SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report

Proposed Amended Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters

Proposed Amended Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters;

Proposed Amended Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters; and

Proposed Rule 1100 - Implementation Schedule for NOx Facilities

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EXECUTIVE SUMMARY

The adoption Resolution of the Final 2016 Air Quality Management Plan (AQMP) directed staff to achieve additional NOx emission reductions and to transition the RECLAIM program to a command-and-control regulatory structure requiring Best Available Retrofit Control Technology (BARCT) as soon as practicable. California State Assembly Bill 617, approved by the Governor on July 26, 2017, requires Air Districts to develop, by January 1, 2019, an expedited schedule for the implementation of BARCT no later than December 31, 2023 for facilities that are in the state greenhouse gas cap and trade program.

Rules 1146, 1146.1 and 1146.2 are the first set of command-and-control regulations that establish BARCT requirements that RECLAIM facilities with equipment applicable to these rules will be required to meet. The proposed amendments in Rules 1146, 1146.1 and 1146.2 initiate the transition of the NOx RECLAIM program to a command-and-control regulatory structure. Proposed Rule 1100 - Implementation Schedule for NOx Facilities (PR 1100) establishes the compliance schedule for facilities exiting the RECLAIM program. The compliance deadlines for Proposed Amended Rules 1146 and 1146.1 were established taking into consideration equipment size range, the number of units at a facility, and facilities with multiple units subject to multiple source-specific command-and-control rules. PR 1100 allows facilities with Rule 1146/1146.1 units until January 1, 2022 to retrofit all existing units and until January 1, 2023 to replace any existing units. In the proposed amendments to Rule 1146.2, units between 400,000 British thermal units per hour to 2 million British thermal units per hour would have to comply with the 30 ppm limit by December 31, 2023, if a technology assessment (to be completed by January 1, 2022) determines that the NOx emission limits specified in Rule 1146.2 still represent BARCT.

Among the 105 RECLAIM facilities that will be affected by the proposed amendments, 72 facilities would be required to retrofit the non-compliant units by the compliance dates specified in PR 1100, while 10 facilities operating units that comply with the applicable RECLAIM BARCT limit of 12 ppm would defer compliance with the compliance dates specified in Rule 1100 until the unit's burner replacement. The permitted Rule 1146/1146.1/1146.2 units in the remaining 23 facilities meet BARCT, but could be impacted by the changes in Monitoring, Reporting and Recordkeeping requirements as they transition from the RECLAIM program into a command-and-control regulatory structure. The cost effectiveness for PARs 1146 series ranged from $4,300 to $36,000 per ton of NOx reduced varying depending on the equipment size, type of retrofits, and the unit's operation and load. The proposed rule amendments are estimated to reduce 0.16 tons per day of NOx by January 1, 2023.

CHAPTER 1: BACKGROUND

INTRODUCTION

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INTRODUCTION

The Regulation XX - Regional Clean Air Incentives Market (RECLAIM) was adopted in October 1993. The purpose of RECLAIM is to reduce NOx and SOx emissions through a market-based approach. The program replaced a series of existing and future command-and-control rules and was designed to provide facilities with the flexibility to seek the most cost-effective solution to reduce their emissions. It also was designed to provide equivalent emission reductions, in the aggregate, for the facilities in the program compared to what would occur under a command-and-control approach. Regulation XX includes a series of rules that specify the applicability and procedures for determining NOx and SOx facility emissions allocations, program requirements, as well as monitoring, reporting, and recordkeeping requirements for sources located at RECLAIM facilities.

Regulation XX – RECLAIM was amended on December 4, 2015 to achieve programmatic NOx emission reductions through an overall reduction in RECLAIM trading credit (RTC) of 12 tons per day from compliance years 2016 through 2022. RECLAIM was amended on October 7, 2016 to address RTCs from facility shutdowns. The most recent amendments to RECLAIM on January 5, 2018 was to amend Rules 2001 and 2002 to commence the initial steps to transition RECLAIM facilities to a command-and-control regulatory approach.

Control Measure CMB-05 of the 2016 AQMP committed to an assessment of the RECLAIM program in order to achieve further NOx reductions of five tons per day, including actions to sunset the program and require facilities to meet BARCT levels through a command-and-control regulatory structure. During the adoption of the 2016 AQMP, the Resolution directed staff to modify Control Measure CMB-05 to achieve the five tons per day of NOx emission reductions as soon as feasible but no later than 2025, and to transition the RECLAIM program to a command-and-control regulatory structure requiring BARCT level controls as soon as practicable. Consistent with the adoption resolution for the 2016 AQMP, staff is providing quarterly updates to the Stationary Source Committee on the status of the transition of RECLAIM facilities to command-and-control with the first two quarterly reports provided on October 20, 2017 and February 16, 2018.

On July 26, 2017 California State Assembly Bill (AB) 617 was approved by the Governor, which addresses non-vehicular air pollution (criteria pollutants and toxic air contaminants). It is a companion legislation to AB 398, which was also approved, and extends California's cap-and-trade program for reducing greenhouse gas emissions from stationary sources. RECLAIM facilities that are in the cap-and-trade program are subject to the requirements of AB 617. Among the requirements of this bill is an expedited schedule for implementing BARCT for cap-and-trade facilities. Air Districts are to develop by January 1, 2019 an expedited schedule for the implementation of BARCT no later than December 31, 2023 with emphasis on the largest emission sources first.

In 2015, staff conducted a programmatic analysis of equipment at each RECLAIM facility to determine if there are appropriate and up to date BARCT NOx limits within existing command-and-control rules. It was determined that existing command-and-control rules would need to be adopted and/or amended to provide implementation timeframes for achieving BARCT compliance limits for certain RECLAIM equipment and to update emission limits to reflect current BARCT in some existing rules.

Proposed Amended Rules 1146, 1146.1 and 1146.2 (PARs 1146 series) are the first set of command-and-control regulations to be amended to address RECLAIM equipment. Rule 1146 –

Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters applies to existing boilers, steam generators, and process heaters with maximum rated heat input capacities greater than or equal to 5 million British thermal units per hour (MMBtu/hr). Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters applies to boilers, steam generators, and process heaters with maximum rated heat input capacities greater than 2 MMBtu/hr and less than 5 MMBtu/hr. Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters establishes NOx emission limits for large water heaters, boilers and process heaters less than or equal to 2 MMBtu/hr. Table 1 summarizes the applicability and NOx emission limits in Rules 1146, 1146.1 and 1146.2.

The proposed amendments in Rules 1146, 1146.1 and 1146.2 initiate the transition of the NOx RECLAIM program to a command-and-control regulatory structure. Proposed Rule 1100 - Implementation Schedule for NOx Facilities (PR 1100) establishes the compliance schedule for facilities exiting the RECLAIM program. The compliance timeframe for PARs 1146 and 1146.1 was established taking into consideration equipment size range and the number of units at a facility. Also taken into consideration within the compliance schedule are facilities with multiple units subject to multiple source-specific landing rules. PR 1100 allows facilities with Rule 1146 and/or Rule 1146.1 units until January 1, 2022 to retrofit all existing units and until January 1, 2023 to replace any existing units.

Table 1
Applicability and NOx Emission Limits of Rules 1146, 1146.1, and 1146.2

Rule	Applicability	Size	Summary of NOx Emission Limits
Rule 1146	Boilers, steam generators, and process heaters	≥ 5 MMBtu/hr	• 5 ppm for units burning natural gas ≥ 75 MMBtu/hr; • 9 ppm for units burning gaseous fuels 5 to 75 MMBtu/hr
Rule 1146.1	Boilers, steam generators, and process heaters	>2 and <5 MMBtu/hr	• 9-12 ppm for units burning natural gas
Rule 1146.2	Natural gas-fired water heaters, boilers, and process heaters	≤ 2 MMBtu/hr	• Manufacturer limit of 20 ppm; • End-user limit of 30 ppm

REGULATORY HISTORY

The following provides an overview of the regulatory history for Rules 1146, 1146.1, and 1146.2. All three rules currently exempt RECLAIM facilities.

Rules 1146 and 1146.1
Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters was adopted September 1988 and establishes NOx limits for boilers, steam generators, and process heaters greater than or equal to 5 MMBtu/hour.

Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters was adopted October 1990 and establishes NOx limits for boilers, steam generators and process heaters greater than 2 MMBtu/hour and less than 5 MMBtu/hour. In September 2008, Rules 1146 and 1146.1 were amended to reduce the allowable NOx emission limits from boilers based on rated heat input capacity. Rule 1146 establishes three groups of units based on the size or type of fuel used. The three Rule 1146 groups are as follows:

- Group I units include any unit burning natural gas, excluding digester and landfill gases, with a rated heat input greater than or equal to 75 MMBtu/hr, excluding thermal fluid heaters.
- Group II units include any unit burning gaseous fuels, excluding digester and landfill gases, with a rated heat input less than 75 MMBtu/hr down to and including 20 MMBtu/hr, excluding thermal fluid heaters.
- Group III units include any unit burning gaseous fuels, excluding digester and landfill gases, and thermal fluid heaters[1] with a rated heat input less than 20 MMBtu/hr down to and including 5 MMBtu/hr, and all units operated at schools and universities greater than or equal to 5 MMBtu/hr.

Under the 2008 amendment Rule 1146 Group I units were required to meet a lower emission limit of 5 ppm. Rule 1146 Group II and III units and Rule 1146.1 units, which represented approximately 1,600 units, were required to comply with the 9 ppm (0.011 lbs/10^6 Btu) NOx limit by January 1, 2012 through January 1, 2015. The applicable compliance date depended on the unit's rated heat capacity, the number of units at the facility, and the type of service (e.g., supplying steam at a university). Both Rules 1146 and 1146.1 were amended in November 2013 to address a SIP approvability issue related to rule enforceability raised by EPA.

Rule 1146.2

Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers was adopted on January 9, 1998. Rule 1146.2 establishes NOx emission limits for large water heaters and small boilers with a rating of less than 2 MMBtu/hr. SCAQMD has developed a certification program (Rule 1146.2 Certification Program) through which manufacturers submit documentation for new units, including source test reports, to SCAQMD to demonstrate compliance with Rule 1146.2 emission limits. Rule 1146.2 does not regulate residential gas-fired tank type water heaters less than 75,000 Btu/hr heat input which are regulated under SCAQMD Rule 1121. Units used in recreational vehicles, and mobile homes are also exempt from the requirements of Rule 1146.2. The 1998 adoption of Rule 1146.2 established NOx emission limits for large water heaters and small boilers ranging from 75,000 Btu/hr up to and including 2 MMBtu/hr. New water heaters or boilers greater than 0.4 MMBtu/hr and less than or equal to 2 MMBtu/hr (Type 2) were required to meet an emission limit of 30 ppm of NOx and 400 ppm of CO. New units from 75,000 Btu/hr to 0.4 MMBtu/hr (Type 1) were required to meet a NOx emission limit of 55 ppm or 40 ng/Joule of heat output. Compliance dates for emission limitations were based on the date of equipment manufacture.

Rule 1146.2 was amended by the SCAQMD Governing Board at the January 7, 2005 hearing. Under the amended rule, compliance for existing in-use equipment was implemented as the unit

[1] A Thermal fluid heater means a process heater in which a process is heated indirectly by a heated fluid other than water.

reached 15 years. Lower emissions limits for new equipment were not considered for the January 7, 2005 rule amendment because additional time was needed to evaluate low NOx technologies and their cost-effectiveness.

Rule 1146.2 was amended again in May 2006 to address NOx emission limits for new equipment. With the exception for small pool heaters rated less than or equal to 400,000 Btu/hour, new manufactured units greater than 400,000 Btu/hr must meet a NOx emission limit of 20 ppm starting January 1, 2010. Most new manufactured units less than or equal to 400,000 Btu/hr must meet a 20 ppm (less than 14 ng/Joule heat output) NOx limit by January 1, 2012. Pool heaters rated less than or equal to 400,000 Btu/hr, will continue to meet the existing limit of 55 ppm (or 40 ng/Joule heat output). The cost effectiveness for meeting a 20 ppm NOx limit averaged $2,400 per ton for Type 2 units and up to $16,000 per ton for Type 1 units less than or equal to 400,000 Btu/hr.

AFFECTED INDUSTRIES

PARs 1146, 1146.1, and 1146.2 affect facilities in the NOx RECLAIM program with boilers, heaters, and process heaters that are greater than 75,000 Btu/hour. PARs 1146, 1146.1, and 1146.2 do not have new requirements for non-RECLAIM facilities so these facilities are not impacted by the proposed amendments. In addition, PARs 1146, 1146.1, and 1146.2 excludes Electricity Generating Facilities (EGFs) and refineries as specific requirements for these facilities will be in an industry-specific rule that will cover all NOx sources including equipment covered under Rules 1146, 1146.1, and 1146.2. As a result, EGFs and refineries that are in RECLAIM are not included in the analyses presented in this staff report.

Out of the 266 facilities currently in the NOx RECLAIM program as of November 2017, approximately 105 facilities would be affected by PARs 1146, 1146.1, and 1146.2 and PR 1100.

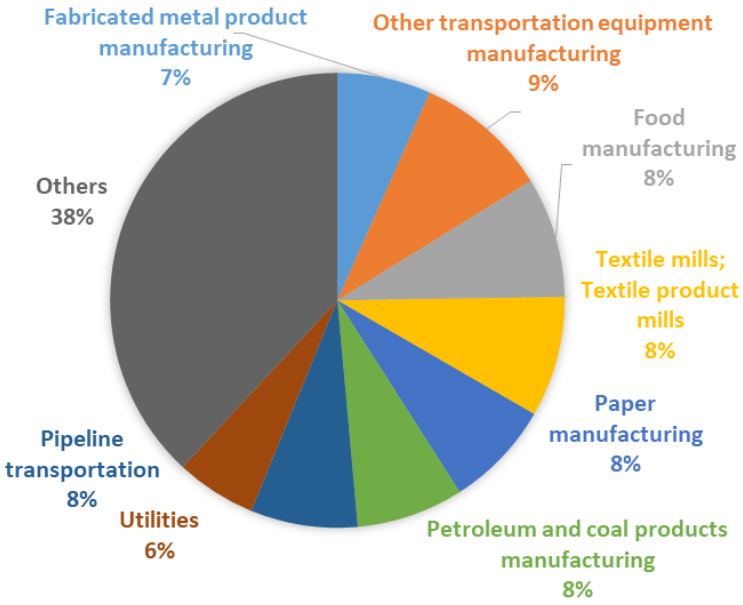


Figure 1
Industries Affected by PARs 1146 Series

When grouped according to the North American Industry Classification System (NAICS) (Figure 1), transportation equipment manufacturing is the largest single contributor accounting for 9% of the total, followed by food manufacturing, textile mills and textile product mills, paper manufacturing, petroleum and coal products manufacturing, pipeline transportation, fabricated metal product manufacturing, and utilities each contributed to 6-8% of the total. Each single remaining group comprises less than 5% of the total. Remaining NAICS groups include, but are not limited to, chemical manufacturing, primary metal manufacturing, computer and electronic product manufacturing, and oil and gas extraction.

PUBLIC PROCESS

Development of PARs 1146, 1146.1, and 1146.2 and PR 1100 was conducted through a public process. SCAQMD staff has held four working group meetings at SCAQMD Headquarters in Diamond Bar on November 30, 2017, January 16, 2018, March 7, 2018, and April 12, 2018. The Working Group is composed of representatives from the manufacturers, trade organizations, permit stakeholders, businesses, environmental groups, public agencies, consultants, and other interested parties. The purpose of the working group meetings are to discuss proposed concepts and to work through the details of staff's proposal. A Public Workshop was held on February 14, 2018. A California Environmental Quality Act (CEQA) scoping meeting was held concurrently with the Public Workshop.

In addition to the PARs 1146, 1146.1, and 1146.2 and PR 1100 Working Group Meetings, staff has also discussed concepts for the proposed rules at the RECLAIM Working Group meetings on July 13, 2017, September 14, 2017, October 12, 2017, January 11, 2018, February 8, 2018, March 8, 2018, and April 12, 2018. On April 20, 2018, the proposed amendments to Rule 1146 series and PR 1100 and the associated impacts were presented to the Stationary Source Committee.

Staff has also had individual meetings with stakeholders who will be impacted by this rulemaking.

CHAPTER 2: CONTROL TECHNOLOGIES

INTRODUCTION

CONTROL TECHNOLOGY ASSESSMENT FOR RULE 1146 AND 1146.1 EQUIPMENT

CONTROL TECHNOLOGY ASSESSMENT FOR RULE 1146.2 EQUIPMENT

INTRODUCTION

The California Clean Air Act (CCAA) requires districts to achieve and maintain state standards by the earliest practicable date, and for extreme non-attainment areas, to include all feasible measures. [Health and Safety (H&S) Code §§40913, 40914, and 40920.5]. The required use of *Best Available Retrofit Control Technology* (BARCT) for existing stationary sources is one of the specified feasible measures. Health & Safety Code §40406 defines BARCT as follows:

> *Best Available Retrofit Control Technology means an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.*

To assess the status of control technology for the source categories subject to the proposed amended rules and to ensure that the proposed amendments address BARCT requirements, staff has reviewed the commercially available NOx reduction technology for boilers, steam generators, and process heaters and evaluated NOx concentration limits established under rules and regulations at other air districts. A summary of the analysis of is provided below.

CONTROL TECHNOLOGY ASSESSMENT FOR RULES 1146 AND 1146.1 EQUIPMENT

For gaseous fuels, thermal NOx is generally the largest contributor of NOx emissions. High flame temperatures trigger the disassociation of nitrogen molecules from combustion air and a chain reaction with oxygen follows to form oxides of nitrogen. Factors that minimize the formation of thermal NOx include reduced flame temperature, shortened residence time, and an increased fuel to air ratio. To reduce NOx emissions, combustion parameters can be optimized, control techniques can be applied downstream of the combustion zone, or a combination of the two approaches can be utilized. Common types of combustion modification include: lowered flame temperature; reduced residence time at high combustion temperature; and reduced oxygen concentration in the high temperature zone.

Ultra-Low NOx Burner Systems

There are a variety of configurations and types of burners for ultra-low NOx burner (ULNB) systems. Often, fuel and air are pre-mixed prior to combustion. This results in a lower and more uniform flame temperature. Some premix burners also use staged combustion with 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. These burners can also be designed to spread flames over a larger area to reduce hot spots and lower NOx emissions. Radiant premix burners with ceramic, sintered metal 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 boiler through the exhaust gases.

