

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report Proposed Rule 1147 – NO_x Reductions From Miscellaneous Sources

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Proposed Rule 1147 (PR1147) is designed to reduce NO_x emissions from a variety of combustion sources. PR1147 is based on two control measures of the 2007 Air Quality Management Plan (AQMP): Control Measure CMB-01 and Control Measure MCS-01.

Control measure CMB-01 (NO_x Reductions from Non-RECLAIM Ovens, Dryers, and Furnaces) proposes reductions of nitrogen oxides (NO_x) from ovens, dryers, kilns, furnaces and other equipment and process that are not currently regulated by AQMD Regulation XI – Source Specific Standards. Control measure MCS-01 (Facility Modernization) is a new control measure developed for the 2007 AQMP that proposes companies upgrade their current technology to the cleanest technology available. Facility modernization proposes that equipment operators meet best available control technology (BACT) emission limits at the end of the equipment's useful life. For equipment subject to PR1147, modernization would require either burner system upgrades or replacement of burner systems.

PR1147 incorporates the concepts of both control measures. It reduces NO_x emissions from the combustions sources addressed by CMB-01 and incorporates the concept of facility modernization under MCS-01. PR1147 requires equipment meet the NO_x emission limit in phases based upon equipment age and type. Units older than 25 years must meet the emission limit first, followed by units older than 15 years over the next 10 years.

PR1147 applies to gaseous and liquid fueled combustion equipment including, but not limited to, ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, and remediation units. This proposed rule does not apply to solid fuel fired combustion equipment, internal combustion engines regulated under District Rule 1110.2, turbines, charbroilers, or boilers, water heaters, thermal fluid heaters or enclosed process heaters subject to District Rules 1109, 1146, 1146.1, or 1146.2. In addition, PR1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, 1118, 1121, or 1135. The rule also exempts specific processes used in some flares, vapor incinerators and catalytic and thermal oxidizers.

PR1147 requires equipment to meet NO_x emission limits in the range of 30 ppm to 60 ppm (referenced to 3% oxygen) depending upon the process and process temperature. The emission limits in PR1147 can be achieved with low NO_x burners. The emission limits are based on AQMD and other air district's determinations for BACT, availability of burners that can achieve these emission levels and recent emission limits decisions for AQMD permits. Currently, the typical emission for low NO_x burners applicable to equipment subject to PR1147 varies from less than 20 ppm to 60 ppm depending upon the burner, process temperature and nature of the process. There are a large variety of burners that emit less than 30 ppm NO_x for the majority of units whose process temperatures are less than 1200° F. A number of manufacturers provide burners meeting the proposed NO_x limits for equipment regulated by the proposed rule.

PR1147 also requires operators to keep equipment maintenance records and to install meters for monitoring fuel use starting January 1, 2011. Maintenance records must be kept on site by facilities for at least three years. Newer units are currently required to have fuel or time meters by their permit conditions. PR1147 will place the same requirement on older equipment but allow time for installation. PR1147 also provides owners of facilities with five or more units with emissions greater than one pound per day an alternative compliance option to retrofit equipment over a longer period of time.

PR1147 provides two options for owners and operators, burner manufacturers and installers to provide evidence the replacement burners comply with the emission limit. One option is to source test the unit using an AQMD approved protocol and test method. The second option is for the manufacturer to certify burners and equipment using an AQMD approved protocol and test method. The AQMD would provide certification of specific combinations of burners and equipment to the manufacturer and a copy of that certification, provided by the manufacturer, would be required to be kept on-site by the owner/operator. The AQMD will monitor manufacturers, sellers and installers in addition to owner and operators to assure that certified installations comply with PR1147 emission limits.

The approximately 6,600 units subject to the emission limits of PR1147 are located at approximately 3,000 facilities. However, only about 2,200 facilities are expected to require retrofit of burners in their equipment. Staff estimates that as many as 2,500 permitted units with NOx emission limits greater than one pound per day must retrofit to meet the emission limits of PR1147 between 2010 and 2014. An additional 2,500 permitted units with NOx emission limits of less than one pound per day will become subject to the emission limits of the proposed rule between 2015 and 2019. About 1,600 additional units at about 800 facilities affected by PR1147 currently meet the NOx emission limits of PR1147. Of the approximately 5,000 units that currently do not meet the emission limits, at least 100 relocated or replacement soil and water remediation units per year will become subject to the NOx emission limit starting in 2011, and all units will meet the NOx emission limit by 2023.

The proposed rule is estimated to reduce annual average emissions of NOx by 3.5 tons per day in 2014 from an annual average inventory of 6.2 tons per day. Phasing-in equipment with emission limits less than one pound per day starting in 2015 will reduce emissions an additional 0.3 tons per day by 2023.

Rule cost effectiveness is based on replacement of burners. Replacement cost includes burner price, tax and installation. The cost effectiveness for burners meeting 30 ppm is about \$5,000 per ton of NOx reduced. The average cost effectiveness for burners meeting 40 or 60 ppm is about \$7,000 per ton. The cost effectiveness for commonly used 1 to 2 mmBtu/hour burners meeting 30 ppm varies widely from \$4,000 to \$13,000 per ton.

CHAPTER 1: BACKGROUND

INTRODUCTION

REGULATORY HISTORY

EQUIPMENT AND PROCESSES

TECHNOLOGY ASSESSMENT

AFFECTED INDUSTRIES

PUBLIC PROCESS

INTRODUCTION

The purpose of Proposed Rule 1147 (PR1147) is to reduce emissions of nitrogen oxides (NO_x) from gaseous and liquid fuel fired combustion equipment. The proposed rule will regulate equipment that is not specifically addressed in AQMD Regulation XI – Source Specific Standards. The equipment addressed by PR1147 is used in a variety of industrial applications.

REGULATORY HISTORY

PR1147 is based on two control measures from the South Coast Air Quality Management District (AQMD) 2007 Air Quality Management Plan (AQMP): Control measure CMB-01 (NO_x Reductions from Non-RECLAIM Ovens, Dryers, and Furnaces) and control measure MCS-01 (Facility Modernization). Emission reductions from the equipment addressed by PR1147 and control measure CMB-01 of the 2007 AQMP were proposed in prior AQMPs (e.g., control measure 97CMB-092 from the 1997 AQMP).

Control measure MCS-01 is a new control measure developed for the 2007 AQMP that proposes companies upgrade their current technology to the cleanest technology available. Facility modernization proposes that equipment operators meet best available control technology (BACT) emission limits at the end of the equipment's useful life. For equipment regulated by PR1147, modernization would require either burner upgrades or replacement of burner systems.

Equipment that will be regulated by PR1147 must currently meet the requirements of AQMD Regulation XIII – New Source Review (NSR) and AQMD Regulation IV – Prohibitions. Equipment subject to NSR must meet BACT requirements and offset emission increases. The AQMD's NSR program includes pre-construction permit review requirements for equipment and processes subject to permit requirements. Permit applications subject to NSR are required to utilize BACT for installation of new equipment, relocation of existing permitted equipment, or modification of existing permitted equipment when the modification results in an emissions increase. BACT is defined as the most stringent emission limitation or control technique that: has been achieved in practice, is contained in any state implementation plan (SIP) approved by EPA, or is any other emission limitation or control technique found by the Executive Officer to be technologically feasible and is cost-effective as compared to adopted rules or measured listed in the AQMP.

