SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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

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TABLE OF CONTENTS

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 284 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, May 27, 2021, and September 15, 2021. In addition, a Public Workshop was 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). PR 429.1 is designed to meet the requirements for startup and shutdown provisions described in the 2015 SSM SIP Policy.

On September 30, 2021, U.S. EPA issued a guidance memorandum to withdraw the 2020 SSM SIP Policy and reinstate the 2015 SSM SIP Policy[1].

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)[2]. 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.

[1] 2021 SSM Guidance Memorandum | U.S. EPA
[2] 2015 SSM Policy | U.S. EPA

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 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)[3].

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.

NOx CONCENTRATION AND MASS EMISSIONS DURING STARTUP AND SHUTDOWN

NOx mass emissions for major NOx sources such as process heaters and boilers are calculated using a certified Continuous Emissions Monitoring System (CEMS). CEMS measures several variables to calculate the mass flow rate of NOx in units of lb/hour. Standard gas conditions are

[3] 2020 SSM Policy | U.S. EPA

defined as a gas temperature of 60°F and a gas pressure of 760 mm Hg (14.7 pounds per square inch) absolute. Table 1-1 contains the measured variables generally used to determine NOx mass emissions.

TABLE 1-1
NOx MASS EMISSIONS VARIABLES FOR CEMS CALCULATIONS

Measured Variables
1. Stack NOx concentration and exhaust flow rate; OR
2. Stack NOx concentration, O2 concentrations, and fuel rate

From the measured variables, an hourly mass emissions flow rate is calculated and total daily mass emissions from each source is reported. Fuel flow measuring devices can be used for approximating stack flow in conjunction with F-factors. Each CEMS is required to conduct semi-annual or annual assessment test of each CEMS known as a Relative Accuracy Test Audit (RATA).

Fundamentally, NOx mass emissions are calculated from the measured NOx concentration and measured stack gas volumetric flow rate. Alternatively, the stack gas volumetric flow rate can also be approximated from measured fuel flow rate for each type of fuel used. Below are general equations to determine NOx mass emissions.

NOx mass emissions are calculated according to the following:

lbs/hour = (Stack Gas Concentration) x (Stack Gas Volumetric Flow Rate) x (1.195×10^{-7})

- Stack Gas NOx concentration as measured in ppmvd
- Stack Gas Volumetric Flow Rate in dscfh

Alternatively, determination of stack flow rate from fuel flow is based on the following equation:

Stack Flow Rate = [20.9/(20.9 - O_2 concentration)] x (dry F-factor x Fuel flow rate x HHV)

- O_2 Concentration is measured at the stack in percent
- Oxygen based dry F-factor of the fuel in dscf/MMBtu
- Fuel flow rate*
- Higher heating value of fuel, HHV*

*The product of the fuel flow rate and HHV in MMBTU/hr

For any given NOx stationary combustion source such as process heaters or boilers with a low NOx permit limit of 5 ppmvd or less, it is understood and accepted that these low NOx levels are steady-state, controlled limits that are made possible by proper combustion and control technology operation. Startup and shutdown emissions on the other hand, are not steady-state emissions and fluctuate more compared to emissions under normal controlled operations. NOx emissions from refinery equipment are not well characterized during periods of startup and shutdown. These periods serve as transitional periods to help thermally stabilize the unit prior to and after full operation. For example, during startup and shutdown of combustion equipment, the temperature

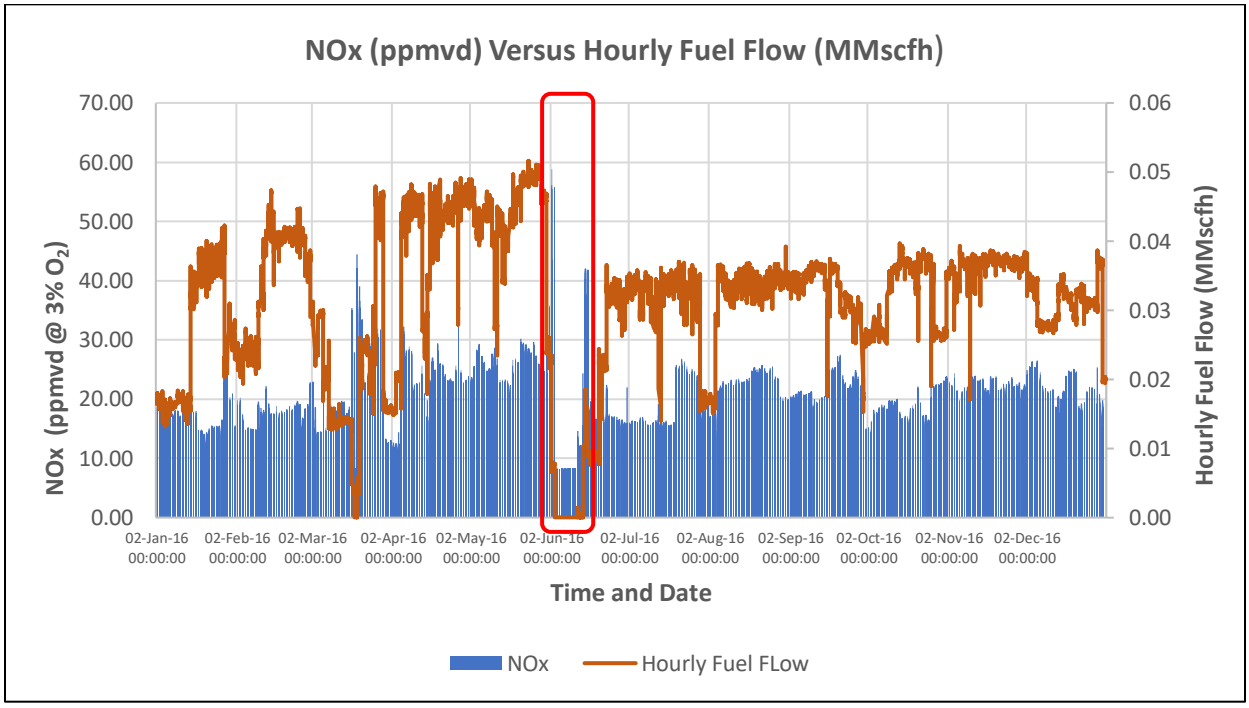
of the unit and/or associated controls is in transition and requires the addition of excess air. This process results in increased NOx formation. While NOx concentration can be higher than normal, this does not necessarily translate to higher NOx mass emissions since fuel rates are typically lower than normal operation since the units are not operating at full operational capacity. As mentioned earlier, a lower fuel rate will result in lower stack volumetric flow rate which is one of the factors in determining overall NOx mass emissions.

Below are two examples of startup/shutdown periods and associated NOx emissions for units equipped with NOx controls. The first example is of a process heater with low-NOx burners (LNB) only and the second example is of a boiler with a LNB and selective catalytic reduction (SCR).

Example One: 82 MMBtu/hr Process Heater with LNB

Figure 1-1 is an example of CEMS data that staff analyzed for a 82 MMBtu/hr process heater at a refinery equipped with LNB. To show relationship between NOx and fuel, the primary y-axis represents NOx emissions in ppmvd and secondary y-axis represents fuel flow in MMscfh. Based on CEMS data, staff identified several periods as potential startup/shutdown scenarios – typically characterized by the ramping down and up of fuel. According to the data there are instances of NOx excursions, but the corresponding fuel usage was dramatically lower, so overall NOx mass emissions was also lower. On average fuel usage can be up to 80% less than normal operation during these startup/shutdown periods. NOx excursions during these periods only occurred for short durations where the unit was in a transitional state. This excursion is expected since manufacturer guarantees for combustion control equipment performance are at steady-state operations and not transitional or startup/shutdown periods.

Figure 1-1 – CEMS and fuel data for 82 MMBtu/hr process heater at a refinery with low NOx burners



Please note the data analyzed by staff was raw unaudited CEMS data that was not annotated with events specifying startup or shutdown periods. Table 1-2 contains a sample NOx emissions calculation comparison based on the process heater in Example 1.

TABLE 1-2
NOx EMISSION CALCULATION FOR 82 MMBTU/HR PROCESS HEATER WITH LNB

	Steady-State Operation	Startup/Shutdown
NOx Concentration @ 3% O2 (ppmvd)	14.7	55.8
Hourly Fuel Flow (MMscfh)	0.03807	0.00738
HHV(Btu/scf)	1,294	1,220
Measured O_2 (%)	5.3	10.1
Calculated Stack Flow rate (dscfh)	574,853	151,760
NOx Emissions (lb/hr)	1.01	1.0009

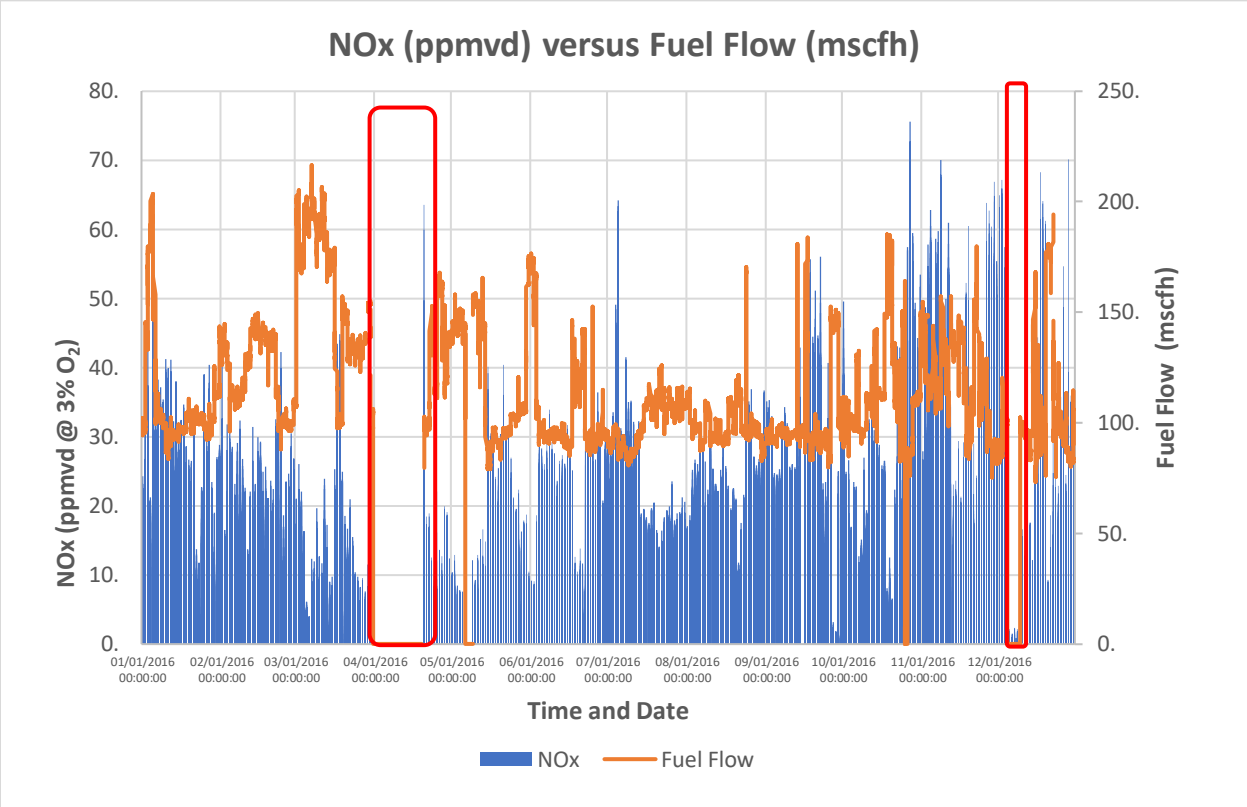
Based on the CEMS data for the example process heater with LNB only, the NOx concentration calculation during a potential startup/shutdown period does not necessarily equate to a higher mass emission of NOx. Other measured variables, such as flow rate also contribute to the overall calculation. In the example above, there was nearly four times more NOx based on concentration in ppmvd during the potential startup/shutdown period but the corresponding mass emission rate did not translate to four times more NOx mass emissions.

