

VENTURA COUNTY APCD
STAFF REPORT
Amendments to Rule 74.15.1
Boilers, Steam Generators and Process Heaters
June 23, 2015
EXECUTIVE SUMMARY

The Ventura County Air Pollution Control Board amended Rule 74.15.1 to reduce Oxides of Nitrogen (NOx) emissions from boilers, steam generators, or process heaters with a rated heat input capacity equal or greater than 2 million BTUs per hour and less than 5 million BTUs per hour. Although this rule was last revised on September 11, 2012, APCD staff committed to updating this rule after 2014 in response to ARB comments. These revisions were included as a potentially feasible control measure in the Ventura County Triennial Assessment adopted by the APCD Board on January 8, 2013.

This rule development will implement an All Feasible Measure as required by the California Clean Air Act (HSC Section 40914). Ventura County APCD's 2007 Air Quality Management Plan relies on adopting All Feasible Measures to help attain the state ambient ozone air quality standard.

These more stringent NOx emission limits of 12 ppm (natural gas – atmospheric combustion) and 9 ppm (natural gas – all others) will only apply to new or replaced boilers, steam generators and process heaters with a rated heat input capacity greater than 2 million BTU/hr and less than 5 million BTU/hr. These NOx standards for new and replaced units are the same as required by San Joaquin Valley Air Pollution Control District Rule 4307, Boilers, Steam Generators and Process Heaters, 2.0 MMBTU/hr to 5 MMBTU/hr. There are approximately 44 emission units potentially subject to the new NOx standards as units are replaced, and the potential emission reductions are about 9.3 tons NOx per year.

These new lower NOx limits will not apply to existing equipment, which would have required expensive retrofits to meet these standards. The cost-effectiveness for retrofits was evaluated during the 2012 rule revision and ranged from \$12 per pound of NOx reduced to \$1,887 per pound of NOx reduced (average of \$147 per pound of NOx reduced). In contrast, the cost-effectiveness for new or replaced equipment is estimated at \$2.30 per pound of NOx reduced based on the installation of ultra-low NOx burners, where the use of a Flue Gas Recirculation system is not needed to comply with the new limits.

During the 2012 rule revision, the California Air Resources Board (ARB) strongly suggested in written comments that these proposed NOx limits apply to existing boilers, steam generators and process heaters, similar to what was adopted in South Coast AQMD

Rule 1146.1. The 2012 rule revision did not include these new NOx limits for this equipment, and VCAPCD staff committed to reevaluating this rule after 2014. This proposal is the result of this staff reevaluation. Staff still considers retrofits not cost-effective based on the 2012 cost analysis, but recent advances and wider availability of ultra-low NOx burners for the new and replacement market support this proposal as a feasible measure.

These amendments included a clarification of the applicability of the rule to other gaseous fuels besides natural gas. As revised, the rule will apply to other gaseous fuels including landfill gas, biogas, liquefied petroleum gas (LPG), otherwise known as propane, and produced oilfield gas. The use of the gaseous fuels other than natural gas requires the establishment of new NOx standards for new or replacement units. These amendments included NOx limits of 25 ppm for landfill gas and 15 ppm for biogas-fired units. These standards are based on the existing retrofit limits from SCAQMD Rule 1146.1. In addition, a new NOx standard of 20 ppm was adopted for LPG or propane-fueled units. This standard is based on what is currently achievable for new or replacement units using propane. Also, the proposal contained new NOx limits for produced oilfield gas at 15 ppm (atmospheric) and 12 ppm (pressurized), based on comments received from industry.

The 2012 rule revision included a new provision to reduce compliance costs by substituting biennial source testing with annual emission screening analysis for equipment rated from 1 million BTU/hr to 2 million BTU/hr and source testing every four years. Based on industry comments at the February 2015 workshop, staff is proposing similar testing requirements for new or replaced units having a rated heat input capacity greater than 2 million BTU/hr and less than 5 million BTU/hr. This would reduce compliance costs for these new or replaced units by reducing the source testing frequency from biennial to every four years, and existing annual screening requirements for these units would continue.

Finally, staff modified the definition of process heater to exclude additional types of combustion equipment from the requirements of Rule 74.15.1. This is a clarification of existing staff policy, and the following equipment shall not be subject to the provisions of Rule 74.15.1:

- Dehydrator, dryer, crematory, incinerator, calciner, cooker, roaster, furnace or open heated tank
- Parts washers, metal heat treating, or metal furnaces
- Afterburners, vapor incinerators, thermal or catalytic oxidizers used in emission control devices
- Glass melting furnaces
- Tenter frame, fabric or carpet dryers.