Regulation IV limits emissions of particulate matter and NO_x from combustion sources. However, NO_x emission limits required by BACT are significantly more stringent than the emission limits in Regulation IV. For example, Rule 474 – Fuel Burning equipment – Oxides of Nitrogen has emission limits that vary from 125 ppm to 400 ppm (referenced to 3% oxygen) depending upon the fuel and heat input rating of the equipment. BACT NO_x emission limits for combustion equipment subject to PR1147 vary from 60 ppm to 30 ppm (referenced to 3% oxygen).

Other AQMD regulations affecting equipment addressed by PR1147 are Regulation IX – Standards of Performance for New Stationary Sources (NSPS) and Regulation XXX – Title V Permits. Regulation IX is a compilation of federal regulations specifying standards of performance and emission guidelines for new and modified sources. Regulation XXX specifies permit application and issuance procedures and compliance requirements mandated by the federal Operating Permit Program in Title V of the federal Clean Air Act.

Some of the equipment that will be regulated under PR1147 may also be subject to AQMD Regulation X – National Emission Standards for Hazardous Air Pollutants and Regulation XIV – Toxics. Regulation X is a compilation of federal performance standards for handling hazardous materials. Regulation XIV includes 15 AQMD Rules that address emissions of toxic air contaminants.

Equipment subject to NO_x emission limits by rules in AQMD Regulation XI – Source Specific Standards are not proposed to be regulated under PR1147. Changes to NO_x emission limits for equipment subject to Regulation XI will be addressed through amendment of those source specific rules.

EQUIPMENT AND PROCESSES

Proposed Rule 1147 applies to combustion equipment including, but not limited to, ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, and remediation units. This proposed rule does not apply to solid fuel fired combustion equipment, internal combustion engines regulated under District Rule 1110.2, turbines, charbroilers, or boilers, water heaters, thermal fluid heaters or enclosed process heaters subject to District Rules 1109, 1146, 1146.1, or 1146.2. In addition, PR1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, 1118, 1121, or 1135.

A wide variety of processes use equipment that will be regulated under PR1147. These processes include, but are not limited to, food products preparation, printing, textile processing, product coating; and material processing. A large fraction of the equipment subject to PR1147 heats air that is then directed to a process chamber and transfers heat to process materials. This is a form of convective heat transfer.

Convective heat transfer involves transfer of energy from a moving fluid (i.e., heated air and combustion gasses) to solid or liquid process materials. Dryers, dehydrators and many ovens heat air to dry or raise the temperature of process materials. Furnaces, kilns and other types of ovens use a more direct form of convective heat transfer as the primary means of raising process materials' temperature. In these processes, heat is transferred directly from exhaust gasses to process materials.

Some ovens, furnaces and kilns also use radiant heat transfer to raise the temperature of process materials. Radiant heat transfer, or thermal radiation, is the transfer of energy by electromagnetic

radiation in the infrared and visible light wavelengths. The amount of thermal radiation emitted by an object depends upon its temperature. Equipment generating radiant heat use specialized burners that transfer a larger amount of the energy from combustion to process materials through thermal radiation. These types of equipment can also generate radiant heat using electric elements instead of combustion.

It is important to note that all burners produce radiant heat from the temperature of the flame and the high temperature of exhaust gasses. Ovens, furnaces and kilns are designed to capture convective heat from exhaust gasses through the use of heat tolerant metal and refractory material in the process chamber and then transfer heat to process materials by thermal radiation. This also helps make the temperature in the unit uniform.

TECHNOLOGY ASSESSMENT

There are several options for reducing NO_x emissions from combustion equipment subject to PR1147. Some processes may be able change their process so heat is generated by electricity. Many processes use equipment that generates heat from electricity. Other processes may be able to use heat generated by a boiler or thermal fluid heater. Heat transfer from steam or thermal fluids can be an efficient and cost effective way to heat a process. However, both of these other options require the use of an exchange system to heat the process chamber or air that heats the product. For the majority of processes however, the preferred option to reduce NO_x emissions will be upgrading or replacing the burner system.

Low NO_x Burner Technology

Low NO_x burners in some applications can achieve less than 10 ppm NO_x (referenced to 3% oxygen). There are many types of burners that emit less than 30 ppm NO_x. The manufacturers of these products use a variety of techniques to achieve lower emissions. The principle technique involves premixing of fuel and air before combustion takes place. This results in a lower and more uniform flame temperature. A lower flame temperature with fewer hot spots reduces formation of NO_x.

Most premix burners require the aid of a blower to mix the fuel with air before combustion takes place (primary air). However, tank type water heaters and some small boilers are now made with atmospheric premix burners that achieve NO_x emissions less than 15 ppm. Atmospheric burners do not use a blower to mix fuel and air. Premixing of fuel and air is accomplished using a jet of fuel gas exiting specially designed nozzle. The velocity of the fuel leaving the nozzle draws in air and mixing is completed in the body of the burner before the fuel and air mixture leaves the burner. Premixing of combustion air with fuel can also help keep the temperature uniform in an oven, furnace, etc.

To further reduce NO_x emissions, some premix burners also use staged combustion. This technique produces two combustion zones with differing air-fuel mixtures. The burner produces a fuel rich zone to start combustion and stabilize the flame and a fuel lean zone to complete combustion and reduce the peak flame temperature. In combination, these two zones reduce the

formation of NO_x. This technique incorporated premixing and can be used in combination with other techniques

Some burners incorporate flue gas recirculation (FGR) to further reduce NO_x emissions. FGR involves mixing a small amount of exhaust gasses with the combustion air that is mixed with fuel. Newer burners are designed to induce an internal FGR within the burner and the combustion chamber. This eliminates the need for external piping and an additional blower to bring the flue gasses to the burner.

Burners can also be designed to spread flames over a larger surface area to reduce hot spots and lower NO_x emissions. Radiant premix burners with ceramic, sintered metal, metal screen or metal fiber heads spread the flame and produce more radiant heat. When a burner produces more radiant heat, it results in less heat escaping the equipment through exhaust gasses.

Another common technique used to lower NO_x emissions is increasing the amount of extra primary combustion air mixed with the fuel prior to combustion (increasing the excess air). Increasing the excess air reduces flame temperature and NO_x emissions, but it also reduces the temperature of combustion gasses through dilution. This reduction in flue gas temperature can reduce process efficiency if no other adjustments are made. However, a large percentage of the equipment regulated by PR1147 is used to heat process air or simply heats a chamber (ovens, dryers, heaters and furnaces). Many processes can be adjusted to compensate for higher levels of excess air in the burner with no loss in efficiency or increase in fuel consumption. Excess air through burners can also help maintain a more uniform temperature and reduce temperature stratification in a unit.