Most premix burners require the aid of a blower to mix the fuel with air before combustion takes place (primary air). A commonly used application in combination with these burners is flue gas recirculation (FGR). FGR recycles a portion of the exhaust stream back into the burner. Increasing the amount of primary air and/or use of FGR can reduce flame temperature but it also reduces the temperature of combustion gases through dilution and can reduce efficiency. To maintain efficiency a manufacturer may have to add surface area to the heat exchanger. Increasing the primary air may also destabilize the flame. Ultra-low NOx burners require sophisticated controls

to maintain emissions levels and efficiency, to stabilize the flame, and to maintain a turndown ratio that is sufficient for the demands of the particular operation.

It was noted in the 2008 Rule 1146 and 1146.1 staff reports that there was clear evidence that these types of burners had been successfully retrofitted on boilers and heaters in the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) in their Rule 4306. Source tests that were conducted in conjunction with Rule 4306 showed a 98% compliance rate with a 9 ppm NOx limits using ultra-low NOx burners. In 2010, staff published a technology assessment report discussing the implementation assessment of ultra-low NOx burners subject to Rules 1146 and 1146.1. The report concluded that the 9 ppm NOx limit can be achieved by ultra-low NOx burner systems for boilers and process heaters greater than 2 MMBtu/hour. There were ultra-low NOx burners from 16 different manufacturers that could achieve the 9 ppm NOx compliance limit.

Selective Catalytic Reduction (SCR)

SCR is a post-combustion control technology that is a commercially available commonly employed to control NOx emissions from boilers and other NOx sources. It is considered to be BARCT, if cost-effective, for controlling NOx emissions from existing combustion sources such as boilers and process heaters. A typical SCR system design consists of an ammonia storage tank, ammonia vaporization and injection equipment, a booster fan for the flue gas exhaust, an SCR reactor with catalyst, an exhaust stack plus ancillary electronic instrumentation and operations control equipment. The technology uses a precious metal catalyst that selectively reduces NOx in the presence of ammonia. Ammonia is injected in the flue gas stream where it reacts with NOx and oxygen in the presence of the catalyst to produce nitrogen and water vapor.

For conventional SCRs, the minimum temperature for NOx reduction is 500 degrees F and the maximum operating temperature for the catalyst is 800 degrees F. Depending on the application, the type of fuel combusted, and the presence of sulfur compounds in the exhaust gas, the optimum flue gas temperature of an SCR system is case-by-case and will range between 550 degrees F and 750 degrees F to limit the occurrence of several undesirable side reactions at certain conditions. Depending on the type of combustion equipment utilizing SCR technology, the typical amount of ammonia slip can vary between less than five ppmv when the catalyst is fresh and 20 ppmv at the end of the catalyst life. However, newly permitted SCR systems have an ammonia slip limit of 5 ppmv. In addition to the conventional SCR catalysts, there are high temperature SCR catalysts that can withstand temperatures up to 1200 degrees F and low temperature SCR catalysts that can operate below 500 degrees F.

Based on the 2008 staff reports for Rule 1146 and 1146.1, SCR as applied to Rule 1146 boilers can achieve NOx concentrations from 5 to 6 ppm for units greater than or equal to 75 MMBtu/hr.

Potential Technologies

The section below summarizes an alternative technology that may have the potential to reduce NOx emissions for this source category.

ClearSign Technology

ClearSign Combustion Corporation in Seattle has developed two technologies applicable for boilers and heaters: DUPLEX™ technology and Electrodynamic Combustion Control (ECC™). DUPLEX™ technology can be installed in new boilers or heaters, or retrofit in existing boilers and heaters. The DUPLEX technology comprises a proprietary DUPLEX tile installed downstream of conventional burners. The hot combustion flame from the conventional burners impinges onto the DULEX tile, and the tile helps radiate heat evenly with high emissivity to the combustion products. DUPLEX operation also creates more mixing and shorter flames. Since the

flame length is one parameter that limits the total heat release in a furnace, decreased flame length can allow for significantly higher process throughputs. DUPLEX tile is expected to have a 3- to 5-year life. The Electrodynamic Combustion Control (ECC™) uses an electric field to effectively shape the flame, accelerate flame speed, and improve flame stability. The total electrical field power required to generate such effects is less than 0.1% of the firing rate. Bench test performance estimates for DUPLEX and ECC indicated that NOx and CO were less than 5 ppmv, when furnace temperatures were steady maintained between 1200 and 1800 degrees F.

In San Joaquin Valley, this technology has been installed in two small refinery heaters, three oilfield steam generators, and six enclosed flares. While it is a promising technology, more testing/demonstration would be needed before sustainability / durability is proven.[2]

Analysis of NOx Concentration Limits for Rules 1146 and 1146.1 Equipment at Other Air districts

To catch all the improvements in innovative control technologies, the SCAQMD compared the requirements in the PAR 1146s series with the analogous rules adopted by four other air districts in California. The four air districts were San Joaquin Valley, Sacramento Metropolitan, Ventura, and Bay Area. They are selected based on the severity of their nonattainment status for O_3 and PM2.5 federal air quality standards.

SJVUAPCD Rule 4306 and SJVUAPCD Rule 4320

SJVUAPCD Rules 4306 Boilers, Steam Generators, and Process Heaters – Phase 3 and 4320 Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr apply to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a total rated heat input greater than 5 MMBtu/hr. SJVUAPCD Rule 4320 limits NOx emissions from units with greater than a 20 MMBtu/hr input rating to 7 ppm (or 5 ppm for compliance at a later date). For units with greater than a 5 MMBtu/hr input rating up to and including 20 MMBtu/hr, emission limit was set at 9 ppm (or 6 ppm for compliance at a later date). Depending on the equipment size and selected NOx limit, the proposed compliance date extended from January 1, 2011 to January 1, 2015.

SJVUAPCD has a more stringent limit than SCAQMD rules for the subcategory between 20 and 75 MMBTu/hr (7 ppm in SJVUAPCD Rule 4320 vs. 9 ppm in SCAQMD Rule 1146). It is important to note that for SJVUAPCD's Rules 4306 and 4320, the owner or operator has the option of paying into an annual emissions fee in lieu of complying with the limits. Also, for units ≥ 75 MMBtu/hr, emission limit in SCAQMD Rule 1146 (5 ppm) is more stringent than SJVUAPCD's limit of 7 ppm.

Sacramento Metropolitan Air Quality Management District (SMAQMD) Rule 411

SMAQMD Rule 411 NOx from Boilers, Process Heaters and Steam Generators establishes NOx emission limits boilers greater than or equal to 1 MMBtu/hr. The emission limits range from 15 to 30 ppm for units of 1 up to and including 20 MMBtu/hr, depending on equipment size and operation. For units greater than 20 MMBtu/hr, the limit is 9 ppm.

Ventura County Air Pollution Control District (VCAPCD) Rule 74.15 and Rule 74.15.1

VCAPCD Rule 74.15 Boilers, Steam Generators and Process Heaters (5 MMBtu and greater) establishes a NOx emission limit of 40 ppm for boilers greater than or equal to 5 MMBtu/hr. For

[2] "Clearsign Ultra Low NOx Technology", San Joaquin Valley APCD, November 7-8 2017.

natural gas fired units greater than 2 and less than 5 MMBtu/hr, emission limits range from 9 to 12 ppm in Rule 74.15.1 Boilers, Steam Generators and Process Heaters (1 to 5 MMBtu). The same rule requires units equal to or greater than 1 and less than or equal to 2 MMBtu/hr to limits their NOx emissions to 20 ppmv.

Bay Area Air Quality Management District (BAAQMD) Regulation 9 Rule 7

BAAQMD Reg 9 Rule 7 (Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters) establishes NOx emission limits for boilers greater than 2 MMBtu/hr. The emission limits range from 15 to 30 ppm for units of 2 MMBtu/hr to and including 20 MMBtu/hr, depending on equipment size and operation. For units greater than 20 MMBtu/hr and less than 75 MMBtu/hr, the limit is 9 ppm. The emission limit is 5 ppm for units greater than or equal to 75 MMBtu/hr.

Summary of BARCT Technology Assessment for Rules 1146 and 1146.1

Upon reviewing the type of pollution control technologies available to control NOx emissions applicable to the boilers, steam generators and process heaters subject to Rule 1146 and 1146.1, SCR and ultra-low NOx burners are still the main technologies that can achieve the NOx concentration limits specified in these rules. Although some potential technologies show preliminary success in achieving NOx emissions similar to or less than 5 ppm, the applications are limited at this time. More time is needed to demonstrate the readiness for these potential technologies in various non-refinery industries and a wider range of operating conditions. In addition, staff evaluated rules in other California Air Districts that are regulating the same equipment, and have not found any new commercially available control technology that could be used to further lower the NOx concentration limits as currently adopted in Rules 1146 and 1146.1. EPA also concluded in 2014 that Rule 1146 and Rule 1146.1 are as stringent as other California District rules for this category. Therefore, it is concluded that the NOx emission limits as currently required in Rule 1146 and 1146.1 still represent BARCT at the time of the proposed amendments, and no new BARCT is proposed to the NOx concentration limit in Rules 1146 and 1146.1.

CONTROL TECHNOLOGY ASSESSMENT FOR RULE 1146.2 EQUIPMENT

As part of the technology assessment under the 2006 amendment, source test reports conducted for the Rule 1146.2 Certification Program were analyzed to assess the advancement in pollution control technologies. It was found that low-NOx burners for boilers and heaters in this size range can achieve less than 10 ppm NOx (at 3% oxygen). In particular, about 15% of the Type 2 units (more than 400,000 Btu/hr) had a certification level of less than 10 ppm of NOx, indicating that Type 2 units are capable of meeting a lower emission level at 12 ppm. Although a lower NOx emission limit was technically feasible at the time of the 2006 amendment, the average cost effectiveness for the 12 ppm emission limit was $24,100, which was considerably higher than the then-proposed emission limit of 20 ppm (average cost effectiveness = $2,400). Due to the relatively high cost of implementing the 12 ppm emission limit for Type 2 units in 2006, the 20 ppm emission limit was proposed and adopted in the 2006 amendment.

Analysis of NOx Concentration Limits for Rule 1146.2 Equipment at Other Air Districts

To evaluate for potential BARCT advancement from the 2006 amendment, staff has evaluated the following analogous rules in other California Air Districts:

- SJVUAPCD Rule 4308 Boilers, Steam Generators, and Process Heaters – 0.075 MMBtu/hr to Less Than 2.0 MMBtu/hr
- SMAQMD Rule 411 NOx from Boilers, Process Heaters and Steam Generators
- SMAQMD Rule 414 Water Heaters, Boilers and Process Heaters Rated Less Than 1,000,000 Btu Per Hour
- VCAPCD Rule 74.15.1 Boilers, Steam Generators and Process Heaters 1 to 5 MMBTUs
- VCAPCD Rule 74.11.1 Large Water Heaters and Small Boilers
- BAAQMD Regulation 9 Rule 6 Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

SCAQMD staff evaluated the requirements contained within the analogous rules and found no requirements that were more stringent than those already in Rule 1146.2.

Summary of BARCT Technology Assessment for Rule 1146.2

Based on the above information, there is a potential opportunity to lower the NOx concentration emission limit for Rule 1146.2. However, amending the NOx concentration limit will affect both RECLAIM and non-RECLAIM sources, and requires a more extensive rulemaking process. Since a major objective is to initiate the transition of RECLAIM facilities into a command-and-control regulatory structure with highest priority given to older, higher polluting units that will need to install retrofit controls, staff is not proposing changes to the NOx concentration limit for Rule 1146.2 equipment at this time. Staff is committed to return to Rule 1146.2 to further assess the advancement and the cost effectiveness of advanced control technologies for this source category.

CHAPTER 3: SUMMARY OF PROPOSALS

INTRODUCTION

PROPOSED AMENDED RULE 1146

PROPOSED AMENDED RULE 1146.1

PROPOSED AMENDED RULE 1146.2

PROPOSED RULE 1100

TRANSITION LOGISTICS

INTRODUCTION

The primary objective of PARs 1146, 1146.1, and 1146.2 is to revise the applicability to remove the exclusion of RECLAIM facilities. Additional definitions and provisions are needed to clarify requirements for RECLAIM facilities.

PROPOSED AMENDED RULE 1146

Rule 1146 Applicability (Subdivision (a))
Rule 1146 applies to boilers, steam generators, and process heaters of equal to or greater than 5 MMBtu/hr per hour of rated heat input capacity used in all industrial, institutional, and commercial operations with the exception of boilers used by electric utilities to generate electricity (or electricity generating facilities, EGFs), boilers and process heaters with a rated heat input capacity greater than 40 MMBtu/hr that are used in petroleum refineries, sulfur reaction plant boilers, and units operated at RECLAIM facilities pertaining to NOx emissions only.

The proposed amendments would include as an exception in the applicability that is contained in paragraph (a)(4) for:

> *"any RECLAIM or former RECLAIM facility that is in an industry-specific category defined in Rule 1100 – Implementation Schedule for NOx Facilities."*

Rule 1146 Definitions (Subdivision (b))
A definition was added for FORMER RECLAIM FACILITY in paragraph (b)(8), which means:

> *"a facility that was in the Regional Clean Air Incentives Market, as established in Regulation XX, that has received a final determination notification, and is no longer in the RECLAIM program."*

A definition was added for NON-RECLAIM FACILITY in paragraph (b)(16), which means:

> *"a facility that is not and never was in the Regional Clean Air Incentives Market, as established in Regulation XX."*

A definition was added for RECLAIM FACILITY in paragraph (b)(21), which means:

> *"a facility that is currently in the Regional Clean Air Incentives Market, as established in Regulation XX."*

Rule 1146 Requirements (Subdivision (c))
As facilities in RECLAIM transition to command-and-control, those units that would be subject to Rule 1146 based on equipment type will be required to comply with the current emission limits in the rule (on Table 1146-1), which represent current BARCT. However, the category assignments and associated implementation schedule will specified in PR 1100. Paragraph (c)(1) will state:

> *"The owner or operator of a non-RECLAIM facility shall subject all of the units within the facility to the NOx emission limits and schedules specified in Table 1146-1. The owner or operator of a RECLAIM or former RECLAIM facility shall subject all of the units within the facility to the applicable NOx emission limits specified in Table 1146-1 in accordance with the schedule specified in Rule 1100 – Implementation Schedule for NOx Facilities."*

Subparagraph (c)(1)(K) that is contained in Table 1146-1 will further specify the emission limits referenced in Table 1146-1 and refer to Rule 1100 for the implementation schedule. The requirements in (c)(2) (Table 1146-2), which specify an enhanced compliance schedule for Group II units, would not apply for a RECLAIM or former RECLAIM facility subject to Rule 1100.

Requirements for Low-Fuel Use Units

Paragraph (c)(5), which contains provisions for low-fuel usage units that have been in operation prior to September 5, 2008, would also apply to low-fuel usage units in a RECLAIM or former RECLAIM facility that would be subject to Rule 1100 that are in operation prior to [date of adoption].

Requirements for Units Permitted at 12 ppm or less of NOx

In the 2008 amendments of Rules 1146 and 1146.1, a provision was included for natural gas units ranging from 2 to 20 MMbtu/hr to defer compliance with the BARCT emission limits until the unit's burner(s) replacement, if the units complied with the then-applicable BACT limit of 12 ppm and were installed prior to the 2008 amendments. The provision was specified in Rule 1146 (c)(7) and Rule 1146.1 (c)(6), respectively (November 1, 2013 amendment).

Currently, there are a total of 42 RECLAIM units between 2 and 20 MMbtu/hr with NOx permit limits between 9 and 12 ppm. The reported emissions for these 42 units in 2016 totaled to 0.011 tpd of NOx. If these units were required to meet a NOx concentration limit of 9 ppm, the estimated emission reductions would be 0.0023 tpd. Units that were permitted at or below 12 ppm were either retrofitted or required to meet a specific emission limit to meet BACT if the unit was new. Assuming an equipment life of 15 years for ultra-low NOx burners, the majority of these units might not have met their full useful life by the compliance date under PR 1100. In addition, the incremental cost-effectiveness will be higher than units that are not equipped with low-NOx burners or SCR. Therefore, Rule 1146 paragraph (c)(7) would allow the same compliance provisions (defer compliance until burner replacement) to units between 2 and 20 MMBtu/hr currently permitted to meet a NOx limit between 9 and 12 ppm at a RECLAIM or former RECLAIM facility.

Requirements for Bio-gas Units

Paragraph (c)(10), which applies to biogas units that are co-fired with natural gas, would require compliance with the emission limits in Table 1146-1 by each applicable compliance date for the selected unit under Rule 1100 for units located at a RECLAIM or former RECLAIM facility.

Rule 1146 Compliance Determination (Subdivision (d))

Subdivision (d) contains the compliance determination requirements for the equipment subject to this rule. Paragraph (d)(8) provides a clarification that is also contained in the Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Units Subject to SCAQMD Rules 1146 and 1146.1 (Combustion Gas Periodic Monitoring Protocol). The purpose of the clarification is to exclude units that are subject to continuous emission monitoring system (CEMS) requirements from the periodic monitoring requirements (or diagnostic emission checks) contained in Rule 1146. Paragraph (c)(6) contains the continuous emission monitoring requirements and the proposed language in paragraph (d)(8) excludes the units that are subject to CEMS from performing diagnostic emission checks. Subparagraph (d)(8)(A) provides for 6 months after each applicable compliance date for the selected unit under Rule 1100 for a RECLAIM or former RECLAIM facility to conduct periodic monitoring for NOx emissions. Subparagraph (d)(8)(B) would require a RECLAIM or a former RECLAIM facility that is subject to Rule 1100 until each applicable compliance date for the selected unit under Rule 1100, or during

burner replacement, whichever occurs later, to conduct NOx emission checks for low fuel usage units according to the existing tune-up schedule contained in subparagraph (c)(5)(B).

Monitoring, Reporting and Recordkeeping Requirements

Staff compared monitoring reporting and recordkeeping requirements for Rule 1146, 1146.1, and 1146.2 to the monitoring and reporting requirements under RECLAIM. The detailed comparison is provided in Appendix B of this staff report. In general, most monitoring and recordkeeping requirements under RECLAIM were similar to the corresponding command-and-control rule. The most substantive difference was the threshold for continuous emissions monitoring systems. A discussion of the requirements of monitoring, recordkeeping, and reporting requirements for RECLAIM and non-RECLAIM facilities is presented below.

