SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report
Proposed Rule 429.1 – Startup and Shutdown Provisions at Petroleum Refineries and Related Operations

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EXECUTIVE SUMMARY

Control Measure CMB-05 of the Final 2016 Air Quality Management Plan (AQMP) included a five tons per day nitrogen oxides (NOx) emission reduction as soon as feasible but no later than 2025, and a direction to transition the Regional Clean Air Incentives Market (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 (AB 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.

Petroleum refineries and facilities with related operations to petroleum refineries are currently regulated under the RECLAIM program and are included in the state greenhouse cap-and-trade program. Due to CMB-05 and AB 617, equipment located at petroleum refineries and facilities with related operations to petroleum refineries are required to transition from the RECLAIM program to a command-and-control regulatory structure.

Proposed Rule 429.1 – Startup and Shutdown Provisions at Petroleum Refineries and Related Operations (PR 429.1) is a companion rule to Proposed Rule 1109.1 – Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations (PR 1109.1). PR 429.1 and PR 1109.1 facilitate the transition of petroleum refineries and facilities related operations to petroleum refineries from the RECLAIM program to a command-and-control regulatory structure.

PR 1109.1 establishes NOx and CO emission limits for NOx emitting combustion equipment at petroleum refineries and facilities with related operations to petroleum refineries. However, PR 1109.1 emission limits will not apply during startup, shutdown, or catalyst maintenance events. PR 429.1 is needed to establish requirements during startup and shutdown pursuant to U.S. EPA policies to regulate startup, shutdown, and malfunction.

A total of 281 units at sixteen facilities will be affected by PR 429.1. PR 429.1 limits the duration of startup and shutdown events and the frequency of scheduled startups. PR 429.1 also establishes best management practices for startup and shutdown events as well as notification and recordkeeping requirements.

PR 429.1 was developed through a public process. Originally, startup and shutdown provisions for equipment located at petroleum refineries and facilities with related operations to petroleum refineries were included in PR 1109.1. However, as the rulemaking for PR 1109.1 progressed, staff decided to separate startup and shutdown provisions into a separate rulemaking. Staff began the development of PR 429.1 in February 2021, incorporating startup and shutdown provisions that were discussed in prior PR 1109.1 Working Group Meetings. Staff held PR 429.1 Working Group Meetings with PR 1109.1 on April 30, 2021, and May 27, 2021. In addition, a Public Workshop will be held on September 1, 2021.

CHAPTER 1: BACKGROUND

INTRODUCTION

Proposed Rule 429.1 – Startup and Shutdown Provisions at Petroleum Refineries and Related Operations (PR 429.1) is a companion rule to Proposed Rule 1109.1 – Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations (PR 1109.1). PR 1109.1 establishes NOx and CO emission limits for combustion equipment at petroleum refineries and facilities with related operations to petroleum refineries. PR 429.1 exempts units from PR 1109.1 NOx and CO emission limits and applicable rolling average provisions during startup, shutdown, and catalyst maintenance events. PR 429.1 also establishes requirements during startup and shutdown pursuant to U.S. EPA policies to regulate startup, shutdown, and malfunction. PR 429.1 limits the duration of startup and shutdown events and the frequency of scheduled startups. Additionally, PR 429.1 establishes best management practices for startup and shutdown events and notification and recordkeeping requirements.

BACKGROUND

2016 AQMP Control Measure CMB-05

The 2016 Air Quality Management Plan (2016 AQMP) includes control measure CMB-05 which committed to identifying approaches to make the RECLAIM program more effective. During the adoption of the 2016 AQMP, staff was directed to modify CMB-05 to achieve the five tons per day of NOx emission reduction commitment as soon as feasible, but no later than 2025, and to transition the RECLAIM program to a command-and-control regulatory structure requiring Best Available Retrofit Control Technology (BARCT) level controls as soon as practicable. A command-and control regulatory structure establishes emission limits for each individual piece of equipment, in contrast to a market-based program, such as RECLAIM, where an emission target is established in the aggregate. A command-and-control regulatory structure directly regulates an industry with requirements that state what is permitted and what is prohibited. The 'command' is the presentation of standards that must be complied with by facilities. The 'control' part signifies the negative sanctions that may result from non-compliance. In this instance, NOx landing rules prescribe emission limits and other requirements for specific equipment or industries.

Startup and Shutdown

Under the RECLAIM program, facilities are required to hold sufficient RECLAIM Trading Credits (RTCs) to reconcile actual emissions at the end of each annual compliance cycle, including the emissions that occur during startup and shutdown. A unit and/or associated control equipment is not operating under steady-state conditions during startup or shutdown, which may result in greater emissions. For example, during startup and shutdown of combustion equipment, the temperature of the unit and/or associated controls is in transition and requires the addition of excess air. This process results in increased NOx formation.

Under a command-and-control regulatory structure, an owner or operator is required to meet emission limits on each individual piece of equipment on a continuous basis. Consequently, units that can otherwise meet lower NOx emission limits during steady-state conditions, may be unable to do so during periods of startup and shutdown. Therefore, provisions are needed to exclude

emissions that occur during startup and shutdown from compliance determination with the BARCT emission limit(s). PR 1109.1 and PR 429.1 work together to regulate NOx emitting combustion equipment at petroleum refineries and facilities with related operations to petroleum refineries during steady-state conditions, and during startup and shutdown, respectively. PR 1109.1 excludes startup and shutdown events from the BARCT emission limits established under the rule. Whereas, PR 429.1 establishes requirements during startup and shutdown, such as limiting the duration of startup and shutdown events and the frequency of scheduled startups.

