SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report

Proposed Rule 1159.1 – Control of NOx Emissions from Nitric Acid Tanks

September 2022

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Regional Clean Air Incentives Market (RECLAIM) program was adopted in October 1993 under South Coast AQMD Regulation XX. RECLAIM is a market-based emissions trading program designed to reduce NOx and SOx emissions and includes facilities with NOx or SOx emissions greater than four tons per year. The 2016 Final Air Quality Management Plan (2016 AQMP) included Control Measure CMB-05: Further NOx Reductions from RECLAIM Assessment (CMB-05) to ensure the NOx RECLAIM program was achieving equivalency with command-and-control rules that are implementing Best Available Retrofit Control Technology (BARCT) and to generate further NOx emission reductions at RECLAIM facilities. The adoption resolution for the 2016 AQMP directed staff to achieve five tons per day of NOx emission reductions as soon as feasible but no later than 2025, and to transition the RECLAIM program to a command-and-control regulatory structure requiring BARCT as soon as practicable. On July 26, 2017 the Governor approved California State Assembly Bill 617, which required air districts to develop, by January 1, 2019, an expedited schedule for the implementation of BARCT no later than December 31, 2023 for industrial facilities that are in the California greenhouse gas cap-and-trade program with priority given to older, higher polluting sources that need to install BARCT. As facilities transition out of the NOx RECLAIM program, a command-and-control rule that includes NOx emission standards that reflect BARCT will be needed for all equipment categories.

Proposed Rule 1159.1 – Control of NOx Emissions from Nitric Acid Tanks (PR 1159.1) is a command-and-control rule for facilities that operate nitric acid tanks where nitric acid either reacts with a metal or decomposes at high temperatures forming NOx. A total of 1610 nitric acid tanks are estimated to be subject to this rule. Approximately 11 facilities that are currently in the RECLAIM program, and approximately 249 non-RECLAIM facilities will be subject to PR 1159.1. PR 1159.1 proposes NOx emission limits for nitric acid tanks that are developed through a BARCT assessment process. PR 1159.1 will require facilities that use nitric acid above a certain threshold to meet the BARCT emission limit of 0.30 pounds per hour (lb/hour) of NOx or a control efficiency of 99% for NOx. Facilities that use nitric acid below the threshold will be exempt from controls and source testing requirements but will be required to maintain recordkeeping to demonstrate that nitric acid usage is below the threshold. PR 1159.1 will establish implementation schedules for all impacted units, as well as requirements for parametric monitoring, record keeping, and source testing. Facilities with nitric acid usage above the low-use exemption threshold are expected to meet BARCT through existing air pollution control equipment with an exception of one facility which may need to add controls to meet the proposed BARCT emission limits. Based on the potential emission reductions from the installation of control at one facility, up to 0.017 tons per day of NOx reductions are expected with a cost-effectiveness of $22,000 dollars per ton of NOx reduced. Staff is further assessing the impact of PR 1159.1 on this facility. Other costs impacts include permitting and periodic source testing.

PR 1159.1 was developed through a public process. South Coast AQMD held five working group meetings in a virtual format using Zoom due to COVID-19 restrictions. A Public Workshop will be held on September 29, 2022 to present PR 1159.1 and receive public comment. Site visits were conducted at nine facilities to better understand facility operations and equipment and obtain industry input. Due to COVID-19, site visits for 7 facilities were held virtually. Staff also met with multiple stakeholders during the rule development process.

CHAPTER 1: BACKGROUND

INTRODUCTION

REGULATORY HISTORY

AFFECTED INDUSTRIES/FACILITIES

PUBLIC PROCESS

CHAPTER 1: BACKGROUND

Introduction

The Regional Clean Air Incentives Market (RECLAIM) program was adopted in October 1993 under South Coast AQMD Regulation XX. RECLAIM is a market-based emissions trading program designed to reduce NOx and SOx emissions and includes facilities with NOx or SOx emissions greater than 4 tons per year.

