal; December 1993 for full compliance) Rule 1146 (Compliance Date is July 2002)	There are phase in compliance timelines for sources with multiple units. 25% of units to comply by June 2005; 62.5% by June 2006; 100% by June 2007. Final compliance timeline is year 2007. Additional time for load following units if they install SCR system.	Rule 360 Compliance date is October 2003) Rule 342 Final compliance date is March 1996)
Compliance Date Conclusion	Some districts have different compliance dates depending on the equipment size. Other districts have phase in compliance timelines for sources with multiple units. Proposed Rule 411 gives one year of compliance timeline. This is more stringent than that adopted by other districts. The District has a few facilities with multiple units. A delayed compliance timeline may be proposed if request by these facilities.				
Overall Rule Feasibility Conclusion	Based on the analysis of boiler rules adopted by other districts, Staff has concluded that the proposed amendments will satisfy the "all feasible" measures requirements.				

Attachment C

Rule 411

Rule 301

Summary of Changes

Existing Section Number	New Section Number	Changes
Rule 411		
101	NA	Revised this section to clarify that this rule applies to new and existing boilers, steam generators, and process heaters used for any type of application or process.
102	NA	Revised this section to lower the applicability to one mmBtu/hr and to clarify the rule language as noted in Section 101.
110	NA	Removed the section since the applicability is covered under Section 102.
111-112	110-111	Section renumbering.
113	112	Revised this section to clarify that waste heat recovery boilers can be used after any combustion devices, not just gas turbine or IC engines.
114	113	<p>Clarified this section to ensure that the current 90,000 therms exemption only applies to units rated at or above 5 mmBtu/hr input which are currently under permit from the District.</p> <p>Clarified that units exempt pursuant to this section are subject to the recordkeeping requirements in Section 502.</p> <p>Added an exemption from the proposed NOx limit based on the annual fuel usage. The proposed exemption levels are: 40,000 therms per year for units rated 1 – <2.5 mmBtu/hr input 70,000 therms per year for units rated 2.5 – <5 mmBtu/hr input 200,000 therms per year for units rated >=5 - <100 mmBtu/hr input 300,000 therms per year for units rated >= 100 mmBtu/hr input</p>
-	114	Added an exemption for standing pilot flames which are used to sustain low steam demands in load following units in response to public comments.
201	NA	Revised the title of this definition to clarify that the annual fuel input is the same as the annual fuel usage for the unit.
202	NA	Revised this section to clarify that Section 304 is a BARCT requirement.

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Existing Section Number	New Section Number	Changes
204	NA	Revised the definition of "Biomass Boiler or Steam Generator" to clarify and to add the word Biomass to the title of the definition.
205	NA	Revised the definition of "Boiler or Steam Generator" to clarify it.
209	NA	Revised this section to correct the section number reference.
	210	Added a definition for "Landfill Gas" since it is used in the rule.
	211	Added a new definition for "Load Following Unit" since it used in Section 301. This definition is the same as the definition in SJVUAPCD, Rule 4306.
210-213	212-215	Section renumbering.
214	216	Revised the definition of a "Process Heater" to clarify that it also includes "Reformers".
215	217	Section renumbering.
	218	Added a definition for "Reformer" since it is used in Section 301 of the rule.
216-220	219-223	Section renumbering.
221	224	Revised the definition of "Unit" to clarify that it includes steam generators and process heaters.
	225	Added a new definition for "Waste Heat Recovery Boilers" similar to that used by EPA.
222	226	Section renumbering.
301	NA	Revised this section to add proposed lower NO _x standards for new and existing boilers and other equipment fired on gaseous fuels. Added new NO _x requirements for new and existing units rated at one mmBtu/hr input and less than 5 mmBtu/hr input fired on gaseous fuels. Added a NO _x emission standard for "Reforming Furnaces". Added NO _x emission standards for load-following boilers.
302	NA	Revised this section to clarify it and to add new NO _x requirements for new and existing units rated at one mmBtu/hr input and less than 5 mmBtu/hr input fired on nongaseous fuels.
303	NA	Revised this section to correct the section numbers referenced under this section.
305	NA	Revised this section to remove the dates that no longer apply.
306	NA	Revised this section to clarify that equipment exempt from the NO _x and CO requirements are required to install a non-resetting totalizing fuel meter, hour meter, or a computerized tracking system.

Existing Section Number	New Section Number	Changes
401	NA	Corrected the section number reference in 401.1; and added a new subsection 401.1 for units exempt pursuant to Section 113.2 to be equipped with a fuel monitoring equipment that comply with the requirements in Section 306. Also added the compliance timeline for exempt units.
403	NA	<p>Added requirements for initial source testing to verify compliance with the proposed emissions units. Also added an alternative testing method to verify NOx emission limits for boilers rated below 5 mmBtu/hr input. Owners and operators can use a portable NOx analyzer to measure NOx emissions from the boiler. The results of the portable analyzer will be used as creditable evidence for demonstrating compliance with the standards in Sections 301 through 304.</p> <p>Lowered the annual testing requirements from units rated at or above 25 mmBtu/hr input to units rated at or above 20 mmBtu/hr input to make it consistent with the proposed NOx limits which apply to units rated at or above 20 mmBtu/hr input.</p> <p>Revised the biennial testing requirements to apply to units rated at or above 5 mmBtu/hr - < 20 mmBtu/hr.</p> <p>Added initial testing requirements for units rated at or above 1 mmBtu/hr to < 5 mmBtu/hr.</p>
404	NA	Added testing guidelines for portable analyzers.
	405	Added a new section for administrative requirements for units that exceed the allowable fuel usage and become subject to the lower NOx emission limits.
	406	Added administrative requirements for load following units.
	407	Added a new section for compliance timelines. The rule requires a two year compliance timeline for sources with two units or less and four years for sources with more than two units.
501	NA	<p>Revised this section to reflect the change in numbering for Sections 217 and 219.</p> <p>Corrected test method number to reflect the updated test numbers for HHV.</p> <p>Added new rule language to clarify that a scheduled source test may not be discontinued solely due to the failure of one or more runs to meet applicable standards.</p> <p>Added clarifying language to allow compliance to be determined based on two test runs instead of three runs if the results of one</p>

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Existing Section Number	New Section Number	Changes
		of the runs are invalidated due to unforeseen reasons. Clarified Section 501.2 to ensure that CEMS are used when the unit is operated.
502		Revised this section to correct subsection number. Added references to applicable sections. Section 502.2 – Replaced with separate requirements for exempt units with fuel meters and exempt units with hour meters. Added recordkeeping requirements for waste heat recovery boilers. Also Added recordkeeping for portable analyzers.
Attachment A		Revised to include tune-up procedure for natural draft-fired units.
Attachment B		Added a new attachment to the rule detailing requirements for portable analyzers since the rule now allows the use of portable analyzers in lieu of source testing for small boilers rated below 5 mmBtu/hr input.
Rule 301		
	302.2	Added a new section for assessing an initial fee for small units that are subject to Rule 411 proposed requirements equivalent to the renewal fee in Section 308.3.

