

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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

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TABLE OF CONTENTS

TABLE OF CONTENTS	i
EXECUTIVE SUMMARY	ES-1
CHAPTER 1: BACKGROUND	
INTRODUCTION	1-1
REGULATORY HISTORY	1-1
TYPES OF EQUIPMENT	1-2
TECHNOLOGY ASSESSMENT	1-3
AFFECTED INDUSTRIES	1-5
PUBLIC PROCESS	1-5
CHAPTER 2: SUMMARY OF PROPOSED RULE 1147	
AQMP CONTROL MEASURE	2-1
PROPOSED RULE REQUIREMENTS	2-1
CHAPTER 3: IMPACT ASSESSMENT	
IMPACT ANALYSIS	3-1
COST EFFECTIVENESS	3-1
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS	3-2
SOCIOECONOMIC ASSESSMENT	3-2
DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727	3-2
INCREMENTAL COST EFFECTIVENESS	3-3
COMPARATIVE ANALYSIS	3-3
REFERENCES	R-1

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Proposed Rule 1147 (PR 1147) is designed to reduce NO_x emissions from a variety of combustion sources. PR 1137 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 PR 1147, modernization would require either burner system upgrades or replacement of burner systems.

PR 1147 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. PR 1147 requires equipment meet the NO_x emission limit in phases based upon equipment age and type. Units older than 15 years must meet the emission limit first, followed by newer units when they become 15 years old.

PR 1147 applies to gaseous and liquid fueled combustion equipment including, but not limited to, ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, soil 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, 1121, 1146, 1146.1, or 1146.2. In addition, PR 1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, or 1135.

PR 1147 requires equipment to meet NO_x emission limits in the range of 20 ppm to 60 ppm (referenced to 3% oxygen) depending upon the process and process temperature. The emission limits in PR 1147 can be achieved with low NO_x burners. Currently, the typical lower limit for low NO_x burners varies from 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 process temperatures less than 1200° F. A number of manufacturers provide burners meeting the proposed NO_x limits for the equipment regulated by the proposed rule.

PR 1147 also requires operators to keep equipment maintenance records and to install meters for monitoring fuel use starting January 1, 2010. 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. PR 1147 will place the same requirement on older equipment but allow time for installation.

PR 1147 provides two options for owner/operators, burner manufacturers and installers to provide evidence that 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, must be kept on site by the owner/operator. The AQMD will monitor manufacturers, sellers and installers in addition to owner/operators to assure that certified installations comply with PR 1147 emission limits.

The proposed rule is estimated to reduce annual average emissions of NO_x by 3.5 tons per day in 2014 from an annual average inventory of 6.2 tons per day. PR 1147 will reduce emissions an additional 0.3 tons per day by 2023. Staff estimates that as many as 2,500 permitted units (excluding remediation units) with NO_x emission limits greater than one pound per day will become subject to the emission limits of PR 1147 between 2010 and 2014. However, approximately one fourth of these units currently meet the NO_x emission limits of PR 1147. An additional 2,500 permitted units with NO_x emission limits of less than one pound per day will potentially become subject to the emission limits of the proposed rule between 2015 and 2019. The approximately 5,000 units subject to the emission limits of PR 1147 are located at approximately 3,000 facilities. In addition, staff estimates that 100 to 200 remediation units per year will become subject to the NO_x emission limits of PR 1147 starting in 2011 and all units will meet the NO_x emission limit by 2020.

Cost effectiveness was based on replacement of burners. The average cost effectiveness across the range of emission limits and of burner sizes was less than \$10,000 per ton of NO_x reduced. The average cost effectiveness for achieving 30 and 20 ppm is about \$5,000 and \$8,000 per ton respectively. The cost effectiveness for commonly used 1 to 2 mmBtu/hour burners meeting 30 or 20 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 (PR 1147) 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 PR 1147 is used in a variety of industrial applications.

REGULATORY HISTORY

PR 1147 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 PR 1147 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 PR 1147, modernization would require either burner upgrades or replacement of burner systems.

Equipment that will be regulated by PR 1147 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 PR 1147 vary from 60 ppm to 20 ppm (referenced to 3% oxygen).

Other AQMD regulations affecting equipment addressed by PR 1147 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 PR 1147 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 PR 1147. 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, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, soil 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, 1121, 1146, 1146.1, or 1146.2. In addition, PR 1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, or 1135.

A wide variety of processes use equipment that will be regulated under PR 1147. 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 PR 1147 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.

TECHNOLOGY ASSESSMENT

There are several options for reducing NO_x emissions from combustion equipment subject to PR 1147. 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.

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 PR 1147 is used to heat process air or simply heats a chamber (ovens, dryers, heaters and furnaces). These processes can be easily adjusted to compensate for higher levels of excess air in the burner with no loss in efficiency or increase in fuel consumption.

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. Currently a number of manufacturers provide burners meeting the proposed NO_x limits for the equipment regulated by the proposed rule.