The 2016 Air Quality Management Plan (AQMP) included Control Measure CMB-05: Further NOx Reductions from RECLAIM Assessment (CMB-05) to ensure the NOx RECLAIM program was achieving equivalency with command-and-control rules that are implementing Best Available Retrofit Control Technology (BARCT) and to generate further NOx emission reductions at RECLAIM facilities. CMB-05 included a requirement for five tons per day of NOx emission reductions as soon as feasible but no later than 2025, and to transition the RECLAIM program to a command-and-control regulatory structure requiring BARCT as soon as practicable. Consistent with the adoption resolution for the 2016 AQMP, staff is providing quarterly updates to the Stationary Source Committee on the status of the transition of RECLAIM facilities to command-and-control.

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

In 2015, staff conducted a programmatic analysis of equipment at each RECLAIM facility to determine if there are appropriate and up to date BARCT NOx limits within existing command-and-control rules. It was determined that existing command-and-control rules would need to be adopted and/or amended to update emission limits to reflect current BARCT and provide implementation timeframes to meet BARCT emission limits. As facilities transition out of the NOx RECLAIM program under the direction of the 2016 AQMP, a command-and-control rule that includes NOx emission standards reflecting BARCT will be needed for all equipment categories. Most NOx sources under RECLAIM are combustion sources. Proposed Rule 1159.1 (PR 1159.1) would address non-combustion based NOx emissions from nitric acid tanks. PR 1159.1 will set the requirements for nitric acid tanks as well as conduct an assessment to determine BARCT concentration limits for this source category. These requirements will apply to RECLAIM facilities, former RECLAIM facilities that have exited the RECLAIM program, and non-RECLAIM facilities.

A nitric acid tank (herein referred as nitric acid unit) is equipment such as a tank, vessel, or reactor that typically removes metal using a chemical reaction with nitric acid or where raw graphite flakes are soaked with nitric acid before sent to a furnace. PR 1159.1 will regulate NOx emissions formed from nitric acid with metals or its decomposition at high temperatures in nitric acid units. These types of operations are typically found in metal finishing, precious metal reclamation, or expanded graphite foil production facilities.

Metal finishing is the surface treatment of a metal substrate to give it a desired characteristic. This can include anti-corrosion, durability, and adhesion. Due to the beneficial properties that can be imparted to products, metal finishing supports many industries including fixtures (home, kitchen, and bath), machinery and industrial equipment, and commercial and military aerospace. In South Coast AQMD, metal finishing facilities span over 90 different classifications under the North American Industry Classification System (NAICS) standard. The amount of NOx emissions from metal finishing is dependent on the intended function of the individual tanks used in the process; surface treatment tanks such as cleaning or degreasing tanks would have reaction times measured in minutes with the base metal of the metal part compared with the other extreme such as chemical milling tanks where a prescribed depth of metal is removed from the metal part taking over a time span of hours or even days.

Precious metal reclamation involves the recovery of precious metals such as gold, platinum, or other metals from unwanted jewelry, used catalytic converters, or other metal scraps. Nitric acid is used in reactors or vessels along with hydrochloric acid to dissolve precious metal(s) into solution in order to later recover and refine theses metals. NOx are formed during the chemical digestion of the metals with nitric acid.

Expanded graphite foil production involves the production of graphite foil (sheets) from raw graphite flakes. Nitric acid is used to soak raw graphite flakes before being sent to a furnace where the nitric acid thermally decomposes into gases, including NOx, that separate the layers of the graphite flakes which later are compressed to form graphite foil or sheets. The graphite foil is used to manufacture various products such as high temperature gaskets. All excess nitric acid must be driven off from the expanded graphite before finally forming the graphite foil.