Low NO_x burners typically incorporate several of the previously discussed technologies. The NO_x reduction technologies incorporated into the burner and the extent utilized depend upon the applications for which the burner is designed.

Emissions and Availability of Low NO_x Burners

PR1147 requires equipment to meet NO_x emission limits in the range of 30 ppm to 60 ppm (referenced to 3% oxygen) depending upon the process and process temperature. The emission limits are based on AQMD and other air district's determinations for BACT, availability of burners that can achieve these emission levels and recent emission limits decisions for AQMD permits. Currently, the typical emission for low NO_x burners applicable to equipment subject to PR1147 varies from less than 20 ppm to 60 ppm depending upon the burner, process temperature and nature of the process.

BACT determinations by the AQMD and other air districts since 1998 have resulted in emission limits of 30 to 60 ppm for equipment ranging from low temperature ovens to very high temperature metal melting and heat treating furnaces. A review of the BACT decisions made by California air districts identifies two decisions on asphalt manufacturing between 40 and 30 ppm, eight of nine decisions on ovens, dryers, printing heat set and drying and low temperature furnaces at 30 ppm or lower, and five decisions on metal melting and heat treating between 39 and 60 ppm. The higher limit of 60 ppm was for a furnace operating with preheated air which

increases NO_x emission concentrations but significantly increases efficiency, which reduces fuel use and results in less NO_x.

Currently a variety of manufacturers provide burners meeting the proposed NO_x limits for the equipment regulated by the proposed rule. There are at least seven models of burner from the two major suppliers (i.e., Eclipse and Maxon) of burners for low temperature processes meeting 30 ppm for air heating, ovens and low temperature furnace applications. There are at least six models of burners from the same two manufacturers that can achieve 30 to 60 ppm in kiln, afterburner or higher temperature furnace applications. Other manufacturers (e.g., Astec, Hauck and North American) produce burners for asphalt and furnace applications. Burners from all of these manufacturers have been used as the basis for AQMD and other air district BACT determinations.

Fuel Efficiency

Most units requiring a burner replacement to meet the emission limit of PR1147 currently have burners with emissions of 110 to 170 ppm or more. Replacement of many of these older high emitting burner with new low NO_x 30 ppm burner's will improve process efficiency because new burners are more fuel efficient. Improved combustion and process efficiency will also result in lower emissions of carbon dioxide. Replacement of 60 to 90 ppm burners with low NO_x burners with 30 ppm burners may result in small efficiency gains.

Burner Turndown

Technical consultants working with businesses that use equipment subject to PR1147 have raised a concern about reduced turndown for low NO burners. Turndown is the ratio of the maximum firing rate to the minimum firing rate and is a way to represent a burner's heat output range. Some operations require process temperature to be maintained within a small range and a burner with a high turndown is typically used to maintain the temperature within that small range. Many standard burners can achieve a turndown ratio of greater than 30:1. However, the NO_x emission rate for these burners is typically greater than 90 ppm (referenced to 3% oxygen) according to burner manufacturers.

The available turndown for any burner depends upon a variety of factors including process operations, emission limit to be achieved, and burner control system. Available low NO_x burners for processes affected by PR1147 have significantly higher turndown than equivalent burners for boilers. A typical low NO_x burner for a boiler has a turndown of 4:1. For PR1147 equipment, current low NO_x burners with NO_x emissions between 20 to 40 ppm (3% oxygen) have a turndown in the range of 15:1 to 10:1. However, there are low NO_x burners with turndown of 25:1 or greater.

In many cases a large burner with a high turndown is used to start up a process quickly. After the equipment is brought up to the process operating temperature, the burner then fires up to 50 to 60% capacity. A large burner with high turndown is important in cold climates when the burner needs to be oversized in order to quickly heat up equipment. However, in Southern California an oversized burner is not essential because the climate is moderate. The equipment can be quickly brought up to operating temperature with a smaller burner.

When equipment with an oversized burner is in production mode and the burner operates at 60% capacity or less, the effective turndown for the process is about 15 percent. This is the reason why equipment that traditionally use burners with a turndown of 30:1 can meet today's BACT limits (20 to 40 ppm) using low NO_x burners with turndowns of 15:1 or less. There may even be an efficiency benefit in switching to a smaller burner. Burners are typically more efficient when they operate closer to their maximum rated capacity.

AFFECTED INDUSTRIES

Proposed Rule 1147 affects manufacturers (NAICS 33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the district (NAICS 21, 23, 31-33, 42, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92). The units affected by the proposed rule are used in industrial, commercial and institutional settings for a wide variety of processes.

The approximately 6,600 units subject to the emission limits of PR1147 are located at approximately 3,000 facilities. However, only about 2,200 facilities are expected to require retrofit of burners in their equipment. Staff estimates that as many as 2,500 permitted units with NO_x emission limits greater than one pound per day must retrofit to meet the emission limits of PR1147 between 2010 and 2014. An additional 2,500 permitted units with NO_x emission limits of less than one pound per day will become subject to the emission limits of the proposed rule between 2015 and 2019. About 1,600 additional units at about 800 facilities affected by PR1147 currently meet the NO_x emission limits of PR1147. Of the approximately 5,000 units that currently do not meet the emission limits, at least 100 relocated or replacement soil and water remediation units per year will become subject to the NO_x emission limit starting in 2011, and all units will meet the NO_x emission limit by 2023.

PUBLIC PROCESS

The rule development effort for Rule 1147 is part of an ongoing process to assess low NO_x technologies for combustion equipment. For this rule development, staff held three Task Force meetings on process and burner technologies with representatives from affected businesses, manufacturers, trade organizations and other interested parties. At these meetings low NO_x technology, emission limits, emission testing and compliance dates were discussed. Staff also held individual meetings with manufacturers and distributors of burner systems and visited local businesses to observe processes and equipment affected by PR1147. In addition, staff held a Public Workshop on September 30, 2008 and a Public Consultation Meeting on October 28, 2008.

CHAPTER 2: SUMMARY OF PROPOSED RULE 1147

AQMP CONTROL MEASURE

PROPOSED RULE REQUIREMENTS

AQMP CONTROL MEASURE

Control measure CMB-01 – NO_x Reductions from Non-RECLAIM Ovens, Dryers, and Furnaces and control measure MCS-01 – Facility Modernization provide a framework for PR1147. Control measure MCS-01 proposes that equipment operators meet best available control technology (BACT) emission limits at the end of the equipment's useful life. Control measure CMB-01 proposes emission NO_x limits in the range of 20 ppm to 60 ppm (referenced to 3% oxygen) for ovens, dryers, kilns, furnaces and other miscellaneous combustion equipment. BACT limits for equipment regulated by PR1147 are in the range of emission limits proposed in control measure CMB-01. To meet these emission limits, equipment will require burner replacement or upgrades to burner control systems.