Efficiency

Most units requiring a burner replacement to meet the emission limit of PR 1147 currently have burners with emissions in the range of 90 to 170 ppm. Replacement of these older high emitting burner with new low NO_x 30 ppm burner's will improve process efficiency because new burners are more 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 would result in smaller efficiency gains.

Burner Turndown

Technical consultants working with businesses that use equipment subject to PR 1147 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. The concern is that 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 PR 1147 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 PR 1147 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 at 50 to 60% capacity at most. 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 333), distributors and wholesalers (NAICS 423) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the district (NAICS 23, 31, 32, and 33). The units affected by the proposed rule are used in industrial, commercial and institutional settings for a wide variety of processes. Staff estimates that there are as many as 2,500 permitted units (excluding remediation units) with NO_x emission limits greater than one pound per day that will potentially become subject to the emission limits of PR 1147 between 2010 and 2014. However, approximately one fourth of these units currently meet the NO_x emission limits of PR 1147. 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. The approximately 5,000 units subject to the emission limits of PR 1147 are located at approximately 3,000 facilities. In addition, staff estimates that 100 to 200 remediation units per year will become subject to the NO_x emission limits of PR 1147 starting in 2011 and all units will meet the NO_x emission limit by 2020.

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 PR 1147.

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 PR 1147. 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 PR 1147 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 PR 1147 include, but are not limited to, ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, soil 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, 1121, 1146, 1146.1, or 1146.2. In addition, PR 1147 does not apply to equipment subject to AQMD Rules 1111, 1112, 1117, or 1135.

Requirements

PR 1147 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, PR 1147 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 from multiple manufacturers.

Table 1 groups 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)	Gaseous Fuel Limit (ppm @ 3% O ₂ , dry) or (lb/mmBtu heat input)
Asphalt Operations	40 ppm
Degassing, Incinerator, or Soil Remediation > 1200° F ¹	60 ppm or 0.073 lb/mmBtu
Fryer	
Heated Open Tank or Evaporator	
Metal Heat Treating	
Metal Melting Furnace	
Metal or Tar Pot	
Other - Process Temperature > 1200° F	
Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster or Furnace with Process Temperature ≤ 800° F	20 ppm or 0.024 lb/mmBtu
Degassing, Incinerator, or Soil Remediation ≤ 1200° F ¹	30 ppm or 0.036 lb/mmBtu
Make Up Air Heater	
Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster or Furnace with Process Temperature > 800 ° F and ≤ 1200° F	
Tenter Frame or Carpet Dryer	
Other Air Heater located outside of building with temperature controlled zone inside building	
Other with Process Temperature ≤ 1200° F	
	Liquid Fuel Limit (ppm @ 3% O ₂ , dry) or (lb/mmBtu heat input)
Units with Process Temperature > 1200° F	60 ppm or 0.080 lb/mmBtu
Units with Process Temperature ≤ 1200° F	40 ppm or 0.053 lb/mmBtu

¹ Emission limit applies when burning 100% natural gas, liquefied petroleum gas, propane or butane.

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 soil 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. In-use equipment must comply with the PR 1147 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
Combustion modification or change of location for Soil Remediation UNIT	January 1, 2011
Degassing, Evaporator, Incinerator, Tank, 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 excluding Soil Remediation UNIT	July 1 of the year the unit is 15 years old

PR 1147 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 and metering requirements start January 1, 2010.

PR 1147 also requires units whose process operates at oxygen levels of 19% or more 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. AQMD staff has committed to work with businesses and technical consultants to provide alternatives.

Compliance Determination, Certification and Enforcement

PR 1147 also identifies test methods for determining compliance with rule requirements and establishes a framework for manufacturers that wish 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 (19% or more). 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 that are regulated by other AQMD source specific rule in Regulation XI. PR 1147 also provides a temporary exemption from the NOx emission limit for new degassing units, evaporators, incinerators, tanks, and spray booth make-up air heaters installed after adoption of PR 1147 and before January 1, 2011. These units must comply with the NOx 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**