Example Two: 304 MMBtu/hr Boiler with LNB and SCR

NOx emissions for units equipped with NOx post-combustion control equipment such as SCR can potentially show a higher deviation in overall NOx mass emissions during startup/shutdown periods. This is primarily due to the SCR not being in optimal operation. Modern SCR designs can achieve up to 95% reduction and achieve very low NOx concentrations, however there is an optimal temperature range where the high NOx reduction can occur. If the unit is not at optimal temperature, the SCR cannot achieve maximum NOx reductions – general temperature window is approximately 550 ºF to 1000 ºF and will vary based on catalyst type and manufacturer. During startup periods the temperature of flue gas leaving the unit may not be high enough for optimal SCR performance and will require time to reach optimal temperature. Furthermore, older SCRs (installed in the early to mid-1990's) do not perform as well as modern SCR design and removal efficiencies can be lower in the 50 to 60% range.

Figure 1-2 is an example of CEMS data for a 304 MMBtu/hr boiler at a refinery with first generation LNB and an older SCR for NOx control. The boiler currently has a 0.015 lb/MMBtu NOx limit under RECLAIM. Similar to Example One above, the relationship between NOx and fuel is shown. The primary y-axis represents NOx emissions in ppmvd and secondary y-axis represents fuel flow in mscfh. Based on CEMS data, staff identified two periods as potential start-up/shutdown scenarios which are highlighted by the red boxes.

Figure 1-2 – CEMS and fuel data for 304 MMBtu/hr Boiler at a refinery with LNB and SCR



Based on the CEMS data that staff analyzed for the boiler, NOx concentrations can be up to three times as high during startup; this is expected since the SCR is not at optimal temperature for maximum NOx removal efficiency. However, this high NOx mass emission rate event only occurred for a limited amount of hours and is highlighted in yellow in Table 1-3 below. The assumption can be made that once the SCR reached optimal temperature and its proper operation was achieved, the NOx mass emission dropped by approximately 50% and if it was a modern or upgraded SCR, the reduction can be even greater within a short period of time.

TABLE 1-3
STARTUP PERIOD AND STEADY-STATE CEMS DATA FOR BOILER

Date/Time	NOx (ppmvd)	NOx @3% (ppmvd)	O2 (%)	Stack Flow (mscfh)	Fuel Flow (mscfh)	NOx (lbs/hr)	HHV 1 (Btu/scf)
STARTUP							
04/20/2016 12:59:59	9.598	36.712	6.825	1481.349	79.521	1.7	1423.098
04/20/2016 13:59:59	21.129	49.717	5.353	1718.691	101.182	4.4	1435.702
04/20/2016 14:59:59	29.847	63.514	5.128	1768.25	102.788	6.31	1473.157
04/20/2016 15:59:59	25.811	59.907	5.321	1679.679	97.276	5.18	1460.168
04/20/2016 16:59:59	12.956	29.501	5.277	1702.361	100.359	2.63	1438.495
04/20/2016 17:59:59	10.723	24.491	5.284	1698.026	102.195	2.18	1408.337
04/20/2016 18:59:59	10.726	24.23	5.259	1695.41	102.184	2.17	1408.552
04/20/2016 19:59:59	10.095	23.552	5.333	1661.187	101.33	2.01	1385.474
04/20/2016 20:59:59	7.772	20.083	5.584	1610.468	96.606	1.5	1385.709
04/20/2016 21:59:59	7.003	18.369	5.623	1602.834	97.491	1.34	1363.175
04/20/2016 22:59:59	6.758	17.679	5.616	1603.367	97.569	1.29	1363.398
12/09/2016 09:59:59	0.115	-79.615	21.026	0.	0.	0.	1278.705
12/09/2016 10:59:59	4.432	38.116	18.907	0.	0.	0.	1304.594
12/09/2016 11:59:59	20.721	55.371	14.264	0.	0.	0.	1309.392
12/09/2016 12:59:59	16.299	33.094	12.135	0.	0.	0.	1298.104
12/09/2016 13:59:59	47.855	52.797	4.685	1754.493	88.013	10.19	1301.049
12/09/2016 14:59:59	18.715	20.73	4.75	2043.689	101.386	4.58	1308.846
12/09/2016 15:59:59	11.314	12.767	5.048	1950.424	95.915	2.63	1296.179
12/09/2016 16:59:59	9.344	10.322	4.706	2047.318	102.413	2.29	1301.559

For comparison, the Table 1-4 below shows the typical NOx concentrations and NOx mass emissions during a period of normal steady-state operations for the boiler in Example 2.

TABLE 1-4
STEADY-STATE CEMS DATA FOR BOILER

Date/Time	NOx (ppmvd)	NOx @3% (ppmvd)	O2 (%)	Stack Flow (mscfh)	Fuel Flow (mscfh)	NOx (lbs/hr)	HHV 1 (Btu/scf)
STEADY-STATE							
09/18/2016 23:59:59	9.053	12.098	7.531	2280.177	85.121	2.47	1482.556
09/19/2016 00:59:59	9.202	12.271	7.502	2307.62	83.744	2.54	1541.083
09/19/2016 01:59:59	9.385	12.541	7.53	2318.878	83.332	2.6	1556.373
09/19/2016 02:59:59	9.106	12.166	7.527	2301.028	83.773	2.5	1520.396
09/19/2016 03:59:59	9.964	13.071	7.279	2294.182	87.997	2.74	1458.136
09/19/2016 04:59:59	10.639	13.766	7.089	2339.046	89.019	2.98	1511.721
09/19/2016 05:59:59	10.688	13.806	7.065	2311.644	89.495	2.95	1480.086
09/19/2016 06:59:59	10.701	13.815	7.057	2308.005	90.352	2.95	1451.861
09/19/2016 07:59:59	9.951	12.509	6.681	2362.826	95.677	2.81	1413.167
09/19/2016 08:59:59	9.533	12.254	6.997	2311.638	91.588	2.64	1411.058
09/19/2016 09:59:59	9.585	12.153	6.804	2402.644	93.827	2.75	1451.252
09/19/2016 10:59:59	9.451	11.988	6.809	2406.33	93.128	2.72	1463.91
09/19/2016 11:59:59	9.413	11.999	6.879	2400.68	92.648	2.7	1460.66
09/19/2016 12:59:59	10.827	13.748	6.824	2413.017	92.247	3.12	1480.524
09/19/2016 13:59:59	10.176	12.907	6.809	2398.985	93.444	2.92	1454.725
09/19/2016 14:59:59	9.626	12.206	6.805	2375.061	95.558	2.73	1409.008

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 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 284 units at 16 facilities that meet the applicability requirements of PR 429.1. Table 1-5 contains the equipment affected by PR 429.1.

TABLE 1-5
PR 429.1 AFFECTED EQUIPMENT

Equipment Type	Number of Units
Boilers and Process Heaters without NOx Post-Combustion Control Equipment	162
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 without NOx Post-Combustion Control Equipment or Castable Refractory	11
Vapor Incinerators with NOx Post-Combustion Control Equipment	0*
Vapor Incinerators with Castable Refractory	2

* There is a proposed SCR retrofit project

PUBLIC PROCESS

The development of PR 429.1 was 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, May 27, 2021, and September 15, 2021.

In addition, one Public Workshop was held on September 1, 2021. The purpose of the Public Workshop was to present the proposed rule language to the general public and to stakeholders and to solicit comments.

On September 10, 2021, staff held a joint study session with PR 1109.1 and associated rulemakings for stakeholders interested in better understanding the requirements and implementation of the proposed rules and proposed amended rules.

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 provide an exemption from Rule 1109.1 oxides of nitrogen (NOx) and carbon monoxide (CO) emission limits and applicable rolling average provisions during startup, shutdown, commissioning, and certain maintenance events and establish requirements during startup, shutdown, and certain maintenance events to limit NOx and CO emissions. 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)(7). 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.

- COMMISSIONING means the first commissioning of a unit, the first commissioning of NOx post-combustion control equipment, or electrical testing associated with upgrades or repairs of cogeneration gas turbines as required by North American Electric Reliability Corporation standards.

  This proposed definition provides clarification on a type of activity that is exempt from PR 1109.1 NOx and CO emission limits and applicable rolling average provisions pursuant to paragraph (d)(1) and exempt from the requirements in paragraph (d)(2).

- MINIMUM OPERATING TEMPERATURE means the minimum operating temperature specified by the manufacturer, unless otherwise defined in the South Coast AQMD Permit to Construct or Permit to Operate.

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

- NEW FACILITY means a facility that begins 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).[4]

- 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.

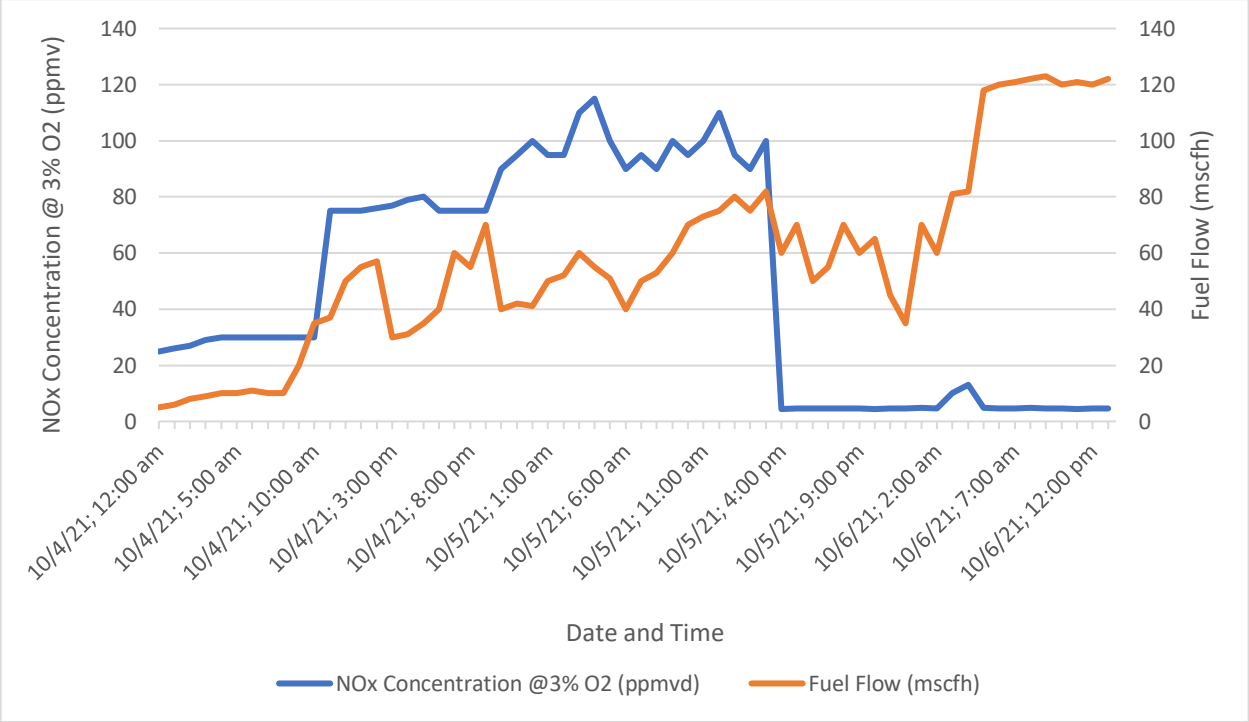
  Staff provides an example of when evaluating the time stable conditions are met is essential for determining compliance with the startup and shutdown duration limits specified in paragraph (d)(2) (Figure 2-1). This example was created by staff for clarification purposes and is not based on actual CEMS data. This example is for a process heater equipped with NOx post-combustion control equipment, which has a startup duration limit of 48 hours.

  In this example, startup begins on October 4, 2021, at 12:00 am. On October 5, 2021, at 4:00 pm the flue gas temperature reaches the minimum operating temperature of the NOx post-combustion control equipment, the NOx post-combustion equipment begins operating, and the Rule 1109.1 NOx concentration limit of 5 ppmv is met. The process heater took 40 hours to reach the minimum operating temperature of the NOx post-combustion control equipment and meet Rule 1109.1 concentration limits. The process heater continues to meet the 5 ppmv NOx concentration limit until October 6, 2021 at 3:00 am, where it is exceeds the

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

concentration limit for 2 hours, before meeting 5 ppmv NOx again on October 6, 2021 at 5:00 am when fuel flow stabilizes. In this example, the process heater used 42 hours of the 48-hour startup duration limit specified in paragraph (d)(2) and is in compliance with paragraph (d)(2). The 11 hours that the unit was meeting the Rule 1109.1 concentration limit before reaching stable fuel flow is not counted towards the startup duration limit pursuant to paragraph (d)(2).

Figure 2-1 – Startup Example for Process Heater with NOx Post-combustion Control Equipment



- 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 the unit 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 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).