Attachment D

Rule 411, Boiler NOx

Cost Analysis

Attachment D-1

Boiler Replacement Cost

Boiler Size mmBtu/hr	Equipment Cost \$	Installation Cost \$	Permit Modification \$	Total Capital Cost \$	Annualized Capital Cost \$/yr	Source Testing Cost \$/yr	Total Annual Cost \$/yr
1	18,000.00	18,000.00	284.00	36,284.00	3,983.79	54.90	4,038.69
2	26,000.00	26,000.00	284.00	52,284.00	5,740.50	54.90	5,795.40
3	36,000.00	36,000.00	284.00	72,284.00	7,936.39	54.90	7,991.29
4	40,000.00	40,000.00	284.00	80,284.00	8,814.75	54.90	8,869.65
5	90,000.00	45,000.00	567.00	135,567.00	14,884.53	0.00	14,884.53
6	96,000.00	48,000.00	567.00	144,567.00	15,872.68	0.00	15,872.68
7	102,000.00	51,000.00	567.00	153,567.00	16,860.83	0.00	16,860.83
8	108,000.00	54,000.00	567.00	162,567.00	17,848.98	0.00	17,848.98
9	114,000.00	57,000.00	567.00	171,567.00	18,837.13	0.00	18,837.13
10	120,000.00	60,000.00	1,134.00	181,134.00	19,887.54	0.00	19,887.54
15	185,000.00	92,500.00	1,134.00	278,634.00	30,592.52	0.00	30,592.52
20	250,000.00	125,000.00	1,134.00	376,134.00	41,297.49	0.00	41,297.49
30	283,333.00	141,666.50	1,134.00	426,133.50	46,787.17	0.00	46,787.17
40	316,666.00	158,333.00	1,134.00	476,133.00	52,276.84	0.00	52,276.84
50	350,000.00	175,000.00	2,267.00	527,267.00	57,891.08	0.00	57,891.08
60	380,000.00	190,000.00	2,267.00	572,267.00	62,831.84	0.00	62,831.84
70	410,000.00	205,000.00	2,267.00	617,267.00	67,772.60	0.00	67,772.60
80	440,000.00	220,000.00	2,267.00	662,267.00	72,713.36	0.00	72,713.36
90	470,000.00	235,000.00	2,267.00	707,267.00	77,654.11	0.00	77,654.11
100	500,000.00	250,000.00	4,533.00	754,533.00	82,843.67	0.00	82,843.67

Attachment D-2

Boiler Retrofit Cost

Boiler Size mmBtu/hr	Equipment Cost \$	Installation Cost \$	Permit Modification \$	Total Capital Cost \$	Annualized Capital Cost \$/yr	Source Testing Cost \$/yr	Total Annual Total Cost \$/yr
1	14,000.00	14,000.00	567.00	28,567.00	3,136.50	54.90	3,191.40
2	18,000.00	18,000.00	567.00	36,567.00	4,014.86	54.90	4,069.76
3	26,000.00	26,000.00	567.00	52,567.00	5,771.57	54.90	5,826.47
4	28,000.00	28,000.00	567.00	56,567.00	6,210.75	54.90	6,265.65
5	65,000.00	0.00	567.00	65,567.00	7,198.90	0.00	7,198.90
6	68,000.00	0.00	567.00	68,567.00	7,528.29	0.00	7,528.29
7	71,000.00	0.00	567.00	71,567.00	7,857.67	0.00	7,857.67
8	74,000.00	0.00	567.00	74,567.00	8,187.06	0.00	8,187.06
9	77,000.00	0.00	567.00	77,567.00	8,516.44	0.00	8,516.44
10	80,000.00	0.00	567.00	80,567.00	8,845.82	0.00	8,845.82
15	92,500.00	0.00	567.00	93,067.00	10,218.26	0.00	10,218.26
20	105,000.00	0.00	567.00	105,567.00	11,590.69	0.00	11,590.69
30	115,000.00	0.00	567.00	115,567.00	12,688.64	0.00	12,688.64
40	125,000.00	0.00	567.00	125,567.00	13,786.58	0.00	13,786.58
50	135,000.00	0.00	567.00	135,567.00	14,884.53	0.00	14,884.53
60	163,000.00	0.00	567.00	163,567.00	17,958.78	0.00	17,958.78
70	191,000.00	0.00	567.00	191,567.00	21,033.03	0.00	21,033.03
80	219,000.00	0.00	567.00	219,567.00	24,107.28	0.00	24,107.28
90	247,000.00	0.00	567.00	247,567.00	27,181.53	0.00	27,181.53
100	488,000.00 ¹	0.00	567.00	488,567.00	53,642.03	0.00	53,642.03

(1) This the cost estimate submitted by Campbell Soup for their boiler.

**Attachment E
Comments and Responses**

Rule 411, NOx Emissions from Boilers, Process Heaters and Steam Generators

Public Workshop Comments (December 1, 2004)

Oral comments that were also submitted in writing are addressed in the responses to the written comments.