PROPOSED RULE REQUIREMENTS

Purpose and Applicability

Rule 1147 will reduce NO_x emissions from a large variety of equipment and processes. Proposed Rule 1147 applies to equipment and processes that are required to have an AQMD permit to operate but whose NO_x emissions are not regulated by AQMD regulation XI. The equipment regulated by PR1147 include, but are not limited to, ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated process tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, and remediation units. This proposed rule does not apply to solid fuel fired combustion equipment, internal combustion engines regulated under District Rule 1110.2, turbines, charbroilers, or boilers, water heaters, thermal fluid heaters or process heaters subject to District Rules 1109, 1146, 1146.1, or 1146.2. In addition, PR1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, 1118, 1121, or 1135.

Requirements

PR1147 requires new, modified, relocated and in-use combustion equipment subject to the rule to comply with the equipment specific NO_x emission limits listed in Table 1. In addition to limits for specific equipment, PR1147 also includes limits based on process temperature. The proposed emission limits are based on AQMD BACT determinations, recent AQMD permit applications and associated sources tests, and discussions with burner manufacturers and vendors. Other criteria considered by AQMD staff in selection of the proposed NO_x limits include cost effectiveness and availability of burners from multiple manufacturers.

Table 1 combines equipment based on process characteristics and lists the proposed NO_x emission limits. Table 1 also includes NO_x emission limits for unspecified equipment based on process temperature. Higher process temperatures result in higher NO_x emissions and this is reflected in the limits in Table 1.

Table 1 – NO_x Emission Limit

Equipment Category(ies)	NO _x Emission Limit PPM @ 3% O ₂ , dry or Pound/mmBtu heat input		
	Process Temperature		
Gaseous Fuel-Fired Equipment	≤ 800°F	> 800 ° F and < 1200° F	≥ 1200 °F
Asphalt Manufacturing Operation	40 ppm	40 ppm	
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator ¹	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Evaporator, Fryer, Heated Process Tank, or Parts Washer	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	
Metal Heat Treating, Metal Melting Furnace, Metal Pot, or Tar Pot	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Oven, Dehydrator, Dryer, Heater, Kiln, Crematory, Incinerator, Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Make-Up Air Heater or other Air Heater located outside of building with temperature controlled zone inside building	30 ppm or 0.036 lb/mmBtu		
Tenter Frame or Fabric or Carpet Dryer	30 ppm or 0.036 lb/mmBtu		
Other Unit or Process Temperature	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Liquid Fuel-Fired Equipment	≤ 800°F	> 800 ° F and < 1200° F	≥ 1200 °F
All liquid fuel-fired Units	40 ppm or 0.053 lb/mmBtu	40 ppm or 0.053 lb/mmBtu	60 ppm or 0.080 lb/mmBtu

- ¹ Emission limit applies to burners in units fueled by 100% natural gas that are used to incinerate air toxics, VOCs, or other vapors; or to heat a unit. The emission limit applies solely when burning 100% fuel and not when the burner is incinerating air toxics, VOCs, or other vapors. The unit shall be tested or certified to meet the emission limit while fueled with natural gas.

Compliance dates for in-use equipment to meet NO_x emission limits are listed in Table 2. Compliance is phased in for equipment based on age starting July 1, 2010. Initially, equipment that is at least 25 years old must meet the emission limit, followed a year later by equipment that is 20 to 25 years old and then equipment that is 15 years old. The exception is remediation equipment which must comply on or after January 1, 2011 when a combustion modification or change of location occurs or when a new unit begins operating. The compliance schedule for degassing equipment, evaporators, incinerators, heated tanks and spray booth make-up air heaters differs in order to allow manufacturers additional time to certify equipment and develop a greater number of compliant products. Tar pots must comply after January 1, 2012 when submitting a permit application for a new unit or change of ownership. Other In-use equipment must comply with the PR1147 emission limit starting January 1, 2013 and when the equipment is 15 years old.

Table 2 – Compliance Schedule for In-Use Units

Equipment Category(ies)	Compliance Date
Remediation UNIT Upon combustion modification or change of location for units manufactured prior to 1998	Beginning January 1, 2011
Tar Pot Permit Application for Change of Ownership or New Equipment	Beginning January 1, 2012
Afterburner, degassing unit, catalytic oxidizer, thermal oxidizer, vapor incinerator, evaporator, food oven, fryer, heated process tank, parts washer or spray booth make-up air heater manufactured prior to 1998	July 1, 2013
Other UNIT manufactured prior to 1986	July 1, 2010
Other UNIT manufactured prior to 1992	July 1, 2011
Other UNIT manufactured prior to 1998	July 1, 2012
Any UNIT manufactured after 1997	July 1 of the year the unit is 15 years old

PR1147 provides owners of facilities with five or more units with emissions greater than one pound per day an alternative compliance option to modify equipment over a longer period of time. Owners or operators of facilities with five or more in-use units with permit emission limits greater than one pound per day NO_x that will require burner modifications may submit an alternate compliance plan by July 1, 2009 to phase-in compliance of all units starting January 1, 2010 and ending before January 1, 2015. At least one unit shall be modified to comply with the applicable emission limit of this rule by January 1, 2010. Each year thereafter, up to a maximum of four years, a minimum of 20 percent of additional units shall comply with the applicable emission limit. All units must comply with the applicable emission limit of this rule by January 1, 2015. PR1147 also provides additional time for specific categories of equipment that has recently replaced burners or has a permit limit of less than one pound per day NO_x at the time of rule adoption.

- Units with 75% or more of the burner capacity replaced before adoption of the rule have an additional ten years from the date of the burner modification to meet the emission limit.
- Units with emissions of one pound per day or less have five additional years to comply with the emission limit.

Additional requirements include keeping records of maintenance and combustion modifications and installation of meters to monitor fuel and equipment use. The recordkeeping requirements start January 1, 2010 and a requirement for gas and time meters starts January 1, 2011.

PR1147 also requires units whose process operates at oxygen levels of more than 18% to use a pre-approved source testing protocol. For processes operating at high oxygen and low carbon dioxide concentrations, the standard techniques for converting NO_x concentration levels to a 3%

oxygen reference level are not appropriate. One alternative is to comply with the pound per million Btu emission limit. AQMD staff will consider alternatives submitted for review in test protocols.

Compliance Determination, Certification and Enforcement

PR1147 also identifies test methods for determining compliance with rule requirements and establishes a framework for manufacturers wanting to certify the emission level of their products. Among the list of approved test methods, two rely on portable analyzers and one method allows compliance determination with the lb/mmBtu emission limit option. Emissions testing using the lb/mmBtu option is one alternative for evaluating emissions from processes that operate at high oxygen concentrations (more than 18%). Copies of source test results and certifications must be kept on site by the operators of affected units and made available to the AQMD upon request. The AQMD will inspect distributors, retailers and installers as well as operators and conduct tests as necessary to ensure compliance of affected units.

Exemptions

Exemptions are provided for equipment and processes at RECLAIM facilities and that are regulated by other AQMD source specific rules in Regulation XI. An exemption is also provided for flare, afterburner, degassing unit, remediation unit, thermal oxidizer, catalytic oxidizer and vapor incinerator processes in which a fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gases, is mixed with air toxics, VOCs or other combustible vapors prior to incineration in the unit in order to start-up or maintain combustion or temperature in the unit. This exemption does not apply to a burner with a separate fuel line used to heat up or maintain temperature of a unit or incinerate air toxics, VOCs or other combustible vapors in a gas stream moving past the burner flame.