One operator expressed concern with compliance and the time allotted for an FCCU startup where only combustion/circulation air is used to move catalyst prior to the startup of the unit and there are no products of combustion being produced. In this example, if no combustion is occurring where fuel is not being injected into the regenerator to initiate or sustain the heat up of the catalyst, then the relief set by PR 429.1 is not needed for this amount of time for this activity nor is the time to be deducted from the amount of time of relief established in PR 429.1.

- TUNING means adjusting, optimizing, rebalancing, or other similar operations to a gas turbine or an associated control device or otherwise as defined in a South Coast AQMD Permit to Construct or Permit to Operate. Tuning does not include normal operations to meet load fluctuations.

  This definition is from Rule 1134 and modified to include South Coast AQMD Permits to Construct.

- 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 to Operate 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.

- WATER FREEING means the procedure of gradually heating a unit to vaporize and remove any accumulated or condensed water in the unit during startup.

  This proposed definition describes an activity that is exempt from paragraph (d)(2) of PR 429.1 in subparagraph (g)(1)(D). Staff received comments from operators, that process heaters, such as FCCU feed pre-heaters, coker heaters, and crude unit heaters and associated equipment, may contain accumulated or condensed water which needs to be gradually boiled off so that the unit may be safely started up.

Subdivision (d) – Requirements

<u>Exemption from Rule 1109.1 Emission Limits During Startup, Shutdown, and Catalyst Maintenance</u>

Paragraph (d)(1) specifies that NOx and CO emission limits in Rule 1109.1 paragraphs (d)(3), (d)(4), Table 1, Table 2, Table 3, an approved B-Plan, or an approved B-Cap and the applicable rolling average provisions do not apply during startup, shutdown, maintenance for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct

maintenance, and catalyst maintenance events. An owner or operator is not subject to the emission limits in Rule 1109.1 and applicable rolling average provisions during tuning and commissioning, provided that a South Coast AQMD Permit to Construct or Permit to Operate specifies requirements during tuning and commissioning. While a Rule 1109.1 facility is still in RECLAIM, the NOx and CO emission limits and applicable rolling average provisions in Rule 1109.1 do not apply during startup, shutdown, and maintenance for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance, regardless of the length of time each event takes. If a unit has a permit condition limiting the time of startup, shutdown, or maintenance for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance, the unit is only exempt from the NOx and CO emission limits and applicable rolling average provisions in Rule 1109.1 for the time specified in the permit condition. While in RECLAIM, a Rule 1109.1 facility will continue to be required to reconcile emissions under the RECLAIM program during startup, shutdown, tuning, commissioning, and maintenance for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance. A Rule 1109.1 facility that has not exited RECLAIM is still subject to the NOx and CO emission limits and applicable rolling average provisions in PR 1109.1 during catalyst maintenance, unless the South Coast AQMD Hearing Board provides relief pursuant to a requested petition. A Rule 1109.1 facility, while in RECLAIM and once it exits RECLAIM, is required to take permit conditions which regulate tuning or commissioning in order to be exempt from the NOx and CO emission limits and applicable rolling average provisions in Rule 1109.1 during tuning or commissioning and is only exempt for the time specified in a South Coast AQMD Permit to Construct or Permit to Operate.

PR 429.1 specifies requirements during startup, shutdown, and catalyst maintenance once a facility exits RECLAIM. Requirements during tuning, commissioning, and maintenance for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance, will be addressed in South Coast AQMD permits; the unit is only exempt from the NOx and CO emission limits and applicable rolling average provisions in Rule 1109.1 for the time specified in the permit condition. Staff evaluated permits for units with a permit condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance to ensure that the permit requirements are collectively NAAQS protective. Once a facility exits RECLAIM, the startup and shutdown allowances specified in Table 1 (Table 2-1 in Staff Report) can be excluded from the applicable rolling average provision in PR 429.1, regardless of if PR 1109.1 emission limits were being met during startup or shutdown. If the startup or shutdown exceeds the duration limits allowed pursuant to Table 1, the owner or operator is subject to the emission limitations and applicable rolling average provisions in PR 1109.1. Refractory dryout and catalyst regeneration activities do not count towards the duration limits pursuant to paragraph (g)(1) and are not subject to the NOx and CO emission limits and applicable rolling average provisions in PR 1109.1; the unit is only exempt for the time specified in a permit condition, if applicable. Paragraph (d)(1) only provides an exemption for catalyst maintenance for a maximum of 200 hours, as subparagraph (d)(7)(A) limits use of a bypass to conduct catalyst maintenance to 200 hours in a rolling three-year cycle. Similarly, paragraph (d)(1) only provides an exemption for water freeing for a maximum of 24 hours, as specified in subparagraph (g)(1)(D). A unit operating only the pilot is not subject to the NOx and CO emission limits and applicable rolling average provisions in PR 1109.1 pursuant to PR 1109.1 paragraph (o)(7).

Startup and Shutdown Duration Limits

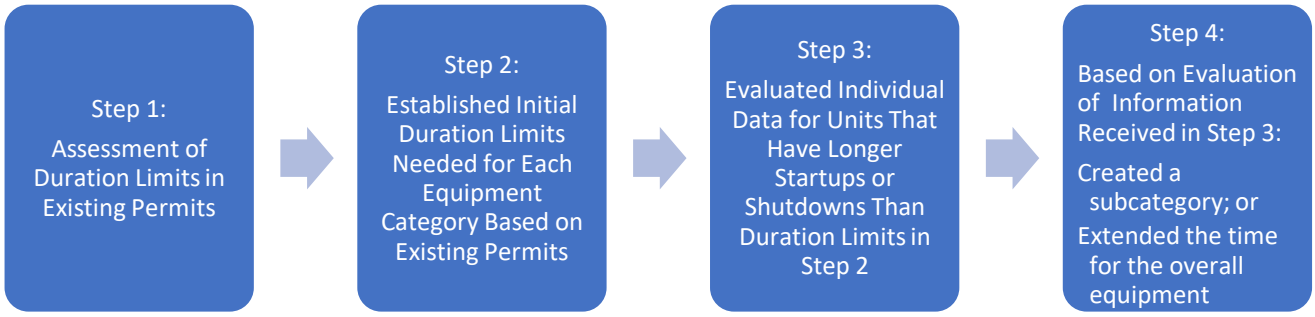
Paragraph (d)(2) includes Table 1 (Table 2-1 in Staff Report), which contains the startup and shutdown duration limits for units at former RECLAIM facilities and new facilities Startup and shutdown duration limits only apply when a unit exceeds the applicable NOx or CO concentration limits in PR 1109.1. 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. The duration limits in Table 1 specify the hour limitation for each individual startup or shutdown; it is not the combined time allowance for startup and shutdown. For example, a flare has 2 hours to startup and 2 hours to shutdown. PR 429.1 provides limited relief from the emission limits assigned per Rule 1109.1 for startup, shutdown and certain defined activities. If there are periods of time during these activities where emissions comply with the limits established in Rule 1109.1, then the limited relief is not needed for that amount of time in compliance nor is the compliant time to be deducted from the amount of time of relief established in PR 429.1.

TABLE 2-1
STARTUP AND SHUTDOWN DURATION LIMITS

Unit Type	Time Allowance (Hours)
Boilers and Gas Turbines without NOx Post-Combustion Control Equipment, Flares, Vapor Incinerators without NOx Post-Combustion Control Equipment or Castable Refractory	2
Gas Turbines with NOx Post-Combustion Control Equipment	4
Vapor Incinerators with NOx Post-Combustion Control Equipment, Vapor Incinerators with Castable Refractory	20
Process Heaters without NOx Post-Combustion Control Equipment	24
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
FCCU Feed Pre-Heater	90
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 2-2). 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 2-2 – Duration Limit Assessment



Best Management Practices

Best management practices are contained in subparagraph (d)(2)(A). 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

Paragraph (d)(3) limits 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. The number of scheduled startups allowed for each unit per calendar year is specified in Table 2 (Table 2-2 in Staff Report).

TABLE 2-2
MAXIMUM NUMBER OF SCHEDULED STARTUPS

Unit Type	Maximum Number of Scheduled Startups per Calendar Year
Cogeneration Gas Turbines	10
Process Heaters on Delayed Coking Units	5
All Other Units	2

General Duty Requirements

Paragraph (d)(4) was modified from an existing Rule 429 provision and requires that an owner or operator of a unit at a former RECLAIM facility or a new facility that exceeds applicable PR 1109.1 NOx and CO emission limits during startup, shutdown, maintenance for units with a South Coast AQMD Permit to Operate condition before [*Date of Adoption*] which allows the use of a bypass to conduct maintenance, catalyst maintenance, tuning, and commissioning 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)(5) 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)(6) 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 and the temperature is stable. 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)(7) specifies requirements for an owner or operator of a unit at a former RECLAIM facility 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*]. If a permit contains more stringent requirements than PR 429.1, the more stringent permit requirements will continue to be applicable.

Subparagraph (d)(7)(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)(7)(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)(7)(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, catalyst used in a NOx combustion control equipment could be conditioned, repaired, or replaced every three years under subparagraph (d)(7)(B). Three years is a conservative estimate of catalyst life; catalysts typically need to be replaced every 3-6 years.

Subparagraph (d)(7)(C) specifies that the process unit must be operated at 50% of the rated heat input capacity of the process unit or less when the NOx post-combustion control equipment is bypassed. PR 429.1 refers to the definition of rated heat input capacity in Rule 1109.1. Staff established the percentage of rated heat input capacity based on information provided by stakeholders of minimum safe operating rates. Subparagraph (d)(7)(C) is included to reduce emissions by lowering the rate that a process unit is operating at when using a bypass to conduct catalyst maintenance.

Subparagraph (d)(7)(D) 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 to 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)(7)(E) 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 by a contractor approved under the South Coast AQMD Laboratory Approval Program (LAP) if emissions cannot be monitored by a certified CEMS.

Paragraph (d)(7) 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)(7) does not apply. For example, if a situation arose where the ammonia injection system associated with the NOx post-combustion control equipment were to stop working and require repair, this situation is not covered under this provision. Rather, South Coast AQMD Rule 430 – Breakdown Provisions (Rule 430), may provide relief from rules or permit conditions during breakdowns as long as specific conditions and requirements are met or the owner or operator may seek additional relief through the Hearing Board process.

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 facility or a new facility. 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, tuning, commissioning, and water freeing event. An operating log may also contain but is not limited to operator signed-off procedures and graphical trends showing key variables of the unit such as temperatures and flow rates. Staff notes that it is the responsibility of the operator to demonstrate to the Executive Officer and their representative that compliance with duration limits or with specified exempt activities under PR 429.1 is met. 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)(7)(E).

Paragraph (f)(2) requires an owner or operator of a unit at a former RECLAIM facility or a new facility 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, unless the South Coast AQMD Permit to Construct or Permit to Operate specifies the required 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, and commissioning, and a maximum of 24 hours for water freeing a unit. Temperatures are not high enough for NOx post-combustion control equipment to be effective during refractory dryouts, catalyst regeneration activities, and water freeing. Furthermore, refractory dryouts and catalyst regeneration activities are infrequent processes during which the expected mass emissions of NOx are low. The expected mass emissions during water freeing are also low and stakeholders expressed that there are significant safety issues associated with starting up too quickly without properly removing condensed water from the unit. The safety issues include concern of the potential rapid vaporization of liquid water in parts of the unit where such a large volume expansion may damage equipment. The exemption from startup and shutdown duration limits during water freeing is limited to 24 hours. 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. Electrical testing for cogeneration turbines is required by the North American Electric Reliability Corporation, and specific conditions will be required by South Coast AQMD's Engineering and Permitting Division.

Paragraph (g)(2) exempts units equipped with a NOx post-combustion control equipment from the catalyst maintenance requirements in paragraph (d)(7) 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.

Paragraph (g)(3) exempts units burning fuel exclusively in a pilot light from the startup and shutdown duration limits contained in paragraph (d)(2) and recordkeeping requirements specified in paragraph (f)(1). Fuel burned in a pilot light contributes relatively minimal emissions and is not the primary NOx emission source in combustion equipment.

CHAPTER 3: IMPACT ASSESSMENTS

INTRODUCTION

COSTS

EMISSION REDUCTIONS

COST-EFFECTIVENESS

INCREMENTAL COST-EFFECTIVENESS

SOCIOECONOMIC ASSESSMENT

CALIFORNIA ENVIRONMENTAL QUALITY ACT ANALYSIS

DRAFT FINDINGS UNDER CALIFORNIA HEATH AND SAFETY CODE SECTION 40727

COMPARATIVE ANALYSIS

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 and incremental cost-effectiveness analysis were evaluated during rule development of PR 429.1. Staff prepared an assessment of emission reductions, a socioeconomic assessment, and a California Environmental Quality Act (CEQA) analysis. Draft findings and comparative analyses were prepared pursuant to California Health and Safety Code Section (H&SC) 40727 and H&SC 40727.2, respectively.