Originally, startup and shutdown provisions for equipment located at petroleum refineries and facilities with related operations to petroleum refineries were included in PR 1109.1. However, as the rulemaking for PR 1109.1 progressed, staff decided to separate startup and shutdown provisions into a separate rulemaking, as the startup and shutdown requirements in Rule 1109 – Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refineries (Rule 1109), are contained in Rule 429 – Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen (Rule 429).

U.S. EPA POLICY ON STARTUP, SHUTDOWN, AND MALFUNCTION (SSM)

U.S. EPA issued startup, shutdown, and malfunction policies in 2015 and 2020, which provided differing guidance on the requirements necessary for State Implementation Plan (SIP) approval. The 2015 policy stated that an emission limitation must be applicable to the source continuously to be permissible in a SIP, whereas the 2020 policy stated that a SIP may contain exemption provisions to emission limits during SSM events if the SIP is composed of numerous planning requirements that collectively protect the National Ambient Air Quality Standards (NAAQS).

2015 Startup, Shutdown, and Malfunction State Implementation Plan Policy

In 2015, U.S. EPA issued a SSM SIP Policy which stated that exemptions from emission limitations during startup and shutdown events and affirmative defense provisions were inconsistent with the federal Clean Air Act (CAA)[1]. U.S. EPA asserted that an emission limitation must be applicable to the source continuously to be permissible in a SIP pursuant to CAA section 302(k). U.S. EPA's 2015 SSM SIP Policy stated that SIP emission limitations do not need to be numerical in format, do not have to apply the same limitation (e.g. numerical level) at all times, and may include alternative numerical limitations, other technological control requirements, or work practice requirements during startup and shutdown events, so long as those components of the emission limitations meet applicable federal CAA requirements.

U.S. EPA issued SIP calls to 36 states with SIP provisions that were substantially inadequate in meeting the CAA requirements. Subsequently, petitions for review were filed with the D.C. Circuit Court of Appeals regarding U.S. EPA's 2015 SSM Policy. In 2017, the D.C. Circuit postponed oral arguments at the request of U.S. EPA because U.S. EPA was reviewing the 2015 SSM SIP Policy. After U.S. EPA took two regional actions that deviated from their 2015 SSM SIP Policy, they reviewed their policy and concluded SSM provisions may be permissible in SIPs in certain

[1] https://www.govinfo.gov/content/pkg/FR-2015-06-12/pdf/2015-12905.pdf#page=2

circumstances which are outlined in U.S. EPA's October 9, 2020 Memorandum Inclusion of Provisions Governing Periods of Startup, Shutdown, and Malfunctions in State Implementation Plans (2020 SSM SIP Policy)[2].

2020 Startup, Shutdown, and Malfunction State Implementation Plan Policy

The 2020 SSM SIP Policy states that a SIP may contain exemption provisions to emission limits during SSM events if the SIP is composed of numerous planning requirements that collectively protect the National Ambient Air Quality Standards (NAAQS). U.S. EPA expects that an in-depth analysis of a SIP will be necessary to determine whether a specific exemption provision is permissible. The 2020 SSM SIP Policy recognizes that a state may be able to demonstrate that a SIP which contains other control measures during SSM events, such as general duty requirements, work practice standards, best management practices, or alternative emission limits, is protective of the NAAQS. U.S. EPA will also consider if the SSM provision in the rule, when considered alongside other factors, will attain and maintain the NAAQS. Such considerations include requirements for sources to use best practicable air pollution control practices to minimize emissions and limitations to the duration and severity of SSM events.

SOUTH COAST AQMD STARTUP AND SHUTDOWN PERMIT CONDITIONS

South Coast AQMD permits often contain startup and shutdown requirements. The permit conditions are tailored for specific equipment and may include limits to the frequency and duration of startups and shutdowns, in addition to mass emission limits, monitoring, and recordkeeping requirements for startups and shutdowns. Staff initially sought to rely on permit conditions to limit startup and shutdown events. However, U.S. EPA recommended that startup and shutdown be included in rules to facilitate enforceability and ensure SIP approval. PR 429.1 will include general restrictions for startup and shutdown events while permit conditions will provide tailored requirements and remain in effect after PR 429.1 is adopted. If a permit contains more stringent requirements than PR 429.1, the more stringent permit requirements will continue to be applicable.

REGULATORY HISTORY

Rule 1109 – Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refineries

The South Coast AQMD adopted the Rule 1109 on November 1, 1985. The rule was last amended on August 5, 1988. Rule 1109 is applicable to boilers and process heaters in petroleum refineries and established refinery-wide NOx emission limits.

Rule 429 – Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen

South Coast AQMD Rule 429 was adopted on May 5, 1989 and last amended on December 21, 1990. Rule 429 applies to equipment subject to Rule 1109, Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Rule 1134), Rule 1146 – Emissions of Oxides of Nitrogen

[2] https://www.epa.gov/sites/production/files/2020-10/documents/placeholder_0.pdf

from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Rule 1146), and Rule 1159 – Nitric Acid Units - Oxides of Nitrogen (Rule 1159). Rule 429 established an exemption from NOx emission limits during scheduled startup and shutdown events, as well as limitations to the number and duration of scheduled startup and shutdown events and notification and recordkeeping requirements.