Non-Major Sources in Non-Title V Facilities

The requirements in monitoring and recordkeeping are comparable between RECLAIM and those specified in Rule 1146, Rule 1146.1, and Rule 1146.2. Since mass emissions are used for RTC reconciliation and compliance determination, the reporting requirements in RECLAIM include both monthly/quarterly electronic reporting, and quarterly and annual paper reporting. The corresponding requirement in Rule 1146 is a semi-annual report only for equipment subject to Rule 218 - *Continuous Emission Monitoring*. Given that the reporting requirements in RECLAIM were designed to ensure the integrity of the reported mass emissions, the reporting requirements might not be needed if the facilities are subject to Rule 1146 series, which determine compliance through a concentration limit. As such, non-major sources in non-Title V facilities would be subject to the MRR requirements in Rule 1146 series.

Major Sources in Non-Title V Facilities

Major sources in the RECLAIM program are required to be equipped with a Continuous Emission Monitoring System (CEMS). Major source is defined in Rule 2012 (c)(1) as follows:

> (A) any boiler, furnace, oven, dryer, heater, incinerator, test cell and any solid, liquid or gaseous fueled equipment with a maximum rated capacity:
>
> (i) greater than or equal to 40 but less than 500 million Btu per hour and an annual heat input greater than 90 billion Btu per year; or
>
> (ii) 500 million Btu per hour or more irrespective of annual heat input;

In Rule 1146, any units with a rated heat input capacity greater than or equal to 40 MMBtu/hr and an annual heat input greater than 200 billion Btu per year are required to install a continuous in-stack NOx monitor (CEMS-equivalent) (Rule 1146 (c)(6)). A comparison between the applicability thresholds in Rule 1146 and the RECLAIM program is shown in Table 2.

Table 2
Applicability Thresholds of CEMS in Rule 1146 and RECLAIM

	Rule 1146	RECLAIM
Size	40 MMBtu/hr	40 MMBtu/hr
Annual Fuel Usage	200 Billion Btu/year	90 Billion Btu/year

Since the applicability threshold in annual heat input is lower in RECLAIM, it is possible that a piece of equipment required to maintain a CEMS under RECLAIM Rule 2012 might not be

required to maintain the CEMS when it is subject to Rule 1146. As discussed previously, mass emissions reported by RECLAIM facilities are used to track and demonstrate compliance in the RECLAIM program. To ensure the integrity of reported emissions, RECLAIM includes substantial monitoring and reporting requirements. As RECLAIM facilities transition into an equipment-based command-and-control regulatory structure, to the extent possible, they should be subject to the same regulatory requirements as other non-RECLAIM facilities that are currently regulated by the respective command-and-control rules. In particular, Rule 1146 was approved in the California State Implementation Plan (SIP) in 2014 (79 FR 57442). It was determined by EPA that Rule 1146 is consistent with the relevant policy and guidance as required under the Clean Air Act. Therefore, as RECLAIM facilities exit the RECLAIM program, PAR 1146 requires that Rule 1146 equipment at a former RECLAIM facility to be subject to the CEMS requirements in Rule 1146. In other words, a former RECLAIM facility would be allowed to remove the CEMS that is equipped on a Rule 1146 unit, if the equipment size and annual heat input usage of the unit is lower than the CEMS applicability threshold as specified in Rule 1146.

To evaluate the potential impacts of the change in CEMS threshold as RECLAIM facilities transition into PAR 1146, the fuel usage records of RECLAIM units was retrieved for calendar year 2015 and 2016. Among the 22 units that exceed the equipment size threshold of ≥ 40 MMbtu/hr, four of them were defined as non-major sources under the RECLAIM program, as their annual heat inputs were less than the major source definition of 90 billion Btu per year as specified in Rule 2012 (c)(1). For these four units, CEMS would not be required under both Rule 1146 or RECLAIM requirements. Fifteen of the 18 major source units reported fuel usage data in 2015 / 2016. Four of these units had an annual fuel usage that exceeded 200 billion Btu per year. These units would be required to be equipped with CEMS under both Rule 1146 and the RECLAIM program. A total of eleven major source units reported fuel usage below 200 million Btu per year with 7 units that reported fuel usage below 90 million Btu per year, and 4 units reported fuel usage between 90 and 200 million Btu per year. Although the annual heat input of these 7 major source units fall below the CEMS applicability threshold in Rule 1146, they are equipped with CEMS, as required by all major source units in RECLAIM. Therefore, these units might have higher fuel usage records before year 2015, which was not captured in this analysis. To be conservative, a total of 11 Rule 1146 major source units is estimated to be potentially impacted by the change in the CEMS applicability threshold as they transition from RECLAIM into Rule 1146, and they may potentially remove the CEMS currently equipped with the unit, dependent upon future fuel usage of each unit.

Title V Facilities

Title V is a federal program designed to standardize air quality permits and the permitting process for major sources of emissions across the country. Title V requires additional periodic monitoring for the SIP-approved, federally enforceable rules that do not contain sufficient monitoring requirements to assure compliance with the emission limitations or other requirements. Currently, the monitoring requirements in the RECLAIM program are comprehensive and address the Title V periodic monitoring requirements. For non-RECLAIM Title V facilities subject to Rules 1146 series, additional periodic monitoring requirement have been outlined in SCAQMD Periodic Monitoring Guidelines.[3]

Rule 1146 Compliance Schedule (Subdivision (e))

[3] Periodic Monitoring Guideline. http://www.aqmd.gov/home/permits/title-v/title-v-requirements#pm.

Subdivision (e) contains the compliance schedule provisions and paragraphs (e)(1) and (e)(2) make exceptions to the compliance schedules that are currently listed on Tables 1146-1 and 1146-2 for RECLAIM or former RECLAIM facilities, since Rule 1100 will contain the implementation schedules for the units that will be transitioning out of the RECLAIM program. Paragraph (e)(3) provides low fuel usage units operated at facilities transitioning out of RECLAIM until each applicable compliance date for the selected unit under Rule 1100 or during burner replacement, whichever is later, to install a burner meeting the 30 ppm NOx emission level, per subparagraph (c)(1)(A) of Table 1146-1.

PROPOSED AMENDED RULE 1146.1

Rule 1146.1 Applicability (Subdivision (a))
Rule 1146.1 applies to boilers, steam generators, and process heaters that are greater than 2 million BTUs per hour and less than 5 million BTUs per hour of rated heat input capacity used in any industrial, institutional or commercial operation with the exception of boilers operated at RECLAIM facilities pertaining to NOx emissions only.

The proposed amendments would revise the exception that is contained in the applicability to be:

> *"any RECLAIM or former RECLAIM facility that is in an industry-specific category defined in Rule 1100 – Implementation Schedule for NOx Facilities.."*

Rule 1146.1 Definitions (Subdivision (b))
A definition was added for FORMER RECLAIM FACILITY in paragraph (b)(7), which means:

> *"a facility that was in the Regional Clean Air Incentives Market, as established in Regulation XX, that has received a final determination notification, and is no longer in the RECLAIM program."*

A definition was added for NON-RECLAIM FACILITY in paragraph (b)(11), which means:

> *"a facility that is not and never was in the Regional Clean Air Incentives Market, as established in Regulation XX."*

A definition was added for RECLAIM FACILITY in paragraph (b)(16), which means:

> *"a facility that is currently in the Regional Clean Air Incentives Market, as established in Regulation XX."*

Rule 1146.1 Requirements (Subdivision (c))
Paragraph (c)(1) would not require a RECLAIM facility to comply with the 30 ppm NOx emission level, but as facilities in RECLAIM transition to command-and-control, those units would be subject to the NOx emission requirements contained in Table 1146.1-1, which represent current BARCT. However, the category assignments and associated implementation schedule will specified in PR 1100. Paragraph (c)(2) will state:

> *"The owner or operator of any unit subject to subdivision (a) in a RECLAIM facility or former RECLAIM facility must select to comply with one of the following NOx emission limits specified in specified in Table 1146.1-1 in accordance with the schedule specified in Rule 1100 – Implementation Schedule for NOx Facilities."*

Table 1146.1-1 will further specify the emission limits referenced in that table and refer to Rule 1100 for the implementation schedule. Paragraph (c)(5), which contains provisions for low fuel

usage units that have been in operation prior to September 5, 2008, would also apply to units in a RECLAIM or former RECLAIM facility that have been in operation prior to [date of rule adoption]. As discussed previously, PAR 1146.1 would allow the same compliance provisions (defer compliance until burner replacement) to RECLAIM units between 2 and 20 MMBtu/hr meeting the RECLAIM BARCT of 12 ppm. Paragraph (c)(6), which contains provisions allowing for deferred compliance for units meeting the 12 ppm limit, would also apply to units in a RECLAIM or former RECLAIM facility. Paragraph (c)(8), which applies to biogas units that are co-fired with natural gas, would require compliance with the emission limits in Table 1146.1-1 by each applicable compliance date for the selected unit under Rule 1100 for units located at a RECLAIM or former RECLAIM facility.

Rule 1146.1 Compliance Determination (Subdivision (d))

Subdivision (d) contains the compliance determination requirements for the equipment subject to this rule. Subparagraph (d)(7)(A) provides for 6 months after each applicable compliance date for the selected unit under Rule 1100 for a RECLAIM or former RECLAIM facility to conduct periodic monitoring for NOx emissions. Subparagraph (d)(7)(B) would require a RECLAIM or former RECLAIM facility that is subject to Rule 1100 until each applicable compliance date for the selected unit under Rule 1100, or during burner replacement, whichever occurs later, to conduct NOx emission checks for low fuel usage units according to the existing tune-up schedule contained in subparagraph (c)(5)(B).

Rule 1146.1 Compliance Schedule (Subdivision (e))

Subdivision (e) contains the compliance schedule provisions and paragraph (e)(1) makes reference to the compliance schedule requirement that is contained in Rule 1100 for a RECLAIM or former RECLAIM facility, since Rule 1100 will contain the implementation schedule for the units that will be transitioning out of the RECLAIM program. Paragraph (e)(2) provides low fuel usage units operated at facilities transitioning out of RECLAIM until each applicable compliance date for the selected unit under Rule 1100 or during burner replacement, whichever is later, to install a burner meeting the 30 ppm NOx emission level, per subparagraph (c)(1).

PROPOSED AMENDED RULE 1146.2

Rule 1146.2 applies to large water heaters and small boilers and process heaters with a rated heat input capacity up to and including 2 MMBtu/hr. There are both manufacturer and end-user requirements contained in the rule. There were no changes to subdivision (a) Purpose and Applicability, subdivision (d) Certification, subdivision (e) Modification (Retrofit) Provisions and Demonstration of Compliance With Emission Limits subdivision (f) Identification of Compliant Units, subdivision (g) Enforcement, subdivision (i) progress reports. All other revisions to PAR 1146.2 are discussed below.

Rule 1146.2 Definitions (Subdivision (b))

A definition was added for BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY in paragraph (b)(1), which means:

"as defined in the California Health and Safety Code Section 40406."

A definition was added for FORMER RECLAIM FACILITY in paragraph (b)(6), which means:

> *"a facility that was in the Regional Clean Air Incentives Market, as established in Regulation XX, that has received a final determination notification, and is no longer in the RECLAIM program."*

A definition was added for RECLAIM FACILITY in paragraph (b)(15), which means:

> *"a facility that is currently in the Regional Clean Air Incentives Market, as established in Regulation XX."*

Rule 1146.2 Requirements (Subdivision (c))

Paragraphs (c)(3), (c)(4), and (c)(5) contain end-user requirements for the operation of units subject to the rule. As discussed in Chapter 2, staff anticipates to further assess the advancement of control technology and the cost effectiveness of the equipment regulated under Rule 1146.2. To avoid the need to install an intermediate technology that would be obsolete upon future amendment to Rule 1146.2, it is recommended that RECLAIM facilities with Rule 1146.2 equipment can exit RECLAIM, but the compliance date under paragraph (c)(13) is proposed in a later timeframe (December 31, 2023) to allow staff time to conduct a technology assessment. Dependent on the results of the technology assessment, if it is determined that the NOx emission limits specified in Rule 1146.2 still represent BARCT, NOx RECLAIM facilities with Rule 1146.2 units will be required to meet the applicable NOx limits by December 31, 2023. In contrast, if a more stringent BARCT level is applicable, then a new compliance schedule will be developed through a future rulemaking effort.

Rule 1146.2 Exemptions (Subdivision (h))

Subdivision (h) contains the exemptions to the provisions of this rule. Paragraph (h)(3) contains the exemptions for units at any RECLAIM or former RECLAIM facilities that are in an industry-specific category as defined in Rule 1100 – Implementation Schedule for NOx Facilities.

PROPOSED RULE 1100

Proposed Rule 1100 - Implementation Schedule for NOx facilities specifies the implementation schedule for NOx RECLAIM and former NOx RECLAIM facilities that have equipment regulated under PAR 1146 and 1146.1. The compliance timeframe for PARs 1146 and 1146.1 was established taking into consideration equipment size range and the number of units at a facility. Also taken into consideration within the compliance schedule are facilities with multiple units subject to multiple source-specific landing rules. Appendix C of this staff report contains the facility and equipment analyses that were conducted to understand the number, size and emissions of the units that would be required to meet the NOx emission limits. The implementation schedule for equipment regulated under PAR 1146.2 is included in that rule.

Purpose (Subdivision (a))

The purpose of this rule is to establish the implementation schedule for Regulation XX NOx RECLAIM facilities that are transitioning to a command-and-control regulatory structure.

Applicability (Subdivision (b))

PR 1100 applies to RECLAIM and former RECLAIM facilities that own or operate equipment that meets the applicability provisions specified in PAR 1146 and 1146.1. The applicability provisions exclude EGFs and refineries which their equipment will be regulated under industry specific rules.

Definitions (Subdivision (c))

Definitions for a Rule 1146 unit and a Rule 1146.1 unit are included in PR 1100 that make reference to the definition of boiler and process heater contained in both Rule 1146 and Rule 1146.1. In addition, a definition for Industry-Specific Category has been specified that would list the types of RECLAIM facilities that would not be subject to the requirements of PR 1100. At this time, refineries and EGFs would not be subject to the command-and-control rules referenced in PR 1100 (Rule 1146 and Rule 1146.1) or the implementation schedule listed in subdivision (d). These types of equipment and all other combustion sources belonging to these two industry-specific categories will be addressed in individual command-and-control rules that will contain both the required emission limits and implementation schedule. PR 1100 includes other definitions under subdivision (c) to improve the clarity of the proposed rule.

Implementation Schedule (Subdivision (d))

Implementation Schedule for Retrofits

PR 1100 subdivision (d) establishes the implementation schedule requirements for boilers and process heaters that will be subject to the emission requirements of Rule 1146 and Rule 1146.1. PR 1100 requires owner or operators to submit a complete permit application no later than 12 months after rule adoption, which leaves about 18 – 30 months for permit approval, unit installation and source testing. RECLAIM facilities that do not meet the emission limits of Rule 1146 and Rule 1146.1 would have until 12 months after rule adoption to submit a complete permit application for retrofits / replacement [PR1100 (d)(1)(A)]. RECLAIM facilities retrofitting boilers and process heaters would have until January 1, 2021 to meet the applicable Rule 1146 and Rule 1146.1 emission requirements for at least 75% of the total heat input for the boilers and process heaters at the facility [PR1100 (d)(1)(B)]. The heat input is the equipment rating of the unit, expressed in million BTUs per hour. The final compliance deadline for the remaining units would be January 1, 2022 [PR1100 (d)(1)(C)].

When establishing the compliance schedule for PARs 1146 and 1146.1 for equipment at RECLAIM facilities, staff took into consideration the compliance schedule of the 2008 amendment of Rules 1146 and 1146.1. In the 2008 amendments, there were about 2100 active permitted units affected by the rule amendments. The impacted facilities were given about 3-5 years to comply with the then-proposed emission limits. Given the considerably lower number of units that would need to be retrofitted/replaced under the proposed amendments (140 permitted units for Rule 1146 and 19 permitted units for Rule 1146.1), staff anticipates that similar, if not a shorter timeframe would be reasonable. The compliance timeframe for PARs 1146 and 1146.1 also took into consideration equipment size range, the number of units at a facility, and facilities with multiple units subject to multiple source-specific landing rules. The details of the analysis are provided in Appendix C of this staff report. PR 1100 would require a compliance timeframe of 2.5 to 3.5 years. To focus on larger emission sources having an earlier final implementation date, staff proposed to stagger the implementation schedule by rated heat input, an approach that is consistent with the 2008 amendment of Rule 1146 and Rule 1146.1. About 17% of the affected facilities have multiple units with rated heat input in different size bins. Instead of setting a different compliance schedule for each size category, all Rule 1146 and 1146.1 equipment are grouped together providing more flexibility to operators to achieve the greatest emission reductions first.

Implementation Schedule for Replacement Equipment

Paragraph (d)(2) contains the command-and-control rule references for the required emission limits of these units. An owner or operator that elects to fully replace the affected equipment, in lieu of installing ultra-low NOx burners or SCRs is given until January 1, 2023 to comply with the

existing NOx emission limits in Rules 1146 and 1146.1, provided the facility notifies the Executive Officer (including Facility Name, Facility Identification Number, Permit Number for the unit(s) being replaced; size of the existing and new units (MMBtu/hr), and fuel type) within 12 months after the date of rule adoption [PR1100 (d)(1)(D)]. Subparagraph (d)(1)(E) specifies the applicable NOx concentration limits in subparagraphs (d)(1)(B) and (d)(1)(C).

Exclusion for Facilities in an Industry-Specific Category

Paragraph (d)(2) states that any RECLAIM facility that is subject to an industry-specific rule as defined in subdivision (c) would not be subject to the command-and-control rules referenced in subdivision (d) or the implementation schedule listed in subdivision (d).

Monitoring, Reporting, and Recordkeeping for Title V Facilities

Under the Title V program, "relaxation of any monitoring, recordkeeping, or reporting requirement, term, or condition in the Title V permit" is considered a significant revision (Rule 3000(b)(31)), and would trigger a public process (Rule 3005(f) and Rule 3006(a)). To avoid the need for an extensive public process triggered by the change in the MRR requirements, PR 1100 would require Title V facilities to maintain the RECLAIM MRR requirements as part of the proposed rule amendments. In other words, Title V facilities would still be subject to the MRR requirements in RECLAIM after the transition. Staff is committed to work on the MRR requirements for Title V facilities in the RECLAIM program, and address the transition for Title V facilities as soon as practicable. Paragraph (d)(3) states that RECLAIM facilities that are also in Title V would be required to comply with the monitoring, reporting, and recordkeeping requirements specified in Rule 2012.