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 prepared 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 contains the environmental analysis required by CEQA Guidelines Section 15187 and tiers 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 was released for a 46-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 is presented below in Table 3-1.

TABLE 3-1
PR 429.1 COMPARATIVE ANALYSIS

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
Applicability	Units at petroleum refineries and facilities with related operations to petroleum refineries	Units at petroleum refineries and facilities with related operations to petroleum refineries	Facilities up until January 5, 2018, unless otherwise exempted, if emission fee data for 1990 or any subsequent year filed pursuant to Rule 301, shows 4 or more tons per year of NOx or SOx emissions	Fluid catalytic cracking unit catalyst regenerators, fuel gas combustion devices, and all Claus sulfur recovery plants except Claus plants with a design capacity for sulfur feed of 20 long tons per day or less.	Fluid catalytic cracking units (FCCU), fluid coking units (FCU), delayed coking units, fuel gas combustion devices (including process heaters), flares and sulfur recovery plants.	Gas turbines with heat input of ≥ 10 MMBtu/hr that commenced construction, modification or re-construction on or before 2/18/2005	Gas turbines with heat input of ≥ 10 MMBtu/hr that commenced construction, modification or re-construction after 2/18/2005	Steam generating units that commenced construction, modification, or re-construction after 6/19/1984 and that has a heat input capacity of >29 MW (100 MMBtu/hr)	Steam generating units that commenced construction, modification, or re-construction after 6/9/1989 and that has a heat input capacity of 29 MW or less, but ≥ 2.9 MW (10 MMBtu/Hr)	Sulfuric acid production units	Sulfuric acid production units that commenced construction or modification after 8/17/1971
Requirements	Startup and shutdown duration limits: • Boilers and Gas Turbines without NOx Post-Combustion Control Equipment, Flares, Vapor Incinerators without NOx Post-Combustion Control	Emission limits: • Boilers <40 MMBtu/hr: 5 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average • Boilers ≥ 40 MMBtu/hr:5 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour	• Comply with all applicable rules and permit conditions as specified in the Facility Permit • Prohibition of emissions in excess of annual allocation • Modeling if actual NOx or	FCCU catalyst regenerators: • Particulate matter (PM) limit: 1.0 kg/Mg of coke burn-off in the catalyst regenerator	All emission limits are dry @ 0% excess air: ○ FCCU & FCU: • PM: 1 g/kg coke burn-off for modified or reconstructed FCCU & FCU; 0.5 g/kg coke burn-off for newly constructed FCCU • NOx: 80 ppmv, 7-day rolling average • SO_2: 50 ppmv, 7-day rolling average; 25 ppmv, 365-day rolling average	NOx limit @ 15% O_2, where Y = Manufacture's rated heat input and F = NOx emission allowance for fuel-bound nitrogen:	NOx limit @ 15% O_2: • ≤ 50 MMBtu/hr – 42 ppm new, firing natural gas, electric generating • ≤ 50 MMBtu – 100 ppm new, firing natural gas, mechanical drive	SO_2 limits (30-day rolling average, except as provided in paragraph (f), apply at all times including SSM, except as provided in paragraph (i)* of this section and §60.45b(a)): • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that combusts coal or oil: 87 ng/J or 10% of the potential SO_2 emission rate and $E_s = \frac{(K_a H_a + K_b H_b)}{(H_a + H_b)}$	SO_2 limits (30-day rolling average, apply at all times including startup, shutdown, and malfunction): • Affected facility that combusts only coal or	H_2SO_4 mist limit: 0.25 grams of H_2SO_4 mist (as measured by EPA Reference Method 8 of appendix	SO_2 limit: 2 kg per metric ton of acid produced, the production being expressed as 100% H_2SO_4

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
	Equipment or Castable Refractory – 2 hours • Gas Turbines with NOx Post-Combustion Control Equipment – 4 hours • Vapor Incinerators with NOx Post-Combustion Control Equipment, Vapor Incinerators with Castable Refractory – 20 hours • Process Heaters without NOx Post-Combustion Control Equipment – 24 hours • Boilers and Process Heaters with NOx Post-Combustion Control Equipment, Steam Methane Reformer Heaters, Sulfuric Acid Furnace – 48 hours • Steam Methane Reformer with Gas Turbine – 60 hours	rolling average • Flares: 20 ppmv NOx and 400 ppmv CO @3% O_2, 2 hour rolling average • FCCU (@ 3% O_2): 2 ppmv NOx and 500 ppmv CO (365 day rolling average); and 5 ppmv NOx and 500 ppmv CO (7 day rolling average) • Gas Turbines (@15% O_2, 24 hour rolling average): 2 ppmv NOx for natural gas units, 3 ppmv NOx for gaseous fuel other than natural gas; and 130 ppmv CO • Petroleum Coke Calciner (@ 3% O_2): 5 ppmv NOx (365 day rolling average); and 10 ppmv NOx (7 day rolling average); and 2000 ppmv CO	SOx emissions exceed its initial allocation by ≥ 40 tons per year • Effective 11/15/1998 each new, modified, and existing electric utility and industrial and commercial boiler which emits > 25 tons per year of NOx shall burn as its primary fuel natural gas, methanol, or ethanol (or a comparably low polluting fuel); or use advanced control technology Emission Limits: • FCCU – 25 ppm SOx, dry @ 0% oxygen on a 365- day rolling average Emission Factors NOx: • Refinery boiler >40	• Opacity limit: >30% except for one six-minute averaging opacity reading in any one hour period • CO limit: 500 ppmv (dry basis) • Comply with one of the following conditions (7-day rolling average): with an add-on control device reduce SO_2 emissions by 90% or maintain at ≤ 50 ppmv, whichever is less stringent; without the use of a control device, maintain SO_2 emissions at ≤ 9.8	• CO: 500 ppmv, hourly average ○ Sulfur recovery plant (emission limits do not apply during maintenance of the sulfur pit, not to exceed 240 hours/year): • SO_2 limit for > 20 LTD with oxidation or reduction control system followed by incineration: $E_{LS} = k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)$; 250 ppmv for Claus units that use only ambient air or elect not to monitor O_2 or for non-Claus • > 20 LTD with reduction control system not followed by incineration: SO_2 $E_{LS} = k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)$; 300 ppmv SO_2 for Claus units that use only ambient air or non-Claus; 10 ppmv H_2S • SO_2 limit ≤ 20 LTD with oxidation or reduction control system followed by incineration: $E_{SS} = k_1 \times (-0.38 \times (\%O_2)^2 + 115.3 \times \%O_2 + 256)$; 2500 ppmv for Claus units that use only ambient air or elect not to monitor O_2 or for non-Claus • ≤ 20 LTD with reduction control system not followed by incineration: SO_2 $E_{SS} = k_1 \times (-0.38 \times (\%O_2)^2 + 115.3 \times \%O_2 + 256)$;	• 0.0075* (14.4/Y) +F • 0.0150* (14.4/Y) +F SO_2 limit @15% O2: • 0.015% by volume	• > 50 MMBtu/hr and ≤ 850 MMBtu/hr – 25 ppm new, firing natural gas • >850 MMBtu/hr – 15 ppm new, modified, or reconstructed, firing natural gas • ≤ 50 MMBtu/hr – 96 ppm new, firing fuels other than natural gas, electric generating • ≤ 50 MMBtu/hr – 150 ppm new, firing fuels other than natural gas, mechanical drive • > 50 MMBtu/hr and ≤ 850 MMBtu/hr – 74 ppm new, firing fuels other than natural gas • >850 MMBtu/hr	• Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that combusts coal refuse alone in a fluidized bed combustion steam generating unit: 87 ng/J or 20% of the potential SO_2 emission rate and 520 ng/J heat input • Affected facility that combusts coal or oil, either alone or in combination with any other fuel, and that uses an emerging technology to control SO_2: 50% of the potential SO_2 emission rate and $E_s = \frac{(K_c H_c + K_d H_d)}{(H_c + H_d)}$ • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that: have an annual capacity factor for coal and oil of ≤30% and a federally enforceable permit limiting operation; is located in a noncontinental area; combusts coal and oil, alone or in combination with a duct burner as part of a combined cycle system where ≤30% of the heat entering the steam generating unit is from combustion of coal and oil in the duct burner and ≥70% of the heat entering the steam generating unit is from the exhaust gases entering the duct burner; or burns coke oven gas alone or in combination with natural gas or very low sulfur distillate oil: 520 ng/J if the facility combusts coal or 215	coal with coal refuse: 87 ng/J (0.20 lb/MMBTU) heat input or 10% of the potential SO_2 emission rate and 520 ng/J (1.2 lb/MMBtu) heat input • Affected facility that combusts coal or coal refuse with other fuels: 87 ng/J (0.20 lb/MMBTU) heat input or 10% of the potential SO_2 emission rate and $E_s = \frac{(K_c H_c + K_b H_b + K_d H_d)}{(H_c + H_b + H_d)}$ • Affected facility that combusts only coal refuse alone in a fluidized bed combustion steam generating unit: 87 ng/J (0.20 lb/MMBTU) heat input or 20% of the potential SO_2 emission rate and 520 ng/J (1.2	A of this part) per kilogram of H_2SO_4 produced, the production being expressed as 100% H_2SO_4	Acid mist standards: • H_2SO_4 limit of 0.075 kg per metric ton of acid produced, the production being expressed as 100% H_2SO_4 • Opacity limit of 10%

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	• FCCU Feed Pre-Heater – 90 hours • FCCU, Petroleum Coke Calciner, SRU/TG Incinerators – 120 hours Scheduled startup limits per calendar year for each unit: • Cogeneration gas turbine– 10 • Process heaters on delayed coking units– 5 • All other units – 2 Work practice requirements: • Take all reasonable and prudent steps to minimize emissions during startup and shutdown, maintenance for units with a South Coast AQMD Permit to Operate condition before [Date of Adoption] which allows the use of a bypass to conduct	• Process Heaters <40 MMBtu/hr: 9 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average • Process Heaters ≥ 40MMBtu/hr: 5 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average • SRU/TG Incinerators: 30 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average • SMR Heaters: :5 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average • SMR Heater with Gas Turbine: 5 ppmv NOx and 130 ppmv CO @15% O_2, 24 hour rolling average • Sulfuric Acid Furnace:	MMBtu/hr – 2 ppm • FCCU – 2 ppm • Gas turbines – 2 ppm • Calciner – 10 ppm • SRU/TG unit – 95% reduction, 2 ppm Emission Standards SOx: • Calciner – 10 ppmv • FCCU – 5 ppmv • Refinery boiler/heater – 40 ppmv • SRU/TG unit – 5 ppmv • Sulfuric acid manufacturing – 10 ppmv	kg/Mg coke burn-off; or process in the FCCU fresh feed that has a sulfur content ≤ 0.30% by weight All units: • H_2S limit:230 mg/dscm Claus sulfur recovery plant: • For an oxidation control system or a reduction control system followed by incineration, SO_2 limit: 250 ppm by volume (dry basis at 0% excess air) • For a reduction control system not followed	3000 ppmv SO_2 for Claus units that use only ambient air or for non-Claus; 100 ppmv H_2S ○ Fuel gas combustion devices: • 20 ppmv SO_2 (3-hour rolling average) and 8 ppmv SO_2 (365 day rolling average) or 162 ppmv H_2S (3 hour rolling average) and 60 ppmv H_2S (365 day rolling average) • Process heaters > 40 MMBtu/hr (30 day rolling average): 40 ppmv or 0.040 lb/MMBtu for natural draft process heaters; 60 ppmv or 0.060 lb/MMBtu for forced draft process heaters; 150 ppmv or Equation 3 for co-fired natural draft process heaters; 150 ppmv or Equation 4 for co-fired forced draft process heaters ○ Flare: 162 ppmv H_2S, 3 hour rolling average Flare management plan, root cause and corrective analysis, implement corrective actions, depressure delayed coking units to ≤ 5 psig prior to discharging exhaust		– 42 ppm new, modified, or reconstructed, firing fuels other than natural gas • ≤ 50 MMBtu/hr – 150 ppm modified or reconstructed • > 50 MMBtu/hr and ≤ 850 MMBtu/hr – 42 ppm modified or reconstructed, firing natural gas • > 50 MMBtu/hr and ≤ 850 MMBtu/hr – 96 ppm modified or reconstructed, firing fuels other than natural gas SO_2 limit: • 110 ng/J • 65 ng/J for turbines burning at least 50% biogas in a calendar month	ng/J if the facility combusts oil other than very low sulfur oil • Affected facility that commenced construction, reconstruction, or modification after February 28, 2005 and that combusts coal, oil, natural gas, a mixture of these fuels, or a mixture of these fuels with any other fuels: 87 ng/J or 8% of the potential SO2 emissions and 520 ng/J * An affected facility subject to paragraph (a), (b), or (c) of this section may combust very low sulfur oil or natural gas when the SO_2 control system is not being operated because of malfunction or maintenance of the SO_2 control system Facilities burning coke oven gas alone or in combination with any other gaseous fuels or distillate oil are allowed to exceed the limit 30 operating days per calendar year for SO_2 control system maintenance. PM and Opacity Limits (apply at all times except startup, shutdown, or malfunction, 24 hour average): • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 and that combusts coal or combusts mixtures of coal with other fuels: 22 ng/J (only coal or if the affected facility combusts coal and other fuels	lb/MMBtu) heat input • Affected facility that combusts only coal and that uses an emerging technology for the control of SO_2 emissions: 50% of the potential SO_2 emission rate and 260 ng/J (0.60 lb/MMBtu) heat input • Affected facility that combusts coal with other fuels and that uses an emerging technology for the control of SO_2 emissions: 50% of the potential SO_2 emission rate and $E_s = \frac{(K_a H_a + K_b H_b + K_c H_c)}{(H_a + H_b + H_c)}$ • Affected facility that combusts coal alone or in combination with another fuel that has		