Regulatory History

There are no regulations at the state or federal level controlling NOx emissions from the use of nitric acid in metal finishing, precious metal reclamation, or expanded graphite foil production operations. In South Coast AQMD, some RECLAIM facilities have requirements for mass emission rates, concentration limits, or control efficiency for NOx. Throughput limits, such as number of workpieces or pounds of metal per day, are indirect ways to limit NOx emissions found on some of the facility permits. South Coast AQMD's Regulation XIII – New Source Review requires applicants to use Best Available Control Technology (BACT) for new sources, relocated sources, and modifications to existing sources that may result in an emission increase of any nonattainment air contaminant. Under Health and Safety Code Section 40405, BACT is defined as:

> "… an emission limitation that will achieve the lowest achievable emission rate for the source to which it is applied."

In South Coast AQMD's BACT Guidelines Part D: BACT Guidelines for Non-Major Polluting Facilities, there are several BACT requirements listed for control of NOx. For chemical milling/open process tanks, the use of pack chemical scrubbers is specified. For precious metal reclamation, the use of a 3-Stage NOx reduction scrubber is listed as BACT.

Affected Industries/Facilities

PR 1159.1 affects facilities that use nitric acid in tanks where nitric acid either reacts with a metal or decomposes at high temperatures. These types of operations are typically found in metal finishing, precious metal reclamation, or expanded graphite foil production operations. PR 1159.1 affects approximately 260 facilities in the NOx RECLAIM program as well as facilities outside of the RECLAIM program. Out of the 236 facilities in the NOx RECLAIM program as of 2021, approximately 11 facilities would be affected by PR 1159.1. There are approximately 249 non-RECLAIM facilities that are affected by PR 1159.1. The number of facilities and type of operation are shown in Table 1.

Table 1 – Number of Facilities by Operation Type

	# of RECLAIM Facilities	# of Non-RECLAIM Facilities
Precious Metal Reclamation	1	3
Metal Finishing	9	246
Expanded Graphite Foil Production	1	0
Total	**11**	**249**

Public Process

Development of PR 1159.1 was conducted through a public process. A PR 1159.1 Working Group was formed to provide the public and stakeholders an opportunity to discuss the proposed rule and provide staff with input during the rule development process. The Working Group is composed of representatives from businesses, environmental groups, public agencies, consultants, and other interested parties. South Coast AQMD held five working group meetings in a virtual format using Zoom due to COVID-19 restrictions. The meetings were held on August 4, 2021, May 25, 2022, July 7, 2022, August 17, 2022, and August 31, 2022. Initial preliminary draft rule language was released on August 26, 2022 and revisions to rule language were made to incorporate comments received from stakeholders as part of the Preliminary Draft Proposed Rule 1159.1. In addition, a Public Workshop will be held on September 29, 2022 to present PR 1159.1 to receive public input.

In January 2022, a survey was sent to affected facilities to collect information about operations, equipment and controls, and nitric usage. A total of 22 survey responses were received, and collected data was used to create profiles for different type of units to estimate both the number of nitric acid units and well as the NOx emissions from the nitric acid units where there was no data.

Staff also conducted site visits to better understand facilities operations and equipment and obtain industry input at nine facilities. Due to COVID-19, site visits for seven facilities were held virtually. In addition, individual stakeholder meetings were held throughout the rule development process.