Comment #1	Will the District allow use of utility billing information for exemption from rule requirements?
Response	Yes, depending on how much other equipment is included on the bill.
Comment #2	The burner rating is less than the boiler rating. We can never achieve the 21 mmBtu/hr input rating.
Response	Section 215 allows the maximum heat input capacity of the burner to be considered as rated heat input.
Comment #3	The rule will cause hardships for large sources.
Response	Staff worked with affected sources to minimize the impact of the rule on these sources. Staff added a higher exemption level for facilities with units rated above 100 mmBtu/hr input. Staff also added two NOx categories for units with specialized applications (reforming units, load following units) which are higher than originally proposed.
Comment #4	Do I still need to source test if I am now exempt pursuant to Section 113.2?
Response	If you are exempt under Section 113.2, but were not previously exempt under Section 113.1, then the requirements in place stay in place (i.e., NOx limits in Section 300 and source testing requirements in Section 400). If you are exempt under Section 113.2 and were exempt under Section 113.1, then the 90,000-therm fuel usage limitation stays in place.
Comment #5	If multiple boilers are manifold together, are they treated as one unit for applicability?
Response	The boilers are looked at individually for purposes of Rule 411.
Comment #6	Compliance timelines are not adequate considering the number of boilers that have to be retrofit.
Response	Staff revised the rule to allow more time for sources to comply with the rule.
Comment #7	Staff report underestimates the number of units in the District, but most of these unpermitted units will have fuel usages below the exemption levels.
Response	Staff cannot know exactly the number of unpermitted units subject to the rule. Unpermitted units are those installed without a permit from the District or those exempt when they were installed and although the exemption was eliminated in 1991, the sources never applied for permits. The District's unpermitted source program will continue to identify unpermitted sources. Staff used the best data available to estimate impacts on unpermitted sources. If commenter had better information, that would be welcome, and considered in this process.
Comment #8	One year timeframe is difficult for manufacturers to complete the retrofit/replacements of all affected boilers.

Response	Staff is requesting information on time needed for sources to comply with the new requirements. Staff subsequently revised the rule to allow more time. See Section 407 in the rule.
Comment #9	Can equipment certification issued by the South Coast AQMD for small boilers be used for compliance determination?
Response	No. The rule does not provide for this option. Staff does not propose to include equipment certification as an option in the rule since equipment is only certified for a specific installation and each installation is different. If the same equipment is installed differently than it was certified under, then this may not guarantee that the emissions from the equipment will be the same. At least one source commented at the public workshop that they prefer that the District require source tests to demonstrate that manufacturers' guarantees meet emission limits required by the rule. Staff added an option for sources with small units to verify NOx emissions by using a portable analyzer in order to reduce the costs to these sources (See response to The Avogadro Group Comment #1). The results of the portable analyzer will be used as creditable evidence for demonstrating compliance with the standards in Sections 301 through 304.
Comment #10	How will the low usage exemption process be handled?
Response	Sources will be required to apply for a permit modification for each unit that qualifies for low fuel usage. The District will modify the Permits to Operate to add a fuel usage limit, tune up requirements, and equipment requirement (i.e., fuel meter or hour meter).
Comment #11	What are the changes or impacts on boiler efficiencies after retrofits?
Response	Boiler manufacturers have told Staff that there will not be any significant impact on boiler efficiency as a result of retrofitting the boilers.
Comment #12	It is not fair to require boilers that are operating properly to be replaced. What if the retrofit does not work?
Response	The District needs the NOx emission reductions from boilers so that the District can move toward achieving attainment of the ozone air quality standard. The boiler retrofit is generally guaranteed by the boiler manufacturer to meet rule limits. Boiler manufacturers have told staff that the proposed low NOx limits for boilers at or above 5 mmBtu/hr input are achievable and have been implemented in SJVUAPCD. Low NOx technology for small boilers (1- <5 mmBtu/hr input) is readily available and the 30 ppm NOx emission level has already been required for new and existing units in the South Coast and Ventura County districts and for new units in the Santa Barbara district..
Comment #13	Is the replacement of units exempt from NSR?
Response	Functionally identical equipment is exempt from having to provide offsets.
Comment #14	Is retrofit from manufacturer standpoint for atmospheric boilers most cost effective or replacement? We urge the District to reconsider precertification (1-2 mmBtu/hr input) by South Coast AQMD in lieu of paying \$2,000 for source testing cost.
Response	See response to comment #9 above.
Comment #15	Business needs more time to evaluate compliance timelines for our

	landfill gases.
Response	Staff revised the rule to allow additional time for compliance with the proposed requirements. The rule requirements will not be effective until 2 years after the adoption of the rule amendments and longer for sources with multiple units.
Comment #16	Larger boilers tolerate higher costs?
Response	Yes, because larger boilers produce greater emissions, and controlling them generates more NOx reductions. The cost to control larger boilers is higher but so is the emission benefit.
Comment #17	What is the survey response rate for this rule?
Response	The response rate was around 90% for permitted sources and about 25% for unpermitted sources. The purpose of survey was to define range of costs and not the cost for each unit. The survey achieved this goal.
Comment #18	Need tune up report every year for small units.
Response	Yes.

Aerojet Fine Chemicals Comments (December 21, 2004)

Comment #1	AFC requests that the effective date for compliance with the rule to be extended to 24 months after the date of adoption of the rule or a schedule dependent on the number of affected units.
Response	Staff revised the rule by extending the effective date to two years after the date of adoption of the rule and also for a longer timeframe for facilities with multiple units.
Comment #2	The cost for retrofitting 45 boilers will be approximately 3 million dollars. The cost for retrofitting 9 of their affected boilers will be in the range of \$500,000 or \$150 per pound of NOx which is extremely higher than the cost effectiveness in the staff report. Some of these boilers may qualify for low fuel exemption, but individual data and time is needed to make that determination.
Response	AFC estimates of the cost effectiveness is based on the total cost for 9 boilers and the total fuel usage for all boilers since all of the 9 boilers are connected to a common fuel meter. Staff estimates that the total cost for AFC will be much lower based on cost information provided by boiler manufacturers. Staff contacted Aerojet by phone and requested actual cost data from AFC a few months prior to the public workshop, but no cost data was provided. AFC has not submitted actual cost data to support their cost estimates. As for the low fuel exemption, the rule will provide two years for affected business to make a determination whether to take a low fuel usage exemption or comply with the proposed NOx limits.
Comment #3	Staff report did not analyze annual costs of maintenance for the boilers.
Response	According to boiler manufacturers there are no increases in maintenance costs for the burner.

Procter and Gamble (P&G) Comments (December 3, 2004)

Comment #1	Attachment D to the staff report for Rule 411 grossly underestimates the equipment and installation cost of \$117,000 (interpolated) for a 32 mmBtu/hr heater. In anticipation of the new Rule, we just completed a retrofit of our 32-mmBtu/hr Dowtherm heater with a burner capable of less than 9 ppm of NOx with flue gas recirculation for a cost of \$380,000, or three times that cited. Furthermore, source tests for this unit run about \$2,000 per year. These figures will significantly affect staff's cost effectiveness calculations related to Rule 411.
Response	Staff cost effectiveness information was based on cost information provided by boiler manufacturers since actual cost data from affected sources was not available. Staff received actual cost data from affected businesses after the December 1, 2004 public workshop which is higher than the cost data provided by the boiler manufacturer and updated the staff report to reflect the new cost data. Staff understands that some installations may require additional modifications to the site such as an upgrade to the electrical system components which can increase the cost significantly as in the case of Procter and Gamble.