RECLAIM Program

The Regional Clean Air Incentives Market (RECLAIM) program is a market-based program that was adopted on October 15, 1993 and applies to facilities with annual emissions four tons per year or more of NOx or SOx. RECLAIM was designed to achieve emission reductions in aggregate equivalent to what would occur under a command-and-control regulatory approach. All petroleum refineries and facilities with related operations to petroleum refineries were transitioned into the RECLAIM program, where they are currently regulated. As listed in Rule 2001– Applicability, subdivision (j), facilities subject to NOx RECLAIM are exempted from meeting the requirements of Rules 429 and 1109.

Under the RECLAIM program, an owner or operator is required to hold RTCs at the end of each annual compliance cycle that are representative of all actual emissions, except for breakdowns which meet specific criteria under Rule 2004 – Requirements. Emissions that occur under typical operations, as well as emissions that occur from startups and shutdowns, are counted toward the actual emissions that are required to be reconciled. PR 1109.1 and PR 429.1 are being adopted to transition petroleum refineries and facilities with related operations to petroleum refineries to a command-and-control regulatory structure. In a command-and-control regulatory structure, an owner or operator is required to meet emission limits on each individual piece of equipment on a continuous basis. PR 1109.1 emission limits do not apply during startup, shutdown, and catalyst maintenance events, therefore, PR 429.1 is needed to establish requirements during startup and shutdown pursuant to U.S. EPA policies to regulate startup, shutdown, and malfunction.

AFFECTED FACILITIES AND EQUIPMENT

PR 429.1 applies to equipment regulated under PR 1109.1. Based on permitting data and facility surveys, staff identified 281 units at 16 facilities that meet the applicability requirements of PR 429.1. Table 1-1 contains the equipment affected by PR 429.1.

TABLE 1-1
PR 429.1 AFFECTED EQUIPMENT

Equipment Type	Number of Units
Boilers and Process Heaters without NOx Post-Combustion Control Equipment	159
Boilers and Process Heaters with NOx Post-Combustion Control Equipment	59
FCCUs	5
Flares	1
Gas Turbines	12
Petroleum Coke Calciners	1
Sulfur Recovery Unit/Tail Gas (SRU/TG) Incinerators	16
Steam Methane Reformer Heaters	11
Steam Methane Reformer with Gas Turbine	2
Sulfuric Acid Furnaces	2
Vapor Incinerators	13

PUBLIC PROCESS

The development of PR 429.1 is being conducted through a public process. Working Group Meetings included representatives from affected facilities, environmental and community groups, other agencies, consultants, and interested parties. The purpose of the Working Group Meetings was to discuss details of proposed rule and to listen to concerns and issues with the objective to build consensus and resolve key issues.

In February 2021, staff decided it would be more appropriate to separate startup and shutdown provisions in PR 1109.1 into a separate rulemaking, as the startup and shutdown requirements in Rule 1109, are contained in Rule 429. Since PR 429.1 is directly related to the implementation of PR 1109.1, all PR 429.1 Working Group Meetings were held during PR 1109.1 Working Group Meetings. Staff began the development of PR 429.1 in February 2021, incorporating startup and shutdown provisions that were discussed in prior PR 1109.1 Working Group meetings. Staff held PR 429.1 Working Group Meetings remotely with PR 1109.1 on April 30, 2021 and May 27, 2021.

A Public Workshop will be held on September 1, 2021, with the comment period closing on September 17, 2021. The purpose of the Public Workshop is to present the proposed rule language to the general public and to stakeholders and to solicit comments.

CHAPTER 2: SUMMARY OF PROPOSAL

INTRODUCTION

PROPOSED RULE 429.1

INTRODUCTION

PR 429.1 will establish requirements during periods of startup and shutdown. The proposed rule will be applicable to petroleum refineries and facilities with related operations to petroleum refineries that are subject to PR 1109.1. The following provides a discussion of provisions under PR 429.1.

PROPOSED RULE 429.1

Subdivision (a) – Purpose

The purpose of this rule is to limit NOx emissions, while not increasing CO emissions, during periods of startup and shutdown, from units at petroleum refineries and facilities with related operations to petroleum refineries. PR 429.1 is needed to establish requirements during startup and shutdown pursuant to U.S. EPA policies to regulate startup, shutdown, and malfunction.

Subdivision (b) – Applicability

PR 429.1 applies to an owner or operator of units at petroleum refineries and facilities with related operations to petroleum refineries. These facilities are subject to PR 1109.1.

Subdivision (c) – Definitions

PR 429.1 incorporates definitions from PR 1109.1 and source-specific rules to define types of facilities, equipment, and other rule terms. New or modified definitions added to PR 429.1 include:

- CASTABLE REFRACTORY means refractory that is made by curing liquid material that has been poured into a mold.

  This proposed definition describes a type of refractory and is used to distinguish the vapor incinerator categories in Table 1 (Table 2-1 in Staff Report). Castable refractory is harder than other types of refractory, such as a ceramic fiber catalyst, and takes longer to heat up as a result.