This proposed rule revision will not nullify existing permit conditions such as Best Available Control Technology (BACT) standards that limit the NO_x emissions from these combustion sources. All units subject to this rule are currently permitted by APCD.

This report contains five additional sections: (1) Background, (2) Proposed Rule Requirements, (3)

Comparison of Proposed Rule Requirements with Other Air Pollution Control Requirements, (4) Impact of the Proposed Rule, and (5) Environmental Impacts of Methods of Compliance. The first section provides background information including regulatory history, air pollution control technology and source description. The second section explains the key features of the proposed requirements. The third section compares the proposed requirements with existing federal requirements and Best Available Control Technology (BACT). The fourth section is an analysis of the proposed amendment's effect on ROC emissions, cost-effectiveness, and socioeconomic impacts. The last section examines the environmental impacts of compliance methods and the mitigations of those impacts.

BACKGROUND

Introduction

Rule 74.15.1 applies to boilers, steam generators, or process heaters with a rated heat input capacity from 1 million BTU per hour up to 5 million BTU per hour. The main purpose of the rule is to limit NO_x emissions, which are precursors to ozone formation. Ventura County is currently designated a nonattainment area for ambient ozone. Ventura County is required by the California Clean Air Act (California Health and Safety Code Section 40914) to adopt “all feasible measures” as an alternative requirement to reducing precursor emissions by a minimum of five percent per year. This proposal is an all feasible measure that will reduce NO_x emissions.

Regulatory History

Rule 74.15.1 was adopted in May 1993 based on Control Measure N-105 from the 1991 Air Quality Management Plan. This initial rule adoption required the retrofit of existing boilers, steam generators, and process heaters from 1 to 5 million BTU per hour to meet a new NO_x limit of 30 ppm and a carbon monoxide (CO) limit of 400 ppm, corrected to a 3 percent oxygen level. The original rule adoption reduced NO_x emissions by 68 tons per year, and the cost-effectiveness ranged from \$2.47 to \$8.57 per pound of NO_x reduced.

In June 1995, Rule 74.15.1 was amended to add a new tune-up procedure for natural draft fired equipment. In June 2000, the rule was amended to satisfy an EPA-identified deficiency in the test

method that related to startups, shutdowns, and breakdown conditions.

In September 2012, the rule was amended to include a new NO_x limit of 20 ppm and certification requirements for new boilers, steam generators, and process heaters rated between 1 and 2 million BTU per hour. This new NO_x standard was based on the same standard set by South Coast AQMD Rule 1146.2. In addition, the 2012 amendments reduced compliance costs by changing the source test requirement for this equipment from every two years to every four years if an annual screening test was performed.

During the 2012 rule revision, comments were received from the California Air Resources Board (ARB) strongly suggesting that staff propose new NO_x limits for existing boilers, steam generators, and process heaters based on standards adopted in South Coast AQMD Rule 1146.1. In response, staff performed a cost analysis for retrofitting existing equipment to the South Coast standards, and the cost-effectiveness for this control measure ranged from \$12 to \$1,887 per pound of NO_x reduced and an average cost-effectiveness of \$147 per pound. On this basis, it was determined that the ARB recommendation was not cost-effective, and it was not included in the 2012 rule revision. In response to the ARB comments, staff committed to a reevaluation of the rule after 2014.

Another reason that Rule 74.15.1 may differ from the SCAQMD Rule 1146.1 is that NO_x emission sources in South Coast may instead be subject to Regulation XX, RECLAIM. RECLAIM is a market-based NO_x

emission credit trading program that allows more efficiently controlled sources to sell excess credits to other less easily controlled sources. Sources participating in RECLAIM are exempt from the command and control NOx rules such as Rule 1146.1. Recent reports of the value of Reclaim Trading Credits in the South Coast average a little over \$2 per pound of NOx. Thus, these market-based costs may be much lower than what may be required to retrofit existing boilers, steam generators, and process heaters.

Small Boiler NOx Emission Sources

Although these proposed amendments to Rule 74.15.1 do not require retrofits of existing boilers, steam generators, or process heaters, there will be impact on new or replaced equipment from a wide variety of sources. As shown in Table 1, the affected

sources have boilers or steam generators that produce hot water or steam for office buildings, schools, hotels, and industrial operations.