Campbell Soup Company Comments (November 22, 2004)

Comment #1	Update staff report to have two charts; the first with those agencies regulating small units and the second with the single agency imposing a 9-ppm NOx emission level on existing sources. Listing all five agencies imposing 9-ppm NOx emission levels misrepresents the current state of affairs within the California Air Districts.
Response	Staff revised the staff report to clarify the status of NOx regulations for boilers at other districts.
Comment #2	The Air District did not explore and discuss the reasoning to impose the proposed amendments in 2005, while the Federal Mandate referenced on page 3 of the Staff Report noted the need to meet the 8-hour Ozone standard by 2013. CSSC contends that there is sufficient time to witness and allow industry and SMAQMD to learn from the implementation of such a restriction by others in other air districts, so that costly pitfalls may be avoided and a sound approach to amendment implementation may be taken.
Response	The reason for proposing these regulations is discussed in the background section of the staff report. Implementing these regulations sooner will help the District toward attaining air quality standards for ozone and reduce particulate matter levels as expeditiously as practicable as required by law. NOx regulations for small boilers have been required by other districts for sometime. As for larger boilers, staff contacted boiler manufactures to find out if there are any problems in implementing the 9 ppm NOx standard. It's Staff's understanding that there were no

	<p>significant problems in achieving these emission levels by the new boiler NOx technologies. To ensure that there are no issues in meeting the NOx limit for boilers specific applications such as load following or firing on other gaseous fuels such as landfill gas, Staff added less stringent 15 ppm NOx limits to accommodate these concerns. Staff also contacted SJVUPACD staff and were told that they are unaware of any sources not being able to meet the 9 ppm NOx limit.</p>
Comment #3	<p>Staff notes that District met the evaluation of "All Feasible Measures" on page 4. CSSC believes that since Staff did not evaluate separately the impacts of regulating small NOx sources and imposing a 9-ppm NOx limit, all feasible measures were not evaluated.</p>
Response	<p>Staff evaluated the impacts on small NOx sources such as sources with one or two small boilers. Most of the small NOx sources will be exempt from the proposed requirements based on their annual fuel usages. Staff understands that there may be a few boilers that will be at the high end of the range of costs. These sources can choose a less costly alternative by applying for alternative compliance option available under Rule 107, Alternative Compliance. Sources can purchase emission reduction credits from the District's Community Bank for a fee which may be less than the cost of retrofitting the boiler. The emission reduction credits are available on a first come first served basis and are only available as long as there are credits in the bank for lease.</p>
Comment #4	<p>The staff report did not address the impact of imposing the new standards on new sources and modified sources requiring a new permit.</p>
Response	<p>Impacts on new sources and modified sources were analyzed by Staff. The analyses were based on the incremental cost between purchasing a compliant boiler vs. a non-compliant boiler. The incremental cost analysis showed that it is cost effective to install a new low NOx boiler.</p>
Comment #5	<p>There are several flaws in the staff report's evaluation of the economic impacts with respect to "Best Available Retrofit Requirement." Specifically, CSSC takes exception to the assumption noted on page 15, regarding boilers with a "cost effectiveness above \$16/lb. Staff expects these sources to take an annual fuel usage limit". CSSC boilers are potentially such a source and cannot accept such a usage limit. CSSC believes that the District should contact the small population of sources in this category to correctly evaluate the economic impact of these regulations.</p>
Response	<p>Staff analyses were based on historic low fuel usages by some sources. These sources may be able to take a low fuel usage exemption limit since their fuel usages have been consistently low. Staff also contacted these sources to see if they are able to take a low fuel usage limit. Some of the sources contacted are planning to retrofit their equipment. Others may retrofit some of their units and take low fuel usage exemption limits or utilize alternative compliance option on the remaining units.</p> <p>Staff understands that there are a few sources such as CSSC with historical low fuel usages. CSSC has large boilers, but historically these boilers were operated a few days per year. Their boilers may qualify for the low fuel usage exemption and not be subject to the rule. CSSC does not wish to take a low fuel usage exemption because of uncertainty of</p>

	<p>their steam supply source. Staff evaluated the cost impact on these large boilers based on the low historical fuel usage and based on the potential use of these boilers if steam supply is interrupted. Staff used the cost information provided by CSSC after the public workshop. This cost data was incorporated in the staff report. Also see response to comment #3 above.</p> <p>Staff has also expanded the exemption level to 300,000 therms per year for units rated at 100 mmBtu/hr and above. This will allow more of the CSSC units to qualify for the low fuel usage exemption.</p>
Comment #6	<p>The annualized costs of imposing the amendment did not include the additional operation and maintenance labor and fuel costs necessary to operate the 9 ppm NOx boilers. Additionally, the overall rule cost effectiveness is misleading. The increase in operating and fuel cost must be properly addressed so that, at the very least, representative estimations may be obtained to take the place of assumption in the cost effectiveness calculations. In addition, the amendments to the rule's economic impact must be evaluated by class or category to highlight the hardship being imposed on the largest sources.</p>
Response	<p>New low NOx boilers are more efficient and do not have increased maintenance costs according to R.F. MacDonald, a boiler manufacturer and installer. Additionally, most of the newer low NOx boilers are more efficient than their predecessors, which translates to lower operating costs. Staff did not include any additional costs such as increase in operating and fuel costs in the analyses since these costs are assumed to be negligible for most boilers. In the case of CSSC, where a larger fan is needed, there will be an increase in operating cost for the boilers. Staff requested at the public workshop that sources submit information on increased operating costs, but CSSC did not submit to the District information on the increase in these costs. Staff will include information in the assessment if provided.</p>
Comment #7	<p>The socioeconomic impact did not address the potential loss of employment and taxes that could result from the closure of businesses of the new costs imposed by the rule. The district can request data from the small-regulated community to clarify these costs.</p>
Response	<p>Staff did not anticipate any closures of businesses as a result of the proposed rule amendments. This information was requested by Staff at the public workshop, but affected businesses did not submit information to the Staff indicating that they will have to lay off employees in order to comply with the rule requirements. Socioeconomic impact analysis for SJVUAPCD Rule 4306 rule amendments estimated a 0.3% to 1% job loss in the food processing industry as a result of their boiler rule amendments. One facility indicated to Staff that they may shutdown their plant if they had to comply with the lower NOx limit because it will be too costly to retrofit the plant considering the age of the plant and the remaining life on their contract. Staff made revisions to the rule to assist this business to comply with the rule without significantly impacting their operations.</p>
Comment #8	<p>The analysis of the availability and cost-effectiveness of alternatives to Rule 411 amendments did not address the various other sources of NOx</p>