Monitoring, Reporting, and Recordkeeping for Non-Title V Facilities

PR 1100 proposes that both major and non-major sources in non-Title V facilities to be subject to the MRR requirements in Rule 1146 series. Paragraph (d)(4) states that the monitoring, reporting, and recordkeeping requirements in the applicable rule(s) as specified in subdivision (b) shall automatically apply for a non-Title V RECLAIM facility once it becomes a former RECLAIM facility.

TRANSITION LOGISTICS

The proposed amendments would initiate the transition of RECLAIM facilities into a command-and-control regulatory structure. A facility is ready to transition into command-and-control if:

1. All equipment is at BARCT; or
2. All RECLAIM source equipment meets current command-and-control BARCT rules with implementation schedule specified in PR 1100.

The procedure for the transition can be found in Rule 2002. Rule 2002 contains the notification procedures for facilities that will be transitioned out of RECLAIM and addresses the RTC holdings for these facilities that will be transitioned out of RECLAIM or that elect to exit RECLAIM. Rule 2002 Paragraphs (f)(6) through (f)(9), detail how a facility will be notified regarding the transition.

As a facility is identified to transition out of RECLAIM, the Executive Officer will provide a written letter to notify a RECLAIM facility that it is under review for transition by way of an initial determination notification. This initial notification will also include an existing list of NOx emitting equipment and a request for the owner or operator of the RECLAIM facility to confirm the RECLAIM source equipment at the facility, as well as to identify any NOx emitting equipment that is not subject to permitting requirements (e.g., Rule 219 permit exempt equipment). The

RECLAIM facility would be required to provide an identification of all NOx emission equipment (including equipment that is exempt from permitting) within 45 days of the date of the initial determination notification. The facility can also respond and provide information to the Executive Officer to confirm that it is ready for the transition to command-and-control. If the notified facility, after responding, is deemed as ready to transition into command-and-control after review by the Executive Officer, it will receive a final determination notification that it will be removed from RECLAIM and be subject to command-and-control regulations [proposed paragraph (f)(7)]. If it is determined that a facility is deemed as not ready to exit from RECLAIM and is notified, it will remain in RECLAIM until a subsequent notification and determination is made to exit.

Rule 2002 Paragraph (f)(9) outlines requirements pertaining to RTCs for facilities that are notified for exiting RECLAIM. It states that:

> *"Any RECLAIM facility that receives a final determination notification from the Executive Officer pursuant to paragraph (f)(7) shall not sell or transfer any future compliance year RTCs as of the date specified in the final determination notification and may only sell or transfer current compliance year RTCs until the facility is transitioned out of the RECLAIM program."*

If, after review, a RECLAIM facility receives a final determination notification, then the facility would not be able to sell any future compliance year RTCs after a date certain as specified in the notification, but could only sell that current compliance year RTCs until the facility exits RECLAIM.

As a result of the proposed amendments to Rules 1146, 1146.1 and 1146.2, staff has identified 26 RECLAIM facilities that could potentially be transitioned out of the RECLAIM program. These facilities have permitted NOx emissions solely from a combination of (i) Rule 1146, (ii) Rule 1146.1, and (iii) Rule 1146.2. Once all the equipment at a facility are retrofitted / replaced to meet the emission limits in Rule 1146 series, they are ready to fully transition from the cap-and-trade regulatory approach to a command-and-control regime.

Currently, facilities regulated under the command-and-control regulatory structure are subject to Regulation XIII for New Source Review (NSR) requirements. There are a number of NSR policy issues that need to be resolved as facilities transition to a command-and-control regulatory structure. Staff has been working on these issues with the RECLAIM Working Group. In addition, staff will continue discussions with EPA on NSR issues. One of the most important NSR issues is the future availability of NOx Emission Reduction Credits (ERCs) in the open market and the concern that there is not a sufficient supply of ERCs in the open market for facilities that want to install new or modified equipment that triggers NSR. RECLAIM facilities that are comprised of the region's largest emitters would join an existing open market with a limited amount of ERCs. As discussed in more depth in the Draft RECLAIM Transition Plan[4], staff will suspend issuing Final Determination Notifications to transition facilities from RECLAIM until this issue can be resolved.

[4] RECLAIM Draft Transition Plan, March 8, 2018
http://www.aqmd.gov/home/rules-compliance/rules/proposed-rules#RegXX

CHAPTER 4: IMPACT ASSESSMENT

INTRODUCTION

Among the 105 RECLAIM facilities that will be affected by the proposed amendments, 72 facilities would be required to retrofit the non-compliant units by the compliance dates specified in PR 1100**,** while 10 facilities operating units that comply with the applicable RECLAIM BARCT limit of 12 ppm would defer compliance with the compliance dates specified in Rule 1100 until the unit's burner replacement. The permitted Rule 1146/1146.1/1146.2 units in the remaining 23 facilities meet BARCT, but could be impacted by the changes in MRR requirements as they transition from the RECLAIM program into a command-and-control regulatory structure. The proposed rule amendments are estimated to reduce 0.16 tons per day (tpd) of NOx by January 1, 2023. The proposed amendments affect a wide variety of RECLAIM facilities. Staff has estimated that there are about 302 active permitted units in the RECLAIM universe that are affected by this rule amendment (230, 40 and 32 permitted units affected by PAR 1146, 1146.1 and 1146.2 respectively). Among the 302 units impacted, 163 units would be required to comply with the existing BARCT limits in Rule 1146 series (140 permitted units for Rule 1146, 19 permitted units for Rule 1146.1, and 4 permitted units for Rule 1146.2) by the compliance dates as specified in PR 1100, 42 units would be allowed to meet the emission limits upon burner replacement, and 97 units that are already at BARCT would be subject to the change in MRR requirements upon transition.

EMISSION REDUCTIONS

The total NOx inventory for the units affected by PARs 1146 series is estimated to be 0.30 tons per day. This estimate is taken from SCAQMD RECLAIM inventory database for compliance year 2016 for permitted units, and excludes EGFs and refineries. Emissions for major sources, as defined in SCAQMD Rule 2012, were extracted from their quarterly certification of emission reports (QCER). Large sources and process units report their mass emissions electronically on a monthly basis, and their monthly mass emissions were included in the analysis. For units with missing data or reports, their emissions were adjusted to full year emissions (i.e. emissions from an equipment with only 3 out of 4 quarterly reports were adjusted up by 33.3%). The NOx emission distribution by the size range are as follows:

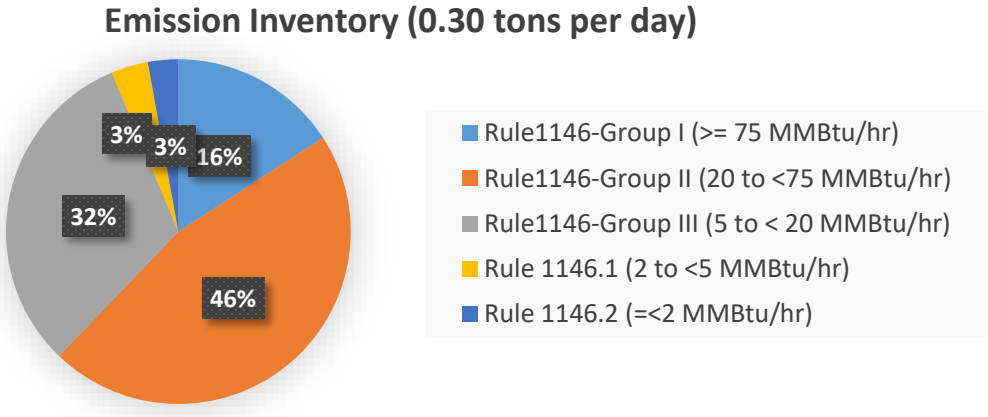


Figure 2
2016 Baseline Emissions by Size Range

As presented in Figure 2, about half of the 2016 baseline emissions were emitted from Rule 1146 Group II units (20 to <75 MMBtu/hr). On average, each Group II unit accounted for 0.0018 tpd of

NOx emissions. Although Group I units contributed to 16% of baseline emissions, on average, each Rule 1146 Group I unit accounted for more than triple the amount of emissions (0.0060 tpd) than a Group II unit (0.0018 tpd). This suggests that to achieve the greatest amount of emission reduction early, equipment with a larger heat input should be addressed first.

Emission reductions were calculated using the difference between the emission factor for the existing permit emission limits and the NOx emission limits for the various categories of boilers and heaters presented in Table 1. Based on this methodology, the proposed rule amendments are estimated to reduce approximately 0.16 tons per day of NOx emissions from RECLAIM facilities regulated under PARs 1146 series. The estimated emission reductions by unit size range are presented in Figure 3.

Note that the emissions for Rule 1146.2 were calculated based on the 32 permitted units. As discussed in Appendix C, the majority of Rule 1146.2 units are exempt from permitting. Therefore, the actual emission inventory, and the associated emission reductions of PAR 1146.2 could be considerably higher than the ones presented in Figures 2 and 3. To avoid overestimating the emission reductions from PAR 1146.2, only emissions from the permitted units were included in the analysis.

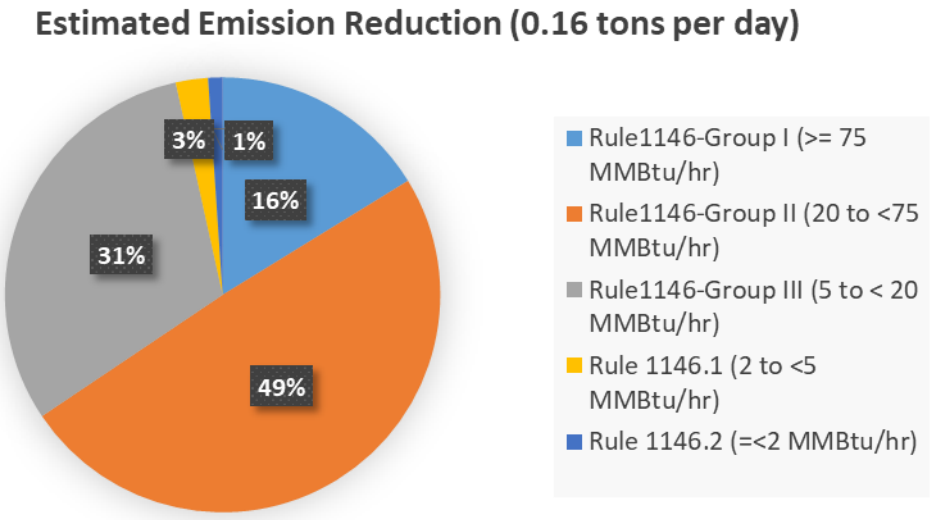


Figure 3
Emission Reduction by Size Range

COST EFFECTIVENESS

As part of the rule development efforts in the 2008 amendments of Rules 1146 and 1146.1, a socioeconomic assessment was conducted to account for the cost to comply with the then proposed regulatory requirements. Costs included equipment, materials, energy, or any other costs associated with meeting the regulatory requirements. The Discount Cash Flow methodology was used assuming a 4% real interest rate. The assumed useful life was 25 years for SCR systems and 15 years for ultra-low NOx burners. The costs to meet the emission limits were estimated according to the information obtained through manufacturers and vendors of units for the size range affected by the rules. These estimates incorporate capital costs (including installation) for retrofitting equipment, and costs for

any additional fuel and/or electricity use that are associated with meeting the more stringent NOx limits. In addition to the above operational parameters, costs for SCR included ammonia injection and complete replacement of the catalyst every 5 years. The 2008 cost effectiveness calculations also included incremental costs associated with the monitoring and testing requirements (periodic monitoring and source testing) in determining total cost for meeting the 2008 rule requirements.

PARs 1146 and 1146.1

Since the emissions limits for PARs 1146 and 1146.1 remain the same as the 2008 amendments, an estimate of cost effectiveness for proposed amendments can rely upon the cost analysis that was done in 2008. Based on the cost effectiveness numbers as presented in the 2008 staff report and after adjusting for inflation between 2008 and 2017, the cost effectiveness for PARs 1146 and 1146.1 ranged from $12,700 to $34,800 per ton of NOx reductions for SCR retrofits, and $10,800 to $37,800 per ton of NOx reductions for ultra-low NOx burners. The ranges were driven by the unit size, type of burner, and the unit's operation and load.

A major limitation of relying on the 2008 cost effectiveness calculations is the potential change in capital cost and recurring cost. Depending on the demand and supply in the Basin, the equipment and installation cost associated with the retrofits might have increased or decreased significantly in the last decade. To ensure this analysis captures the current economic conditions, the following information has been obtained from manufacturers and vendors[5] in April 2018:

- Equipment cost (with installation)
- Operation and maintenance cost
- Monitoring cost for SCR units

In general, the capital cost for a SCR system has decreased by about 30% from the 2008 cost analysis. The capital cost for retrofitting a Rule 1146 Group II unit has decreased by about 70%, while the capital cost for a Rule 1146 Group III unit and a Rule 1146.1 unit has increased by roughly 70-90% varying depending on the size of the unit. In the updated cost effectiveness analysis, the incremental monitoring cost for ultra-low NOx burners was assumed to be nominal. As described in a greater detail in the Appendix B, the MRR requirements are generally comparable in the Rule 1146 series and the RECLAIM program. Since the units impacted by the proposed amendments are currently required to comply with the RECLAIM MRR requirements, the incremental cost of the change in MRR requirements is expected to be nominal for equipment meeting the emission limits through burner retrofits. For an SCR system, the incremental operation and maintenance including ammonia and catalyst cost has been included in this analysis.

Based on the new cost information and the estimated emission reductions as presented in the earlier section (Figure 3), an updated cost effectiveness analysis was performed since the release of the Preliminary Draft Staff Report. It was assumed that the SCR would be used for Rule 1146 Group I units to achieve the desirable NOx limits. Each SCR unit is

[5] Based on cost estimates obtained from California Boiler and Parker Boiler. April 2018.

assumed to last for 25 years, and each SCR unit is due for a catalyst replacement every five years, with the cost of catalyst assumed to be about one third of the equipment cost. For Rule 1146 Group II and Group III units and Rule 1146.1 units, it was assumed that ultra-low NOx burners would be used to achieve the proposed limits. Each burner is assumed to last for 15 years. The annual operation and maintenance cost was calculated based on a 50% operating capacity. More details about the assumptions and methodology for the cost effectiveness calculations can be found in the Socioeconomic Impact Assessment for PARs 1146 series and PR 1100. To be consistent with the 2008 cost effectiveness analysis, the updated cost analysis presented below was based on the Discount Cash Flow (DCF) methodology assuming a 4% real interest rate. Analysis using the Levelized Cash Flow (LCF) approach can be found in the Socioeconomic Impact Assessment.

For Rule 1146 Group I units meeting the emission limits through SCR retrofits, the updated cost effectiveness is approximately $30,000 per ton of NOx reductions. As mentioned previously, the cost of SCR has decreased considerably in the past decade, lowering the cost of the retrofit. Nonetheless, in the 2008 analysis, the estimated emission reductions was based on going from the previous emission limits to the then proposed emission limits (30 ppm to 5 ppm for Group I units). In the current analysis, emission reductions was estimated based on the ratio of the emission limit as specified in the permit to the existing BARCT limit. Of the 6 Group I units that were identified for possible retrofit to meet the existing BARCT limit of 5 ppm, 2 were permitted at or above 30 ppm, while the permitted limits for the remaining 4 units ranged from 10 - 25 ppm. In addition to the six units, one Group I unit was in the permit database when data was retrieved. As of April 2018, that piece of equipment was removed from the facility and the permit has been inactivated. Therefore it is not included in the equipment analysis. Another Group I unit that used both natural gas and process gas was permitted at an emission limit of 7 ppm. This unit was considered as BARCT-compliant in this analysis pursuant to Rule 1146 (c)(3), which allows a dual fuel co-fired combustion unit a weighted average limit calculated by Rule 1146 Equation 1146-1.

For ultra-low NOx burners, the updated cost effectiveness is $25,000 per ton of NOx reductions for Rule 1146 Group II units, which is slightly higher than the 2008 cost analysis. Similar to Group I units, emission reductions in the 2008 analysis was based on the potential reduction from the previous emission limit to the then proposed emission limit. While the majority of the non-compliant RECLAIM units were permitted at 30 ppm or above (~75%), a fraction was permitted below 30 ppm. More importantly, in the 2008 amendment, the cost analysis excluded boilers and heaters with low-fuel usage, which accounts for 13% of the universe. Rule 1146 (c)(5) allows low-fuel usage boilers and heaters operated at heat input of no more than 90,000 therms per calendar year to meet the NOx limit by the compliance date or during burner replacement, whichever occurs later. While it is anticipated that some of the non-compliant RECLAIM boilers or heaters may be low-fuel units, the current cost analysis included all units regardless of their fuel usage, which would likely overestimate the number of units required to be retrofitted and the associated cost of rule compliance. For Rule 1146 Group III units, the updated cost effectiveness is $20,000 per ton of NOx reductions, which is similar to the assessment in the 2008 staff report. Despite the increase in capital cost, the updated cost effectiveness for

Group III units remains similar. This is mostly driven by the characteristics of the non-complaint RECLAIM units. Over 80% of the non-compliant units were permitted at or above 30 ppm. In particular, 5 units were permitted at 102 ppm. For these older units, the estimated emission reductions from the permitted emission limit to the existing BARCT limit of 9 ppm are high, compensating for the increased cost of the retrofit.

The updated cost effectiveness for Rule 1146.1 units is $36,000 per ton of NOx reductions. This is similar to the 2008 cost effectiveness analysis ($16,300 to $37,900 per ton of NOx reductions). In 2008, the cost of meeting the then new monitoring requirements in Rule 1146.1 accounted for a significant portion of recurring cost. For RECLAIM facilities, substantial MRR requirements are currently required pursuant to Rule 2012, and the transition into PARs 1146 series impose nominal incremental MRR costs. In particular, RECLAIM has extensive reporting requirements. As presented in Appendix B, in addition to the Quarterly Certification of Emissions Report and Annual Permit Emissions Program, RECLAIM facilities are required to electronically report their emissions daily for major source units, monthly for large source units and quarterly for other units. In contrast, Rule 1146 requires units with CEMS to report their emissions once every 6 months pursuant to Rule 218 *Continuous Emission Monitoring*. As such, it is anticipated that there might be potential cost savings in MRR for some facilities that transition to Rule 1146 series. Yet, given the uncertainty in quantifying the potential cost savings, the incremental MRR cost for the transition into PAR 1146 series is assumed to be nominal in the cost effectiveness calculations. Meanwhile, the equipment and installation cost for ultra-low NOx burners have increased from 2008 to 2018. The increase in capital cost was largely compensated by the assumption of zero incremental cost for MRR for this source category.