Natural gas-fired heaters are used at oil and gas production facilities to break oil-water emulsions so that the oil can be accepted by pipeline or transport. Process heaters are used to heat material streams for industrial operations such as oil heaters at asphalt batch plants. Table 1 lists facilities currently having permitted boilers, steam generators, or process heaters in the range greater than 2 and less than 5 million BTU/hr. The projected NOx emission reductions from the replacement of 44 boilers, steam generators, or process heaters are approximately 9.3 tons per year.

Table 1

Facilities with Natural Gas-Fired Boilers, Steam Generators or Process Heaters (2 to 5 Million BTU/hr)

Amgen Inc.	La Conchita Oil & Gas Plant	Ronald Reagan Pres. Library
Astrofoam Molding Company Inc.	Los Cerritos Intermediate School	Saticoy Lemon Association/Plant #4
California Resources Production	Maple Leaf Bakery-Pioneer Div	Seneca Resources Corporation
CalMat Company / Vulcan Materials		Skyworks Solutions, Inc.
Thousand Oaks Civic Arts Plaza	Naval Base Ventura County	St. John's Pleasant Valley Hospital
Farmers Insurance Group	Newbury Park High School	Tenby Production Facility
Granite Construction Company	Oxnard Lemon Co.	Ventura Co. National Bank Bldg
Hill Cyn Wastewater Treatment Plant	Paramount Citrus	Ventura Youth Correctional Facility
Hyatt Westlake Plaza Hotel	Platform Gilda	Verizon California
Juvenile Justice Complex	Record Technology Inc.	Vulcan Materials Co., Western Div.

NOx Emission Control Technology

NOx emissions are defined by CARB Method 100 and include both nitric oxide (NO) and nitrogen dioxide (NO₂). In almost all combustion sources, more than 90 percent of the NOx emissions in the exhaust stack are nitric oxide. NOx emissions are formed using three different mechanisms: thermal NOx, fuel NOx, and prompt NOx. Thermal NOx is formed the reaction of nitrogen and oxygen at high temperatures, typically above flame temperatures of 2000°F. Fuel NOx is formed by the direct oxidation of organo-nitrogen compounds contained in the fuel, but this is not an issue for natural gas fuel. Prompt NOx is formed by the relatively fast reaction between nitrogen, oxygen, and hydrocarbon radicals, consisting of hundreds of reactions and dozens of chemical species. Prompt NOx becomes more important under fuel rich conditions.

characteristics. Ultra-low NOx burners are available from many vendors including but not limited to: Ajax Boiler, Burnham, Cleaver Brooks, Laars, Miura, Superior Boiler, Parker Boiler, Altex Technologies, Bloom Engineering, S.T. Johnson Company, Power Flame, Alzeta Corporation, Maxon, and SAACKE.

The object of these ultra-low NOx burners is to create more uniform combustion, better mix the fuel and oxygen, and reduce the combustion residence times. These characteristics will reduce NOx formation and reduce the peak flame temperature, at which thermal NOx is formed. Some burners are also designed to manage the flame area to reduce hot spots. The combustion uniformity reduces the formation of fuel rich zones where prompt NOx is formed. These burners may increase thermal efficiencies by reducing the amount of excess air needed for combustion. This has the added benefit of reducing fuel usage, which results in energy savings.

According to the SCAQMD Rule 1146.1 Staff Report, the technology available to meet the new NOx limits is the use of ultra-low NOx burners. These burners designed to pre-mix the fuel and air prior to combustion achieve low emissions while maintaining good flame stability and heat transfer

Another type of ultra-low NOx burner is the radiant pre-mix burner that can be constructed from ceramic or metal fibers, which can spread the flame via radiant heat. These burners increase boiler efficiency

by having a more uniform heat source, which leads to more efficient heat transfer.

Most premix burners require the use of a blower to mix the fuel and air prior to combustion. Atmospheric boilers, where the burners are not totally enclosed, may still need a blower to premix the fuel and air. Ultra-low NOx burners may need automatic controls and an oxygen trim system to maintain emission levels, efficiency, operate at turndown levels, and initiate startups.

Ultra-low NOx burner systems can achieve less than 9 ppm NOx for boilers, steam generators, or process heaters without the use of Flue Gas Recirculation (FGR) systems. Source tests performed by the San Joaquin Unified Air Pollution Control District showed a 95 percent compliance rate with 9 ppm limits using ultra-low NOx burners. The average NOx concentration measured was 7 ppm.