	within the air district and the feasibility and cost of reducing those other sources.
Response	This section, as provided by Health and Safety Code Section 40728.5, deals with the alternatives to adopting more stringent or less stringent NOx regulations for boilers. However, Staff has identified other possible sources of cost-effective NOx emission reductions, as shown in the District's 2003 Triennial Report and SB 656 implementation analysis. Because substantial NOx reductions are required to meet ozone and particulate matter standards, all cost-effective measures will be considered for adoption.
Comment #9	The report notes that the staff has consulted with "boiler and burner manufacturers" and concluded that the technology is feasible. A glaring weakness in this analysis is the lack of input from the source categories that are operating these devices. CSSC contends that the District, in its due diligence, must contact those sites that have been recently permitted and have had 9 ppm NOx limits imposed, via BACT review process. CSSC is confident that a truthful and comprehensive review of these sites will clearly show that, while feasible, the technology developed thus far is nowhere near as reliable or conducive to normal boiler operation as the technology which currently in use for achieving 30 ppm NOx emission levels.
Response	Staff contacted SJVUAPCD staff to see if the 9 ppm NOx limit is achievable as BACT and if this limit has been implemented at SJVUAPCD prior to rule implementation date. There are a few sources in SJVUAPCD that were permitted at 9 ppm as BACT. There are also some sources that have completed the boiler retrofits to comply with the new NOx limits prior to the effective dates of these limits. A list of these sources was obtained from SJVUAPCD. These sources are currently meeting the NOx limits without any significant issues. CSSC did not provide information supporting that the 9 ppm limit is not reliable or conducive to normal boiler operation, nor did they provide information from other businesses supporting this claim. Telephone conversation with Charles Fischer of CSSC pointed out the 9 ppm NOx limit is not achievable at low firing rates for load following boilers. CSSC did not provide information supporting information showing that the new technology unreliable or unachievable. Staff contacted boiler manufactures and were told that the 9 ppm limit is achievable at all firing rates, but it is harder to achieve at all times for load following boilers which have constant load fluctuations from low fire to high fire depending on steam needs. To address this concern, staff added a 15 ppm NOx limit for load following boilers with heat input capacity of 20 mmBtu/hr and greater.
Comment #10	The single agency, SJVUAPCD that has imposed the 9-ppm regulation recognized the severe limitations of the 9 ppm technology, still in its infancy, and allowed load following boilers to be permitted at much more reasonable 15 pm NOx limit. There is no such consideration present in the proposed amendment to Rule 411.
Response	See response to comment #9.
Comment #11	CSSC would like the staff of the District to address the issues raised in

	regard to the staff report prior to finalizing the report and issuing the proposed amendments for comments. CSSC would like to assist the District in the organization of a workgroup of potentially affected sources, provide the District with the proper data to complete a full evaluation of the proposed amendments.
Response	Staff addresses all issues and comments raised by affected businesses and the public. Staff worked with affected businesses in finalizing the rule and the staff report. Staff also contacted affected businesses and offered to meet with them individually or in a group setting. Staff met with interested affected businesses prior to finalizing the staff report.

Campbell Soup Company Comments (December 21, 2004)

Comment #1	Campbell Soup submitted cost data that lists the estimated costs for retrofitting their affected boilers. CSSC indicated that they are not able to utilize the low fuel exemption provided in the rule.
Response	<p>The cost submitted by CSSC is higher than provided by the boiler manufacturer since an additional upgrade to the electrical system is needed to handle the increase in fan size. CSSC can explore other alternative to retrofitting the boiler such as SCR system which may be more cost effective or the use of the alternative compliance option as provided under Rule 107.</p> <p>Staff has also expanded the exemption level to 300,000 therms per year for units rated at 100 mmBtu/hr and above. This will allow more of the CSSC units to qualify for the low fuel usage exemption.</p>
Comment #2	CSSC would like to suggest that the District explore splitting the proposed regulatory action into three phases, with implementation dates that follow completion of District Staff evaluation of the efficacy of the preceding phase. The first phase would be to expand the regulated sources to the desired minimum mmbtu/hr level. The second regulatory phase would lower the NOx emission level of all new sources and those sources that trigger a major permit revision. Then the District could evaluate and regulate the NOx emission level of existing sources. The approach noted above would allow the district to evaluate the need and impact of each phase independently. In addition, this approach would allow the technology required to comply with the proposed regulation to develop and become more reliable.
Response	The first two phases are already required by Rules 201 (since 1991) and Rule 202 (since 1996) respectively. The NOx for units rated at or above 5 mmBtu/hr input proposed in the rule are based on similar limits adopted by SJVUAPCD. Staff therefore does not see a need to phase in the rule requirements at this time. Staff, however, revised the rule to allow for a longer compliance timeline than originally proposed in the rule.
Comment #3	CSSC suggests that the District modify the amendments to Rule 411, to allow the use of the pilot flames of such burners, by themselves, at a NOx level higher than 9 PPM. If such a modification is not acceptable, then

	<p>CSSC will be forced to either; 1) de-rate a boiler, significantly limiting our potential for future manufacturing expansion and economic growth in the area or, 2) install at least one new 50-60 mmbtu Low NOx boiler to allow us to sustain the low firing rate, without exceeding the 9 PPM NOx limit. The smaller of the two burner sizes installed in our boilers is currently rated at ~100 mmbtu.</p>
Response	<p>“Pilot flames” are generally used to ignite main burners. Retrofit large low NOx burners have a 6:1 turndown ratio, which means a 100 mmBtu/hr boiler could fire as low as 16.7 mmBtu/hr while complying with the 15 ppm NOx limit for load following units. However, CSSC has a need to fire at even lower rates during periods of low steam demand, which could be accomplished by the sustained firing of the standing pilot flame.</p> <p>Staff added an exemption to allow the sustained operation of standing pilot flame burners used in load following units. To qualify for the exemption, the standing pilot flame burner must be 5 mmBtu/hr or less and emit no more than 30 ppm NOx. This limit is consistent with the NOx limit for small boilers rated between 1 and 5 mmBtu/hr.</p>