CHAPTER 2: BARCT ASSESSMENT

INTRODUCTION
BARCT ANALYSIS
LOW-USE EXEMPTION

CHAPTER 2: BARCT ASSESSMENT

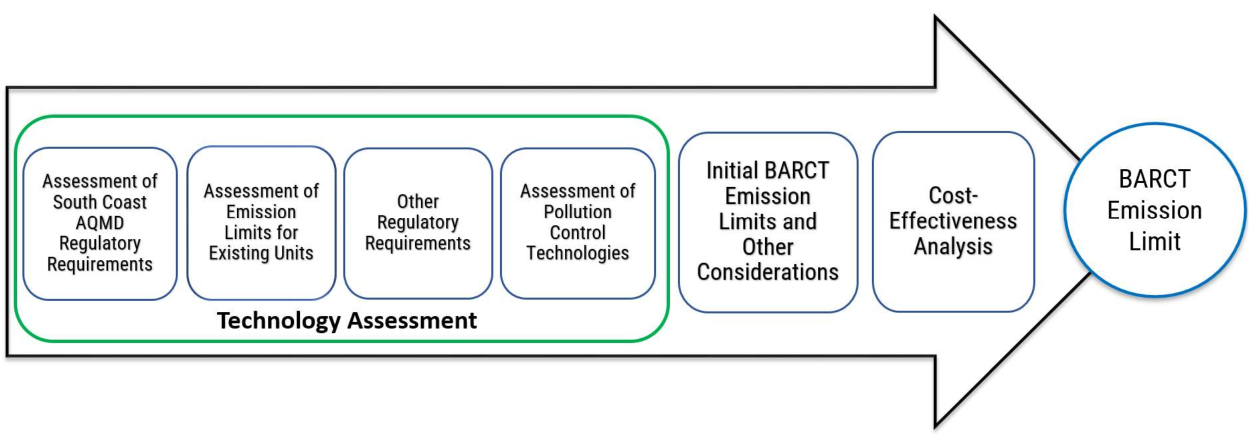
Introduction

As part of the rule development process, staff conducted a BARCT assessment of equipment subject to PR 1159.1. The purpose of a BARCT assessment is to identify any potential emission reductions from specific equipment or industries and to establish an emission limit that is consistent with state law. Under Health and Safety Code Section 40406, BARCT is defined as:

> "… an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source."

BARCT assessments are performed periodically for equipment categories to determine if current emission limits are representative of current technologies and maximum achievable NOx reductions. The BARCT assessment is a stepwise process that includes a robust technology assessment that seeks maximum achievable cost-effective emission reductions. The BARCT assessment begins with a technology assessment to establish initial BARCT emission limits. A technology assessment identifies current regulatory requirements for specific equipment categories, established by either South Coast AQMD or other regulatory agencies. Permits and source test data are analyzed to identify the emission levels being achieved with existing technology. Current and emerging technologies are evaluated to determine the feasibility of achieving lower concentration limits relative to existing requirements. Based on the technology assessment, an initial BARCT limit is identified and a cost-effectiveness analysis and, if necessary, an incremental cost-effectiveness analysis, are conducted. A cost-effectiveness calculation, expressed in dollars per ton of pollutant reduced, is made that considers the cost to meet the initial proposed NOx limit and the reductions that would occur from implementing technology that could meet the proposed limit. The cost-effectiveness analysis considers the cost to implement one or more technologies that can meet the initial BARCT limit. An incremental cost-effectiveness analysis is conducted if multiple initial BARCT limits are identified that vary in stringency and are each cost-effective. A final BARCT limit is established that is both technologically feasible, achievable within the implementation schedule allowed in the proposed rule, cost-effective, and incrementally cost-effective. The BARCT Assessment Process is illustrated in Figure 2-1 below.

Figure 2-1 – BARCT Assessment Process



BARCT assessment was conducted for PR 1159.1 in order to establish a BARCT emission limit for which nitric acid tanks would be required to meet in order to reduce NOx emissions where it would be cost-effective.

BARCT Analysis
In identifying the initial universe that would be subject to PR 1159.1, staff used South Coast AQMD's permit database. Staff identified an initial universe of 260 facilities which included 11 RECLAIM facilities with 126 nitric acid units and 249 non-RECLAIM facilities with an estimation of 1484 nitric acid units. As part of the rule development process, data was obtained from multiple sources which included: online articles, industry publications, scientific and vendor literature, permits, source tests, annual emission reports, inspection reports, surveys, site visits, stakeholder meetings, Working Group meetings, and South Coast AQMD inter-departmental meetings. An overview of each step in the BARCT assessment is presented below.