PAR 1146.2

Based on the 1998 staff report for the adoption of Rule 1146.2, the cost effectiveness to retrofit Rule 1146.2 Type 2 units to meet the 30 ppm limit was $2,800 and $8,400 per ton of NOx reduced for 1 MMBtu/hr and 500,000 Btu/hr units, respectively. After adjusting for inflation between 1997 and 2017, the updated cost effectiveness ranged from $4,300 to $13,000 per ton of NOx reduced, depending on the size of the unit.

Another cost effectiveness analysis was done to account for the cost to comply with the then proposed regulatory requirements in the 2006 amendment to Rule 1146.2. The incremental cost from the then Rule 1146.2 limit of 30 ppm to the then proposed limit of 20 ppm was analyzed for Type 2 units, which averaged $2,400 per ton of NOx reduced (Table 3.4 of the 2006 Final Staff Report). After adjusting for inflation between 2006 and 2017, the updated cost effectiveness averaged to roughly $2,700 per ton of NOx reduced.

In the proposed amendments to Rule 1146.2, Type 2 units would have to comply with the 30 ppm limit by December 31, 2023, if the technology assessment (to be completed by January 1, 2022) determines that the NOx emission limits specified in Rule 1146.2 still represent BARCT. Based on the cost analysis in the 1998 staff report and after adjusting for inflation, it would be cost effective for Type 2 units in RECLAIM to meet the 30 ppm NOx limit in Rule 1146.2.

Currently, the manufacturer limit of 20 ppm has been fully implemented as part of Rule 1146.2, and only 20 ppm units are available in the market. Based on the 2006 cost effectiveness analysis, it is cost effective to meet the 20 ppm limit. Particularly, it may sometimes be more economical to replace a unit rather than to retrofit or modify an older one for units in this size range.

Based on the new cost information and the estimated emission reductions as presented in the earlier section (Figure 3), the updated cost effectiveness for Rule 1146.2 units has been calculated as part of PAR 1146.2, which is about $9,000 per ton of NOx reduced. This is consistent with the cost effectiveness analysis for the 2006 amendment to Rule 1146.2.

Summary of Cost Effectiveness Analysis

As shown in Table 3, regardless of the approach, PARs 1146 series are shown to be cost-effectiveness for those units that will be transitioned out of RECLAIM.

Table 3
Cost Effectiveness Summary

	Cost Effectiveness Based on Previous Rule Amendments ($/ton)*	Cost Effectiveness Based on Updated Cost Information ($/ton)
Rule 1146 – Group I (SCR)	12,700 – 34,900	30,000
Rule 1146 – Group II (ULNB)	10,900 – 15,900	25,000
Rule 1146 – Group III (ULNB)	14,100 – 28,200	20,000
Rule 1146.1 (ULNB)	16,300 – 37,900	36,000
Rule 1146.2 (ULNB)	4,300 – 13,000	9,000

**After adjusting for inflation between the time of previous rule amendments and 2017.*

INCREMENTAL COST EFFECTIVENESS

Health and Safety Code Section 40920.6 requires an incremental cost-effectiveness analysis for 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, SOx, NOx, and their precursors. Incremental cost effectiveness is defined as the difference in control costs divided by the difference in emission reductions between two potential control options that can achieve the same emission reduction goal of a regulation.

Since the emissions limits for the proposed amendments remain the same as the existing rule requirements, an estimate of incremental cost effectiveness for proposed amendments relied upon the analysis conducted for the 2008 amendment to Rules 1146 and 1146.1, and the 2006 amendment to Rule 1146.2.

For Rules 1146 and 1146.1, the incremental cost effectiveness was calculated assuming the use of SCR to meet the more stringent 5 ppm NOx limit for units with rated heat input of 2 MMBtu/hr to

75 MMBtu/hr, and the cost and emission reduction were compared to those same units using ultra low NOx burners meeting the 9 ppm NOx limit. As presented in Table 8 of the 2008 Final Staff Report to Rule 1146 and Table 3 of the 2008 Final Staff Report to Rule 1146.1, the incremental cost effectiveness ranged from $40,700 to $334,500 per tons of NOx reduced. After adjusting for inflation between 2008 and 2017, the updated incremental cost effectiveness ranged from roughly $46,000 to $378,000 per tons of NOx reduced.

In the 2006 amendment to Rule 1146.2, the incremental cost effectiveness for the larger Type 2 units meeting a lower NOx emission limit of 12 ppm / 20 ppm from 30 ppm was analyzed. The incremental cost effectiveness was about $2,400 per ton of NOx reduced for meeting the 20 ppm limit and $24,100 per ton of NOx reduced for meeting the 12 ppm limit. The incremental cost effectiveness between NOx emission limits of 20 ppm and 12 ppm was about $43,600 per additional ton reduced. After adjusting for inflation between 2006 and 2017, the updated incremental cost effectiveness ranged from roughly $2,700 to $27,000 per tons of NOx reduced for meeting the 20 ppm and 12 ppm respectively.

SOCIOECONOMIC ASSESSMENT

The main requirements of the PARs 1146 series that have cost impacts for affected facilities would include one-time costs and annual recurring costs. The one-time costs would include capital and installation of SCRs, ULNBs, and one-time permit modifications. Annual recurring cost estimates include additional operating and maintenance costs and additional electricity of SCRs and ULNBs, and catalysts replacement, and ammonia usage of SCRs. The average annual cost of PARs 1146 series is estimated at $3.7 to $4.3 million between 2020 and 2045. Annual costs of installing SCRs and ULNBs would make about $2.40 million (65%) to $3.02 million (69%) of overall annual compliance costs. The majority of the cost $2.4 to $2.67 million (64% to 61%) is expected to be incurred due to PAR 1146 (Group I, II, and III). The average annual costs of PAR 1146.1 is estimated at 0.09 to $0.1 million and that of PAR 1146.2 is estimated at $1.26 to $1.76, respectively. The cost-effectiveness of the PARs 1146 series is estimated at $9,000 to $36,000 based on Discount Cash Flow method and $12,000 to $73,000 based on Levelized Cash Flow method, respectively. Based on the compliance cost of PAR 1146 Series, and the application of the Regional Economic Models, Inc. (REMI) model, it is projected that an average of 50 to 60 to jobs forgone annually, on average, between 2020 and 2045. The projected jobs loss impacts represent about 0.005 percent of the total employment in the four-county region.

Currently, there are 36 facilities in operation which have received an initial determination notification. If PARs 1146, 1146.1, and 1146.2 are adopted, 26 additional facilities (62 total) are expected to receive an initial determination notification because, according to staff's evaluation, all of their permitted RECLAIM NOx source equipment will be subject to these rules once the proposed amendments are adopted. These 62 affected facilities currently account for only about one percent of annual NOx emissions and two percent of NOx RTCs holdings in the NOx RECLAIM universe. As such, staff concludes that these facilities' compliance with Rule 2002(f)(9) would have a very small impact, if any, on the demand and supply of NOx RTC market. Specifically, while the transition of the 62 facilities out of the NOx RECLAIM program could potentially assert upward pressure on the discrete-year NOx RTC prices, it is unlikely to result in large price fluctuations in the NOx RTC market, nor is the transition expected to significantly affect the remaining NOx RECLAIM facilities that are not yet ready to exit the market-based program.

More details of the socioeconomic assessment can be found in the Draft Socioeconomic Impact Assessment for PARs 1146 series and PR 1100, which has been released for public review and comment 30 days prior to the SCAQMD Governing Board Hearing, and is included as part of the Public Hearing Package.

CALIFORNIA ENVIRONMENTAL QUALITY ACT ANALYSIS

The California Environmental Quality Act (CEQA) requires that all potential adverse environmental impacts of proposed projects be evaluated and that methods to reduce or avoid identified significant adverse environmental impacts of these projects be implemented, if feasible. The purpose of the CEQA process is to inform the SCAQMD Governing Board, public agencies, and interested parties of potential adverse environmental impacts that could result from implementing the proposed project and to identify feasible mitigation measures or alternatives, when an impact is significant.

Public Resources Code Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written documents in lieu of a negative declaration or environmental impact report once the Secretary of the Resources Agency has certified the regulatory program. The SCAQMD's regulatory program was certified by the Secretary of the Resources Agency on March 1, 1989, and has been adopted as, and is implemented by, SCAQMD Rule 110 – Rule Adoption Procedures to Assure Protection and Enhancement of the Environment. Pursuant to Rule 110, the SCAQMD typically prepares an Environmental Assessment (EA) to evaluate the environmental impacts for rule projects proposed for adoption or amendment.

PARs1146 series and PR 1100 are considered a "project" as defined by CEQA. PARs 1146 series contains amendments that revise existing requirements included in Rules 1146 and 1146.1, as amended in September 2008 and November 2013, and Rule 1146.2 as amended in May 2006.

PARs 1146 series in combination with PR 1100 will transition affected units at NOx RECLAIM facilities to a command-and-control regulatory structure. NOx RECLAIM facilities with equipment subject to PARs 1146, 1146.1, and 1146.2 will be required to meet the NOx emission limits in these rules in accordance with the implementation schedule outlined in PR 1100. The decision to transition from NOx RECLAIM into a source-specific command-and-control regulatory structure was approved by the SCAQMD Governing Board as control measure CMB-05 in the 2016 AQMP and the potential environmental impacts associated with the 2016 AQMP, including CMB-05, were analyzed in the Final Program Environmental Impact Report (Program EIR) certified in March 2017[6].

SCAQMD staff has determined that PARs 1146 series and PR 1100 contain new information of substantial importance which was not known and could not have been known at the time: 1) the Final EAs were certified for the September 2008 amendments to Rules 1146 and 1146.1 (referred to herein as the September 2008 Final EAs for Rules 1146 and 1146.1); 2) the Final EA was certified for the May 2006 amendments to Rule 1146.2 (referred to herein as the May 2006 Final EA); and 3) the Final Program EIR was certified for the March 2017 adoption of the 2016 AQMP (referred to herein as the March 2017 Final Program EIR). However, the proposed project is not expected to create new significant effects that were not discussed in the previous September 2008 Final EAs for Rules 1146 and 1146.1, the May 2006 Final EA for Rule 1146.2, and the March 2017 Final Program EIR for the 2016 AQMP.

[6] SCAQMD, Final Program Environmental Impact Report for the 2016 Air Quality Management Plan, March 2017. http://www.aqmd.gov/home/research/documents-reports/lead-agency-scaqmd-projects/scaqmd-projects---year-2017

Because additional potentially significant adverse effects to air quality and hazards and hazardous materials that may result from implementing PARs 1146 and 1146.1 were not analyzed at the project level in the September 2008 Final EAs for Rules 1146 and 1146.1 or the March 2017 Final Program EIR for the 2016 AQMP, and because PAR 1146.2 and PR 1100 contain new information that was not previously considered, the SCAQMD, as lead agency for the proposed project has prepared a Subsequent EA (SEA) with significant impacts pursuant to its Certified Regulatory Program. The analysis in the Draft SEA indicates that while reducing NOx emissions is an environmental benefit, secondary significant adverse environmental impacts are also expected for the topic areas of air quality and hazards and hazardous materials. Pursuant to CEQA Guidelines Section 15252, since significant adverse impacts have been identified, an alternatives analysis and mitigation measures are required.

In addition, because PARs 1146 series and PR 1100 may have statewide, regional or areawide significance a CEQA scoping meeting was required and held in conjunction with the Public Workshop on February 14, 2018 pursuant to Public Resources Code Section 21083.9(a)(2). One oral, CEQA-related comment was made at the Public Workshop/CEQA scoping meeting relative to PARs 1146 series and PR 1100. The comment and response are included in Appendix F of the Draft SEA. The Draft SEA has been released for a 45-day public review and comment period from April 3, 2018 to May 18, 2018. Comment letters received during the public comment period relative to the analysis in the Draft SEA will be included in an appendix and responded to in the Final SEA.

The September 2008 Final EA for Rule 1146, the September 2008 Final EA for Rule 1146.1, the May 2006 Final EA for Rule 1146.2, and the March 2017 Final Program EIR for the 2016 AQMP upon which this SEA relies, are available from the SCAQMD's website at:

> September 2008 Final EA for Rule 1146: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2008/final-environmental-assessment-for-proposed-amended-rule-1146.pdf
>
> September 2008 Final EA for Rule 1146.1: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2008/final-environmental-assessment-for-proposed-amended-rule-1146-1.pdf
>
> May 2006 Final EA for Rule 1146.2: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2006/final-ea-for-proposed-amended-rule-1146-2.doc
>
> March 2017 Final Program EIR for the 2016 AQMP: http://www.aqmd.gov/home/research/documents-reports/lead-agency-scaqmd-projects/scaqmd-projects---year-2017

The above documents may also be obtained by visiting the Public Information Center at SCAQMD Headquarters located at 21865 Copley Drive, Diamond Bar, CA 91765; or by contacting Fabian Wesson, Public Advisor by phone at (909) 396-2039 or by email at PICrequests@aqmd.gov.

Prior to making a decision on the adoption of PARs 1146 series and PR 1100, the SCAQMD Governing Board must review, consider, and certify the Final SEA, including responses to comments, as providing adequate information on the potential adverse environmental impacts that may occur as a result of adopting PARs 1146 series and PR 1100.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

California Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the SCAQMD 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.

Necessity

PARs 1146, 1146.1 and 1146.2, and PR 1100 are needed to establish BARCT requirements for facilities that will be transitioning from RECLAIM to a command-and-control regulatory structure.

Authority

The SCAQMD obtains its authority to adopt, amend, or repeal rules and regulations pursuant to California Health and Safety Code Sections 39002, 39616, 40000, 40001, 40440, 40702, 40725 through 40728, and 41508.

Clarity

PARs 1146, 1146.1 and 1146.2, and PR 1100 are written or displayed so that their meaning can be easily understood by the persons directly affected by them.

Consistency

PARs 1146, 1146.1 and 1146.2, and PR 1100 are in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non-Duplication

PARs 1146, 1146.1 and 1146.2, and PR 1100 will not impose the same requirements as any existing state or federal regulations. The proposed amended rules are necessary and proper to execute the powers and duties granted to, and imposed upon, the SCAQMD.

Reference

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

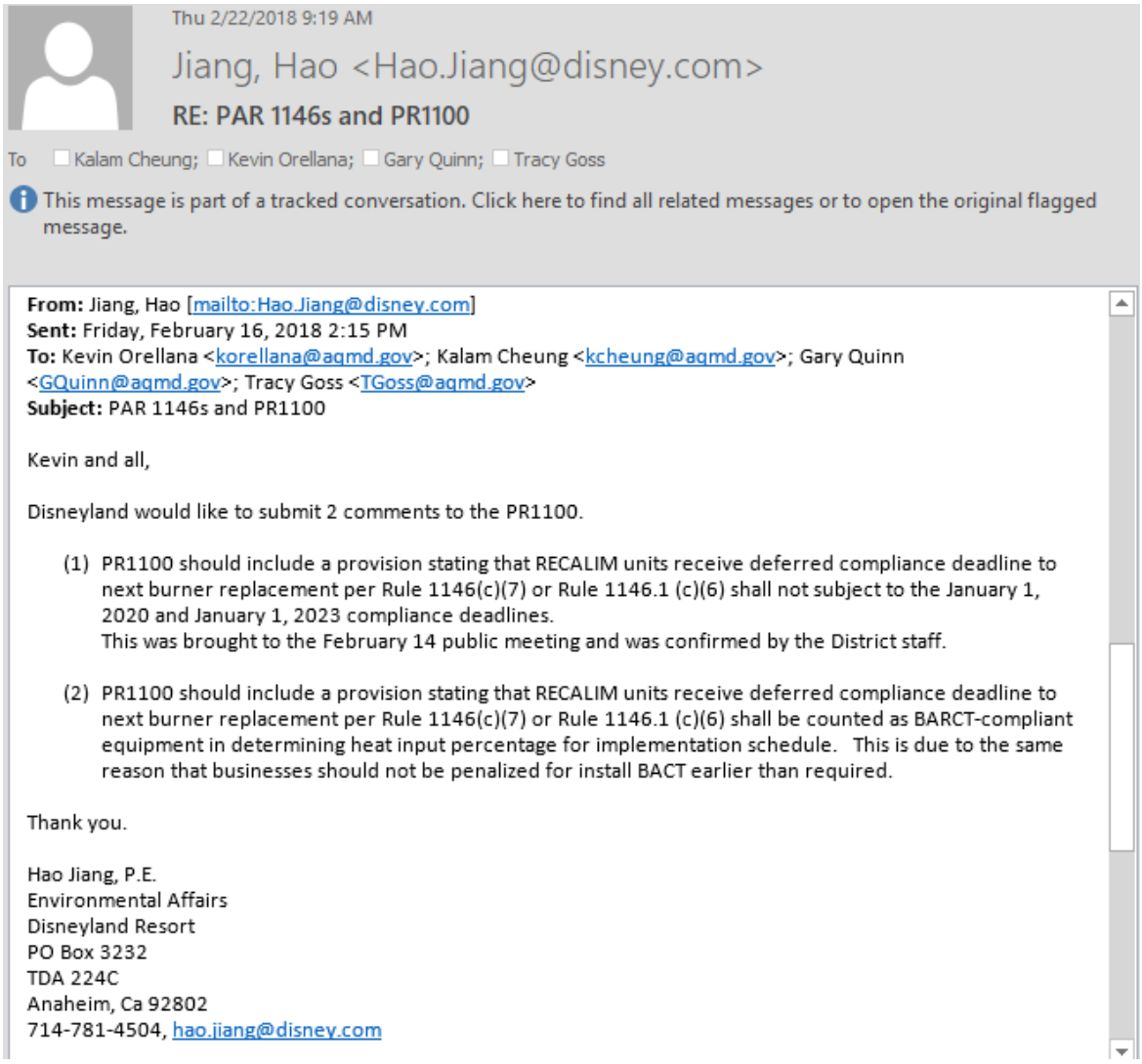
COMPARATIVE ANALYSIS

Under H&SC Section 40727.2, the SCAQMD 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 SCAQMD rules and air pollution control requirements and guidelines which are applicable to industrial, institutional, and commercial water heaters, boilers, steam generators, and process heaters. See Table 4 below.