AMENDMENTS TO RULE 74.15.1

Rule Applicability (Section A)

The amendments include clarification of the rule applicability so that the rule will apply to both liquid and gaseous fuels. Applicable gaseous fuels include natural gas, landfill gas, biogas, liquefied petroleum gas (propane), and produced oilfield gas. In addition, the rule will apply to both stationary and portable process heaters. These changes will align Rule 74.15.1 more closely to South Coast AQMD 1146.1.

Emission Limits for New and Replacement Boilers, Steam Generators and Process Heaters (Section B.2.b)

The amended rule will reduce NOx emissions from new and replaced boilers, steam generators, and process heaters in the size range greater than 2 million BTU/hr and less than 5 million BTU/hr. Effective January 1, 2016, the new NOx limits for this natural-gas fired units in this size range will be 12 ppmv at 3 percent oxygen (0.015 lbs/MMBTU) heat input (calculated as NO₂) for atmospheric units and 9 ppmv for all other natural gas units. These limits are based on the new and replaced NOx limits from San Joaquin Valley Unified APCD Rule 4307. Atmospheric units are defined in the rule as having a non-sealed combustion chamber in which natural draft is used to exhaust combustion gases.

The amended rule will include new NOx limits for new or replaced units fired on gaseous fuels other than natural gas. The NOx limit for landfill gas-fired units is 25 ppm, and the NOx limit for biogas is 15 ppm. Both of these standards are based on the NOx limits for existing equipment subject to SCAQMD Rule 1146.1. In addition, a new NOx limit was adopted for new or replaced units at 20 ppm for LPG or propane-fired units. This standard is based on available low NOx burner technology for propane-fired units. Also, the proposal contains new NOx emission limits for new or replaced units fired on

produced oilfield gas. The NOx limits of 15 ppm (atmospheric) and 12 ppm (pressurized) for units using this fuel are based on comments received from the oil industry.

The existing 20 ppm NOx limit for new or replacement natural gas-fired boilers, steam generators, and process heaters for the size range equal to or greater than 1 million BTU/hr and less than equal to 2 million BTU/hr was adopted in 2012, and is not being revised. This NOx limit is consistent with SCAQMD Rule 1146.2.

Change in Testing Frequency (Section B.4.b)

New or replacement units subject to the new NOx limits in Subsection B.2.b and greater than 2 million BTU/hr input heat capacity will be subject to reduced frequency source testing requirements. These units will test for compliance upon initial installation and then once every 48 months instead of every 24 months. The newer equipment is more reliable and the emissions are more stable over time. In addition, this equipment will still be subject to the annual screening requirements.

Clarify Annual Screening Deadline (Section B.4.d)

The existing rule does not have a clear deadline for performing the annual screening analysis, which only applies to units with a rated heat capacity less than or equal to 2 million BTU/hr. This proposal establishes this deadline as no later than the yearly anniversary date of the last source test.

Exemption (Section C.2)

As described earlier, the amendments to Rule 74.15.1 have been developed to reduce NOx emissions from new or replacement units, rather than retrofit existing units, because of cost considerations. However, one

existing source (Thompco) has been identified that would have required retrofitting to meet the existing NOx limit of 30 ppm when the proposed changes to rule applicability become effective. Since the cost of this retrofit exceeds \$9.50 per pound of NOx reduced, staff adopted an exemption from the existing NOx limit in Section B.1 for any portable oil well dewaxing process heater when the annual heat input is less than 2.8 billion BTU. The amount of NOx reductions not captured by including this exemption for this source is 0.29 ton NOx per year.

**Recordkeeping Requirements
Totalizing Fuel Meter (Section D.1)**

Currently, units that are exempt from the NOx limits in Subsection B.1 because of low fuel consumption at an annual heat input of less than 1.8 billion BTU are required to install a totalizing fuel meter for each applicable unit and for each fuel. These amendments will require that any newly exempt source not subject to Subsection B.1 install a totalizing fuel meter.

**Recordkeeping Requirements
Screening Test Log (Section D.3)**

A new recordkeeping requirement was adopted for the annual screening of NOx and CO required by Subsection B.4.c. Operators shall record the date of the screening, measured NOx and CO readings,

applicable emission limits, and any action taken, in an annual test log. This test log shall be made available to APCD personnel upon request. The purpose of this recordkeeping is to increase rule compliance and rule enforceability.