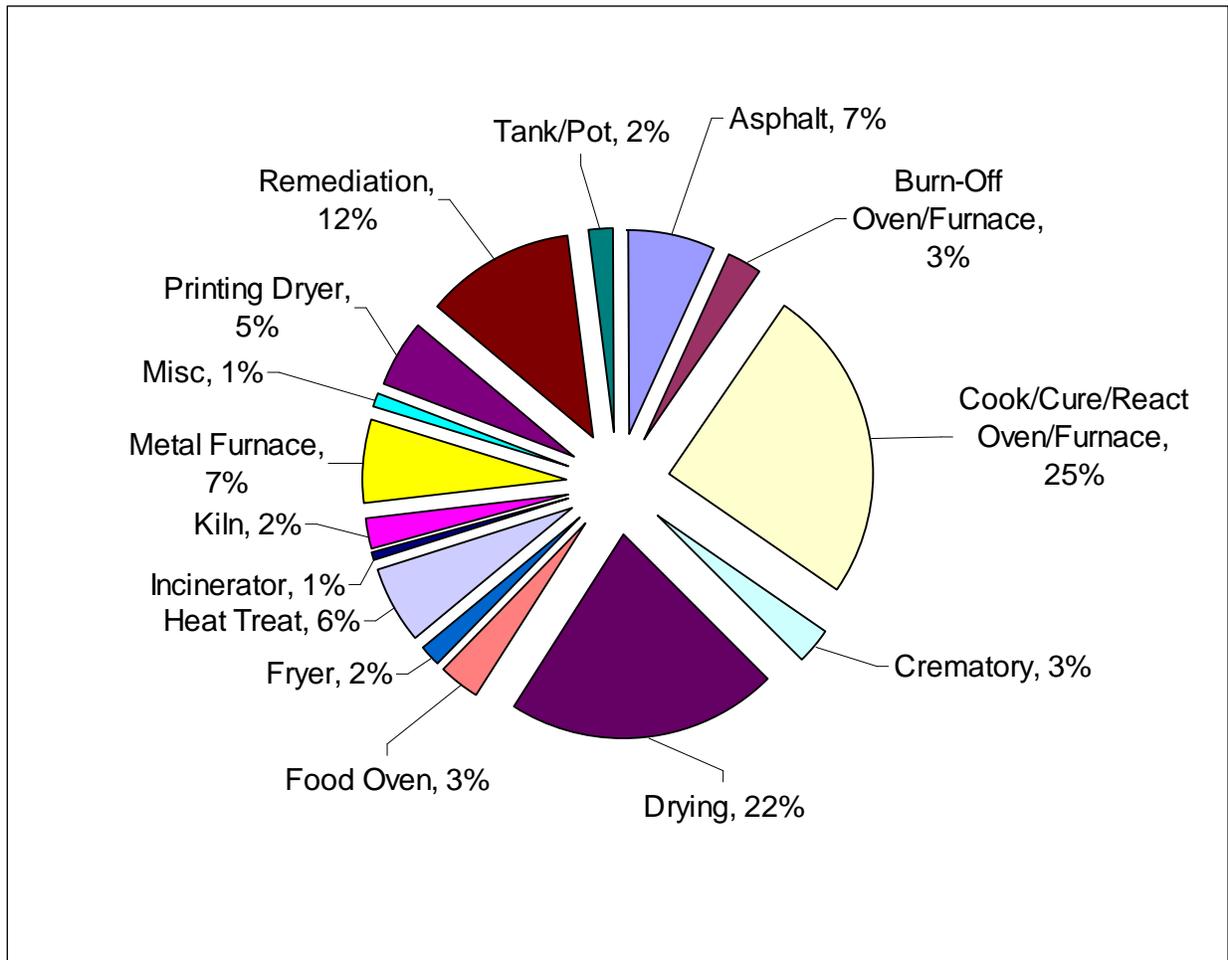
INCREMENTAL COST-EFFECTIVENESS

COMPARATIVE ANALYSIS

IMPACT ANALYSIS

Staff has prepared a preliminary analysis of the impacts of Proposed Rule 1147. The proposed rule is estimated to reduce annual average emissions of NO_x by 3.5 ton per day by 2014 and 3.8 tons per day by 2023. 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 3-1 provides an estimate of the percentage of NO_x emissions in the current inventory associated with various process categories.

Figure 3-1
NO_x Emission Contribution from Processes Subject to PR 1147



COST EFFECTIVENESS

A cost effectiveness for installing new low NO_x burners in equipment affected by PR 1147 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 AQMP 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 amendment of 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 PR 1147. 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 PR 1147 would have significantly higher usage.

Cost effectiveness was estimated for achieving 60 ppm, 40 ppm, 30 ppm and 20 ppm in PR 1147 equipment. For all emissions levels, the average cost effectiveness across the range of burner sizes was less than \$10,000 per ton of NO_x reduced. The average cost effectiveness for 30 and 20 ppm is \$5,000 and \$8,000 per ton respectively. The lowest cost effectiveness is replacement with 30 ppm burners. The cost effectiveness for 1 to 2 mmBtu/hour burners meeting 30 or 20 ppm varies from \$4,000 to \$13,000 per ton.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) and AQMD Rule 110, the appropriate CEQA documentation will be prepared to analyze any potential adverse environmental impacts associated with PAR 1147. Upon completion, the CEQA document will be released for public review and comment, and will be available at AQMD Headquarters, by calling the AQMD Public Information Center at (909) 396-3600, or by accessing AQMD's CEQA website at: www.aqmd.gov/ceqa.

SOCIOECONOMIC ASSESSMENT

A socioeconomic analysis of Rule 1147 will be performed. The socioeconomic report will be released no later than 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, 41508, and 41700.

Clarity: PR 1147 has been written or displayed so that its meaning can be easily understood by the persons affected by the rule.

Consistency: PR 1147 is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions or federal regulations.

Non-Duplication: PR 1147 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 which 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 PR 1147 is replacement or upgrade of burner systems. As there is not more than one control option which would achieve the emission reduction objective for equipment regulated by PR 1147, 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 which 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 PR 1147 units. As there are no state or federal requirements for in-use PR

1147 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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