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	maintenance, catalyst maintenance, tuning, and commissioning • Operate NOx post-combustion control equipment if the temperature to the gas at the inlet of the NOx post-combustion control equipment is ≥ the minimum operating temperature Install and maintain a calibrated temperature measuring device on all units with NOx post-combustion control equipment Units with a bypass stack or duct by [Date of Adoption] that elects to use a bypass to conduct catalyst maintenance: shall not use a bypass if the unit is scheduled to	30 ppmv NOx and 400 ppmv CO @3% O_2, 365 day rolling average • Vapor Incinerators: 30 ppmv NOx and 400 ppmv CO @3% O_2, 24 hour rolling average		by incineration: limits of 300 ppm by volume of reduced sulfur compounds and 10 ppm by volume of hydrogen sulfide (H_2S), each calculated as ppm SO_2 by volume (dry basis at 0% excess air)			Operate and maintain stationary combustion turbine, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction.	and has an annual capacity factor for the other fuels of ≤10%), 43 ng/J (affected facility combusts coal and other fuels and has an annual capacity factor for the other fuels > 10 percent% and is subject to a federally enforceable requirement), 86 ng/J (combusts coal or other fuels and has an annual capacity factor for coal or coal and other fuels of ≤30%, has a maximum heat input of ≤73 MW, has a federally enforceable limit ,construction of the affected facility commenced after June 19, 1984, and before November 25, 1986) • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that combusts oil (or mixture of oil with other fuels) and uses a SO2 control technology: 43 ng/J • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that combusts wood, or wood with other fuels, except coal: 43 ng/J (annual capacity factor >30% for wood) or 86 ng/J (annual capacity factor ≤30% for wood and subject to a federally enforceable annual capacity limit and a heat input capacity of ≤73 MW) • Affected facility that combusts municipal-type solid waste or mixtures of municipal-type solid waste with other fuels: 43 ng/J (only	a heat input capacity of ≤ 22 MW, is subject to a federally enforceable requirement of an annual capacity factor for coal of ≤55%, located in a noncontinental area, or combusts coal in a duct burner as part of a combined cycle system where ≤30% of the heat entering the steam generating unit is from combustion of coal in the duct burner and ≥70% of the heat entering the steam generating unit is from exhaust gases entering the duct burner: $E_s = \frac{(K_a H_a + K_b H_b + K_c H_c)}{(H_a + H_b + H_c)}$ PM and Opacity Limits		

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	operate for <5 years between planned maintenance shutdowns, shall not use a bypass to conduct catalyst maintenance for more than 200 hours in a rolling 3 year cycle, operate the process unit at 50% of the rated heat input capacity or less; notification, continuous monitoring							municipal-type solid waste or combusts municipal type solid waste and other fuels and has an annual capacity factor for the other fuels of ≤10%), 86 ng/J (has an annual capacity factor for municipal-type solid waste and other fuels of ≤ 30%, a maximum heat input of ≤ 73 MW, a federally enforceable annual capacity limit, and construction of the affected facility commenced after June 19, 1984, but on or before November 25, 1986) • Affected facility that combusts coal, oil, wood, or mixture of these fuels with other fuels: 20% opacity (6 minute average) • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005 that combusts coal, oil, wood, a mixture of these fuels, or a mixture of these fuels with any other fuels except as provided in paragraphs (h)(2), (h)(3), (h)(4), (h)(5), and (h)(6): 13 ng/J NOx limits (apply at all times including startup, shutdown, and malfunction, 30-day rolling average, except as provided in paragraph (j)): • Natural gas and distillate oil, except duct burners in combined cycle systems: 43 ng/J (low heat release), 86 ng/J (high heat release) • Residual Oil: 130 ng/J (low heat release), 170 ng/J (high heat release)	(apply at all times except during startup, shutdown, and malfunction): • Affected facility that commenced construction, reconstruction, or modification on or before February 28, 2005, combusts coal or coal with other fuels, a heat input capacity ≥ 8.7 MW: 22 ng/J PM (annual capacity factor for the other fuels of 10% or less) or 43 ng/J PM(annual capacity factor for the other fuels >10%, and subject to a federally enforceable requirement) • Affected facility that commenced construction, reconstructio		

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								• Coal: 210 ng/J (mass-feed stoker), 260 ng/J (spreader stoker and fluidized bed combustion), 300 ng/J (pulverized coal), 260 ng/J (Lignite), 340 ng/J (Lignite mined in North Dakota, South Dakota or Montana and combusted in a slag tap furnace), 210 ng/J (coal-derived synthetic fuels) • Duct burner in a combined cycle system: 86 ng/J (natural gas and distillate oil), 170 ng/J (residual oil) • Simultaneous combustion of mixtures of only coal, oil, or natural gas $E_s = \frac{(EL_p H_{pd}) + (EL_w H_w) + (EL_s H_s)}{(H_{pd} + H_w + H_s)}$ • Affected facility that simultaneously combusts coal or oil, natural gas (or any combination of the three), and wood, or any other fuel: Emission limit pursuant to paragraph (a) or (b) • Affected facility that simultaneously combusts natural gas and/or distillate oil with a potential SO2 emissions rate of ≤26 ng/J with wood, municipal-type solid waste, or other solid fuel, except coal: 130 ng/J • Affected facility that commenced construction after July 9, 1997: 86 ng/J (combusts coal, oil, or natural gas, or any combination of the three)	n, or modification on or before February 28, 2005, combusts wood or wood with other fuels (except coal), a heat input capacity ≥ 8.7 MW: 43 ng/J PM (annual capacity factor for wood >30%) or 130 ng/J PM (annual capacity factor for wood ≤ 30% and federally enforceable limit) • Affected facility that combusts coal, wood or oil, a heat input capacity ≥ 8.7 MW: 20% opacity (6 minute average) • Affected facility that commenced construction, reconstruction, or modification on or before		

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
									February 28, 2005, combusts wood, oil, coal, or a mixture of these fuels, wood with other fuels with any other fuels, a heat input capacity ≥ 8.7 MW: 13 ng/J PM		
Monitoring	Continuous monitoring with a certified CEMS or a Laboratory Approval Program approved contractor is required if bypassing NOx post-combustion control equipment for catalyst maintenance	Continuous monitoring with a certified CEMS (as specified in Rules 218.2 and 218.3) to measure NOx and O2 for units ≥40 MMBtu/hr and sulfuric acid furnaces. Unit with CO CEMS are required to be certified and operated in compliance with Rules 218.2 and 218.3. Units without a CEMS must conduct source tests for units without ammonia emissions in	• Continuous monitoring device for each as specified in Rule 2012, Appendix A and Rule 2011, Appendix A for each major NOx or SOx source • Source testing every 6 months for major NOx sources at a Super Compliant NOx facility which is reclassified as a large NOx source • Source testing every 12 months (units with emission rates) and	• Initial performance test for all units and daily performance test for FCCU catalyst regenerators (7-day average) • Test methods: 5B, 5F, 9, 2, 3B, 11, 15, 15A,16, 6, 6C, 3, 3A,4, 8, 1, ASTM D129–64, 78, or 95, ASTM D1552–83 or 95, ASTM D2622–87, 94, or 98, or ASTM	• Initial performance test • Test methods: Method 1 of Appendix A-1 to part 60, Method 2 of appendix A-1 to part 60, Method 3, 3A, or 3B of appendix A-2 to part 60, Method 5, 5B, or 5F of appendix A-3 to part 60, Method 7, 7A, 7C,7D or 7E of appendix A-4 to part 60, Method 10, 10A, or 10B of appendix A-4 to part 60, Method 6, 6A, or 6C of appendix A-4 to part 60, Method 15 or 15A of appendix A-5 to part 60, Method 16 of appendix A-6 to part 60, Method 11, Method 18 of appendix A-6 to part 60, ASTM D1945–03, ASTM D1946–90, ASTM D6420–99, GPA 2261–00, ASTM UOP539–97, EPA Method 2, 2A, 2B, 2C or 2D of appendix A–2 to part 60, ASME	• Performance test using either: EPA Method 20; ASTM D6522-00; EPA Method 7E and either EPA Method 3 or 3A; sampling traverse points following Method 20 or Method 1, and sampled for equal time intervals • A continuous	• Initial performance test • Test methods: EPA Methods 7E and 3A, EPA Method 20, EPA Method 19 • A continuous monitoring system to monitor and record the fuel consumption and the ratio of water or steam to fuel or CEMS for stationary gas turbines using water or steam injection	• Performance tests • Test Methods: Method 19, Method 3A or 3B, Method 5, 5B, or 17, Method 5, Method 17, Method 1, Method 9, Method 7E, Method 7,7A, 7E, Method 320 • Quarterly accuracy determinations and daily calibration drift tests for CEMS • SO_2 CEMS except as provided in paragraphs (b) and (f) • Continuous opacity monitoring systems (COMS)	• Initial performance test • Test Methods for PM: Method 1, Method 3A or 3B, Method 5, 5B, or 17, Method 9 • CEMS for measuring SO_2 and either O_2 or CO2 at the outlet of the SO_2 control device (or unit if there is no control device); 1 hour average • Quarterly accuracy determinations and daily calibration drift tests • COMS	None	• Performance test • Test Methods: Method 8, Method 9, Method 3 • Continuous monitoring system for SO_2.

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
		the exhaust (vapor incinerators <40 MMBtu/hr and flares: every 36 months; all other units without NOx or CO CEMS : quarterly; units with NOx CEMS and without CO CEMS: every 12 months; units without NOx CEMS and with CO CEMS: quarterly) and with ammonia emissions in the exhaust (units without NOx, CO, or ammonia CEMS: quarterly; units with NOx CEMS and without CO and ammonia CEMS: quarterly; units with NOx and CO CEMS and without ammonia CEMS: quarterly; units with	every 6 months (units with concentration limits) for major SOx sources at a Super Compliant SOx facility which is reclassified as a SOx process unit • Source testing shall comply with District Source Test Methods 1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 4.1, 6.1, 7.1, 307-91, and 100.1; ASTM Methods D3588-91, D4891-89, D1945-81, D4294-90, and D2622-92; and EPA Method 19 • Source testing once every 3 years for large NOx sources • Source testing once every 5 years for NOx process units	D1266–87, 91, or 98. • Continuous monitoring systems (7 day rolling average)	MFC–3M–2004, ANSI/ASME MFC–4M–1986, ASME MFC–6M–1998, ASME/ANSI MFC–7M–1987, ASME MFC–11M–2006, ASME MFC–14M–2003, ASME MFC–18M–2001, AGA Report No. 3, Part 1, AGA Report No. 3, Part 2, AGA Report No. 11, AGA Report No. 7, API Manual of Petroleum Measurement Standards, Chapter 22, Section 2, ANSI/ASME–MFC–5M–1985, ASME/ANSI MFC–9M–1988, ASME MFC–16–2007, ASME MFC–22–2007, ISO 8316, ASTM D240–02, ASTM D1826–94, ASTM D1945–03, ASTM D1946–90, ASTM D3588–98, ASTM D4809–06, ASTM D4891–89, GPA 2172–09 • FCCU & FCU subject to a PM limit: continuous parameter monitor systems, bag leak detection system, CEMS, or an instrument for continuously monitoring the opacity of emissions • FCCU & FCU subject to NOx, SO_2 or CO limit: CEMS • Sulfur recovery plants subject to SO_2, reduced sulfur compounds, or H_2S limit: CEMS	monitoring system to monitor and record the fuel consumption and the ratio of water or steam to fuel (averaged over one hour) or CEMS consisting of NOx and O2 monitors for stationary gas turbines that commenced construction, reconstruction, or modification after October 3, 1977, but before July 8, 2004, and which uses water or steam injection to control NOx emissions (averaged	(hourly average) • Annual performance tests or continuous monitoring for turbines without water or steam injection. • Monitor the total sulfur content of the fuel being fired.				