Test Methods (Section E.1)

An alternative procedure was adopted to allow for the determination of emission compliance in terms of lbs/MMBTU. These emission terms are calculated by dividing the emission rate in lbs/hr by the heat input rate (MMBTU/hr). Staff is proposing the South Coast AQMD’s “Compliance Protocol for the Measurement of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Sources Subject to SCAQMD Rules 1146 and 1146.1, dated March 10, 2009” as an alternative procedure for this purpose.

Definitions (Section G)

The definition of “process heater” in Subsection G.12 was amended for clarification so that the rule will not apply to additional process heating combustion sources that are not as amenable to advanced NOx emission control technology. The additional combustion sources proposed for exclusion from the process heater definition and rule applicability are listed in Table 2.

**Table 2
Combustion Sources Excluded from Process Heater Definition**

Kiln	Oven	Afterburners	Thermal Oxidizers
Dehydrator	Dryer	Catalytic Oxidizers	Glass Melting
Crematory	Incinerator	Tenter Frame Dryer	Open Heated Tank
Roaster	Furnace	Carpet Dryer	Fabric Dryer

**COMPARISON OF PROPOSED RULE REQUIREMENTS
WITH OTHER AIR POLLUTION CONTROL REQUIREMENTS**

Health and Safety Code Section 40727.2 requires Districts to compare the requirements of a proposed revised rule with other air pollution control requirements. These other air pollution control requirements include federal New Source Performance Standards (NSPS), federal National Emissions Standards for Hazardous Air Pollutants (NESHAPS), Best Available Control Technology (BACT), and any other District rule that applies to the same equipment.

At this time, EPA has not adopted a national rule or a CTG to reduce NOx emissions from small boilers or process heaters. EPA published an Alternative

Control Techniques (ACT) for process heaters in 1993, and an ACT for industrial, commercial, and institutional boilers in 1994. These ACT documents provide an analysis of control technologies and their cost-effectiveness. Although ACT documents do not represent presumptive RACT, the control technologies evaluations provide some useful background information even if the analysis is over 20 years old. However, almost all the focus of these ACT documents is on much larger boilers and refinery based process heaters

A review of current BACT determinations from the South Coast AQMD and California Air Resources

Board indicates that BACT for this source category is based on existing SCAQMD Rule 1146.1. In summary, there are no conflicts between the proposed

amendments to Rule 74.15.1 and any other pertinent air pollution control regulations.

IMPACT OF THE PROPOSED RULE

NOx Emissions Impacts

The estimated NOx emission reductions of 9.3 tons per year from this source category are significant, and all emission reductions are needed to reach the federal and state ambient ozone air quality standards. Ultra-low NOx burners for replacement or new boilers and process heaters in the size range between 2 and 5 MMBTU/hr are available, feasible, and cost-effective.

Cost-Effectiveness

Staff estimates typical cost-effectiveness at about \$2.30 per pound of NOx reduced for new or replaced units. This analysis is based on the added cost (\$10,000) of installing an ultra-low NOx burner in place of the normal burner for a new or replaced unit. Assuming a ten year life and four percent interest rate resulted in a capital recovery factor (CRF) of 0.123. This assumes that the energy savings from the lower excess air characteristics of ultra-low NOx system will compensate for any added costs needed to control the combustion process including electronic oxygen feedback or oxygen trim systems.

Incremental Cost-Effectiveness Analysis

Health and Safety Code Section 40920.6(a) requires districts to identify one or more potential control options, assess the cost-effectiveness of those options, and calculate the incremental cost-effectiveness. Health and Safety Code Section 40920.6 also requires an assessment of the incremental cost-effectiveness for proposed regulations relative to ozone, carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), and their precursors.

Incremental cost-effectiveness is defined as the difference in control costs divided by the difference in emission reductions between two potential control options achieving the same emission reduction goal of a regulation.

An incremental cost-effectiveness analysis was performed by the South Coast AQMD in their 2008 revision to Rule 1146.1. The alternative control option identified in their evaluation was the use of Selective Catalytic Reduction (SCR) control

equipment, which uses a catalyst with ammonia injection to reduce the NOx emission from 9 ppm to 5 ppm. The estimated incremental cost-effectiveness calculated by SCAQMD staff for this alternative ranged from \$53 to \$141 per pound of NOx reduced. The high cost of this alternative control option disqualifies it as a cost-effective control measure.