The Avogadro Group, LLC (December 3, 2004)

Comment #1	<p>The District would benefit most from testing the boiler "as found" operating conditions. Requiring testing the boiler at the maximum load the boiler never operates at forces people to tune the boiler to minimize emission at that load point, which many times leads the boiler to increase emission concentrations where the boiler will operate the entire time when it is not being tested. SJVUAPCD has source testing requirements addressing boiler load variation.</p> <p>SJVAPCD has guidelines for portable analyzers. The debate on source testing verses pre-certification for the 1-2 mmBtu/hr units may be addressed by requiring folks to show the emission concentrations after installation with a "certified" portable analyzer that has been calibrated with EPA protocol gases. This would eliminate the larger cost of a compliance source test but still provide the Air District with some confidence that the units are in compliance without worrying about the validity of "pre-certified" equipment. A boiler that passes in the factory by no means is guaranteed to pass once it is installed. Proper installation is absolutely critical for proper emissions, and that can only be verified in the field.</p>
Response	<p>Source testing will be addressed in the implementation of the rule rather than in the rule language. Historically, source testing has been required to be performed based on the normal operating load or the anticipated load of the unit and not the maximum rated capacity of the unit.</p> <p>SJVUAPCD allows the use of portable analyzers as an alternative compliance method to CEM systems for units at or above 5 mmBtu/hr</p>

	input, but not in lieu of source testing. To minimize the cost impacts to sources with small boilers rated below 5 mmBtu/hr input, Staff added a provision which allows sources to use a portable analyzer to check for the NOx emission level as an alternative to source testing. If NOx readings using a portable analyzer show that the NOx emissions are above the limit allowed by Rule 411, then the source will be required to perform a source test to verify compliance. Additionally, the results of the portable analyzer will be used as credible evidence for demonstrating compliance with the standards in Sections 301 through 304.
Comment #2	The District may want to consider the use of a portable analyzer to verify the emission concentrations after installation with a "certified" portable analyzer that has been calibrated with EPA protocol gases. This would eliminate the larger cost of a compliance source test but still provide the District with some confidence the units are in compliance without worrying about the validity of "pre-certified" equipment.
Response	Staff believes that using portable analyzers is a good method for checking the boiler to ensure that it continues to operate within the permitted parameters. Staff revised the rule to allow the use of a portable analyzer for small boilers. However, source test is required to verify initial compliance and compliance thereafter for boilers rated at or above 5 mmBtu/hr input as has been required in the previously adopted rule. See response to comment #1 above and public workshop Comment #9 above.

Blue Diamond Growers (January 11, 2005)

Comment #1	<p>Landfill Gas: The most significant omission in the rule is the lack of provisions regarding boilers firing landfill gas. Based on our conversation with various burner vendors (Coen, R.F. MacDonald, and NATCOM), it has not been demonstrated that burners firing landfill gas can achieve 9 ppm NOx at 3% oxygen. Blue Diamond currently burns landfill gas in its Cleaver Brooks boiler, and would like the flexibility to burn this gas in its Nebraska boiler. If Blue Diamond does not burn this landfill gas as fuel for its boilers, the gas will be vented to flares at the landfill site resulting in higher NOx emissions, and Blue Diamond will have to combust natural gas in place of the landfill gas, resulting in more than double the current NOx emissions. Therefore, there is a significant environmental benefit to burning landfill gas in the Blue Diamond boilers.</p> <p>We recommend that the rule be revised to include provisions for testing of landfill gas burners to determine if 9 ppm is feasible, or, alternatively, setting the landfill gas NOx limit based on demonstrated emission levels (approximately 15 ppm at 3% oxygen, according to vendors).</p>
Response	Staff revised the rule to allow for a higher NOx limit when firing on landfill gas. Boiler manufacturers have indicated to staff that they are not willing to guarantee a 9 ppm NOx limit when firing on landfill gas since fuel quality changes constantly.

Comment #2	The District should include a provision for phase-in of compliance for facilities with multiple emission units, similar to the revisions to Rule 4036 in the San Joaquin Valley APCD. It will be extremely difficult to retrofit multiple boilers within 12 months of rule adoption, especially when these boilers cannot be off simultaneously without presenting serious process disruptions.
Response	Staff revised the rule allow for phase-in of compliance for facilities with multiple emission units.
Comment #3	It is unclear from the Staff Report how the District arrived at the 200,000 therms/yr low usage exemption level for boilers larger than 5 mmBtu/hr. Rule 4306 in the San Joaquin Valley APCD has a 30 billion Btu/yr (300,000 therms per year) low usage exemption. Also, the District should provide a better analysis of the cost effectiveness of requiring controls or fuel flow meters for boilers in the 1 to 2.5 mmBtu/hr ranges. The cost tables seem to indicate that it is equally cost effective to install meters or controls on these small boilers as it is for boilers in the 2.5 to 5 mmBtu/hr size range. Finally, the District should compare the cost effectiveness of these proposed rule revisions to other NOx rules it has adopted, rather than other VOC rules as indicated on page 13 of the staff report.
Response	<p>Staff also analyzed the cost impact, emission reductions, and number of units affected for a 200,000 and 300,000 therms exemption level. Staff set the exemption level at 200,000 for units rated below 100 mmBtu/hr input in order to achieve the most NOx reductions without resulting in significant impact on permitted facilities in the District. Staff, however, set 300,000 therms per year exemption level for units rated at or above 100 mmBtu/hr input in order to minimize the cost impact to these facilities. Staff evaluated costs and benefits for affected boilers and determined that 200,000 therms per year is the appropriate exemption level for units rated from 5 mmBtu/hr to 100 mmBtu/hr.</p> <p>The overall cost effectiveness analysis takes into account the cost impact for all affected units that are required to be retrofitted and exempt units required to have a fuel or hour meter. The cost of a fuel meter is the same for boilers rated below 5 mmBtu/hr input. The cost analysis for applying controls on small units was performed for each unit size (e.g., 1 mmBtu/hr, 2 mmBtu/hr, etc.). The specific cost data for replacing or retrofitting existing units and for installing fuel or hour meters are listed in the summary cost table on Page 14 of the staff report.</p> <p>Staff compared the cost of this rule to the cost effectiveness of previous rule amendments adopted by the Board. The cost effectiveness of this rule is consistent with the cost effectiveness for these previous rule amendments. Both VOC and NOx reductions are required for ozone reductions. Therefore, it is appropriate to compare to both. As it turns out the VOC rule- Rule 449 is highest cost at \$17/lb. Previous amendments to Rule 411 costs were as high as \$4.74 for most boilers in today's monies. The rule also affected one source that had a much higher cost effectiveness figure of \$19.51 in today's monies. The cost effectiveness for the gas turbine and IC engine rules were \$12.44 and \$12.07</p>