An exemption is also provided for flares, afterburners, degassing units, thermal oxidizers or vapor incinerators in which a fuel; including but not limited to natural gas, propane, butane or liquefied petroleum gases; is only used to maintain a pilot for vapor ignition. PR1147 also exempts solid fuel-fired units and provides an exemption for existing afterburners incorporating a heat exchanger that captures heat from an oven or furnace.

PR1147 in addition provides a temporary exemption from the NO_x emission limit for new afterburners, degassing units, thermal oxidizers, catalytic oxidizers, vapor incinerators, and spray booth make-up air heaters installed after adoption of PR1147 and before January 1, 2011. New food ovens, fryers, heated process tanks, parts washers, and evaporators installed after date of adoption and before January 1, 2013 are also exempt from the emission limit in Table 1 at the time of installation. These two categories of units must comply with the NO_x emission limit on or before July 1 of the year the unit becomes 15 years old. New and relocated remediation units installed before January 1, 2011 are exempt until the unit is moved or a combustion modification is made.

CHAPTER 3: IMPACT ASSESSMENT

IMPACT ANALYSIS

COST EFFECTIVENESS

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

SOCIOECONOMIC ASSESSMENT

**DRAFT FINDINGS UNDER CALIFORNIA HEALTH & SAFETY CODE
SECTION 40727**

INCREMENTAL COST-EFFECTIVENESS

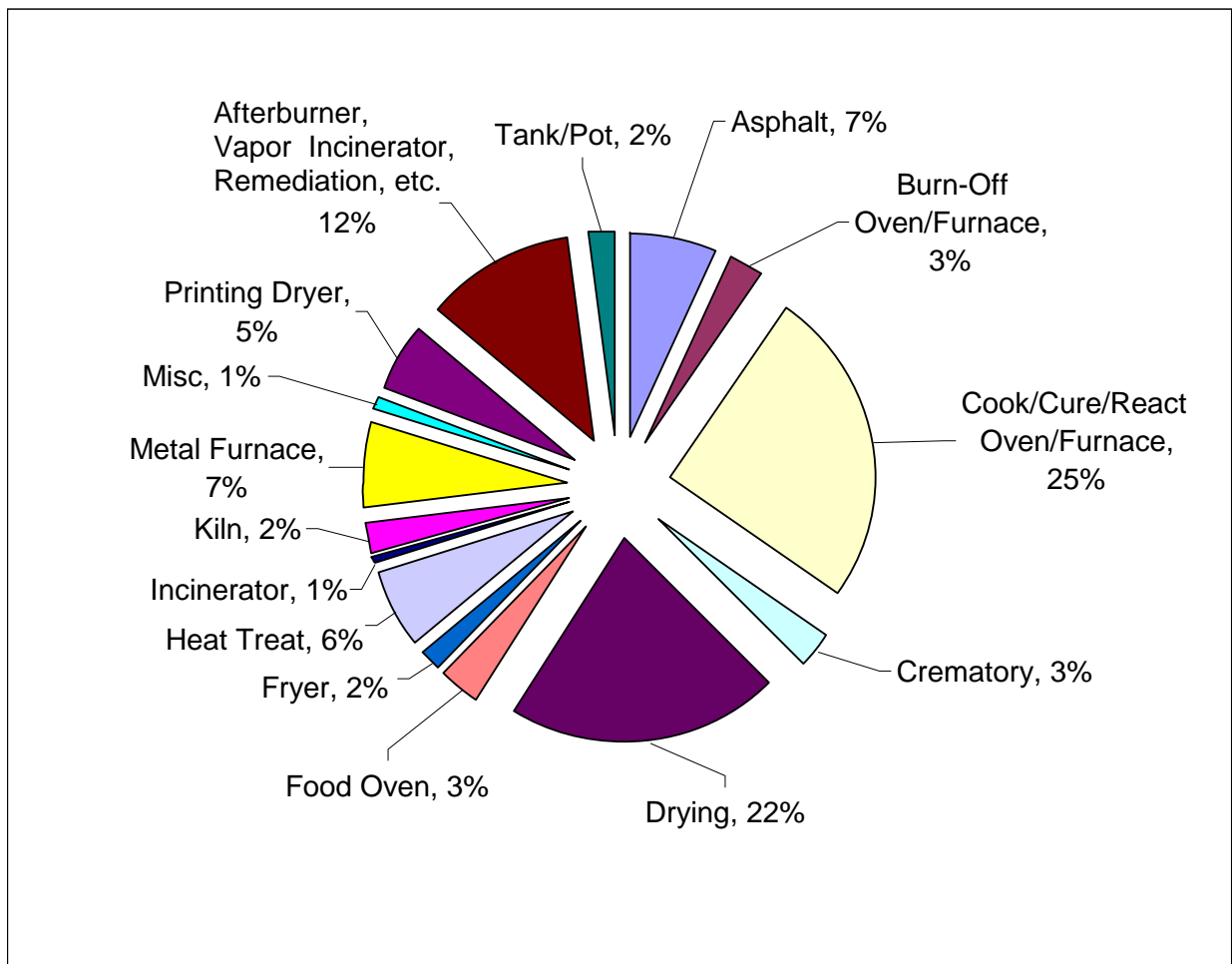
COMPARATIVE ANALYSIS

IMPACT ANALYSIS

The proposed rule is estimated to reduce annual average emissions of NO_x by 3.5 ton per day by 2014 (56%) and 3.8 tons per day by 2023. Emission reductions are estimated based on a survey of equipment permits for units subject to PR1147. Overall, about 25% of the equipment subject to the rule is estimated to meet the proposed emission limits in PR1147. Many current BACT limits were put in place between 1998 and 2003. For some equipment categories the percentage meeting BACT emission limits is higher than 25% (e.g., ovens, dryers and furnaces less than 1200 ° F which account for about half of the units subject to PR1147). For other categories (e.g., high temperature furnaces, heated tanks, afterburners and remediation units) the fraction meeting PR1147 limits is lower. The average emission reduction per unit is about 75%. An average reduction of 75% from three fourths of the emission inventory results in a reduction of 56%.

Emission reductions are spread over a variety of industrial, commercial and institutional operations and are anticipated to be proportional for each process category in the current inventory. Figure 1 provides an estimate of the percentage of NO_x emissions in the current inventory associated with various process categories.

Figure 1 – NO_x Emission Contribution from Processes Subject to PR1147



COST EFFECTIVENESS

A cost effectiveness for installing new low NO_x burners in equipment affected by PR1147 was estimated by 2007 AQMP Control Measures CMB-01 and MCS-01. The range of cost effectiveness was \$4,000 to \$17,000 per ton. This estimate was based on a number of previous analyses including the 2005 amendment to the AQMD RECLAIM program which includes large operations with ovens, dryers, furnaces and kilns.