Assessment of South Coast AQMD Regulatory Requirements
Staff reviewed existing requirements in South Coast AQMD source specific rules as well as BACT guidelines under Regulation XIII – New Source Review to identify for similar operations or equipment that may serve as potential BARCT NOx emission limits. There are no existing source specific rules limiting NOx emissions from the use of nitric acid in metal finishing, precious metal reclamation, or expanded graphite foil production operations.

BACT guidelines for non-major polluting facilities specified scrubber technology as BACT for NOx control for certain chemical milling tanks and precious metal reclamation operations. A packed chemical scrubber is BACT for chemical milling tanks that mill nickel alloys, stainless steel, and titanium, while 3-stage NOx reduction scrubber is BACT for precious metal reclamation conducted with chemical recovery or chemical reaction. There is no BACT guideline for major sources for metal finishing, precious metal reclamation or expanded graphite foil production operations.

Assessment of Emission Limits for Existing Units
Since no existing source specific rule regulates NOx emissions from nitric acid tanks, NOx emission limits in permitted nitric acid units were reviewed. The majority of nitric acid units subject to PR 1159.1 are located at metal finishing facilities. The chemical reaction of metal parts with nitric acid is expected to be limited (i.e., surface treatment tanks), except for chemical milling processes. Only a fraction of nitric acid units is equipped with air pollution control devices (APCDs). For nitric acid units with APCDs, most APCDs were installed to control acid fumes. The permit for the APCD often did not specify the pollutant being controlled and the permit conditions did not list emission limits for a particular pollutant.

Recent permits, such as those issued after 2010, or facilities with large operations using nitric acid units were likely to have APCDs installed for NOx reduction. NOx emission limits for nitric acid units equipped with APCD's varied in stringency and metrics. A few nitric acid units were permitted with direct NOx limits such as requirements for a minimum control efficiency or a concentration limit. The degree of control efficiency ranged from 44 to 99% for APCDs that had been source tested. A metal finishing facility conducting chemical milling had a permit limit of 5 ppm for NOx, and it is the only facility permitted with a concentration limit; Nitric acid unit operations are not steady state combustion sources of NOx. On the other hand, some permits list NOx related limits based on indirect metrics such as number of work pieces processed per month, amount of metal removed, and pounds or gallons of nitric acid added per day or month. Table 2-1 show some examples of existing NOx related emissions limits found.

Table 2-1 – Examples of NOx Related Permit Limits

	Facility Operation	NOx Related Permit Limit
Facility A	Metal Finishing - Surface Treatment	• 50 gallons of nitric acid (70%)/month
Facility B	Metal Finishing - Surface Treatment	• 20 lbs of nitric acid per day
Facility C	Metal Finishing - Chemical Milling	• 200,000 pieces per month • 5 ppmv NOx
Facility D	Precious Metal Reclamation	• 99% control efficiency
Facility E	Expanded Graphite Foil Production	• 330 lbs of nitric acid (98%)/hr

Source test reports were also reviewed to evaluate the performance of NOx control equipment. Source testing of control equipment measures the emissions that exit out of a stack into the ambient air. If an inlet measurement is also taken, control efficiency can be determined and represented as the percent of NOx controlled. Based on a search of the South Coast AQMD database, nine source tests for nitric acid units were identified. All nine reports were for facilities using scrubber technology for an APCD. Source tests used to determine compliance with a rule or permit condition may not be suitable to use for quantification of emissions. Among the nine source tests, four were deemed acceptable to assess control efficiency and/or outlet mass NOx emission rates. There was at least one source test for each type of operation subject to PR 1159.1.

A source test at one RECLAIM precious metal reclamation facility with a 3-Stage scrubber system that controls NOx (as well as HCl and Cl2) emissions showed an outlet emission rate of 0.26 lb/hr and control efficiency of 98.4% for NOx. This APCD controls emissions from 15 nitric acid units. Only one out of two of the facility's 3-Stage scrubber systems was required to be source tested in order to determine the emission factor used for all the nitric acid units.