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Weyerhaeuser (January 17, 2005)

Comment #1	<p><u>Rule 411 Applicability</u></p> <p>If the District should be considering some method of compliance demonstration for space heaters, the starting point should be the manufacturers. They logically should be the source of the most data to support any performance claims.</p> <p>Furthermore, assuming a facility can demonstrate that it operates and maintains their units in conformance with the manufacturer's specifications, and then the units should be deemed in compliance with the rule.</p> <p>The reason is simple: cost/benefit. Reduction of NOx in these units is minimal and any cost exacerbates the financial effect of the rule on these few, small manufacturing facilities.</p>
Response	<p>Staff is planning to maintain the exemption for Process Heaters in Section 111. If the process heater is exempt, then source testing will not be required.</p> <p>The rule requires source testing to verify compliance with the proposed NOx emission limits. A portable analyzer is also allowed as an alternative to source testing for units rated below 5 mmBtu/hr input. The rule does not provide for precertification option. Staff does not propose to include equipment certification by manufacturers as an option in the rule since equipment is only certified for a specific precertified installation. If the same equipment is installed differently than it was certified under, then this may not guarantee that the emissions from the equipment will be the same.</p>
Comment #2	<p><u>Cost/Benefit Comments</u></p> <p>The District's estimate of approximately \$93,000 to comply with the rule coincides with a preliminary vendor estimate to retrofit the Elk Grove boiler. Current boiler emissions are below the present 30ppm limit for NOx based on test data confirming the manufacturer's claims at installation.</p> <p>At the rated firing rate, 14.65MMBTU/hr heat input, and at the as tested emission rate of 18.7 ppm NOx, the boiler would emit approximately 1.44 ton/yr, assuming 365 operating days. By reducing the threshold to 15ppm (and assuming 12ppm actual for example), the emission drops to 0.93 tons/yr for a difference of 0.51tons/yr, according to data provided by the equipment vendor.</p>

	<p>Of course, the boiler does not operate 365 days per year, nor does it operate at full capacity routinely. The average production rate is closer to 30%.</p> <p>Under the best of conditions, the removal of NOx is minimal, perhaps a few hundred pounds per year, for a very large expenditure. A brief review of the Agency's DCF calculation methodology does seem to acknowledge the costs in some cases are quite high.</p> <p>On the other hand, there seems to be some costs that are not adequately recognized with the current methods.</p> <p>For example, the District apparently introduced the current NOx limits in 1997. For those facilities that had to retrofit at that time, was there an allowance, or consideration, in the cost impact analysis for the lost capital represented by disposing of burner equipment still operating years within its planned service life? Would the previous cost analysis have been done over a 15 year life and if so, is there some way for those who made the expenditure in good faith to recover losses?</p> <p>While the DCF cost impact methodology used appears to be commonly employed in these evaluations, it does not seem to take into account the real and immediate financial burden on production facilities in the year the expense is incurred. In the highly competitive global markets in which many facilities operate, it is just not realistic to pass this type compliance cost directly to the customer. As a result, there are potential practical consequences that may be missed and that may only surface much later.</p>
Response	<p>Staff cost effectiveness analysis is based on reducing NOx emissions from 30 ppm to 15 ppm for boilers rated from 5 mmBtu/hr input to less than 20 mmBtu/hr input. For units with known NOx emissions below 30 ppm (e.g., source test data or permitted NOx limits below 30 ppm), Staff used the actual NOx data to calculate the emission benefits. Staff did not have emission data for this boiler and a 30 ppm NOx limit was used in calculating the emission benefits. The change in emissions for this source did not affect the overall rule cost effectiveness, however.</p> <p>The proposed amendments estimated the cost over 15 years for the retrofitted equipment. Staff assumed that affected businesses will borrow the money to retrofit their equipment and those monies and the cost will be spread over the life of the loan. Staff did not include in the cost effectiveness analysis the lost capital represented by the disposal of the current burner equipment because it is not a cost that will be incurred as a result of the proposed rule amendment. The original rule estimated the cost effectiveness based on 15 years. Because of new state requirements, the District is now required to further reduce NOx emissions.</p>
Comment #3	<p><u>General Comments</u></p> <p>Weyerhaeuser Company has experience with the implementation of Rule 4306 in the San Joaquin at its Modesto facility. As required by</p>

	<p>the District, an "Application To Construct" was submitted with the requisite retrofit schedule in a timely manner. However, the burner manufacturer has been unable to meet their production schedules, despite assurances at the beginning there would be no problems. Several facilities within the District are experiencing delays at this time.</p> <p>The Sacramento Air District staff is encouraged to clearly outline the procedures available to those clients requiring boiler modifications who, through no fault of their own, are unable to meet the deadlines in the rule. Weyerhaeuser Company's policies do not allow for operating in a non-compliant mode, regardless of the cause. If the equipment is not available to install in time to meet the deadlines, then clients like Weyerhaeuser will need timely legal relief to avoid having to stop operating until the facility can again operate in compliance.</p>
<p>Response</p>	<p>Staff extended the rule compliance timeline for 2 years after the adoption date of the proposed amendments and for a longer time period for facilities with multiple boilers. If due to unforeseen reasons, the boiler retrofit may not be completed by the final compliance date, then the facility can either 1) apply for a variance pursuant to Rule 601, Procedure Before the Hearing Board or 2) apply for the alternative compliance option available under Rule 107, Alternative Compliance. The Variance has to be approved by the Hearing Board. The alternative compliance option provides emission credits to offset the increase in emissions due to non compliance at a cost to the applicant. Some alternative compliance requests require approval by the District's Board of Directors.</p> <p>Staff did not revise the rule to provide these procedures in the rule, but instead revised the Staff Report to include information on how facilities can utilize these options.</p>

Air Products (January 14, 2005)