- CATALYST MAINTENANCE means conditioning, repairing, or replacing the catalyst in NOx post-combustion control equipment associated with a unit which has a bypass stack or duct that exists prior to [*Date of Adoption*].

  This proposed definition describes the type of maintenance activities that are allowed pursuant to paragraph (d)(8). This definition specifies that only units which have a bypass stack or duct that exists prior to [*Date of Adoption*] may elect to use a bypass for the maintenance activities listed in the definition.

- CATALYST REGENERATION ACTIVITIES means the procedure where air or steam is used to remove coke from the catalyst of a unit or the conditioning of catalyst prior to the startup of a unit.

  This proposed definition describes a maintenance activity that is exempt from paragraph (d)(2) of PR 429.1 in subparagraph (g)(1)(B). Staff received comments from operators which described times when a unit that contains catalyst may be required to undergo a catalyst regeneration. For example, a semi-regenerative rheniformer unit is a fixed-bed catalyst reactor system which accumulates carbon on the catalyst during the unit's operation. Over time, the carbon buildup reduces the catalyst's effectiveness and it requires that the unit be

shut down and the catalyst undergo a procedure to restore its activity. During this procedure, a unit, such as a furnace, may be used as a heat source to burn the carbon off of the catalyst.

In addition to regeneration activities, other catalyst systems may require steps to condition catalyst. For example, the sulfiding of a catalyst system requires the injection of a sulfur-containing reagent to temporarily reduce catalyst activity in preparation for the introduction of hydrocarbon feed to the unit. During the sulfiding of a catalyst system, a unit, such as a furnace, may be used as a heat source to assist with the decomposition of the sulfur-containing reagent.

Staff acknowledges that the activities in the regeneration or conditioning of catalyst systems as described in the preceding paragraphs and other similar activities constitute a unique occurrence where a unit, such as a furnace, is operated under abnormal conditions. The time to complete catalyst regeneration or catalyst conditioning activities will not be counted towards PR 429.1 time allowances of a startup or shutdown.

- FORMER RECLAIM PETROLUEM REFINERY means a petroleum refinery or a facility with related operations to petroleum refineries, or any of its successors, that was in the Regional Clean Air Incentives Market as of January 5, 2018, as established in Regulation XX – Regional Clean Air Incentives Market (RECLAIM), that has received a final determination notification, and is no longer in the RECLAIM program.

  This proposed definition is modified from the Rule 1146 definition of FORMER RECLAIM FACILITY to specifically refer to petroleum refineries and facilities with related operations to petroleum refineries.

- MINIMUM OPERATING TEMPERATURE means the minimum operating temperature specified by the manufacturer, unless otherwise defined in the South Coast AQMD permit to operate.

  This proposed definition provides clarification on the temperature described for compliance determination in various PR 429.1 requirements.

- NEW PETROLEUM REFINERIES means a petroleum refinery or a facility with related operations to refineries that begin operation after [*Date of Adoption*].

  This definition describes a type of facility that PR 429.1 is applicable to.

- NOx POST-COMBUSTION CONTROL EQUIPMENT means air pollution control equipment which eliminates, reduces, or controls the issuance of NOx after combustion.

  This definition is modified from the Rule 102 – Definition of Terms definition of CONTROL EQUIPMENT and made specific to NOx and post-combustion control equipment.

- REFRACTORY DRYOUT means the initial application of heat under controlled rates to safely remove water from refractory lining as part of the curing process prior to placing the unit in service.

This proposed definition describes a process that is exempt from PR 429.1 from paragraph (d)(2) of PR 429.1 in subparagraph (g)(1)(A).[3]

- SCHEDULED STARTUP means a planned startup that is specified by January 1 of each year.

  This definition was modified from the definition of A SCHEDULED START-UP AND SHUTDOWN PAIR in Rule 429. Scheduled startup events include, but are not limited to, those planned for maintenance, testing, tuning, or construction. A startup is only considered a scheduled startup if it is specified by January 1 each year. Scheduled startups do not include change in status due to demand loads, unplanned maintenance, breakdowns, malfunctions, or other events not scheduled prior to January 1 for the upcoming calendar year.

- SHUTDOWN means the time period that begins when an operator reduces load or heat input, and flue gas temperatures fall below the minimum operating temperature of the NOx post-combustion control equipment, if applicable, and which ends in a period of zero fuel flow or zero feedstock, or when combustion/circulation air flow ends if the unit does not use fuel for combustion.

  This proposed definition is from Rule 1134 and was modified to apply to all equipment types subject to PR 429.1.

- STABLE CONDITIONS means that the fuel flow, fuel composition, or feedstock to a unit, or the combustion/circulation air if the unit does not use fuel for combustion, is consistent and allows for normal operations.

  This proposed definition provides clarification for compliance determination under subparagraph (d)(2)(A), as well as the definition of startup. For example, a stakeholder expressed concern that during the startup of a hydrogen reformer furnace, there is an adjustment period where the fuel balance fluctuates and is unstable. Once the fuel balance normalizes, the unit is considered to be under stable conditions. A unit may stabilize and destabilize multiple times during a complex startup procedure. Stable conditions are only determined after all startup procedures for a unit are complete.