One source test at a metal finishing facility for a single large chemical milling tank and associated rinse tank equipped with a multistage scrubber had an outlet emission rate of 0.23 lb/hr and 97.7% control efficiency for NOx.

Another source test at a different metal finishing facility for a single nitric strip (surface treatment) tank connected to a single-stage scrubber had an outlet emission rate of 0.29 lb/hr and 43.8% control efficiency for NOx.

A source test at the sole expanded graphite foil production facility's two graphite flake feed hoppers where nitric acid is added before entering into a furnace vented to a 3-stage scrubber system had an outlet emission rate of 0.26 lb/hr. The design and configuration of the APCD precludes a measurement of inlet emissions needed in order to determine control efficiency. Table 2-2 summarizes the source test results for the four facilities described above.

Table 2-2 – Summary of Source Test Results

Facility	Facility Operation	Number of Nitric Acid Units Controlled	Control Efficiency	Source Test Result (Outlet NOx)
1	Precious metal reclamation	15	98.4 %(1)	0.26 lb/hr
2	Expanded graphite foil production	2	N/A(2)	0.26 lb/hr
3	Surface treatment	1	43.8% (3)	0.29 lb/hr
4	Chemical milling	1	97.7%	0.23 lb/hr

(1) Average test results meet the 99% permit condition with acceptable error
(2) Control efficiency could not be calculated
(3) Single stage scrubber

Other Regulatory Requirements
Rules and regulations at the local, state, and national levels including USEPA regulations were reviewed. Staff did not identify any regulatory requirements at the local, state or federal level that regulate NOx emissions for similar operations and equipment for metal finishing, precious metal reclamation, or expanded graphite foil production that use nitric acid.

Assessment of Pollution Control Technologies
Multiple sources of information were reviewed to understand available and applicable control technologies to nitric acid units. Sources included scientific literature, the South Coast AQMD database, vendors and consultants, and facility representatives. Information obtained was analyzed with the objective of identifying relevant control technologies and understanding the capabilities and limitations of each technology. Staff identified three technologies that were used to control emissions of NOx: (1) selective catalytic reduction, (2) non-selective catalytic reduction, and (3) wet scrubbers. A discussion of each of these technologies is provided below.

Selective catalytic reduction (SCR)
A post-combustion control technology, SCR involves the injection of ammonia (NH3) or urea (which is vaporized into ammonia) into the flue gas stream to reduce NOx to N2 and H2O via the use of catalysts. The optimal range of flue gas temperatures corresponding to the highest NOx reductions and maximum catalyst life is 500-1,000 °F. A molar ratio of 0.9:1 to 1:1 NH3:NOx provides the maximum NOx reductions while minimizing “ammonia slip”. Ammonia slip occurs when ammonia from the ammonia injection passes through the catalyst bed without reacting with NOx and continues outside the flue stack to the ambient air. NOx reduction efficiencies can range from 80% to more than 85%. Catalysts are often installed in modular beds, with the first bed in the flue stream contributing to the most NOx reductions relative to the beds subsequent in the flue gas stream. Accordingly, catalyst beds can either be rotated or replaced on a regular basis in intervals

in line with their usage. Catalysts can also be regenerated instead of replaced, which can be approximately 40% less expensive that catalyst replacement.

Due to the high temperature requirements inherent to SCR systems, they are not suited for control of NOx from nitric acid units for PR 1159.1 and none were used to control NOx from nitric acid units in PR 1159.1.