<p>Comment #1</p>	<p>Air Products is particularly concerned about the impact of this rule on the two reforming furnaces we operate at our Sacramento hydrogen production facility. For the reasons set forth below (Supporting information are not discussed below, but are included in the actual comment letter which is kept on file), meeting the proposed NOx standard of 9 ppm is not technically feasible at any reasonable cost. We request that the District consider placing reformers in the exempt unit category or reconsider the NOx standard applicable to this type of combustion unit.</p> <p>In its examination of technical feasibility of various retrofit technologies, the District naturally focused on the largest group of gas-fired units, namely boilers. The implicit conclusion of the staff report was that it was feasible, for the most part, to retrofit boilers with ultra low NOx burners ("ULNB"); or, in some cases, it was cost effective to replace the entire boiler to achieve 9 ppm NOx (3% O2). However, a reformer furnace is not a boiler. It is essentially a direct fired chemical reactor. It</p>
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	<p>differs from a conventional natural gas-fired boiler in the following significant ways:</p> <p>The furnace must operate at the much higher temperatures needed for the reforming reaction to take place efficiently. Typically flue gas leaving the furnace's radiant section is 1900 to 2000°F while for a small package boiler temperatures will be hundreds of degrees less.</p> <p>Combustion air pre-heat temperatures for the reformers is very high, 500 to 900°F, while package boiler's have much lower air preheat, if any.</p> <ul style="list-style-type: none"> • The reformers use multiple burners leading to higher peak flame temperature. • The fuels are very different. The furnaces' heat input is primarily from "purge gas" containing mostly H₂ and CO₂ while most package boilers fire natural gas; mostly methane. The burners in the furnace must be able to simultaneously fire both purge gas (~80% of the total heat input on a Btu basis); and some natural gas (< 20% of the heat input), which acts as a trim fuel. • Reforming furnaces are very costly compared to boilers of the same size. Rough costs for the reformers at Sacramento are \$10,000,000 each. Because of the high temperatures involved and the multiple fuel requirements, it is much more difficult to use combustion controls in a reformer furnace to reach very low NO_x levels. <p>Air Products requested that the District exempt reforming furnaces from the 9 ppm NO_x limit since it is not cost effective using SCR system and that using ultra low NO_x burners is only capable of achieving 30 ppm NO_x level.</p>
Response	<p>Staff added a new category to Section 301 for reforming gas burners which is consistent with the current 30 ppm NO_x limit in Rule 411 since information provided by the applicant shows that achieving a 9 ppm NO_x limit for this type of process is not technologically feasible without the use of add on control method such as an SCR system. Cost information provided by the applicant shows that using an SCR system as a control option is not cost effective considering the age and the remaining time on their contract to produce hydrogen gas. In addition, the SCAQMD limits for similar equipment at refineries is 30 ppm.</p>

Paramount Petroleum (February 2, 2005)

Comment #1	<p>Paramount Petroleum has six affected units between 5 mmBtu/hr and 20 mmBtu/hr heat input. All of the units have already been retrofitted with low NO_x burners in recent years at a significant cost (i.e., approximately \$500,000) to meet the current requirements in Rule 411. The slight NO_x reduction achieved to meet the proposed 15 ppm is estimated to cost an additional \$500,000. Therefore, Paramount requests an exemption to Rule 411 for its Elk Grove facility on the</p>
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	basis of cost effectiveness.
Response	Staff discussed the alternative compliance options available to this facility. Suzanne Gornick, Senior Environmental Engineer with Paramount Petroleum has told Staff that they are planning to utilize the alternative compliance option available under Rule 107, Alternative Compliance in lieu of modifying their existing units. Staff has calculated the total cost to Paramount Petroleum using this option to be around \$155,000 which is much less than the cost to retrofit the six units.

Grafil Inc. (March 7, 2005)

Comment #1	Grafil Inc. is requesting that the District exempt waste heat recovery boilers from the rule requirements if these boilers are used to recover heat from an air pollution control device such as a thermal oxidizer.
Response	Staff revised the definition of a "Waste Heat Recovery Boiler" to expand the definition to include air pollution control devices. This change has no effect on the NOx reductions from this rule since it does not affect any existing sources. The request is for a proposed new unit in the District.

Air Products Comments (September 22, 2005)

Comment #1	Revise the definition of "Reformer" to better suit the reforming processes at our Sacramento facility. The definition should be revised as follows: A furnace in which a hydrocarbon feedstock is reacted with steam over a catalyst at high temperature to form hydrogen and lesser amounts of carbon monoxide and carbon dioxide.
Response	Staff revised the definition as requested by Air Products.

Campbell Soup Comments (September 22, 2005)

Comment #1	<p>The language in the definition for "Load Following Unit" should be revised as follows:</p> <p>LOAD FOLLOWING UNIT: A unit with normal operational load fluctuations and requirements, imposed by the fluctuations in the process(es) served by the unit, which exceed the operational response range of an Ultra-Low NOx burner system(s) operating at 9 ppmv NOx. The operator shall designate load-following units on the Permit to Operate.</p> <p>It is CSSC's considered opinion that our boilers are, in fact, Load Following Units, in accordance with this definition.</p>
Response	Staff revised the definition as requested Campbell Soup.
Comment #2	The following exemption should be added, to the proposed changes to the amendments to Rule 411, as the District sees fit, to address CSSC's and others' fully anticipated requirement, to utilize a "Standing Pilot

	<p>Burner" arrangement, to meet steam production requirements, in situations where steam demand is considerably less than that which can be provided by the current Ultra-Low NOx burner system technology's turn-down capability.</p> <p>Exemption: In the case of Load Following Units, at times during which demand imposed by fluctuations in the process(es) served is lower than the operational response range of an Ultra-Low NOx burner system(s) necessitating that a Standing Pilot Burner or similar arrangement be utilized to serve the process, the NOx limit in Section 301 shall not apply.</p> <p>In conversations with an RF MacDonald Co. representative, it was learned that such a "Standing Pilot Burner" arrangement was determined to be necessary, for a boiler owned and operated by Hershey's, in Oakdale, CA. Additionally and, most significantly, this arrangement was approved by the San Joaquin Valley Unified APCD.</p>
Response	<p>Staff added an exemption to allow the sustained operation of standing pilot flame burners used in load following units. To qualify for the exemption, the standing pilot flame burner must be 5 mmBtu/hr or less and emit no more than 30 ppm NOx. This limit is consistent with the NOx limit for small boilers rated between 1 and 5 mmBtu/hr.</p>