- STARTUP means the time period that begins when a NOx emitting unit combusts fuel, after a period of zero fuel flow or zero feedstock, or when combustion/circulation air is introduced if the unit does not use fuel for combustion, and ends when the flue gas temperature reaches the minimum operating temperature of the NOx post-combustion control equipment and reaches stable conditions, or when the time limit specified in Table 1 is reached, whichever is sooner.

  This proposed definition is from Rule 1134 and was modified to apply to all equipment types subject to PR 429.1. Staff worked with stakeholders to address concerns about when startup ends for a unit equipped with NOx post-combustion control equipment and units without NOx post-combustion control equipment.

  Stakeholders expressed that although NOx post-combustion control equipment needs to reach the minimum operating temperature for startup, there are additional steps, such as the injection

[3] https://brimstone-sts.com/wp-content/uploads/2015/11/04V11-Jenkins-Considerations-for-Refractory-Dryouts.pdf

of any associated chemical reagent, before NOx and CO concentration limits can be achieved. Stakeholders also expressed that there are unique situations, such as the startup of a hydrogen reformer furnace, where the introduction of varying quality of gas fuel from the routing of gas to the furnace burners may cause compositional fluctuations where the control of the post-combustion control equipment is not stable. Therefore, startup is not considered to be complete until a unit reaches the minimum operating temperature of the NOx post-combustion control equipment and the unit reaches stable conditions, or the duration limit specified in Table 1, whichever is sooner. For units without NOx post-combustion control equipment, startup ends when the duration limit in Table 1 is achieved, notwithstanding the requirements of subparagraph (d)(2)(A).

- UNIT means equipment that is subject to Rule 1109.1 which includes boilers, flares, fluid catalytic cracking units (FCCUs), gas turbines, petroleum coke calciners, process heaters, steam methane reformer heaters, sulfuric acid furnaces, sulfur recovery units/tail gas incinerators (SRU/TG incinerators), and vapor incinerators, as defined in Rule 1109.1, requiring a South Coast AQMD permit and not required to comply with a NOx emission limit by other South Coast AQMD Regulation XI rules.

  This definition is from PR 1109.1 and modified to refer to definitions in PR 1109.1.

Subdivision (d) – Requirements

Exemption from Rule 1109.1 Emission Limits During Startup, Shutdown, and Catalyst Maintenance

Paragraph (d)(1) specifies that NOx and CO emission limits and the applicable rolling average provisions pursuant to Rule 1109.1 do not apply during startup, shutdown, and catalyst maintenance events. During startup, shutdown, and catalyst maintenance an owner or operator of a unit is subject to the provisions in PR 429.1.

Startup and Shutdown Duration Limits

Paragraph (d)(2) includes Table 1 (Table 2-1 in Staff Report), which contains the startup and shutdown duration limits for units at former RECLAIM petroleum refineries and new petroleum refineries. The definitions of both former RECLAIM petroleum refineries and new petroleum refineries include facilities with related operations to petroleum refineries. . Startup and shutdown duration limits only apply when a unit exceeds the applicable NOx or CO concentration limits in PR 1109.1. During the startup or shutdown of a unit, exhaust emission concentrations may fluctuate due to the nature of startups and shutdowns. Therefore, the time counted towards the startup and shutdown duration limits in PR 429.1 may be non-continuous. A unit may meet the applicable NOx and CO emission limits in PR 1109.1 temporarily during a startup or shutdown but then experience swings where the applicable emission limits are not met due to instability. The time counted towards Table 1 duration limits does not start anew if PR 1109.1 emission limits are temporarily met during the startup or shutdown, but then fluctuations result in an emission increase which exceeds applicable PR 1109.1 emission limits. However, in a situation where the owner or operator of a unit has initiated a startup of a unit but then had to shutdown the unit and will startup the unit again, then the Table 1 duration limits would apply anew. A unit with permit conditions

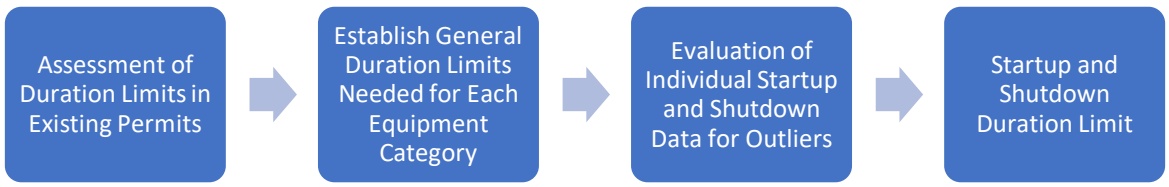
which specifies more stringent startup or shutdown duration limits than PR 429.1 will continue to be restricted by its existing permit conditions.