Selective non-catalytic reduction systems (SNCR)
A post-combustion control technology, SNCR involves the injection of ammonia or urea into the flue gas stream to reduce NOx to N2 and H2O without the use of catalysts. The optimal range of flue gas temperatures corresponding to highest NOx reductions and maximum catalyst life is comparatively higher than that for SCR, as the catalyst integrity and efficiency is no longer a concern. This temperature range is 1,500-2,200 °F. Relative to SCR, many processes may not need to install a dilution air fan nor additional duct work due to the elevated optimal temperature range capability. A molar ratio of 2:1-4:1 NH3:NOx with a residence time of longer than one second provides the maximum NOx reductions. A higher molar ratio is necessary due to the absence of a catalyst facilitating the reaction between NH3 and NOx. Due to this, ammonia slip is more of a concern with SNCR than it is for SCR. The lack of a catalyst leads to a lower NOx reduction potential. SNCR have been demonstrated to achieve 60% NOx reduction efficiencies in the boiler industry. Due to the lack of catalyst, operating costs and maintenance costs are also lower than those for SCR by approximately 20%.

Due to the high temperature requirements inherent to SNCR systems, they are not suited for control of NOx from nitric acid units for PR 1159.1 and none were used to control NOx from nitric acid units in PR 1159.1.

NOx Scrubber Technology
Whereas SCR and SNCR systems are not suitable for use with the operating conditions of nitric acid units, scrubber technology was the only control technology found to be used for nitric acid units used in metal finishing, precious metal reclamation, and expanded graphite foil production operations. However, few of the scrubbers were NOx scrubbers, with the majority being installed for the control of acid fumes. NOx scrubbers require longer residency times and are typically larger in size than acid fume scrubbers. Scrubbers are common add-on controls used to control many pollutants, both particulates and gases. In order for the scrubber to be effective in achieving its targeted emission limit, it must be designed accordingly. The typical wet scrubber consists of a cylindrical tower filled with media designed to increase the available surface area for chemical reactions needed to reduce the target pollutant. Located above the packed bed of media are spray nozzles that distribute the scrubbing solution/liquid to the large surface areas on the media where the chemical reaction occurs. The scrubbing solution accumulates at the bottom and a recirculation pump will once again send the solution back up to the spray nozzles. There are also sensors and controllers (not illustrated in figure) that add back the chemicals spent during the chemical reaction. The contaminated gas stream with the pollutant typically enters from the bottom and flows up through the packed bed before passing through a mist eliminator that minimizes the loss

of the scrubbing solution before exiting out to another tower or the stack. Figure 2-2 illustrates the parts of a typical packed bed scrubber.