Other examples of low NO_x burner cost effectiveness for equipment with smaller burners are also available. For example, in the analysis for the May 2006 amendment to AQMD Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters, the cost effectiveness for meeting a 20 ppm NO_x limit was \$2,400 to \$16,000 per ton. In the analysis for the amendment to Rule 1121, the cost effectiveness for smaller tank type water heaters to meet a 30 ppm and 15 ppm limit respectively was estimated to be \$4,000 and \$16,000 per ton.

A new cost effectiveness analysis has been prepared for equipment affected by PR1147. Technical information and costs were provided by burner manufacturers. The cost effectiveness estimates include burner cost, tax and installation. Installation cost is assumed to be 50% of the equipment cost based on EPA guidelines. Emission reductions are calculated assuming an average capacity factor of 20%. The capacity factor is used to represent the annual heat output and emissions of a burner relative to the theoretical annual maximum. A 20% capacity is conservative and much equipment subject to PR1147 would have significantly higher usage. For burners less than 500,000 Btu/hr the baseline emission is assumed to be 0.134 lb/mmBtu (110 ppm). For larger burners the baseline emission is assumed to be 0.109 lb/mmBtu (90 ppm). In many cases, emissions are higher than the baseline assumed. However, these baseline emission estimates are conservative and appropriate because some units have lower emissions.

Cost effectiveness was estimated for achieving 60 ppm, 40 ppm, and 30 ppm in PR1147 equipment. The average cost effectiveness for 30 ppm, 40 ppm and 60 ppm was \$5,000, \$7,000 and \$7,000 per ton respectively. The cost effectiveness for frequently used 1 to 2 mmBtu/hour burners meeting 30 ppm varies from \$4,000 to \$13,000 per ton. The average cost effectiveness for specific size categories of 30 and 60 ppm burners is presented in Table 3. Table 4 provides a summary of average cost for burners meeting 30 and 60 ppm.

Table 3 – Burner Cost Effectiveness

Burner Size (mmBtu/hr)	30 ppm	60 ppm
Less than 0.5	\$19,700	\$17,000
1	\$6,000	\$6,000
2.5	\$4,000	\$5,000
5	\$3,000	\$4,500
10	\$2,800	\$4,000
20	\$2,700	\$3,000

Table 4 – Average Burner Cost

Burner Size (mmBtu/hr)	30 ppm	60 ppm
Less than 0.5	\$6,800	\$2,500
1	\$3,500	\$2,000
2.5	\$5,500	\$3,500
5	\$5,000	\$5,000
10	\$10,000	\$8,000
20	\$23,000	\$22,000

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) and AQMD Rule 110, the SCAQMD has prepared a Draft Environmental Assessment (EA) to analyze environmental impacts from the project identified above pursuant to its certified regulatory program. The Draft EA was released for public review and comment on Thursday, October 16, 2008. The 30-day public review and comment period ends at 5 p.m. on Friday, November 14, 2008. Any comments received during this period will be responded to and included in the Final EA. The environmental analysis in the Draft EA concluded that PR1147 would not generate any significant adverse environmental impacts. The EA is available at AQMD Headquarters, by calling the AQMD Public Information Center at (909) 396-2039, or by accessing AQMD's CEQA website at: www.aqmd.gov/ceqa.

SOCIOECONOMIC ASSESSMENT

An analysis of Rule 1147 assessing the socioeconomic impacts was conducted and the socioeconomic report was released 30 days prior to the Board hearing.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH & SAFETY CODE SECTION 40727

California Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. In order to determine compliance with Sections 40727, 40727.2 requires a written analysis comparing the proposed rule with existing regulations.

The draft findings are as follows:

Necessity: A need exists to adopt Rule 1147 to reduce emission limits from combustion equipment in order to meet federal and state ambient air quality standards.

Authority: The AQMD obtains its authority to adopt, amend, or repeal rules and regulations from California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, 40725 through 40728, and 41508.

Clarity: PR1147 has been written or displayed so that its meaning can be easily understood by the persons affected by the rule.

Consistency: PR1147 is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions or federal regulations.

Non-Duplication: PR1147 does not impose the same requirement as any existing state or federal regulation, and is necessary and proper to execute the powers and duties granted to, and imposed upon the AQMD.

Reference: In amending this rule, the following statutes which the AQMD hereby implements, interprets or makes specific are referenced: Health and Safety Code sections 39002, 40001, 40702, 40440(a), and 40725 through 40728.5.

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code Section 40920.6 requires an incremental cost-effectiveness analysis for Best Available Retrofit Control Technology (BARCT) rules or emission reduction strategies when there is more than one control option that would achieve the emission reduction objective of the proposed amendments, relative to ozone, CO, SO_x, NO_x, and their precursors.

The only option for reducing NO_x emission from equipment affected by PR1147 is replacement or upgrade of burner systems. Some ovens, furnaces or heated tanks use electricity to heat the unit. However, these equipment are either small (oven, furnace or heated tank) and do not require a District permit or are unique applications that require electric heat (electric induction furnace). Discussions with users and equipment manufacturers indicate that equipment subject to PR1147 cannot retrofit to electric heat or require fuel fired burners to produce the heat and temperature control required by their processes. Because there is not more than one control option that would achieve the emission reduction objective for the combustion equipment regulated by PR1147, an incremental cost-effectiveness analysis has not been prepared.

COMPARATIVE ANALYSIS

Under Health and Safety Code Section 40727.2, the AQMD is required to perform a comparative written analysis when adopting, amending, or repealing a rule or regulation. The comparative analysis is relative to existing federal requirements, existing or proposed AQMD rules and air pollution control requirements and guidelines that are applicable to industrial, institutional, and commercial combustion equipment.

The AQMD is not aware of any state or federal requirements regulating air pollution that are applicable to in-use PR1147 units. Because there are no state or federal requirements for in-use PR1147 units, the proposed amendments are not in conflict with and do not duplicate current AQMD, state or federal requirements.

REFERENCES

REFERENCES

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APPENDIX A: DRAFT PUBLIC COMMENTS AND RESPONSES

DRAFT PUBLIC COMMENTS AND RESPONSES

The following comments include those received at the PR1147 Public Workshop on September 30, 2008 and sent to AQMD staff by October 24, 2008. Comments from an AQMD Public Consultation meeting on October 28 are also included.

Comment: Which equipment is subject to the rule? Are units rated less than two million Btu per hour exempt?

Response: Any combustion process/equipment with NO_x emissions that requires an AQMD permit is subject to PR1147. A unit would be subject to the rule if it requires a permit because of VOC or particulate emissions and it uses a burner to heat the process. A unit with burners rated less than two million Btu per hour that requires a permit for VOC or particulate emissions is subject to the rule.

Comment: What requirements do other air districts have for these types of equipment?

Response: Other districts (e.g., San Joaquin Valley Unified APCD) have requirements for larger heaters, dryers, ovens, etc. that are similar to the limits in PR1147.

Comment: Do owners have the choice of the ppm or pound per million Btu emission limits?