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
		NOx and ammonia CEMS and without CO CEMS: every 12 months; units with ammonia CEMS and without NOx or CO CEMS: quarterly. Source test methods: South Coast AQMD methods 100.1, 7.1, 10.1, 207.1, any other approved test method determined to be equivalent and approved by the Executive Officer and either the California Air Resources Board or U.S. EPA. Diagnostic emissions checks pursuant to South Coast AQMD Combustion Gas Periodic Monitoring Protocol every 365 days or 8760 operating			• Fuel gas combustion devices subject to a SO_2 or H_2S limit: CEMS • Flare with H_2S limit: CEMS • Process heaters with a NOx limit: CEMS • Process heaters with a mass based or heating value based limit NOx limit: Fuel gas flow and fuel oil flow monitors • CPMS flow monitoring for flares • CEMS to measure total reduced sulfur for flares	over one hour) • Monitor the total sulfur content of the fuel being fired					

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
		hours, whichever occurs later, for units required to source test every 36 months									
Reporting	Notification of bypass events to conduct catalyst maintenance and scheduled startups	Source tests and reports of excess emissions	• Daily electronic reporting for major sources • Monthly emissions report for major sources • Quarterly reporting for large sources and process units • Quarterly Certification of Emissions Report and Annual Permit Emissions Program report for all units • Breakdowns which result in an applicable rule or permit violation	Semi-annual reports of excess emissions and monitor downtime. Notification of compliance selection choice for FCCU catalyst regenerators, notification of initial startup	Semi- annual reports of excess emissions and monitor downtime. Notification of the specific monitoring provisions the owner or operator intends to comply with.	Semi-annual reports of excess emissions and monitor downtime	Semi-annual reports of excess emissions and monitor downtime. Annual performance test results.	Performance test results, notification of the initial startup, design heat input capacity, fuels to be combusted, a copy of any federally enforceable requirement that limits the annual capacity factor, annual capacity factor, emerging technology used for SO2 emissions; reports of excess emissions	Performance test results, performance evaluation of the CEMS and/or COMS, excess emission reports, notification of the date of construction, reconstruction, and startup, design heat input capacity, fuels to be combusted, annual capacity factor, emerging technology used for SO_2 emissions	None	Semi-annual reports of excess emissions and monitor downtime
Recordkeeping	Operating log, list of scheduled startups, list of planned maintenance shutdowns for the next 5 years for units with bypasses, and	Operating log, CEMS data, mass emissions, calculated emission rate, source test reports, diagnostic emission	• Maintenance & emission records, source test reports, RATA reports, audit reports and fuel meter calibration	Performance testing; emission rates; monitoring data; CEMS audits and checks; occurrenc	Performance testing; emission rates; monitoring data; CEMS audits and checks; occurrence and duration of any SSM; flare management plan; conformance with bag leak detection system O&M; bag leak	Performance testing; emission rates; monitoring data; CEMS audits and checks; occurrenc	Performance testing; emission rates; monitoring data; CEMS audits and checks; occurrence	Performance testing; emission rates; daily records of the amounts of each fuel combusted; calculations of the annual capacity factor for coal, distillate oil, residual oil, natural gas, wood, and municipal-type solid waste; nitrogen content; opacity; hours of operation. Records are	Performance testing; emission rates; monitoring data; CEMS audits and checks; fuel supplier certification;	None	Performance testing; emission rates; monitoring data; CEMS audits and

Rule Element	PR 429.1	PR 1109.1	RECLAIM	CFR Title 40, Vol. 7, Part 60, Subpart J	CFR Title 40, Vol. 7, Part 60, Subpart Ja	CFR, Title 40, Vol. 7, Part 60, Subpart GG	CFR, Title 40, Vol. 8, Part 60, Subpart KKKK	CFR, Title 40, Vol. 7, Part 60, Subpart Db	CFR, Title 40, Vol. 7, Part 60, Subpart Dc	CFR, Title 40, Vol. 7, Part 60, Subpart Cd	CFR, Title 40, Vol. 7, Part 60, Subpart H
	emissions data shall be maintained onsite for 5 years. Documentation from the manufacturer of the minimum operating temperature of NOx post-combustion control equipment.	checks, logs of startups, shutdowns, breakdowns, maintenance, service, tuning, and any other information required by this rule, annual throughput, burner replacement records, post-combustion control replacement/installation records	records for Annual Permit Emissions Program • Records shall be maintained for 3 years (5 years if Title V) except data gathered or computed for intervals < 15 minutes shall be maintained for a minimum of 48 hours	e and duration of any startup, shutdown, or malfunction	detection system alarms and actions; FCCU & FCU coke-burn off rate and hours of operation; records of emissions > 500 lbs SO_2; qualification for exemptions; time periods during which the sulfur pit vents were not controlled and measures taken to minimize emissions during these periods	e and duration of any startup, shutdown, or malfunction	and duration of any startup, shutdown, or malfunction	required to be maintained for 2 years.	daily fuel combustion. Records are required to be maintained for 2 years.		checks; occurrence and duration of any startup, shutdown, or malfunction

APPENDIX A: LIST OF AFFECTED FACILITIES

Table A-1: Facilities Affected by PR 429.1

Facility ID	Facility Name
148236	Air Liquide Large Industries U.S., LP
3417	Air Prod & Chem Inc.
101656	Air Products and Chemicals, Inc.
187165	AltAir Paramount, LLC
800030	Chevron Products Co.
180908	Eco Services Operations Corp.
800080	Lunday-Thagard Co DBA World Oil Refining
171107	Phillips 66 Co/LA Refinery Wilmington Pl
171109	Phillips 66 Company/Los Angeles Refinery
174591	Tesoro Ref & Mktg Co LLC, Calciner
174655	Tesoro Refining & Marketing Co, LLC
151798	Tesoro Refining and Marketing Co, LLC
800436	Tesoro Refining and Marketing Co, LLC
181667	Torrance Refining Company LLC
800393	Valero Wilmington Asphalt Plant
800026	Ultramar Inc

APPENDIX B – RESPONSES TO PUBLIC COMMENTS

Public Workshop Comment

Public Workshop Commenter #1: Oscar Espino Padron – Earthjustice

The commenter expressed the following:

a. Startup and shutdown exemptions are inconsistent with the Clean Air Act.
b. There is no incentive for facilities to not startup or shutdown in PR 429.1, such as a fee.
c. PR 429.1 provision for facilities to take all reasonable and prudent steps to minimize emissions during startup and shutdown is not specific.

Staff Response to Public Commenter #1:

a. PR 429.1 is consistent with U.S. EPA SSM policies for compliance with the Clean Air Act. U.S. EPA's 2015 startup, shutdown, and malfunction (SSM) policy states that state implementation plan emission limitations do not need to be numerical in format and may be composed of a combination of numerical limitations, specific technological control requirements and/or work practice requirements, with each component of the emission limitation applicable during a defined mode of source operation. PR 429.1 contains specific technological control requirements and work practice requirements during a defined mode of source operation (i.e., startup and shutdown), as well as limitations to the duration and severity of startup and shutdown events, pursuant to U.S. EPA policy guidance for startup and shutdown provisions.
b. Facilities are incentivized to limit their startups and shutdowns because they cannot fully operate the unit. Proposition 26 prevents the South Coast AQMD from imposing a fee in these circumstances unless there is an alternative compliance option.
c. Staff included specific examples of reasonable and prudent steps to minimize emissions during startup and shutdown in Chapter 2 of the staff report. This provision is consistent with general duty provisions described in U.S. EPA's 2015 SSM policy and similar provisions in South Coast AQMD permits to operate.

Email Comments

Email Comment #1: Robert Brown – Eco Services Operations Corporation

The exemption for pilots that was included in the pre-preliminary draft rule language is missing from the preliminary draft rule language.

Staff Response to Email Comment #1:

Staff removed the exemption from PR 429.1 initially because PR 1109.1 added an exemption for boilers and process heaters operating only the pilot from PR 1109.1 emission limits and the applicable rolling average. Staff recognizes that an exemption for pilots from PR 429.1 duration limits and certain recordkeeping requirements is still needed and added the exemption back into PR 429.1.

Email Comment #2: Chris Drechsel – Tesoro Refining & Marketing Company LLC

The email expressed the following:

a. 48 hours is the appropriate startup and shutdown duration limit for boilers and process heaters without NOx post-combustion control equipment, with the exception of FCCU feed preheaters, due to potential process safety issues.

b. The FCCU feed pre-heater is integrated with FCCU and is complex startup process. MPC requests 120 hours for startup and shutdown for the FCCU feed pre-heater.

c. Cogeneration gas turbines with SCRs require additional time for startup and shutdown for the catalyst to get up to temperature. MPC requests an 8 hour startup and shutdown duration limit which is consistent with existing permit conditions.

d. MPC proposes edits to startup and shutdown definitions because the appropriate indication of startup is fuel, and all combustion devices, including FCCUs use fuel. The circulation of air in the FCCU without combustion and the introduction of feed or H2 without fuel does not produce NOx emissions.

   STARTUP means the time period that begins when a NOx emitting unit combusts fuel, after a period of zero fuel flow ~~or and 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~~.

   SHUTDOWN means the time period that begins when an operator reduces the 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~~.

Staff Response to Email Comment #2:

a. See response to Comment 2-6.

b. See response to Comment 2-6.

c. See response to Comment 2-7.

d. The time that a unit is complying with the NOx and CO emission limits in Rule 1109.1 during a startup or shutdown does not count toward the startup and shutdown duration limits specified in Table 1. Staff did not change the startup or shutdown definition.

Comment Letters[5]

Comment Letter #1: Nanette Diaz Barragan – U.S. Representative, California 44th District

No exemptions for refineries during startup, shutdown, and malfunction periods. Refineries must be held accountable to the standards of Proposed Rule 1109.1 during non-compliance periods that are a result of inadequate equipment maintenance, operator error, or other negligence. These exemptions would provide an incentive to pollute without limitations during equipment startup and shutdown.

Staff Response to Comment Letter #1

Startup, shutdown, and malfunction (SSM) events are unavoidable. Often units are shutdown for maintenance to ensure the unit can properly operate. During startup and shutdown periods, units are not operating at stable conditions. Although NOx concentration levels may be higher during startup and shutdown, the NOx mass emissions are not necessarily higher because the flow of emissions through the stack are lower. Many air pollution control devices are subject to technical, operational, or safety constraints that require the unit to follow specific protocols when starting up and shutting down to prevent damaging the unit or its components and to ensure safe operation.

PR 429.1 has specific time periods in which a unit is exempt from PR 1109.1 emission limits. PR 429.1 is designed to minimize the emissions during startup and shutdown, while recognizing that it takes time to reach stable conditions. Some control technologies cannot achieve reductions until specific temperatures are reached and as noted in its 2015 Policy document[6], the U.S. EPA "recognize that some control equipment cannot be operated at all or in the same manner during every mode of normal operations." U.S. EPA's 2015 SSM policy states that SIP emission limitations may include other technological control requirements, or work practice requirements during startup and shutdown, so long as those components of the emission limitations meet applicable federal CAA requirements. As such, Proposed Rule 429.1 limits the duration (in hours) of the startup and shutdown event, as well as the number of scheduled startups per year. It also requires the owner or operator to take all reasonable and prudent steps to minimize emissions during startup and shutdown. PR 429.1 does not exempt an operator from the PR 1109.1 emission limits for longer than the time to reach stable conditions and the minimum operating temperature of the NOx post-combustion control equipment.

Provisions for equipment breakdowns or malfunctions are addressed by Rule 430 – Breakdown Provisions. Rule 430 does not provide coverage for rule violation directly resulting from operator error, neglect, or improper operation or maintenance procedures.