Socio-Economic Impacts

Assembly Bill 2061 (Polanco), which became effective January 1, 1992, requires that the District Board consider the socioeconomic impacts of any new rule. The Board must evaluate the following socioeconomic information on proposed revisions to Rule 74.15.1.

- (1) The type of industries or businesses, including small business, affected by the rule or regulation.

The amendments to this rule may directly affect the following facilities:

- Commercial buildings
- Fruit packing plants
- Government facilities
- Hospitals
- Hotels
- Naval facilities
- Oil and Gas Production
- School Districts
- Small scale factories

- (2) The impact of the rule amendments on employment and the economy of the region.

Revisions to this rule are not expected to have a negative impact on either employment or the economy of Ventura County. Worst-case cost estimates for the end user are not significant enough to impact employment. Limiting the impact of the proposal to new or replaced units will delay the rule implementation and spread out the costs over many years.

- (3) The range of probable costs, including costs to industry or business, including small business, of the rule or regulation.

Based on a staff analysis, the probable cost-effectiveness of \$2.30 per pound of NOx

reduced may be expected when installing or replacing a new boiler, steam generator, or process heaters in the size range between 2 and 5 MMBTU/hr. The added cost to a new or replaced unit utilizing the ultra-low NOx burner was estimated at \$10,000. The energy savings from the lower excess air characteristics of the ultra-low NOx burners should compensate for any additional costs, including electronic combustion controls using oxygen feedback.

- (4) The availability and cost-effectiveness of alternatives to the rule or regulation being proposed or amended.

The proposed revision to Rule 74.15.1 is the most cost-effective control option, which involves the use of ultra-low NOx burners. The new proposed NOx limits will not require the use of additional equipment such as Flue Gas Recirculation (FGR). Other control alternatives, such as the use of SCR control equipment, are not cost-effective for this source category.

- (5) The emission reduction potential of the rule.

The anticipated emission reduction potential of the proposed rule is about 9.3 tons per year of NOx emissions. These emission reductions result from the use of ultra-low NOx burners.

- (6) The necessity of adopting, amending, or repealing the rule or regulation in order to attain state and federal ambient air standards pursuant to Chapter 10 (commencing with Section 40910).

Ventura County is classified as a nonattainment area for the federal Ambient Air Quality Standards for ozone. These proposed rule amendments will reduce NOx emissions that are precursors to the formation of ozone. According to the 2007 AQMP, these emission reductions will help the District in its effort to attain the standards. California Health and Safety Code Section 40914(b)(2) requires that the District adopt every feasible measure to reduce ozone precursors.

ENVIRONMENTAL IMPACTS OF METHODS OF COMPLIANCE

California Public Resources Code Section 21159 requires the District to perform an environmental analysis of the reasonably foreseeable methods of compliance. The analysis must include the following information on proposed amendments to Rule 74.15.1

- (1) An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.
- (2) An analysis of the reasonably foreseeable mitigation measures.
- (3) An analysis of the reasonably foreseeable alternative means of compliance with the rule or regulation.

Table 3 lists all reasonably foreseeable compliance methods, the environmental impacts of those methods, and measures that could be used to mitigate the environmental impacts.

Table 3
Environmental Impacts and Mitigations of Methods of Compliance

Compliance Methods (including all reasonably foreseeable alternative means of compliance)	Reasonably Foreseeable Environmental Impacts	Reasonably Foreseeable Mitigation Measures
Installation of Ultra-Low NOx Burners	Air Quality Impacts: Lower excess air requirements may increase carbon monoxide emissions.	Both advanced flame stabilization and rapid mixing design of the ultra-low NOx burners will mitigate any CO emission increases.
Installation of Ultra-Low NOx Burners	Energy Efficiency Impacts: Older ultra-low NOx burners resulted in a two percent fuel penalty.	Lower excess air requirements and better combustion controls will actually increase fuel efficiency.
Installation of Ultra-Low NOx Burners	Air Quality Impacts: Construction emissions resulting from the replacement of boilers and process heaters.	No add-on controls or flue gas recirculation systems are required so construction emissions are minimized.

This analysis demonstrates that the adoption of amendments to Rule 74.15.1 will not have a significant effect on the environment due to unusual circumstances.

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DISCLAIMER

This report contains references to company and product names to illustrate product availability. Mention of these names is not to be considered an endorsement by the Ventura County Air Pollution Control District.