TABLE 2-1
STARTUP AND SHUTDOWN DURATION LIMITS

Unit Type	Time Allowance When Emissions Exceed Rule 1109.1 Emission Limits (Hours)
Boilers and Process Heaters without NOx Post-Combustion Control Equipment, Gas Turbines, Flares, Vapor Incinerators without NOx Post-Combustion Control Equipment or Castable Refractory	2
Vapor Incinerators with NOx Post-Combustion Control Equipment, Vapor Incinerators with Castable Refractory	20
Boilers and Process Heaters with NOx Post-Combustion Control Equipment, Steam Methane Reformer Heaters, Sulfuric Acid Furnaces	48
Steam Methane Reformers with Gas Turbine	60
FCCUs, Petroleum Coke Calciners, SRU/TG Incinerators	120

Startup and shutdown duration limits were established through an assessment which considered duration limits established in permits, the general startup and shutdown time periods necessary for each equipment category, and individual startup and shutdown data for outliers (Figure 2-1). Staff reviewed existing permits to establish a baseline for the general number of hours necessary for startup and shutdown in each equipment category. Permit conditions are tailored for specific equipment but can be reviewed in aggregate to assess the range of duration limits for a category of equipment. An inclusive duration limit was selected to be applicable to a wide range of equipment. However, where there were clear outliers, special provisions were included rather than establish excessive duration limits.

Figure 2-1 – Duration Limit Assessment



Best Management Practices

Best management practices are contained in subparagraph (d)(2)(A) pursuant to the U.S. EPA 2020 SSM SIP Policy. If a unit reaches stable conditions and reaches the minimum operating temperature of the NOx post-combustion control equipment, if applicable, before reaching the duration limit specified in Table 1, the startup period is considered to be over, and the unit is required to meet applicable NOx and CO emission limits in PR 1109.1. Stable conditions and minimum operating temperature are defined in PR 429.1. Subparagraph (d)(2)(A) will further limit excess emissions from startup events.Limit to the Number of Scheduled Startups

Paragraphs (d)(3) and (d)(4) limit the number of scheduled startups. Limitations to the number of scheduled startups is an existing requirement in Rule 429 and is carried forward into PR 429.1. Furthermore, limiting the frequency of scheduled startups provides further bounds to the startup and shutdown provisions. Unscheduled startups are not limited by PR 429.1 because they may be driven by operational demand, emergencies, or maintenance needs.

Paragraph (d)(3) limits the number of scheduled startup events to 10 per calendar year for boilers, flares, gas turbines, process heaters, steam methane reformer heaters, sulfuric acid furnaces, and vapor incinerators. This maximum number of scheduled startup events reflects Rule 429 requirements for a scheduled startup and shutdown pair for equipment subject to Rule 1109.

Paragraph (d)(4) limits the number of scheduled startup events to 3 per calendar year for FCCUs, petroleum coke calciners, and SRU/TG incinerators. The maximum number of scheduled startups for FCCUs, petroleum coke calciners, and SRU/TG incinerators is fewer than other equipment categories due to the longer startup and shutdown durations allowed pursuant to Paragraph (d)(2).

General Duty Requirements

Paragraph (d)(5) was modified from an existing Rule 429 provision and requires that an owner or operator of a unit at a former RECLAIM petroleum refinery or a new petroleum refinery that exceeds applicable PR 1109.1 NOx and CO emission limits during startup and shutdown events to take all reasonable and prudent steps to minimize emissions to meet applicable emission limits. Reasonable and prudent steps to minimize emissions include, but are not limited to, equipment repairs and adjusting the temperatures of post-combustion controls.

Requirements for Units with NOx Post-Combustion Control Equipment

Paragraph (d)(6) requires each unit equipped with NOx post-combustion control equipment to install and maintain a temperature measuring device that is calibrated annually at the inlet of the NOx post-combustion control equipment. Temperature measuring devices include thermocouples and temperature gauges. Most existing units with NOx post-combustion control equipment are already equipped with temperature measuring devices. It is standard practice to include a temperature measuring device requirement for units with NOx post-combustion control equipment in South Coast AQMD permits, and any future units would be expected to install and maintain a temperature measuring device through the permitting process. A temperature measuring device is necessary to determine the temperature of the gas stream entering the NOx post-combustion

control equipment and when the catalyst in the NOx post-combustion control equipment will effectively control NOx emissions.

NOx Post-Combustion Control Equipment Operating Temperature

Paragraph (d)(7) requires the operation of NOx post-combustion control equipment during startup and shutdown events, including the injection of any associated chemical reagent into the exhaust stream to control NOx, if the temperature of the gas to the inlet of the emission control system is greater than or equal to the minimum operating temperature. Minimum operating temperature is defined in PR 429.1. A unit with a permit condition specifying a lower temperature to operate its NOx post-combustion control equipment than PR 429.1 will continue to be restricted by its existing permit condition.

Catalyst Maintenance Provision

Paragraph (d)(8) specifies requirements for an owner or operator of a unit at a former RECLAIM petroleum refinery or a new petroleum refinery that elects to use a bypass to conduct catalyst maintenance. Only units which have a bypass stack or duct that exists prior to *[Date of Adoption]* may elect to use a bypass to conduct catalyst maintenance. Catalyst used in NOx post-combustion control equipment at petroleum refineries and at facilities with related operations to petroleum refineries typically needs to be replaced every 3-6 years, which is shorter than the turnaround schedules for some units. The process of starting up and shutting down units to conduct maintenance on NOx post-combustion control equipment can result in more emissions than if the NOx post-combustion control equipment were bypassed temporarily and the unit was kept in operation. This provision is only for units that are equipped with a stack or ducting that allows for bypassing the unit's NOx post-combustion control equipment by [*Date of Adoption*].