Table 4
Comparative Analysis

Rule Element	PAR 1146	PAR 1146.1	PAR 1146.2	PR 1100	RECLAIM	Equivalent Federal Regulation
Applicability	Boilers, steam generators, and process heaters with maximum rated heat input capacities greater than or equal to 5 MMBtu/hr	Boilers, steam generators, and process heaters with maximum rated heat input capacities greater than 2 MMBtu/hr and less than 5 MMBtu/hr	Large water heaters, boilers and process heaters less than or equal to 2 MMBtu/hr	RECLAIM or post-RECLAIM facilities	Facilities regulated under the NOx RECLAIM program (SCAQMD Reg. XX)	None
Requirements	NOx limits: • Digester gas: 15 ppmv • Landfill gas: 25 ppmv • Refinery gas: 30 ppmv For other types of fuels: 5 ppmv for ≥75 MMbtu/hr, natural gas; 30 ppmv for ≥75 MMbtu/hr, other fuels; and 5 or 9 ppmv for 20–75 MMbtu/hr units CO limit: 400ppmv	Atmospheric Units: 12 ppmv • Digester gas: 15 ppmv • Landfill gas: 25 ppmv • All others: 9 ppmv CO limit: 400 ppmv.	NOx limit is 20 ppmv for new units less than 2 mmbtu/hr. NOx limit is 30 ppmv for retrofit units less than 2 mmbtu/hr.	• Schedule for meeting BARCT emission limits and MRR requirements	For refinery gas: 2 ppmv for units > 40 MMbtu/hr For other units: 9 ppmv for units > 20 MMbtu/hr; and 12 ppmv for units ≥ 2 MMbtu/hr	None
Reporting	Every 6 months for units greater than or equal to 40 MMBtu/hr and an annual heat input greater than 200 x 10^9 Btu per year (Rule 218)	None	None	As specified in SCAQMD Rules 1146, 1146.1 and 1146.2	• Daily electronic reporting for major sources • Monthly to quarterly reporting for large sources and process units • Quarterly Certification of Emissions Report and Annual Permit Emissions Program for all units	None
Monitoring	• A continuous in-stack NOx monitor for units greater than or equal to 40 MMBtu/hr and an annual heat input greater than 200 x 10^9 Btu per year • Source testing once every 3 – 5 years for other units	• Source testing once every 5 years	None	As specified in SCAQMD Rules 1146, 1146.1 and 1146.2	• A continuous in-stack NOx monitor for major sources • Source testing once every 3 years for large sources •Source testing once every 5 years for process units	None
Recordkeeping	• Source test records • Maintenance & emission records = 2 years • Monitoring data = 2 years (5 years if Title V)	• Source test records = 2 years (5 years if Title V) • Monitoring data = 2 years (5 years if Title V)	None	As specified in SCAQMD Rules 1146, 1146.1 and 1146.2	• < 15-min. data = min. 48 hours; • ≥ 15-min. data = 3 years (5 years if Title V) • Maintenance & emission records, source test reports, RATA reports, audit reports and fuel meter calibration records for Annual Permit Emissions Program = 3 years (5 years if Title V)	None

APPENDIX A – COMMENTS AND RESPONSES



Thu 2/22/2018 9:19 AM

Jiang, Hao <Hao.Jiang@disney.com>

RE: PAR 1146s and PR1100

To Kalam Cheung; Kevin Orellana; Gary Quinn; Tracy Goss

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

From: Jiang, Hao [mailto:Hao.Jiang@disney.com]
Sent: Friday, February 16, 2018 2:15 PM
To: Kevin Orellana <korellana@aqmd.gov>; Kalam Cheung <kcheung@aqmd.gov>; Gary Quinn <GQuinn@aqmd.gov>; Tracy Goss <TGoss@aqmd.gov>
Subject: PAR 1146s and PR1100

Kevin and all,

Disneyland would like to submit 2 comments to the PR1100.

(1) PR1100 should include a provision stating that RECALIM units receive deferred compliance deadline to next burner replacement per Rule 1146(c)(7) or Rule 1146.1 (c)(6) shall not subject to the January 1, 2020 and January 1, 2023 compliance deadlines.
This was brought to the February 14 public meeting and was confirmed by the District staff.

(2) PR1100 should include a provision stating that RECALIM units receive deferred compliance deadline to next burner replacement per Rule 1146(c)(7) or Rule 1146.1 (c)(6) shall be counted as BARCT-compliant equipment in determining heat input percentage for implementation schedule. This is due to the same reason that businesses should not be penalized for install BACT earlier than required.

Thank you.

Hao Jiang, P.E.
Environmental Affairs
Disneyland Resort
PO Box 3232
TDA 224C
Anaheim, Ca 92802
714-781-4504, hao.jiang@disney.com

1-1

1-2

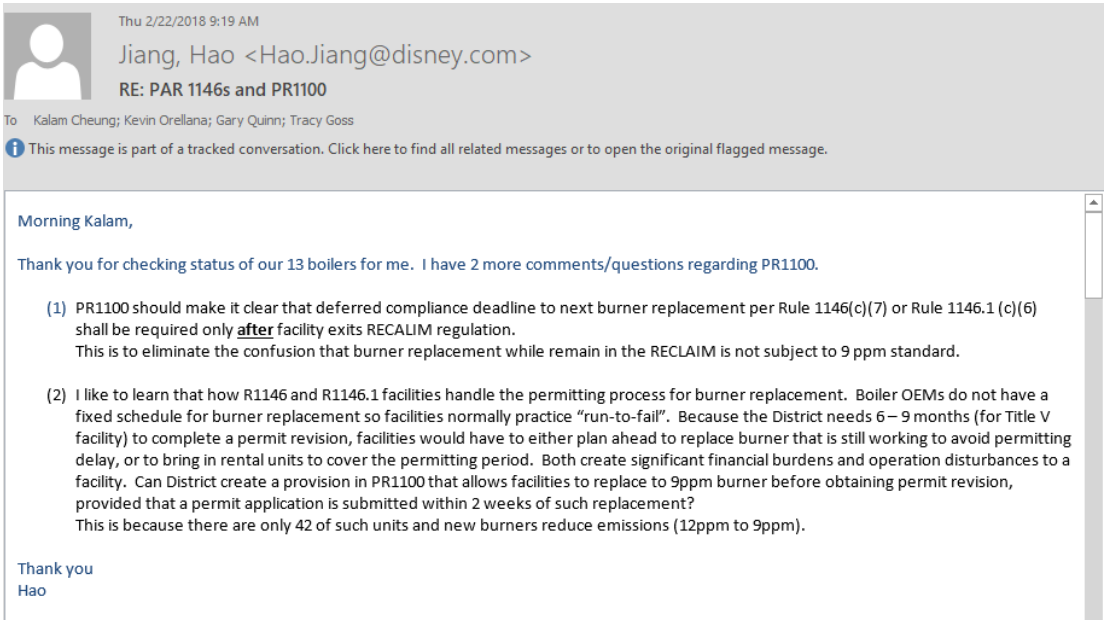
Response to Comment 1-1

Rule 1146 (c)(7) proposes to allow a RECLAIM or former RECLAIM facility that installs or modifies a respective Group III natural gas fired unit prior to the date of rule adoption and complying with the RECLAIM BARCT emission limit of 12 ppm or less of NOx to defer compliance with the compliance dates specified in Rule 1100 until the unit's burner(s) replacement.

Rule 1146.1 (c)(6) proposes to allow a RECLAIM or former RECLAIM facility that installs or modifies a natural gas fired unit prior to the date of rule adoption and complying with the BACT emission limit of 12 ppm or less of NOx to defer compliance with paragraph (c)(2) or the compliance dates in Rule 1100 until the unit's burner(s) replacement.

Response to Comment 1-2

As presented in the third Working Group Meeting and specified in PR 1100 (d)(A)(B), BARCT-compliant units could be counted towards the 75% total heat input compliance requirement.



Thu 2/22/2018 9:19 AM

Jiang, Hao <Hao.Jiang@disney.com>

RE: PAR 1146s and PR1100

To Kalam Cheung; Kevin Orellana; Gary Quinn; Tracy Goss

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Morning Kalam,

Thank you for checking status of our 13 boilers for me. I have 2 more comments/questions regarding PR1100.

(1) PR1100 should make it clear that deferred compliance deadline to next burner replacement per Rule 1146(c)(7) or Rule 1146.1 (c)(6) shall be required only **after** facility exits RECALIM regulation.
This is to eliminate the confusion that burner replacement while remain in the RECLAIM is not subject to 9 ppm standard.

(2) I like to learn that how R1146 and R1146.1 facilities handle the permitting process for burner replacement. Boiler OEMs do not have a fixed schedule for burner replacement so facilities normally practice "run-to-fail". Because the District needs 6 – 9 months (for Title V facility) to complete a permit revision, facilities would have to either plan ahead to replace burner that is still working to avoid permitting delay, or to bring in rental units to cover the permitting period. Both create significant financial burdens and operation disturbances to a facility. Can District create a provision in PR1100 that allows facilities to replace to 9ppm burner before obtaining permit revision, provided that a permit application is submitted within 2 weeks of such replacement?
This is because there are only 42 of such units and new burners reduce emissions (12ppm to 9ppm).

Thank you
Hao

2-1

2-2

Response to Comment 2-1

As part of this rule amendment, PARs 1146 series will expand the applicability to include units that were not previously required to comply with Rules 1146 and 1146.1 because they were in the NOx RECLAIM program. Rule 1146 (c)(7) and Rule 1146.1 (c)(6) proposes to allow a RECLAIM or former RECLAIM facility that installs or modifies a respective Group III natural gas fired unit or Rule 1146.1 natural gas fired unit prior to the date of rule adoption and complying with the RECLAIM BARCT emission limit of 12 ppm or less of NOx to defer compliance with the compliance dates specified in Rule 1100 until the unit's burner(s) replacement.

Response to Comment 2-2

Before a burner becomes inoperable, the burner or boiler performance will suffer and show signs of wear and tear, which would be shown in the various operating parameters. For example, a review of higher fuel usage or even a Visible Emission Evaluation (VEE) at the smoke stack could indicate a problem with the burner assembly. Once a determination that the boiler is suffering a performance problem, an overall evaluation of the boiler should take place. Overall, if there are signs of a potential problem, routine maintenance should be able to ascertain the problem well ahead of time for planning purposes.

SoCalGas
A Sempra Energy utility

Daniel McGivney
Environmental Affairs
Program Manager

Tel: 951-225-2958
dmcgivney@semprautilities.com

February 28, 2018

Mr. Philip Fine, Ph.D.
Deputy Executive Officer
South Coast Air Quality
Management District
21865 Copley Drive
Diamond Bar, CA 91765

via email

Subject: Proposed Amended Rules 1146, 1146.1, 1146.2, and Proposed Rule 1100 Transition Rules for RECLAIM Facilities

Dr. Fine:

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide comments on Proposed Amended Rules 1146, 1146.1, 1146.2, and Proposed Rule 1100 Transition Rules for RECLAIM Facilities. We look forward to continued engagement in the working group process as this, and other RECLAIM landing rules are developed.

Comments regarding Proposed Rule 1100

Permit Application Submittal Date

The August 1, 2018 permit application submittal deadline contained in draft Proposed Rule 1100 (PR 1100) does not provide adequate time for a regulated facility to prepare and submit a required permit application. Facilities need time to assess their equipment and determine a retrofit or replacement strategy, evaluate and estimate project costs, including ancillary activities such as necessary electrical, plumbing and/or ducting modifications. Additionally, facilities must obtain funding and management approval for these projects, perform engineering design and develop project bid specifications, and select equipment. These activities must occur before preparation and submittal of a permit application (which typically also requires bringing on a contracted entity to prepare the permit application). Depending upon type, complexity and size of a business, the time to do all of this can range from weeks to many months. At SoCalGas facilities, the above activities can take as long as 12 to 18 months.

3-1

1

As proposed in PR 1100, there are approximately 44 months between the scheduled May 2018 hearing to adopt amendments to the 1146 series rules and the final Best Available Retrofit Control Technology (BARCT) implementation date of January 1, 2022. **SoCalGas respectfully requests that the proposed permit application submittal deadline be revised to require submittal at one year from the date of Governing Board adoption of Rule 1100.** If amended in May as scheduled, this would still allow 20 and 32 months for permit issuance and construction/installation of necessary equipment to achieve compliance with the January 1, 2021 and 2022 deadlines.

3-1 cont.

General Comments Regarding the RECLAIM Transition

Permitting

SoCalGas is concerned about the transition process for Title V/major sources as we understand that there could be a lag in updating permits as facilities are transitioned out of RECLAIM and become regulated under command and control (C&C) regulations. This lag would appear to expose facilities to undue enforcement jeopardy as a facility may be responsible for complying with both C&C regulations due to the transition and requirements contained in the existing, and yet to be amended, Title V/RECLAIM permits.

We recommend that if permits cannot be updated at the time of transition, that the District consider including language in Rule 1100 that stays, or otherwise addresses, applicable requirements in the facilities' existing permits until permits can be amended.

3-2

Comments Regarding the Amendments to Rule 1146, 1146.1, 1146.2

Monitoring, Reporting & Recordkeeping

SoCalGas is concerned that the District is requiring facilities that transition out of the program to maintain existing RECLAIM program Monitoring, Reporting & Recordkeeping (MR&R) requirements even though they will be subject to command and control regulation. Transitioning facilities into a C&C regulatory regime requires those facilities to retrofit or replace existing equipment and install emissions controls to achieve BARCT standards contained in applicable C&C regulations. In many cases, this will result in emission reductions. SoCalGas believes that these reductions, and the MR&R contained in the landing rules, are sufficient to assure compliance. Therefore, retaining more costly RECLAIM MR&R, is not necessary or reasonable.

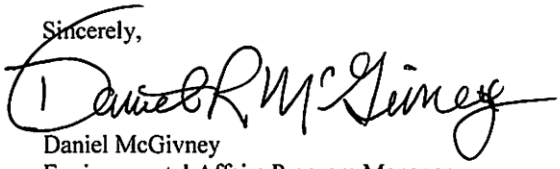
As MR&R has been a significant topic of discussion at all landing rule and RECLAIM phase-out working group meetings to date, SoCalGas recommends that the District continue to discuss this important issue so that there is consistent application of MR&R as facilities transition into a variety of landing rules. We suggest modifying the proposed 1146 series rules to include language transitioning RECLAIM facilities to current, or significantly similar, landing rule MR&R requirements and phase-out the bulk of existing RECLAIM MR&R requirements as these RECLAIM facilities fully transition to a full C&C regulatory program.

3-3

Conclusion

SoCalGas appreciates your consideration of these comments and recommendations. We look forward to continuing to work with staff regarding these amendments. Please contact me if there are any questions.

Sincerely,



Daniel McGivney
Environmental Affairs Program Manager
Southern California Gas Company

cc:
Susan Nakamura, SCAQMD
Tracy Goss, SCAQMD
Gary Quinn, SCAQMD
Kevin Orellana, SCAQMD
Lauren Nevitt, SoCalGas

3

Response to Comment 3-1
After considering public input, the permit application submittal deadline has been extended from August 1, 2018 to twelve months after rule adoption (i.e. June 1, 2019). Staff believes the new deadline provides adequate time if a comprehensive engineering or energy assessment is needed to prepare for the required permit application.

Response to Comment 3-2
As a facility modifies its equipment, permits can be modified to reflect compliance with command-and-control rules. In the Monthly RECLAIM Working Group Meeting held on April 12, 2018, staff presented an initial plan for permitting for the RECLAIM transition. Staff will continue to work with stakeholders and will modify the schedule as needed to transition facilities to command-and-control if additional time is needed to address transitional permitting issues.

Response to Comment 3-3
Staff acknowledges that part of the existing RECLAIM MRR requirements, such as daily monitoring and reporting of emissions, and missing data provisions, are developed for a compliance program that relies on reported mass emissions to track and demonstrate compliance. Staff has evaluated the MRR requirements in both RECLAIM and Rule 1146 series, and recommends that non-Title V facilities to be subject to the MRR requirements in Rule 1146 series after exiting the RECLAIM program. For Title V facilities, an extensive public review process is triggered by modifications on monitoring and recordkeeping requirements. Staff is recommending that Title V facilities maintain existing RECLAIM MRR requirements while the transition process proceeds. The SCAQMD is committed to re-evaluate monitoring and recordkeeping requirements for Title V facilities, and will continue to discuss the matter with EPA.

PLAINS
West Coast Terminals LLC

February 28, 2018

Gary Quinn, P.E.
Program Supervisor
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: COMMENTS TO PAR 1146 and PR 1100

Dear Mr. Quinn:

Thank you for this opportunity to comment on SCAQMD Proposed Amended Rule 1146 and Proposed Rule 1100.

Plains West Coast Terminals (PWCT) has five RECLAIM facilities – PWCT Alamitos and PWCT Dominguez Hills have two Rule 1146 heaters each, PWCT Long Beach has two out of service heaters and a Rule 1147 afterburner, PWCT Huntington Beach has an out of service heater, and PWCT El Segundo no longer has a heater on location. The last three should comply fairly easily with using the Rule 1146 (c)(5) low use provision. The first two facilities with active heaters may be able to use the low use provision however, it only allows for an 18 month compliance date if it no longer meets the exemption while Proposed Rule 1100 allows a 31 month compliance date if adopted in its current version in May 2018. 4-1

PWCT will have from one to four heaters to retrofit by January 2021. The first hurdle will be to prepare *COMPLETE* permit to construct (PTC) applications by August 1, 2018. Before an application can be prepared, there are many planning components involved. These include: engineering evaluation of the current heaters, viability of retrofitting the existing configuration, scoping out viable venders and their guarantees for the retrofit, signing all subcontractors on an agreeable master services contract, scheduling the construction on-site with limited physical space, evaluating downtime options without interrupting our business, and more importantly budgeting this new unanticipated work in the middle of a fiscal year. We are requesting more time to provide the PTC applications, such as January 1, 2019 with a compliance date of 30 months for this major retrofit after the PTC is issued. We foresee SCAQMD staff being overly burdened with extra applications to process and feel it is unfair for us to have a shorter time to retrofit the heater due to unforeseen permitting evaluation time. 4-2

C:\My Documents\Environmental Projects\PAA\2018\PWCT 1146 - 1100 comment letter\PWCT PAR1146 Comments.docx

Plains West Coast Terminals, LLC
5900 Cherry Avenue • Long Beach, CA 90805-4408 • (562) 728-2800 • FAX (562) 728-2860

Also while staff is evaluating the permit applications, there should be a distinction in the monitoring, recordkeeping, and reporting (MRR) requirements between NOx Title V facilities and other Title V facilities. Our facilities are in Title V because we have the potential to emit more than 10 tons per year of ROGs. All the other criteria pollutants are less than 10 tons per year. Therefore, the MRR requirements should entail those listed in Rule 1146 and not in Regulation XX – RECLAIM for large sources. 4-3

If you have any questions, please contact me at (661) 204-8749 or Ms. Connie Cunningham at (562) 728-2024.