Response: Yes, equipment owners and operators will have a choice of emission limits with the exception of units that heat air with exhaust oxygen concentrations near ambient levels (greater than 18% oxygen) which will have to comply with the pound per million Btu limit. This would require measurement of fuel use and exhaust flow rate while testing for NO_x concentration in the exhaust. Staff will also review and consider alternative protocols submitted to the District at least 90 days in advance of the test date.

Comment: How will the proposed certification program for burners and equipment work?

Response: While details of the certification program will be developed after rule adoption, Staff envisions that certification will be similar to other AQMD certification programs such as the one for Rule 1146.2, which addresses small boilers and large water heaters rated less than two million Btu per hour.

Comment: Do we need to apply for a permit when modifying equipment?

Response: A permit modification may be required. Staff is evaluating options for streamlining the process and reducing cost where possible.

Comment: The AQMD should consider a low fuel usage exemption. Replacement of a small burner of the size 150,000 Btu/hour will have higher cost effectiveness (e.g., \$13,000 per ton) and emission reductions could be as low as 21 pounds per year. This reduction is not significant.

Response: The rule provides a later compliance date for equipment with lower emissions (2015 or later). However, NOx emission reductions are needed from this equipment group in order to meet emission reduction commitments in the 2007 Air Quality Management Plan and comply with ambient air quality standards. While some individual pieces of equipment have small emissions, the cumulative emissions from these small units are significant. Our region needs NOx emissions in the District to be reduced significantly in order to meet the federal PM2.5 ambient standard by 2014 and make significant progress toward meeting the 8-hour federal ozone standard.

Please note that there are many other combustion equipment categories covered by other recent AQMD rule amendments with emission limits comparable to those from equipment subject to PR1147. For instance, the emission reductions from small units affected by this proposed rule are comparable to the reductions from small boilers from the last amendment of AQMD Rule 1146.2. Rule 1146.2 does not have a low use or low Btu exemption. Under Rule 1146.2 boilers and water heaters less than 400,000 Btu/hour will be required by 2012 to reduce emissions from 55 ppm to 20 ppm. Emissions for small burners subject to PR1147 can vary from 80 ppm to 170 ppm or more. Current residential tank type water heaters less than 75,000 Btu/hour that are sold in the District meet an even lower emission limit of 15 ppm (10 nanograms/Joule) with emissions of about one pound per year. A new car has annual NOx emissions similar to a residential water heater. The equipment affected by PR1147 is the last category of permitted in-use combustion sources that is not currently regulated by the AQMD.

The cost effectiveness provided in the staff report is an average across the range of equipment. The cost effectiveness calculated by the commenter is in the same range as estimated by AQMD staff.

Comment: Specify that solid fuel-fired equipment is exempt.

Response: Solid fuel-fired equipment is excluded by the applicability section of the proposed rule. However, to clarify this issue, staff has added a specific exemption for municipal solid waste incinerators.

Comment: Are flares at RECLAIM facilities exempt?

Response: Yes. In addition, the proposed rule has been revised in the applicability, definitions and exemption sections to clarify that this equipment is exempt.

Comment: Most use of propane and LPG is for remediation units in remote locations. Most burners have higher NOx emissions when burning these fuels. This equipment should be exempt.

Response: The proposed rule has been revised to state that remediation units fueled with propane, butane or LPG are exempt from the emission limit. However, these units must be tested or certified to meet the applicable emission limit while fueled with natural gas and must meet the limit when natural gas is available.

Comment: The AQMD should have emission limits on a pound per hour basis.

Response: Pound per hour or pound per day permit emissions limits are determined for units after applying for a permit. The permit processing engineer determines the allowable emissions in pounds per hour or pounds per day based on the pounds per mmBtu allowed by a rule emission limit.

NOx emission limits in new AQMD source specific rules are expressed in parts per million referenced to a specific oxygen concentration and an equivalent pounds per million Btu of heat input. The pounds per million Btu of heat input option allows more efficient equipment to emit at a higher concentration (ppm) but still produce the same or less mass emissions (pounds per hour) as a unit complying with the parts per million limit. The pounds per million Btu limit is also used by permit processing engineers to derive permit limits in pounds per hour, pounds per day or pounds per million cubic feet of natural gas.

A pound per hour limit would not be equitable. A unit with a burner operating at a lower heat output could emit more pounds per million Btu at a much higher concentration (ppm) than a unit with a larger burner firing at a higher rate. In order to achieve equivalent NOx reductions to those from the emission limits in PR1147 and AQMP Control Measure CMB-01, a pound per hour limit would have to be more stringent than current BACT and would be unfair to owners of both large and small units.

Comment: Now is not a good time for the AQMD to pass new rules, add to the cost of new equipment, and add the expense of modifying existing equipment. The AQMD should postpone this rule.

Response: AQMD staff recognizes that there is currently a slowdown in the economy. However, emission reductions from the equipment regulated by this rule will be required in order to meet ambient air quality standards. The proposed rule has been revised to provide additional time for new projects and for specific categories of equipment to meet the proposed emission limits. In addition, the rule has been designed to delay compliance for most equipment by several years, and provides additional time for units with new burners or lower emissions. The proposed rule will phase-in compliance for smaller and lower emitting equipment starting 2015. Compliance for equipment with higher emissions is phased-in, based on equipment age, starting January 1, 2010, and continuing until 2014. In 2010, equipment at least 25 years old and a NOx permit limit greater than one pound/day NOx emissions will be required to meet the proposed emission limits, followed by equipment 20 years old and then 15 years old. Approximately half of the equipment has emissions less than or equal to one pound per day and must meet limits starting in 2015.

Comment: The cost can be significant for smaller businesses to upgrade their equipment. It will cost \$10,000 to \$16,000 to change burners in a typical oven of the size used to cure coatings. The rule will also increase cost for new equipment for equipment manufacturers and users. This is too expensive for smaller businesses and will cause businesses to leave the District. In addition, the AQMD should provide additional time before new projects must comply with the rule. Installers will now have to change their bids for new projects proposed for next year.

Response: The cost estimate of \$10,000 to \$16,000 provided by the commenter is consistent with costs estimated by AQMD staff from information provided by equipment vendors. The cost for large metal melting or heat treating furnaces will be much higher because multiple burners with higher heat output must be replaced. However, the cost to comply for most existing smaller or lower emitting equipment is delayed until 2015 or later. Staff has also revised the proposed rule to delay the compliance date for new equipment until 2010. The cost effectiveness for this rule is \$5,000 to \$7,000 per ton of NO_x reduced and is much lower than for other AQMD NO_x rules and AQMD BACT guidelines.

Comment: Burner manufacturers and vendors will not guarantee the emission limits proposed for ovens and other equipment. Some burners cannot meet the emission limits at low fire. The available burners will not work in all applications.