Subparagraph (d)(8)(A) precludes the use of a bypass to conduct catalyst maintenance for units that are scheduled to operate continuously for less than five years between planned maintenance shutdowns of the unit. Subparagraph (d)(8)(A) is included to limit the catalyst maintenance provision to units that have long turnaround schedules. Turnarounds typically occur every 3-5 years for refinery equipment, but some units have turnaround schedules that are 9 years or longer.

Subparagraph (d)(8)(B) limits the use of a bypass to condition, repair, or replace the catalyst in the NOx post-combustion control equipment to 200 hours in a rolling three-year cycle. Therefore, a catalyst used in NOx combustion control equipment could be conditioned, repaired, or replaced every three years under subparagraph (d)(8)(B). Three years is a conservative estimate of catalyst life; catalysts typically need to be replaced every 3-6 years.

Subparagraph (d)(8)(C) specifies that the unit must be operated at the minimum safe operating rate when the NOx post-combustion control equipment is bypassed. Subparagraph (d)(8)(C) is included to reduce emissions by lowering the rate the unit is operating at when using a bypass to conduct catalyst maintenance.

Subparagraph (d)(8)(D) requires documentation from the manufacturer of the minimum safe operating rate of the unit being bypassed to be submitted the South Coast AQMD to assist in verifying compliance with subparagraph (d)(8)(C).

Subparagraph (d)(8)(E) provides notification requirements during catalyst maintenance. Notifications are required to be made by calling to 1-800-CUT-SMOG at least 24 hours before bypassing the NOx post-combustion control equipment and include the date and estimated time and estimated duration that the NOx post-combustion control equipment will be bypassed. Advanced notification of these events is considered important because it gives the South Coast AQMD time to allocate resources if necessary to monitor the catalyst maintenance activity and information to respond to inquiries from the community should they arise.

Subparagraph (d)(8)(F) contains a requirement to continuously monitor NOx and CO emissions during catalyst maintenance. PR 429.1 only requires NOx and CO emissions to be continuously monitored when the owner or operator elects to bypass the NOx post-combustion control equipment to conduct catalyst maintenance. The continuous monitoring is required to be conducted with a certified Continuous Emissions Monitoring System (CEMS) pursuant to Rule 218.2 – Continuous Emission Monitoring System: General Provisions and Rule 218.3 – Continuous Emission Monitoring System: Performance Specifications or a contractor approved under the South Coast AQMD Laboratory Approval Program (LAP) if emissions cannot be monitored be a certified CEMS. Paragraph (d)(8) is intended only for activities involved in catalyst maintenance, as described in in subdivision (c). This provision is not intended to provide relief for malfunctions or breakdowns of ancillary equipment used in the operation of NOx post-combustion control equipment. In situations not related to the conditioning, repairing, or replacement of catalyst in NOx post-combustion control equipment, but related to breakdowns of ancillary equipment used in the operation of the NOx post-combustion equipment, paragraph (d)(8) does not apply. South Coast AQMD Rule 430 – Breakdown Provisions (Rule 430), provides relief from of rules or permit conditions during breakdowns during specific conditions.

Subdivision (e) – Notification

Paragraph (e)(1) provides notification requirements for scheduled startups. Notifications are required to be made by calling 1-800-CUT-SMOGat least 24 hours before the scheduled startup and include the date and time of the scheduled startup. Advanced notification of these events is considered important because it gives the South Coast AQMD time to allocate resources if necessary to monitor the startup and information to respond to inquiries from the community should they arise.

Subdivision (f) – Recordkeeping

Records assist in verifying compliance with Rule 429.1. Paragraph (f)(1) provides recordkeeping requirements for owners and operators of units at a former RECLAIM petroleum refinery or a new petroleum refinery. Records are required to be maintained on-site for 5 years and made available to the South Coast AQMD upon request. The provision in subparagraph (f)(1)(A) requires the operating log to contain the date, time, duration, and reason for each startup, shutdown, refractory dryout, catalyst maintenance, catalyst regeneration activity, initial commissioning of a unit, and initial commissioning of NOx post-combustion control equipment. For startups, the reason provided in the operating log must specify if the startup was scheduled. Subparagraphs (f)(1)(B) through (f)(1)(D) requires a list of scheduled startups, a list of planned maintenance shutdowns for the next 5 years for each unit equipped with a bypass stack or duct that exists prior to [*Date of Adoption*], and NOx and CO emissions data collected pursuant to subparagraph (d)(8)(F).

Paragraph (f)(2) requires an owner or operator of a unit at a former RECLAIM petroleum refinery or a new petroleum refinery equipped with NOx post-combustion control equipment to maintain documentation from the manufacturer of the minimum operating temperature of the NOx post-combustion control equipment. Records are required to be on-site and made available to the South Coast AQMD upon request for compliance verification.

Subdivision (g) – Exemptions

Paragraph (g)(1) exempts units from the startup and shutdown duration limits contained in paragraph (d)(2) during refractory dryouts, catalyst regeneration activities, the initial commissioning of a unit, and the initial commissioning of NOx post-combustion control equipment. Temperatures are not high enough for NOx post-combustion control equipment to be effective during refractory dryouts or catalyst regeneration activities. Furthermore, refractory dryouts and catalyst regeneration activities are infrequent processes during which the expected mass emissions of NOx are low. The initial commissioning of a unit or the initial commissioning of NOx post-combustion control equipment only occurs once, and specific conditions are established by South Coast AQMD's Engineering and Permitting Division for this time period. Stakeholders had expressed concern that initial commissioning activities may present periods of time where a new unit or a new NOx post-combustion control equipment would experience one-time, unique issues, and may be unable to meet the startup and shutdown duration limits in paragraph (d)(2).