[5] Staff only included comments related to startup and shutdown in the PR 429.1 Staff Report. The full comment letters for Comment Letters #1, 3, and 4 are included in the PR 1109.1 Staff Report.
[6] 2015 SSM Policy | U.S. EPA

Comment Letter #2:

WSPA

Patty Senecal
Senior Director, Southern California Region

September 17, 2021

Michael Morris
Manager, Planning and Rules
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Via e-mail at: mmorris@aqmd.gov

Re: SCAQMD Proposed Rule 429.1, Startup and Shutdown Provisions at Petroleum Refineries and Related Operations
WSPA Comments on PR 429.1 Language (August 20, 2021 version)

Dear Mr. Morris,

Western States Petroleum Association (WSPA) appreciates the opportunity to participate in the Working Group Meetings (WGMs) for South Coast Air Quality Management District (SCAQMD or District) Regional Clean Air Incentives Market (RECLAIM) Transition, Proposed Rule 1109.1 (PR1109.1), Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations, and the related rulemaking for Proposed Rule 429.1 (PR429.1), Startup and Shutdown Provisions at Petroleum Refineries and Related Operations. These rulemakings are being undertaken to transition facilities in the RECLAIM program for NO_X emissions to a command-and-control structure (i.e., the "RECLAIM Transition Project"). WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport, and market petroleum, petroleum products, natural gas, and other energy supplies in five western states including California. WSPA has been an active participant in air quality planning issues for over 30 years. WSPA-member companies operate petroleum refineries and other facilities in the South Coast Air Basin that are within the purview of the RECLAIM Program administered by the SCAQMD and will be impacted by the RECLAIM Transition Project.

SCAQMD released revised preliminary draft rule language for PR429.1 on August 20, 2021.[1] WSPA offers the following comments on the draft rule language.

1. **PR 429.1 (a): Section (a) states that the purpose of the rule is to limit emissions of NOx and CO during periods of startup and shutdown from units at petroleum refineries and facilities with related operations. This is inadequate to address refinery needs for maintenance and malfunction.**

   As currently drafted, PR429.1 addresses operations during periods of startup and shutdown for refinery equipment. But with the exception of SCR catalyst maintenance, maintenance activities for refinery equipment are not included in the stated purpose of the proposed rule. The rule also does not address equipment breakdowns (i.e., malfunctions). Current Rule 430, Breakdown Provisions, does not provide adequate provisions for refining equipment. For this reason, WSPA suggests that a new section be included in the rule to explicitly address

2-1

[1]Proposed Rule 429.1, Startup and Shutdown Provisions at Petroleum Refineries and Related Operations: Preliminary Draft Rule Language. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/429.1/rule-429-1-pdrl-pw.pdf?sfvrsn=4. Accessed: September 2021.

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maintenance and breakdown provisions for refinery equipment. The Purpose should be restated as follows:

The purpose of this rule is to limit emissions of oxides of nitrogen (NOx) and carbon monoxide (CO) during periods of startup, ~~and~~ shutdown, maintenance, and malfunctions (SSMM) from units at petroleum refineries and facilities with ~~related~~ operations related to petroleum refineries.

2-1 cont.

2. **PR 429.1(c)(2): The definition of "Catalyst Maintenance" should be revised to include any ancillary equipment to the SCR system, such as the ammonia injection system or induced draft fans. WSPA recommends that the language be updated as follows:**

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

2-2

3. **PR 429.1(c): Some gas turbines need to be tuned multiple times per year as part of regular scheduled maintenance required by the manufacturer. In the event that tuning requires a startup or shutdown, units will require relief from Proposed Rule 1109.1 concentration limits if a startup or shutdown is necessary.**

WSPA suggests the definition of "TUNING" from Rule 1134 be added to Rule 429.1:

TUNING is adjusting, optimizing, rebalancing, or other similar operations to a stationary gas turbine or an associated control device or otherwise as defined in the South Coast AQMD Permit to Construct or Permit to Operate. Tuning does not include normal operations to meet load fluctuations.

2-3

4. **PR 429.1(d): WSPA recommends the following changes.**

- PR429.1(d)(1)
  - As discussed above, cogeneration turbines need to be tuned multiple times per year as part of regular scheduled maintenance. If a gas turbine requires shutdown for tuning, it will not be able to meet the concentration limits in Proposed Rule 1109.1. WSPA recommends that the language in Section (d)(1) be updated as follows:

    (1) *An owner or operator of a unit is not subject to the NOx and CO emission limits and the applicable rolling average provisions pursuant to Rule 1109.1 during startup, shutdown, tuning maintenance events, and catalyst maintenance events.*

2-4

- PR429.1(d)(2)
  - Section (d)(2) limits the duration of startup and shutdown events. This section should include stated duration limits for equipment commissioning periods. SCAQMD often includes commissioning duration when issuing Permits to Construct, and this should be reflected in the rule language.
  - The proposed durations for process heaters, boilers, and SMR heater startup and shutdown events are insufficient to accommodate these activities. The District should confer with facilities to understand what adjustments are

2-5

2-6

needed. The standards established in the rule must be adequate to allow all affected units to comply.

- Gas turbines with NOx post-combustion control equipment have similar issues to boilers and process heaters with respect to the necessary time allowance to meet NOx emission limits. WSPA requests that Table 1 of (d)(2) be changed such that a gas turbine with NOx post-combustion control equipment is subject to the same 48-hour time allowance as boiler and process heaters with NOx post-combustion control equipment

2-6 cont.

2-7

- PR429.1(d)(7)
  - Paragraph (d)(7) is an operating requirement for post-combustion control equipment if the temperature of the exhaust gas to the inlet of the control equipment "… is greater than or equal to the minimum operating temperature." Because operating temperature fluctuates during startup, WSPA observes that, at times, the minimum temperature may be initially reached for a very short duration and then fall below that minimum temperature before again rising to a minimum temperature until a stabilized minimum temperature is reached. For this reason, WSPA requests that the aforementioned phrase be changed to "… is greater than or equal to the minimum operating and stable temperature."

2-8

- PR 429.1(d)(8) – The proposed rule language significantly restricts the ability to use bypass stacks. The purpose of the bypass stack is to allow conditioning, repair, and replacement of SCR catalyst or ancillary equipment associated with the NOx post-combustion control equipment in order to meet the BARCT limit. Therefore, the following adjustments are requested.

  - (d)(8)(B)
    - This section limits the use of a bypass stack to 200 hours in a rolling three-year cycle. This time period appears to be arbitrary and is insufficient for catalyst changeouts on some units. WSPA recommends that the duration for use of the bypass stack be extended to 14 days per year.

2-9

  - (d)(8)(C)
    - This section requires that the unit be operated at the minimum safe operating rate of the unit when the NOx post-combustion control equipment is bypassed. The minimum safe operating rate should be in reference to the process unit, not the combustion device. The minimum rate or turndown of a combustion device could be lower than the safe operating rate of the process unit and would cause the unit to shut down. The operation of the combustion device will be dictated by the operating rate of the process unit. WSPA suggests that the language be updated as follows:

      Operate the unit at the minimum safe operating rate of the process unit when the NOx post-combustion control equipment is bypassed.

2-10

  - (d)(8)(D)

- This section requires that a facility submit documentation from the manufacturer of the minimum safe operating rate for the unit being bypassed. The minimum safe operating rate is determined by the refinery, not the manufacturer. WSPA recommends that the language in Section (d)(7)(d) be stricken from the rule. 2-11

5. PR 429.1 (f)(2): WSPA recommends the following.

- This section requires that an owner or operator of a unit maintain on-site documentation from the manufacturer of the minimum operating temperature of the NOx post-combustion control equipment and make the information available to SCAQMD upon request. Refinery permits already include conditions specifying minimum temperature for ammonia injection which are equipment-specific. WSPA suggests that the language be updated as follows: 2-12

  An owner or operator of a unit equipped with NOx post-combustion control equipment at a former RECLAIM petroleum refinery or a new petroleum refinery shall maintain on-site documentation from the manufacturer of the minimum operating temperature of the NOx post-combustion control equipment and make this information available to the South Coast AQMD upon request *unless the minimum temperature requirement is listed in the Permit to Operate*.

6. PR 429.1(g): WSPA requests that the following exemptions be added to the rule:

- The SSMM provisions listed in PR429.1 should be a backstop for units that do not have SSMM provisions included in their Permits to Operate. The rule should therefore defer to equipment specific SSMM conditions where listed in the permit. WSPA recommends that an exemption be added to the rule to address equipment with existing SSMM permit conditions. 2-13
- PR429.1(g)(1) – This section provides an exemption from the duration limits during certain commissioning and maintenance activities. An exemption should be added to the rule to address duration limits related to tuning on cogeneration turbines. WSPA recommends revising the language in Section (g)(1) as follows: 2-14

  (1) An owner or operator of a unit at a former RECLAIM petroleum refinery or a new petroleum refinery shall be exempt from the requirements of paragraph (d)(2) during the following…
  (E) Tuning Maintenance Activities

- Cogeneration units are subject to North American Electric Reliability Corporation (NERC) standards, which specify reliability standards for power generation facilities that supply power to the public. These standards include the requirement to maintain their equipment in good working order, including the obligation to conduct electrical testing following any upgrades or repairs made to the cogeneration unit's safety and control systems (e.g., protection relay and excitation control systems). These tests are required to ensure that the systems have been functionally tested to prevent any process safety or reliability issues. Some testing must occur at different electrical loads that can only occur during the startup phase. The testing duration ranges from 4 to 12 hours depending on the complexity of the testing. As this testing is required to ensure 2-15

the safety and reliability of the system, WSPA requests that this testing be categorically excluded from the time limitations in paragraph (d)(2) by including the following:

- Adding the following exemption as a new subparagraph to paragraph (g)(1):

  (g)(1)(E) Electrical testing associated with commissioning of cogeneration control systems following upgrades or repairs.

  and

- Adding the definition of gas turbine which incorporates the term "cogeneration" from subdivision (c) of PR 1109.1 to PR429.1(c).

2-15 cont.

2-16

WSPA appreciates the opportunity to provide these comments related to PR429.1. We look forward to continued discussion of this important rulemaking. If you have any questions, please contact me at (310) 808-2144 or via e-mail at psenecal@wspa.org.

Sincerely,

Patty Senecal

Cc: Wayne Nastri, SCAQMD
Susan Nakamura, SCAQMD

Western States Petroleum Association 1415 L Street, Suite 900, Sacramento, CA 95814 805.701.9142 wspa.org

Staff Response to Comment Letter #2:

Response to Comment 2-1:
The purpose of PR 429.1 is not to provide an exemption or establish requirements for other maintenance activities not specified in the rule. Equipment breakdowns from units at petroleum refineries and facilities with related operations to refineries will be regulated under Rule 430 – Breakdown Provisions. Rule 430 contains similar breakdown provisions to Rule 2004, which refineries are currently subject to.

Response to Comment 2-2:
The catalyst maintenance definition in PR 429.1 is intentionally narrow to not include activities that are regulated under Rule 430 – Breakdown Provisions.

Response to Comment 2-3:
A unit is not subject to Rule 1109.1 NOx or CO emission limits or applicable rolling average provisions during startup or shutdown. Therefore, in the event that a turbine needs to be shutdown and subsequently startup for tuning, relief from Rule 1109.1 emission limits is already provided in PR 429.1. However, staff recognizes that tuning typically occurs when the unit is in operation.
Staff updated the rule language to include a definition of tuning and exemptions from PR 1109.1 emission limits and applicable rolling average provisions during tuning provided that tuning requirements are included in the South Coast AQMD Permit to Construct or Permit to Operate.

Response to Comment 2-4:
See response to Comment 2-3.

Response to Comment 2-5:
Requirements during commissioning, including duration limits, will continue to be regulated by the South Coast AQMD permitting process, rather than by PR 429.1. PR 429.1 provides an exemption from Rule 1109.1 emission limits and applicable rolling average provisions during commissioning, provided that a South Coast AQMD Permit to Construct or Permit to Operate specifies requirements during commissioning. The PR 429.1 exemption during commissioning only applies for the duration specified in the South Coast AQMD Permit to Construct or Permit to Operate.

Response to Comment 2-6:
Staff met with facilities regarding their concerns with the proposed startup and shutdown duration limits and requested supporting documentation, such as CEMS data, to determine the duration limits needed for startup and shutdown. Staff increased the startup and shutdown duration limits for process heaters without NOx post-combustion control equipment to 24 hours and created a new category for FCCU feed pre-heaters based on supporting facility documentation. Staff also added an exemption from the startup and shutdown duration limits specified in paragraph (d)(2) during water freeing for a maximum of 24 hours. Staff did not receive sufficient documentation that would demonstrate the need for increased duration limits for boilers or SMR heaters.