Response: Staff has evaluated current burner technology and discussed the achievable emission limits with manufacturers. Several vendors have products that can achieve the proposed emission limits. Staff has changed the proposed rule limit for ovens, dryers, heaters, furnaces and other equipment with process temperatures less than 800 °F from 20 ppm to the current BACT limit of 30 ppm. The proposed rule also provides a much later compliance date for equipment for which manufacturers have only a limited number of models or sizes of burners that meet the proposed emission limit. AQMD staff's experience suggests that manufactures will not guarantee burners to a lower limit than is required by BACT or rule.

Each burner manufacturer has a different focus and its products have advantages over others in certain applications. However, each manufacturer has competing products that meet the emission limits proposed in the rule.

Comment: The rule should specify exactly which types of equipment are subject to the rule. The emission limit table in the rule is confusing.

Response: The rule and emission limit table has been revised to provide additional specificity regarding emission limits for equipment, and the rules list of common equipment names has been expanded. However, since the purpose of the rule is to reduce emissions from equipment for which there are no current NO_x limits in AQMD Regulation XI, and each piece of equipment can be assigned many different names by manufacturers, vendors and operators, it is not possible to identify every conceivable name that could be used for any specific unit. The proposed rule clearly states the most common names used by equipment subject to the rule, and that the list of names is not exclusive. The rule also clearly states that the rule regulates equipment that is not subject to NO_x emission limits in other AQMD Regulation XI rules, and identifies those rules.

Comment: Do BACT limits supersede the proposed rule limits?

Response: If BACT for new, relocated or modified equipment is more stringent than the rule NO_x limit, then BACT would be required by the permit for the new, relocated or modified equipment. If the BACT limit for the equipment at the time the equipment was installed or last modified is less stringent than the rule NO_x limit, then the equipment must comply with the new rule limit.

Comment: Explain how afterburners, vapor incinerators, oxidizers, degassing units and remediation units (soil and water treatment units) must meet the proposed emission limit. Is this equipment subject to the rule?

Response: Yes, afterburners, vapor incinerators, oxidizers, degassing units and remediation units are subject to the rule. The purpose of the rule is to require new and existing equipment to switch to newer technology burners with lower emissions. Burners that only use 100% natural gas, LPG, propane or butane in the burner and that incinerate air toxics, VOCs, or vapors by moving the gaseous stream to be treated past the burner are subject to the rule limits. Burners used to heat thermal or catalytic units are also subject to the emission limits.

However, the proposed rule requires that burners used by afterburners, vapor incinerators, degassing units, oxidizers and remediation equipment for incineration of air toxics, VOCs and other vapors meet NOx emission limits while burning 100% natural gas or other fuel and a gaseous waste stream is not being incinerated by the burner itself.

Flare based systems that mix fuel and VOCs or vapors prior to combustion in the burner are proposed to be exempt (see following comment and response). Burners used to heat thermal or catalytic units must comply with the emission limits at all times. Existing remediation units will be subject to the rule limits when they are moved or require a burner replacement on or after January 1, 2011.

Comment: Specific types of equipment (called by a variety of names including afterburners, vapor incinerators, and oxidizers) are based on flare technology and do not use 100% natural gas, propane, or LPG except for pilots or to start up the flare. Fuel is mixed with the vapors that are to be incinerated prior to the burner in the flare. The fuel is used to maintain the BTU going to the burner. Tuning this type of equipment for lower NOx emissions on natural gas could result in higher NOx emissions when incinerating VOCs or vapors. This type of equipment should be exempt from the rule.

Response: AQMD staff has modified the proposed rule to provide an exemption for flare technologies and other processes where fuel and vapors, VOCs or air toxics are mixed prior to the combustion zone and/or only use fuel for a pilot. Other processes that mix fuel and air toxics, VOCs or vapors prior to combustion include thermal and catalytic oxidizers. However, thermal and catalytic oxidizers also include a burner that uses 100% natural gas, LPG or propane to heat the thermal or catalytic component. The burners used by oxidizers to heat thermal or catalytic elements will not be exempt. Staff recognizes that each specific type of burner has a range of NOx emissions. The goal of this rule is facility modernization by replacement of older style burners with newer technology that has lower emissions of NOx and other pollutants. However, staff feels that the best way to address NOx emissions from flare based systems is through a BACT analysis and has modified the proposed rule to provide an exemption at this time.

Comment: How does this rule impact carbon dioxide emission reductions programs developed by the state of California? Some burners increase the amount of excess air going through the burner to reduce NOx and this could decrease efficiency.

Response: The emission limits proposed in the rule would not increase emissions of carbon dioxide. Staff expects that owners of equipment will often see lower fuel use and hence gains in efficiency when replacing their old burners with newer ones. Burner manufacturers have indicated to staff at PR1147 Task Force meetings that most applications should see a small increase or no change in efficiency (a decrease or no change in fuel consumption). However, staff has not quantified the benefits of improved efficiency.

Most of the equipment subject to PR1147 heats air. In many applications, the effect of an increase in the amount of air going through the burner can be offset by reducing in the amount of other air pulled into the system by a blower or exhaust fan. The same amount of air, regardless of the source, at the same temperature would result in the same fuel use and efficiency. Increased excess air will also help distribute heat in an oven or furnace and prevent stratification. More even heating in a unit can reduce fuel use.

Comment: How will the rule be enforced?

Response: Inspectors will check equipment age using ratings plates, records and other information and notify companies if their equipment is not in compliance. AQMD staff or contractors will also test equipment emissions on a random basis. Owners and operators of the equipment will be responsible for updating equipment before the compliance date, testing the equipment and maintaining records on-site.

Comment: Staff held the Public Workshop on a religious holiday and some individuals were unable to attend.

Response: Staff regrets the oversight in scheduling the Public Workshop on a religious holiday. However, staff held an additional public consultation meeting on October 28, 2008. In addition, staff has held separate meetings or teleconferences with individuals who requested meetings. Staff also extended the submittal date for written comments on the preliminary draft rule.

Comment: Name the manufacturers with burners that produce burners meeting the emission limits in the proposed rule and products that meet the emission limits.

Response: The two manufacturers that provide the majority of burners for equipment subject to PR1147 are Maxon and Eclipse. However, other companies also provide burners, but for a narrow range of applications (e.g., ASTEC and North American). Each manufacturer has a different focus and has advantages over the others in certain applications. However, they have competing products that meet the emission limits proposed in the rule.

Comment: The categories of equipment in the rule are two general. The emission limit table is a one size fits all approach. Individual processes are two variable and some may not be able to meet these emission limits.

Response: Staff has proposed the emission limits based on AQMD and other air district's BACT determinations, recent permit limits for equipment in the AQMD, burner manufacturer information, and emission levels achieved by burners in equipment subject to PR1147 and other

AQMD rules. The emission limit table in the rule groups equipment with similar emission limits for the convenience of permit applicants.

For equipment categories for which there are a limited number of burners meeting the proposed limits, PR1147 provides additional time for new and existing in-use equipment to meet the proposed rule limit. Such categories include food ovens, immersion tube heating (e.g., fryers, heated process tanks and parts washers), tar pots and remediation units. Note that one half of the units will not be subject to the emission limits until 2015. In addition, PR1147 allows facilities with 5 or more units additional time for all units to comply with emission limits.

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