Sincerely,

Glen Mears
Western Division ERC Director

Cc: Kevin Orellana, SCAQMD
Kalam Cheung, SCAQMD
Connie Cunningham, PWCT

C:\My Documents\Environmental Projects\PAA\2018\PWCT 1146 - 1100 comment letter\PWCT PAR1146 Comments.docx

Response to Comment 4-1
The proposed compliance schedule for units eligible for the Rule 1146(c)(5) low use provision is January 1, 2022 or during burner replacement, whichever occurs later. As specified in Rule 1146 (e)(4), within 18 months after exceeding the low use threshold of 90,000 therms of heat input in any twelve month period, compliance needs to be demonstrated for the life of the unit.

As compliance of Rule 1146 (e)(3) takes effect on January 1, 2021, the fuel usage records should be used to determine compliance with the low use provision. In the worst case scenario, if it is determined in January 2021 that the fuel usage exceeds 90,000 therms in a 12-month period, compliance with all applicable requirements in paragraphs (c)(1), (c)(2), (c)(3), and (c)(6) should be demonstrated no later than 18 months after January 1, 2021 (i.e., July 2022). This schedule is consistent with the compliance timeframe for the non-low use units.

Response to Comment 4-2
After considering public input, the permit application submittal deadline has been extended from August 1, 2018 to twelve months after rule adoption (i.e. June 1, 2019). Staff believes the new deadline provides adequate time if a comprehensive engineering or energy assessment is needed to prepare for the required permit application. Staff highly encourages facilities to start the necessary planning, engineering design, and budgeting process early to allow for enough time after the Permit to Construct (PTC) is issued.

The compliance date specified in PR 1100 is consistent with the compliance timeframe allowed in previous Rules 1146 and 1146.1 amendments in 2008. Units that are subject to Rules 1146 and 1146.1 are grouped together in the compliance schedule to allow facilities to decide which units they can demonstrate compliance by the earlier compliance date (January 1, 2021), thereby providing them more flexibility. In addition, for any operator that commits to fully replacing the affected equipment, in lieu of installing ultra-low NOx burners or SCR retrofit, extra time (until January 1, 2023) is allowed to comply with the existing NOx emission limits in Rules 1146 and 1146.1.

Response to Comment 4-3
Staff acknowledges that some NOx RECLAIM facilities are in the Title V program due to other pollutants such as VOC or PM. As discussed in Response to Comment 3-3, an extensive public review process is triggered by modifications on monitoring and recordkeeping requirements for Title V facilities. Since the RECLAIM Title V permit is a facility permit, the public review process could be triggered by changes in MRR requirements. The SCAQMD is committed to re-evaluate monitoring and recordkeeping requirements for Title V facilities, and will continue to discuss this matter with EPA.

February 28, 2018

Philip Fine, Ph.D.
Deputy Executive Officer
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Re: PAR1146, 1146.1, 1146.2 and PR1100

Dear Dr. Fine:

As Executive Director of the Southern California Air Quality Alliance I am providing the following comments on the proposed rules identified above.

Proposed Rule 1100

Proposed Rule 1100 currently includes a requirement that applications for permits to construct any new equipment or retrofit equipment necessary to comply with the emission standards in the 1146 series of rules be submitted by August 1, 2018. This time period is way too short for many if not all of the affected facilities. They will need adequate time to determine whether retrofits or replacements (or a combination of the two) are most appropriate, determine project costs, retain consultants to develop the appropriate engineering solution(s), obtain funding for the project, and then prepare a complete package to submit to SCAQMD in the form of the necessary permit forms and support documents. My members have advised me that this cannot reasonably be done (and done well) in the amount of time currently provided in the rule. We strongly request that additional time be provided and suggest that an appropriate amount of time is 12-18 months from the date of adoption of the proposed rules and amendments. 5-1

Proposed Amended Rule 1146, 1146.1 and 1146.2

I was very involved during the initial development and adoption of the RECLAIM program. One of the early "trade-offs" demanded by SCAQMD and EPA was extensive monitoring, recordkeeping and reporting requirements in exchange for the flexibility provided to facility operators in determining how to comply with the emission caps imposed by the RECLAIM program. With SCAQMD now moving those facilities to a command-and-control regime, facility operators are losing that flexibility. There is no longer a need to demonstrate that emissions are below arbitrary quarterly poundage limits reflected by RTC allocations since RTCs will no longer have any pertinence in the command-and-control program. Accordingly, we believe that it is only fair that the monitoring, recordkeeping and reporting requirements now applicable to facilities exiting RECLAIM be those that have traditionally been applicable to non-RECLAIM facilities and equipment. 5-2

We believe that requirements such as daily monitoring and reporting of emissions to the SCAQMD and missing data reporting have no relevancy to a

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command-and-control regime and should be eliminated as soon as a facility exits RECLAIM. Only monitoring, recordkeeping and reporting that is necessary to show compliance with the emission standards in the applicable rule should be required. We believe that the Rule 1146 series rules have adequate and appropriate monitoring, recordkeeping and reporting requirements and no different or more stringent requirements are necessary or appropriate.

5-2 cont.

Compliance During Transition from RECLAIM to Command and Control

All current RECLAIM facilities have facility permits with detailed permit requirements. Those permit requirements do not reflect the requirements of the command-and-control rules and may conflict with the command-and-control rules. There needs to be a recognition somewhere in the transition rules that the command-and-control requirements take precedence and that facility operators will not be considered in violation of facility permit requirements while the permit modification process is pending.

5-3

I look forward to continuing to work with you and SCAQMD staff on these and other issues that we will confront as we move ahead with "unwinding" the RECLAIM program.

Very truly yours

Curtis L. Coleman, Esq.
Executive Director
Southern California Air Quality Alliance

Response to Comment 5-1
After considering public input, the permit application submittal deadline has been extended from August 1, 2018 to twelve months after rule adoption (i.e. June 1, 2019). Staff believes the new deadline provides adequate time if a comprehensive engineering or energy assessment is needed to prepare the required permit application.

Response to Comment 5-2
See Response to Comment 3-3.

Response to Comment 5-3
See Response to Comment 3-2.

NORTHROP GRUMMAN

Northrop Grumman Systems Corporation
One Space Park
SDS362/R9
Redondo Beach, CA 90278

March 12, 2018

Gary Quinn,
Program Supervisor, Planning and Rules
21865 E. Copely Drive
Diamond Bar, CA 91765-4182

RE: COMMENTS ON PROPOSED RECLAIM TRANSITION TO RULES 1100, 1146, and 1146.1

Dear Mr. Quinn,

Per our meeting on February 7th, Northrop Grumman Systems Corporation is hereby submitting a proposed adjusted compliance timeline for replacing equipment subject to SCAQMD Rules 1100, 1146, and 1146.1. Northrop Grumman operates multiple manufacturing centers located in the South Coast Air Basin involved in advanced development engineering and production and assembly of aircraft, satellites, electronics, and extreme high frequency semiconductors for government and military customers. This letter pertains to the El Segundo, Manhattan Beach, and Redondo Beach sites collectively known as South Bay, comprised of over 3.4 million square feet, located in the vicinity of LAX, and managed under the same operating budgets and project management personnel. Although none of these three sites are subject to the cap and trade requirements of AB32, the facility in Redondo Beach (FID 800409) does submit an abbreviated report with emissions well below the 25,000 MT CO2e threshold for cap and trade.

We believe the transition to command and control rules is an excellent opportunity to reevaluate overall energy demand and usage. Instead of replacing like with like, a building by building robust engineering analysis would maximize this opportunity, yet it is a time-intensive endeavor. In addition, as a government contractor, Northrop Grumman is bound by specific procurement rules and requirements that significantly impede expedient vendor selection. Based on our best faith effort, we have put together what we believe to be a reasonable timeline to replace existing equipment covered under the proposed amended 1146 and 1146.1 rules.

6-1

Site	Bldg	Permit ID Number	Asset	Input rating (MMBTUH)	Year of Completion
Manhattan Beach	D1	D22	16044	2.5	Q4_2018
Manhattan Beach	D1	D314	21424	4.5	2019
Manhattan Beach	D1	D24	16043	4.5	2019
Manhattan Beach	R6	D19	19786	5	2020
Redondo Beach	S	D185	18310	2.07	2020
Redondo Beach	S	D183	18311	2.07	2021
Redondo Beach	S	D181	18312	2.07	2021
El Segundo	905	D37	BOOWC011	5.23	2021
Redondo Beach	S	D179	18313	2.07	2022
Redondo Beach	E1	D90	3000	5	2022
Redondo Beach	S	D187	18309	3	2023
Redondo Beach	R7	D102	8449	2.7	2023

We recognize that facilities covered under AB617 need to meet the 1/1/2021 and 1/1/2022 compliance deadlines, but we strongly believe a minor extension will allow facilities like ours to further explore opportunities, maximizing our emission reductions. Under our proposed timeline our three facilities would achieve 100% compliance by January 1 of the following years:

Manhattan Beach (FID 800408) – **2021**
El Segundo (FID 18924) – **2022**
Redondo Beach (FID 800409) – **2024**

6-1 cont.

If you have any questions or need additional information please don't hesitate to contact the undersigned at Matthew.Kent@ngc.com or at the number provided below.

Sincerely,
NORTHROP GRUMMAN SYSTEMS CORPORATION

Matthew Kent
Air Quality Engineer
Aerospace Systems
(310) 812-9698

Response to Comment 6-1

The compliance date specified in PR 1100 is consistent with the compliance timeframe allowed in previous Rules 1146 and 1146.1 amendments in 2008. Units that are subject to Rules 1146 and 1146.1 at a facility are grouped together in the compliance schedule to allow facilities to decide which units they can demonstrate compliance by the earlier compliance date (January 1, 2021), thus providing them more flexibility. In addition, for any operator that commits to fully replacing the affected equipment, in lieu of installing ultra-low NOx burners or SCR retrofits, extra time (January 1, 2023) is allowed to comply with the existing NOx emission limits in Rules 1146 and 1146.1.

Fri 4/20/2018 1:31 PM

Jiang, Hao <Hao.Jiang@disney.com>

PAR Rule 1100 comment

To Kevin Orellana; Kalam Cheung

Cc Tracy Goss; Gary Quinn

Kevin and Kalam,

Disneyland would appreciate the District to consider sunsetting RECLAIM MRR requirements after Title V facilities fully integrated into command-and-control rules, as proposed below. This is to avoid unnecessary and duplicated MRR requirements as current in PAR Rule 1100 to Title V facilities.

R1100(d)(4): All Title V facilities subject to this rule shall comply with the monitoring, reporting, and recordkeeping requirements specified in Rule 2012 until six months after the applicable compliance date specified in Rule 1100 – Implementation Schedule for NOx Facilities.

7-1

Thank you!

Hao Jiang, P.E.
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Disneyland Resort
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714-781-4504, hao.jiang@disney.com

Response to Comment 7-1

As discussed in Response to Comment 3-3, an extensive public review process is triggered by modifications on monitoring and recordkeeping requirements for Title V facilities. The SCAQMD is committed to re-evaluate monitoring and recordkeeping requirements for Title V facilities, and will continue to discuss this with EPA. Staff is recommending that Title V facilities to maintain existing RECLAIM MRR requirements while the transition process proceeds. Staff intends to return to PR 1100 (d)(4) as the MRR requirements for Title V facilities exiting the RECLAIM program are addressed.

APPENDIX B – ANALYSIS OF MRR REQUIREMENTS

INTRODUCTION

Under RECLAIM mass emissions reported by each facility are used to track and demonstrate compliance. To ensure the integrity of reported emissions, RECLAIM includes substantial monitoring and reporting requirements, as specified in Rule 2012 *Requirements for Monitoring, Reporting and Recordkeeping for Oxides of Nitrogen Emissions.* RECLAIM MRR requirements are developed to accurately determine mass emissions of NOx for each facility, which is necessary for emission reconciliation and compliance demonstration in the cap-and-trade regulatory structure. RECLAIM MRR requirements are segregated by device classifications. The 4 major device classifications are major sources, large sources, process units, and Rule 219 exempt equipment.

In a command-and-control regulatory structure, a device-level emission standard (expressed in concentration such as ppm in Rules 1146, 1146.1 and 1146.2) is used for regulatory and compliance demonstration. Staff has analyzed the MRR requirements in RECLAIM and Rule 1146 Series. Comparisons between the MRR requirements in RECLAIM and Rule 1146 Series of (a) source testing, (b) tune up / emission checks, (c) reporting, (d), recordkeeping, and (e) missing data procedures are presented in Tables B1-5, respectively.

Table B(1)
Source Testing Requirements

Equipment Type		RECLAIM	Rule 1146 Series
RECLAIM	**Rule 1146 Series**		
Major Source* • ≥40 MMBtu/hr or • >10tpy	R1146 • ≥40 MMBtu/hr	Continuous Emissions Monitoring System (CEMS) – Annual (or semi-annual#) certification of Relative Accuracy Test Audits (RATA) including source testing	
Large Source* • ≥10 and <40 MMBtu/hr or • >4 and <10 tpy	R1146 • ≥5 and <40 MMBtu/hr	Source testing once every 3 years;	Source testing once every 3 years for ≥10 and <40 MMBtu/hr; Source testing once every 5 years for ≥5 and <10 MMBtu/hr
Process Unit* • >2 and <10 MMBtu/hr • ≤2 MMBtu/hr if permitted	R1146.1 • >2 and <5 MMBtu/hr	Source testing once every 5 years for devices with concentration limit	Source testing once every 5 years;
R219 Exempt • ≤2 MMBtu/hr	R1146.2 • ≤2 MMBtu/hr	Not applicable^	Not applicable

* Refer to Rule 2012 for specific definitions
# Only applicable to RECLAIM facilities with standards exceeding the 7.5% requirements
^ Unless equipment is reported to be using an alternate emission factor

Table B(2)
Tune Up / Emission Check Requirements

Equipment Type		RECLAIM Tune Up Frequency	Rule 1146 Series Diagnostic Emission Check Frequency
RECLAIM	**Rule 1146 Series**		
Major Source* • ≥40 MMBtu/hr or • >10tpy	R1146 • ≥40 MMBtu/hr	Daily calibration and semi-annual tune ups OR Annual RATA	Not required for units with CEMS
Large Source* • ≥10 and <40 MMBtu/hr or • >4 and <10 tpy	R1146 • ≥5 and <40 MMBtu/hr	Semi-annual tune ups	At least monthly or every 750 operating hours, or quarterly or every 2000 operating hours
Process Unit* • >2 and <10 MMBtu/hr • ≤2 MMBtu/hr if permitted	R1146.1 • >2 and <5 MMBtu/hr	Annual tune ups	At least quarterly or every 2000 operating hours or semi-annually or every 4000 operating hours
R219 Exempt • ≤2 MMBtu/hr	R1146.2 • ≤2 MMBtu/hr	Not applicable	Not applicable

* Refer to Rule 2012 for specific definitions

Table B(3)
Reporting Requirements

Equipment Type		RECLAIM		Rule 1146 Series
RECLAIM	**Rule 1146 Series**	**Electronic**	**Paper**	
Major Source* • ≥40 MMBtu/hr or • >10tpy	R1146 • ≥40 MMBtu/hr	Daily automatic reporting	Quarterly Certification of Emissions Report and Annual Permit Emissions Program	Every 6 months (Rule 218)
Large Source* • ≥10 and <40 MMBtu/hr or • >4 and <10 tpy	R1146 • ≥5 and <40 MMBtu/hr	Monthly reporting		None
Process Unit* • >2 and <10 MMBtu/hr • ≤2 MMBtu/hr if permitted	R1146.1 • >2 and <5 MMBtu/hr	Quarterly reporting		None
R219 Exempt • ≤2 MMBtu/hr	R1146.2 • ≤2 MMBtu/hr	Quarterly reporting		None

* Refer to Rule 2012 for specific definitions

Table B(4)
Recordkeeping Requirements

Equipment Type		RECLAIM	Rule 1146 Series
RECLAIM	**Rule 1146 Series**		
Major Source* • ≥40 MMBtu/hr or • >10tpy	R1146 • ≥40 MMBtu/hr	• < 15-min. data = min. 48 hours • ≥ 15-min. data = 3 years (5 years if Title V) • Maintenance & emission records, source test reports, RATA reports, audit reports and fuel meter calibration records for Annual Permit Emissions Program = 3 years (5 years if Title V)	• Source test records • Maintenance & emission records = 2 years • Monitoring data = 2 years (5 years if Title V)
Large Source* • ≥10 and <40 MMBtu/hr or • >4 and <10 tpy	R1146 • ≥5 and <40 MMBtu/hr		• Source test records • Monitoring data = 2 years (5 years if Title V)
Process Unit* • >2 and <10 MMBtu/hr • ≤2 MMBtu/hr if permitted	R1146.1 • >2 and <5 MMBtu/hr		• Source test records = 2 years (5 years if Title V) • Monitoring data = 2 years (5 years if Title V)
R219 Exempt • ≤2 MMBtu/hr	R1146.2 • ≤2 MMBtu/hr	• Fuel usage records	• Fuel usage records

* Refer to Rule 2012 for specific definitions

Table B(5)
Missing Data Procedures

Equipment Type		RECLAIM	Rule 1146 Series
RECLAIM	Rule 1146 Series		
Major Source* • ≥40 MMBtu/hr or • >10tpy	R1146 • ≥40 MMBtu/hr	For >95% availability (short gaps) • use avg. valid hour before and after or use highest hourly NOx conc. for last 30 days For <95% availability (longer gaps) • use highest hourly NOx conc. or last 30 days, or 365 days For <90% availability • use lifetime highest hourly NOx conc.	Not applicable
Large Source* • ≥10 and <40 MMBtu/hr or • >4 and <10 tpy	R1146 • ≥5 and <40 MMBtu/hr	If missing data is < 1 month • use average monthly for the previous 12 months. If missing data is > 1 month • use highest monthly fuel usage for the previous 12 months. If missing data is > 2 months or no records are available • assume 24 hours operation at maximum rated capacity at an uncontrolled emission factor	Not applicable
Process Unit* • >2 and <10 MMBtu/hr • ≤2 MMBtu/hr if permitted	R1146.1 • >2 and <5 MMBtu/hr	If missing data is < 1 quarter • use average quarterly fuel usage for the previous 4 quarters. If missing data is > 1 quarter • use source's highest quarterly fuel usage for the previous 4 quarters. If no records are available • assume 24 hours operation at maximum rated capacity at an uncontrolled emission factor	Not applicable
R219 Exempt • ≤2 MMBtu/hr	R1146.2 • ≤2 MMBtu/hr		