Response to Comment 2-7:
Staff met with the known affected facility requesting increased startup and shutdown duration limits for gas turbines with NOx post-combustion control equipment. The facility provided documentation that a 4 hour startup and shutdown limit is needed for gas turbines with NOx post-combustion control equipment. Staff updated PR 429.1 to include a 4 hour startup and shutdown limit for gas turbines with NOx post-combustion control equipment.

Response to Comment 2-8:
Staff recognizes that there may be temperature fluctuations during startup and updated the rule language.

Response to Comment 2-9:
Staff contacted multiple industry representatives involved in the manufacture and design of catalyst systems at refineries to establish the number of hours for catalyst maintenance. Staff has not received comment letters from any affected facilities regarding the hour limit for catalyst maintenance. Therefore, staff did not change the number of hours for catalyst maintenance allowed in PR 429.1.

Response to Comment 2-10:
Staff updated the rule language to incorporate the suggested clarification.

Response to Comment 2-11:
The proposed requirement for a facility to submit documentation from the manufacturer of the minimum safe operating rate of a unit was included for compliance verification purposes. Initially, staff proposed that the unit be operated at a percentage of the rated heat input capacity during catalyst maintenance events. Staff changed the rule language to operate the unit at the "minimum safe operating rate" at the request of WSPA. Since documentation of the minimum safe operating rate cannot be provided by the manufacturer, staff has decided to specify a percentage of the rated heat input capacity that the process unit is required to operate at or below during catalyst maintenance events. Staff established the percentage of rated heat input capacity from stakeholder information of the minimum safe operating rates.

Response to Comment 2-12:
Staff recognizes that documentation from the manufacturer of the minimum operating temperature of NOx post-combustion control equipment is unnecessary for units with a permit requirement specifying the temperature to operate the NOx post-combustion control equipment. Minimum operating temperature is defined in PR 429.1 as "…the minimum operating temperature specified by the manufacturer, unless otherwise defined in the South Coast AQMD permit to operate". Staff updated the rule language.

Response to Comment 2-13:
U.S. EPA has requested that startup and shutdown requirements be specified in a rule. Units are required to comply with PR 429.1 and South Coast AQMD permit conditions. A unit with a permit

condition that is more stringent than PR 429.1 will continue to be regulated by the more stringent permit condition.

Response to Comment 2-14:
Tuning does not fall under the definitions of startup or shutdown, and therefore an exemption from the startup and shutdown duration limits specified in Paragraph (d)(2) is unnecessary.

Response to Comment 2-15:
Staff recognizes that there are reliability standards required by North American Electric Reliability Corporation for power generation facilities, which includes electrical testing. Staff updated the rule language to include an exemption from startup and shutdown duration limits during commissioning provided requirements are included in the South Coast AQMD Permit to Operate or Permit to Construct. The definition of commissioning in PR 429.1 includes electrical testing associated with upgrades or repairs of cogeneration gas turbines as required by North American Electric Reliability Corporation standards.

Response to Comment 2-16:
The definition of unit in PR 429.1 includes gas turbines and refers to the definitions in Rule 1109.1. Therefore, the Rule 1109.1 definition of gas turbine, which incorporates the term cogeneration, is applicable in PR 429.1.

Comment Letter #3: Steve Steach – Torrance Refining Company LLC

Rule 429.1 Comments

(c) Definitions

The definition of "CATALYST MAINTENANCE" should also include any ancillary equipment to the SCR system such as the NH3 injection system and the induced draft fan. 3-1

(d) Requirements

(d)(8) – *"An owner or operator of a unit equipped with a NOx post-combustion control equipment at a former RECLAIM petroleum refinery or a new petroleum refinery which has a stack or duct that exists prior to [Date of Adoption] that allows for the exhaust gas to bypass the NOx post-combustion control*

equipment and that elects to use a bypass to conduct catalyst maintenance shall:

(A) Not use a bypass if the unit is scheduled to operate continuously for less than five years between planned maintenance shutdowns of the unit;

(B) Not use a bypass to conduct catalyst maintenance for more than 200 hours in a rolling three-year cycle;

(C) Operate the unit at the minimum safe operating rate of the unit when the NOx post-combustion control equipment is bypassed; 3-2

(D) Submit documentation from the manufacturer of the minimum safe operating rate for the unit being bypassed to the South Coast AQMD;"

The term "minimum safe operating rate of the unit" should clearly refer to the Process Unit, not the combustion device. The minimum rate or turndown of a combustion device could be lower than the safe operating rate of the Process Unit and would cause the unit to shut down. The combustion device's operation will be dictated by the operating rate of the Process Unit. Further, the minimum safe operating rate is determined by the Refinery, not a manufacturer. Therefore, documentation should not be required.

(f) Recordkeeping

(f)(2) – *"An owner or operator of a unit equipped with NOx post-combustion control equipment at a former RECLAIM petroleum refinery or a new petroleum refinery shall maintain on-site documentation from the manufacturer of the minimum operating temperature of the NOx post-combustion control equipment and make this information available to the South Coast AQMD upon request."* 3-3

Refineries' Title V permits include permit conditions for specific temperatures when the injection of NH3 should begin in the SCR system for optimal NOx reduction. Therefore, this requirement should also include … "unless the minimum temperature requirement is in the Refinery's permit."

Staff Response to Comment Letter #3:

Response to Comment 3-1:
See response to Comment 2-2.

Response to Comment 3-2:
See responses to Comment 2-10 and Comment 2-11.

Response to Comment 3-3:
See response to Comment 2-12.

Comment Letter #4: Brad Levi – Tesoro Refining & Marketing Company LLC

18. PR 1109.1 needs to reference and incorporate the startup and shutdown provisions in PR 429.1 and revise PR 429.1 so as to appropriately address management of startups and shutdowns.

The proposed PR 1109.1 rule does not reference PR 429.1 or otherwise clarify how startup and shutdown emissions are to be included or excluded for accounting against emission limits. Particularly, PR 1109.1 needs to expressly state that emissions from startups and shutdowns are exempt when determining compliance with the Alternative NOx BARCT Limits and the annual mass emissions against the BARCT Emissions Targets. To remove this ambiguity, MPC requests SCAQMD add a reference or statement in PR 1109.1 excluding the emissions from startup and shutdown events in PR 429.1 for purposes of compliance with emission limits in PR 1109.1. 4-1

Regarding the proposed PR 429.1 rule itself, MPC offers the following comments to address multiple startup and shutdown activities that are required for compliance with PR 1109.1. Attachment 2 of this letter is a proposed mark-up of PR 429.1 to reflect MPC's comments.

A. Cogeneration unit electrical testing

Cogeneration units are subject to industry and electrical standards to ensure that the equipment is reliable and in good working order. This includes conducting electrical testing following any upgrades or repairs made to the cogeneration unit's safety and control systems (e.g., protection relay and excitation control systems). These tests are to ensure that the systems have been functionally tested to prevent process safety and reliability issues. Some testing must take place at different electrical loads that can only occur during the startup phase. The testing duration ranges from 4 to 12 hours depending on the complexity of the 4-2

testing. As this testing is to ensure the safety and reliability of the system, MPC requests that this testing be categorically excluded from the time limitations in paragraph (d)(2) of PR 429.1 by including the following:

- Add the following exemption as a new subparagraph (g)(1)(E) to paragraph (g)(1): *"electrical testing associated with commissioning of cogeneration control systems following upgrades or repairs."*; and

- Copy the definition of gas turbine from subdivision (c) of PR 1109.1, which incorporates the term "cogeneration."

4-2 cont.

4-3

B. Catalyst maintenance and related activities

MPC offers the following proposed changes to address catalyst maintenance and related activities:

- Paragraph (c)(2) requires that catalyst maintenance for a Unit *"... which has a bypass stack or duct ..."* MPC requests removal of this phrase, since some combustion units have only one stack which is used for both normal operations and for catalyst maintenance activities that bypass the control equipment (i.e., the control equipment is not operable during control equipment maintenance). Paragraph (d)(8) is also revised to align with this definition.

4-4

- The proposed definition in paragraph (c)(2) is specific only to catalyst maintenance activities and is not inclusive of other maintenance activities inherently needed for NOx post-combustion control equipment. For example, routine maintenance activities associated with a post-combustion control equipment's ammonia injection system and related components is required, which would impact emissions because ammonia is not being introduced into the control equipment during that time. MPC proposes to revise this definition to include maintenance of ancillary components in NOx post-combustion control equipment.

4-5

- Paragraph (d)(7) is an operating requirement for post-combustion control equipment if the temperature of the exhaust gas to the inlet of the control equipment *"... is greater than or equal to the minimum operating temperature."* Operating temperature fluctuates during startup, and MPC has observed from its operations that the minimum temperature may be initially reached for a very short duration and then fall below that minimum temperature before again rising to a minimum temperature until the stabilized minimum temperature is reached. For this reason, MPC requests that the aforementioned phrase be changed to *"... is greater than or equal to the minimum operating and stable temperature."*

4-6

- Subparagraph (d)(8)(D) requires documentation from a manufacturer of the *"minimum safe operating rate for the unit being bypassed."* The minimum safe operating rate for a Unit is a function of process safety management reviews by operations and safety staff and the application of MPC's operational safety policies and procedures to a Unit. Manufacturers will not know or have documentation of the minimum safe operating rate for a Unit. MPC requests deletion of this subparagraph.

4-7

C. Gas turbines with NOx post-combustion control equipment

Gas turbines with NOx post-combustion control equipment have issues that are similar to boilers and process heaters with respect to the necessary time allowance to meet NOx emission limits. MPC requests

4-8

that Table 1 of PR 429.1 be changed such that a gas turbine with NOx post-combustion control equipment is subject to the same 48-hour time allowance as boiler and process heaters with NOx post-combustion control equipment. 4-8 cont.

D. Two-hour duration limit in Table 1 for process heaters

Based upon a review of its procedures and practices, MPC has determined that the startup and shutdown duration limit of two hours in Table 1 is insufficient for process heaters. It is unclear in the corresponding Draft Staff Report how this hourly limit was established. From MPC's experience it is unrealistic for several process heaters that do not have post-combustion NOx control equipment to reach stable conditions in two hours such that the NOx emissions controls (i.e., ultra-low NOx burners) can effectively meet the emission limits in PR 1109.1. For example, some heaters inherently require slower warming to avoid damaging downstream equipment affected by temperature changes and thus need more than 2 hours to start up. Also, heaters with natural draft systems or several dozen burners that need to be lit during startup will make control of excess oxygen difficult at low and fluctuating firing rates, which causes higher NOx concentrations until stable conditions are reached. To ensure MPC is allotted sufficient time to allow for safe and steady startup, MPC requests additional consultation with SCAQMD to support an appropriate increase to the 2-hour duration limit currently proposed in Table 1 for process heaters. 4-9

Staff Response to Comment Letter #4:

Response to Comment 4-1:
Staff is following the 2015 guidance on startup and shutdown provisions from U.S. EPA. U.S. EPA informed staff of the possibility that it's policy guidance for startup and shutdown provisions may be updated. Staff decided to bifurcate all startup and shutdown references and requirements from PR 1109.1 and instead create PR 429.1 to address U.S. EPA policy guidance on those topics. A direct reference in PR 1109.1 to PR 429.1 is unnecessary as all adopted rules are equally applicable and PR 429.1 refers to PR 1109.1.

Response to Comment 4-2:
See response to Comment 2-15.

Response to Comment 4-3:
See response to Comment 2-16.

Response to Comment 4-4:
Staff recognizes that some combustion units may have only one stack or duct used for both normal operations and for bypassing the NOx post-combustion control equipment. Paragraph (c)(2) includes units with bypass stacks or ducts that are used solely for bypassing the NOx post-combustion control equipment and units with bypass stacks or ducts that are used for both normal operations and for bypassing the NOx post-combustion control equipment. Staff is not removing

this phrase because it specifies that the catalyst maintenance provision in PR 429.1 only applies to units that have a bypass stack or duct that exists prior to [*Date of Adoption*].

Response to Comment 4-5:
See response to Comment 2-2.

Response to Comment 4-6:
See response to Comment 2-8.

Response to Comment 4-7:
See response to Comment 2-11.

Response to Comment 4-8:
See response to Comment 2-7.

Response to Comment 4-9:
See response to Comment 2-6.