Paragraph (g)(2) exempts units from the catalyst maintenance requirements in paragraph (d)(8) if the unit has a permit condition before [*Date of Adoption*] that allows the use of a bypass for maintenance. A unit that qualifies for the exemption in paragraph (g)(2) will continue to be restricted by its current permit conditions.

CHAPTER 3: IMPACT ASSESSMENTS

INTRODUCTION

Impact assessments were conducted during PR 429.1 rule development to assess the environmental and socioeconomic implications of PR 429.1. California Health & Safety Code (H&SC) requirements for cost-effectiveness analysis, incremental cost-effectiveness analysis, and a socioeconomic assessment were evaluated during rule development of PR 429.1. Staff prepared draft findings pursuant to H&SC 40727 and an assessment of emission reductions. Staff will prepare a California Environmental Quality Act (CEQA) analysis and a comparative analysis pursuant to H&SC 40727.2 at least 30 days prior to the South Coast AQMD Governing Board Hearing on PR 429.1, which is anticipated to be heard on September 3, 2021.

COSTS

The provisions in PR 429.1 are not expected to impose any additional costs.

EMISSION REDUCTIONS

There will not be additional emission reductions from combustion equipment subject to PR 429.1; all emission reductions for these units are a result of PR 1109.1.

COST-EFFECTIVENESS

The H&SC Section 40920.6 requires a cost-effectiveness analysis when establishing BARCT requirements. The proposed rule does not include new BARCT requirements. Therefore, this provision does not apply to the proposed rule.

INCREMENTAL COST-EFFECTIVENESS

H&SC 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. The proposed rule does not include new BARCT requirements. Therefore, this provision does not apply to the proposed rule.

SOCIOECONOMIC ASSESSMENT

The proposed rule 429.1 does not impose any additional costs to the affected facilities and does not result in any adverse socioeconomic impacts.

CALIFORNIA ENVIRONMENTAL QUALITY ACT ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's Certified Regulatory Program (Public Resources Code Section 21080.5 and CEQA Guidelines Section

15251(l); codified in South Coast AQMD Rule 110), the South Coast AQMD is lead agency for the proposed project, which is comprised of Proposed Rules 1109.1 and 429.1, Proposed Amended Rules 1304 and 2005, and Proposed Rescinded Rule 1109. CEQA Guidelines Section 15187 requires an environmental analysis to be performed when a public agency proposes to adopt a new rule or regulation requiring the installation of air pollution control equipment or establishing a performance standard, which is the case with the proposed project. The South Coast AQMD is preparing a Subsequent Environmental Assessment (SEA) for the proposed project, which is a substitute CEQA document pursuant to CEQA Guidelines Section 15252, prepared in lieu of a Subsequent Environmental Impact Report. The SEA will contain the environmental analysis required by CEQA Guidelines Section 15187 and will tier off of the December 2015 Final Program Environmental Assessment (PEA) for Proposed Amended Regulation XX – Regional Clean Air Incentives Market (RECLAIM) (referred to as NOx RECLAIM) and the March 2017 Final Program Environmental Impact Report (EIR) for the 2016 Air Quality Management Plan as allowed by CEQA Guidelines Sections 15152, 15162, 15168 and 15385. The Draft SEA will be released for a 45-day public review and comment period to provide public agencies and the public an opportunity to obtain, review, and comment on the environmental analysis. Comments made relative to the analysis in the Draft SEA and responses to the comments will be included in the Final SEA.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

H&SC 40727 requires that prior to adopting, amending or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. The draft findings are as follows:

Necessity

PR 429.1 is needed to establish limits on duration and frequency of startup and shutdown events for units at petroleum refineries and facilities with related operations to petroleum refineries when units exceed the applicable NOx or CO limits in Rule 1109.1.

Authority

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations pursuant to H&SC Sections 39002, 39616, 40000, 40001, 40440, 40702, 40725 through 40728, 40920.6, and 41508, as well as the federal Clean Air Act.

Clarity

PR 429.1 is written or displayed so that its meaning can be easily understood by the persons directly affected by them.

Consistency

PR 429.1 is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non-Duplication

PR 429.1 will not impose the same requirements as any existing state or federal regulations. The proposed rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

In adopting this rule, the following statutes which the South Coast AQMD hereby implements, interprets or makes specific are referenced: H&SC Sections 39002, 40001, 40702, 40440(a), and 40725 through 40728.5, and the federal Clean Air Act.

COMPARATIVE ANALYSIS

Under H&SC Section 40727.2, the South Coast AQMD is required to perform a comparative written analysis when adopting, amending, or repealing a rule or regulation. The comparative analysis is relative to existing federal air pollution control requirements, existing or proposed South Coast AQMD rules and regulations, and all air pollution control requirements and guidelines which are applicable to the same equipment or source type. A comparative analysis will be prepared and released at least 30 days prior to the South Coast AQMD Governing Board Hearing on PR 429.1, which is anticipated to be heard on November 5, 2021.