APPENDIX C – FACILITY AND EQUIPMENT ANALYSIS

INTRODUCTION

Starting March 2017, a monthly RECLAIM Working Group Meeting has been held to present and solicit information and suggestions from the public regarding the RECLAIM transition mechanisms. With the consideration of comments received, staff identified four different pathways to transition facilities out of RECLAIM:

- Source-specific command-and-control rules
- Industry-specific command-and-control rules
- Compliance plans
- Opt-out provisions

As of April 2018, four industry-specific categories have been identified. These four sectors are:

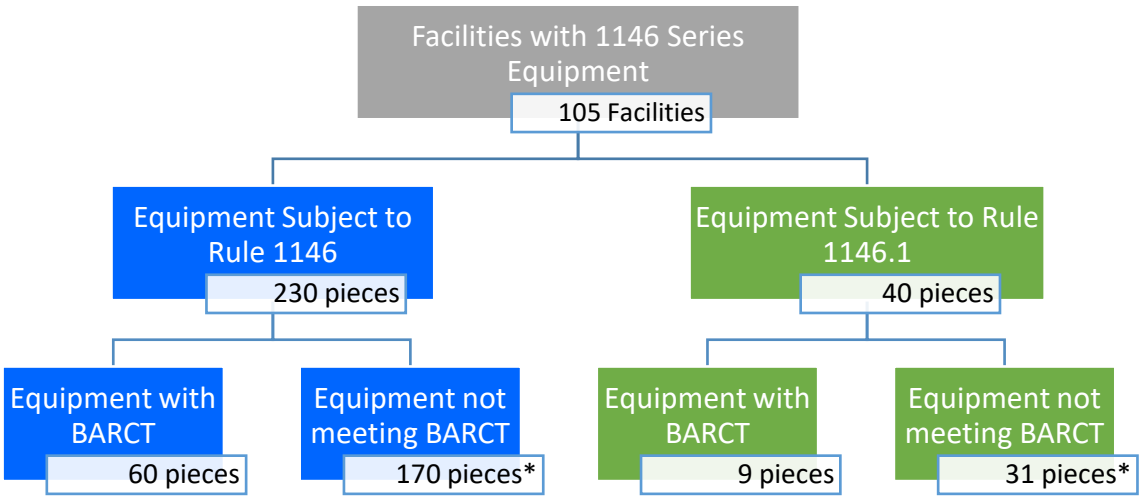
- Electricity Generating Facilities (EGFs)
- Refineries
- Metal Operations Facilities
- Aggregate Facilities

Facilities in these four sectors would be subject to industry-specific command-and-control rules (Rule 1135 for EGFs; Rule 1109.1 for refineries; Rule 1147.1 for metal operations facilities; and Rule 1147.2 for aggregate facilities). Rule 1146 series equipment in EGFs and refineries are subject to requirements to be established in the industry-specific rules. Since they would not follow the implementation schedule established for PARs 1146 series, they are not included in the permit analysis presented in this staff report. However, for metal operations and aggregate facilities, their Rule 1146 series equipment will be subject to the requirements and implementation schedule as specified in the proposed rule amendments.

To understand the number and the size of units that need to meet the NOx concentration limits, permit data was retrieved in August 2017 for all Rule 1146, 1146.1, and 1146.2 units in RECLAIM to evaluate facilities with multiple pieces of Rule 1146 and 1146.1 equipment and those with both Rule 1146 series and other RECLAIM equipment.

Analysis of Rule 1146 and 1146.1 Units Currently Not Meeting NOx Limit

Out of the 266 RECLAIM facilities, 105 facilities were permitted with equipment that will be subject to PARs 1146, 1146.1 or 1146.2. As shown in Figure C(1), for the 105 facilities, there are 230 pieces of equipment that are subject to Rule 1146 and 40 pieces of equipment that are subject to Rule 1146.1. Of the 230 pieces of Rule 1146 equipment, 170 are currently not meeting the proposed BARCT limits. Of the 40 Rule 1146.1 equipment, 31 are currently not meeting the BARCT limit. Some facilities will have a combination of Rule 1146 and 1146.1 pieces of equipment at their facility.



**Includes units eligible for the deferred compliance provision*

Figure C(1)
RECLAIM Facilities with Rule 1146 Series Equipment

Figure C(2) shows Rule 1146 and 1146.1 equipment differentiated by their BARCT status.

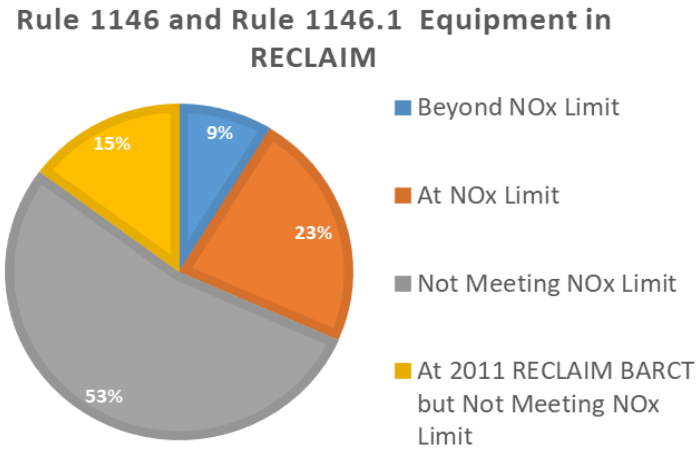


Figure C(2)
Rule 1146 and Rule 1146.1 Equipment in RECLAIM

Figure C(3) shows the number of units that are currently not meeting the applicable NOx concentration limits in Rules 1146 and 1146.1 at a facility level. Most of the facilities had 1 to 3 pieces of equipment that are non-compliant with Rule 1146 & Rule 1146.1 limits. Nine facilities had between 4 and 7 non-compliant units, while 2 facilities had 8 or more pieces of non-compliant equipment. One of two facilities had 19 units between 5 and 20 MMBtu/hr not meeting the Rule 1146 BARCT limit of 9 ppm. However, 13 of the 19 units are currently meeting the RECLAIM BARCT limit of 12 ppm, and they are eligible for the deferred compliance provisions under the proposed rule amendments, which allow them to defer compliance until burner replacement. The other facility had a total of 11 non-compliant units (3 Rule 1146 units and 7 Rule 1146.1 units), of which 3 are eligible for the deferred compliance provision. Excluding the units that could defer compliance until burner replacement, these two facilities are required to retrofit 6 and 8 units,

respectively. These units range from 2 to 13 MMBtu/hr, and compliance can be achieved with ultra-low NOx burners.

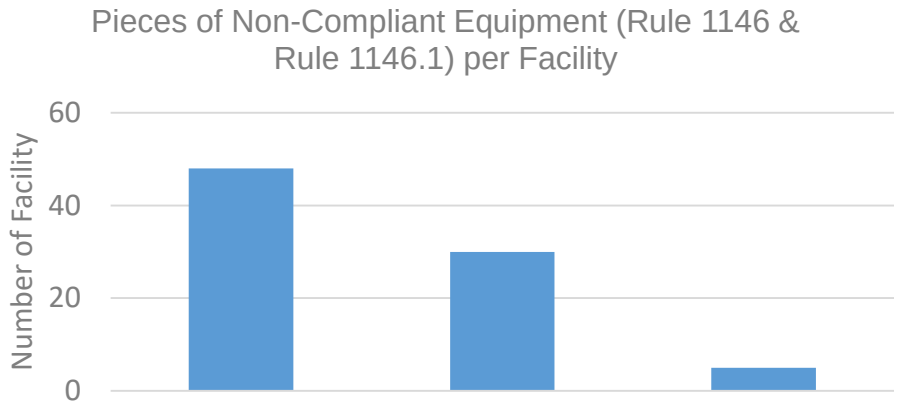


Figure C(3)
Non-Compliant Equipment in Facilities Subject to Rules 1146 & 1146.1 Only

Analysis of Facilities with Rules 1146 and 1146.1 Equipment and Other Landing Rules

Staff has reviewed permits for all Rule 1146, 1146.1, and 1146.2 units in RECLAIM, and identified the number of non-Rule 1146 and 1146.1 units a facility has. As illustrated in Figure C(4), about half of the facilities had 3 or less non-Rule 1146 and 1146.1 units[7] ("other units"). Most of these equipment are subject to Rule 1110.2 (*Emissions from Gaseous - and Liquid-Fueled Engines*) or Rule 1147 (*NOx Reductions from Miscellaneous Sources*), which are scheduled to be amended in fall 2018 and in 2019 respectively. Twenty-five facilities had 4 to 10 other units. On this basis, facilities with 10 or less other units can meet the NOx concentration limits for Rule 1146 and/or Rule 1146.1 within three years.

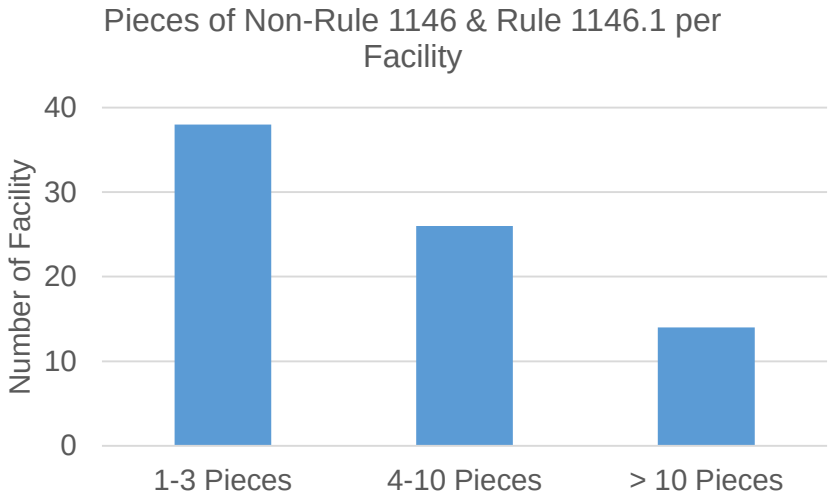
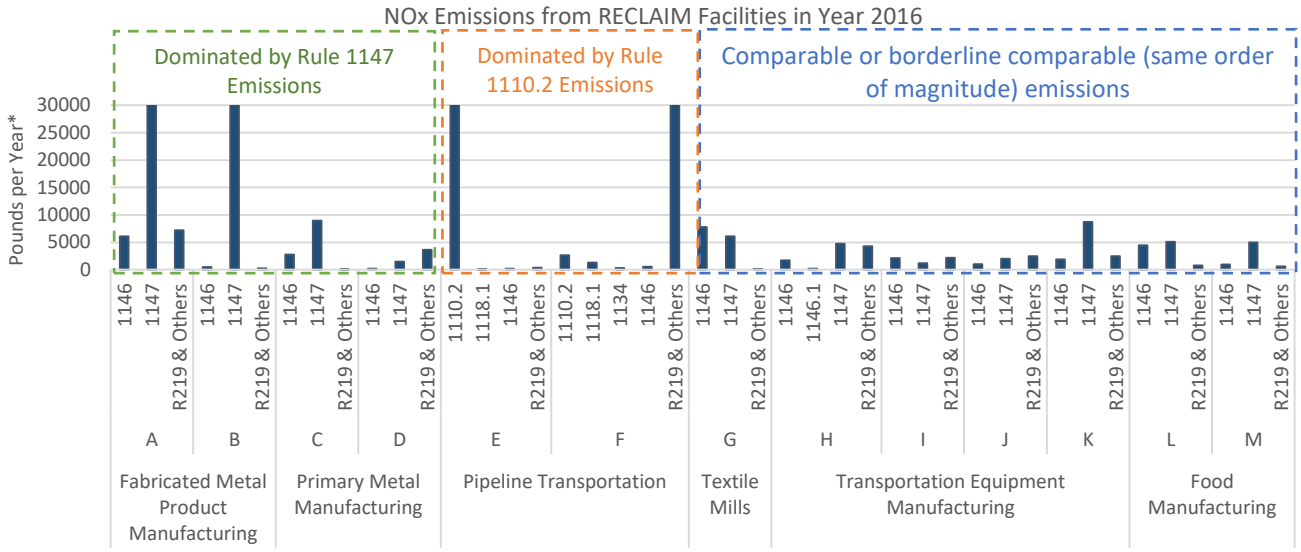


Figure C(4)
Non-Rule 1146 and Rule 1146.1 Equipment

[7] Excludes Rule 1470 equipment

To ensure that the greatest emissions reductions are achieved as early as practicable, staff evaluated the NOx emissions for each source category for facilities with more than 10 other units. Figure C(5) illustrates the NOx emissions of the 13 facilities with more than 10 units subject to other landing rules. Four of the 13 facilities (Facilities A-D) had emissions dominated by Rule 1147 (*NOx Reductions from Miscellaneous Sources*) units. These facilities are associated with fabricated metal product manufacturing and primary metal manufacturing. Emissions from the two facilities (Facility E and Facility F) in the pipeline transportation industry were largely contributed by their internal combustion engines that are subject to Rule 1110.2 (*Emissions from Gaseous - and Liquid-Fueled Engines*). For the remaining facilities, emissions from their Rule 1146 series are mostly comparable with the emissions from other landing rules.



** Emissions from some facilities exceeded 30,000 pounds per year.*

Figure C(5)
Emissions from Facilities with More than 10 Units
Subject to Other Landing Rules

For facilities with emissions dominated by other landing rules, staff evaluated each facility individually to better understand the emissions from different source types. The permitted units that are subject to the proposed rule amendments in Facility D and Facility E are already at BARCT, and they are not impacted by the compliance schedule in the proposed amendments. For Facilities A, B, C, and F, they have 5, 1, 2, and 3 permitted units that would be required to retrofit according to the compliance timeframe set forth in the proposed amendments.

These units ranged from 3 to 33 MMBtu/hr, and compliance can be achieved with ultra-low NOx burners. Ultra-low NOx burners were utilized as a control technology to achieve the 9 ppm emission limit introduced from the 2008 amendments to Rule 1146/1146.1. Now, it is considered a readily available off-the-shelf technology, and installations of the ULNB are considered to be straightforward. None of these units would require the more expensive control technology of SCR. In particular, the units in Facilities A-C are subject to Rule 1147, which is scheduled to be amended in 2019 as presented in various monthly RECLAIM Working Group Meetings. Given the time required for facilities to perform the engineering evaluation as well as the time needed for permit application and processing, it is very likely that the implementation timeframe for the proposed

amendments to Rule 1147 series would be later than January 1, 2021, leaving time for compliance with the Rule 1146 series equipment before that timeframe. Staff also determined that there are many other facilities belonging to different industries that are in a similar situation as some of these metal and aggregate facilities (e.g., many Rule 1147 pieces of equipment, along with Rule 1146 series equipment), and they would be subject to PARs 1146 series under the proposed amendments.

Analysis of Rule 1146.2 Units

Rule 1146.2 applies to boilers and process heaters with a rated heat input less than or equal to 2 MMbtu/hr. However, Rule 1146.2 units are exempt from SCAQMD permitting requirements per Rule 219 (Equipment Not Requiring a Written Permit Pursuant to Regulation II). Only a small portion of the Rule 1146.2 units are permitted due to unique circumstances, such as operators obtaining a lower emission factor for calculating the unit's potential to emit (PTE). As of August 2017, there is a total of 32 permitted Rule 1146.2 units in the RECLAIM universe, with 28 units meeting the existing Rule 1146.2 NOx concentration limit of 30 ppm. Among the 28 units, 21 of them were permitted at 12 ppm, above and beyond the 30 ppm requirement. Four of the 32 permitted Rule 1146.2 RECLAIM units were permitted at emission limits above the Rule 1146.2 limit, and would require retrofit / replacement to meet the existing Rule 1146.2 requirements. It is important to emphasize that majority of the Rule 1146.2 units in RECLAIM facilities are not permitted. Although non-RECLAIM facilities are required to register Rule 1146.2 equipment from 1 up to and including 2 MMbtu/hr under Rule 222 (*Filing Requirements For Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II*), RECLAIM facilities are exempt from the registration requirements. In addition, RECLAIM facilities report emissions from Rule 1146.2 units in the aggregate with other Rule 219 exempt equipment. Thus, the actual number of Rule 1146.2 units in the RECLAIM universe and its associated emissions could not be accurately quantified as part of this rule development, and the analysis below is the best estimate based on the best available information to date.

To better estimate the number of Rule 1146.2 units in RECLAIM, staff evaluated the equipment inventory provided by the facility responses from the initial determination notifications. This initial notification included an existing list of NOx emitting equipment and a request for the owner or operator of the RECLAIM facility to confirm the RECLAIM source equipment at the facility, as well as to identify any NOx emitting equipment that is not subject to permitting requirements (e.g., Rule 1146.2 units). As of April 2018, 37 RECLAIM facilities responded to the initial determination notifications, and a total of 118 Rule 1146.2 Type 2 units were reported. Based on the results of this initial survey, on average, each RECLAIM facility has 3.19 pieces of Rule 1146.2 Type 2 equipment. Assuming the same ratio for the rest of the RECLAIM facilities, it is estimated that about 850 Rule 1146.2 Type 2 units are present in the RECLAIM universe comprising of 266 facilities. While this provides an adequate estimation of the number of Rule 1146.2 units under the RECLAIM program, staff commits to collect and improve the RECLAIM inventory for this source category through annual inspections.

Equipment by Size

One major goal of PR 1100 is to ensure that facilities affected by multiple landing rules will achieve the greatest emission reductions early, and that facilities will address higher emitting equipment first. The distribution of units affected by PARs 1146 and 1146.1 by size range is presented in Table C(1).

Table C(1)
Number of Equipment by Size

Rule Applicability	Meet BARCT	Do Not Meet BARCT
Rule 1146		
Group I (≥ 75 mmBtu/hr)	2	6
Group II (20 to <75 mmBtu/hr	25	55
Group III (5 to < 20 mmBtu/hr)	33	109*
Rule 1146.1 (2 to <5 mmBtu/hr)	9	31#
Total	**69**	**201**

**30 of the 129 units can defer compliance until burner replacement under the proposed rule amendments*
 # 12 of the 31 units can defer compliance until burner replacement under the proposed rule amendments