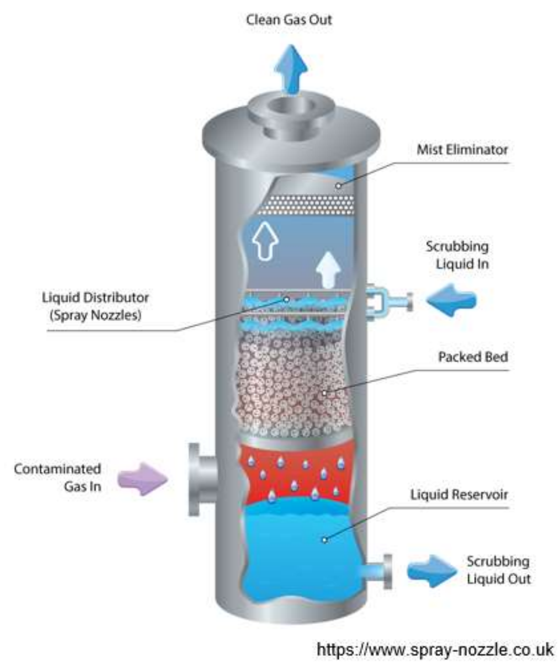


Figure 2-2 – Typical Packed Bed Scrubber

Control systems with multiple scrubbers (towers) connected in series can be used to target the specific species of NOx such as nitric oxide (NO) and nitrogen dioxide (NO_2) that primarily make up NOx. Multiple scrubbers in series increases the overall control of NOx. Typically, the first tower will oxidize the NO portion of the gas stream into NO_2 then a second tower will target NO_2 reducing it to N_2. Single tower NOx scrubbers often target only NO_2 which has a brownish visible plume and is more toxic than NO which is a colorless gas. Single tower NOx scrubber using hydrogen peroxide (H_2O_2) are able to control both NO and NO_2 but have limitations such as scrubber construction and available space for placement of the APCD. A nitric acid unit's operation, target NOx emission limit, and available physical space at the facility are important factors in the proper design of the APCD to be considered.

Based on the existing emission limits and technology assessment, staff determined that a 99% control efficiency of NOx emissions from nitric acid units is feasible with a properly designed NOx scrubber system.

Initial BARCT Emission Limit

Initial BARCT emission limits were proposed for each type of facility operation, including the two categories in metal finishing, and based on the assumption that 99% control efficiency of uncontrolled NOx emission could be achieved with a packed bed scrubber. Source tests were used to determine uncontrolled NOx emissions to the packed bed scrubber.

A NOx emission rate at 0.30 lb/hr was proposed for the precious metal reclamation facility based on the source test result for the facility. The source test showed an outlet NOx emission rate of 0.26 lb/hr. This facility currently has a an APCD achieving 99% control efficiency.

The 0.30 lb/hr emission limit was also proposed for the expanded graphite foil production facility. The source test for this facility showed an outlet NOx emission rate of 0.26 lb/hr. Staff was not able to determine the uncontrolled NOx emissions to the APCD, and therefore, not able to determine the control efficiency of the APCD. For this reason, and because the source test showed similar results to the precious metal reclamation facility with 99% control, staff proposed the same initial BARCT emission limit as that proposed for the precious metal reclamation facility. Both precious metal reclamation and expanded graphite foil production source tests showed post-control emission rates of 0.26 lb/hr of NOx despite having operations expected to be the most emissive.

For metal finishing, the two source tests represented the two subcategories: surface treatment and chemical milling. As expected, the surface treatment tank was equipped with a single stage NOx scrubber achieving a control efficiency of 44% had the highest emission rate of 0.29 lb/hr. The chemical milling tank was equipped with a multistage NOx scrubber which achieved a control efficiency greater than 97% and the lowest emission rate of 0.23 lb/hr. However, as the two metal finishing facilities could install APCDs to achieve a control efficiency of 99%, it was technically feasible to achieve lower NOx emission than the 44% and 97% of their current APCDs allowed. Initial NOx limits for these facilities were determined based on the ability to achieve 99% control efficiency. First, the uncontrolled emissions were determined for the two facilities based on the outlet emission rate and source tested control efficiency. A 99% reduction was then applied to the uncontrolled emissions for the two facilities. The remaining NOx emission rates represent the initial BARCT emission limits. Table 2-3 summarizes the initial BARCT emission limits for each of the four facilities.

Table 2-3 – Initial BARCT Emission Limits

Operation	Source Test Results (Emission Rate and Control Efficiency)	Initial BARCT Emission Limit
Metal finishing (surface treatment)	0.29 lb/hr (44% CE)	0.005 lb/hr
Metal finishing (chemical milling)	0.23 lb/hr (97% CE)	0.08 lb/hr
Precious metal reclamation	0.26 lb/hr (99% CE)	0.3 lb/hr
Expanded graphite foil production	0.26 lb/hr (CE not applicable)	0.3 lb/hr

Cost-Effectiveness and Incremental Cost-Effectiveness

Based on the information obtained, staff performed a cost-effectiveness analysis on the initial BARCT emission limits. Cost-effectiveness is the cost to benefit analysis comparing the relative cost to the outcomes (i.e., reduction of NOx emissions in tons). Currently the cost-effectiveness threshold from the 2016 Air Quality Management Plan is $50,000 per ton of NOx reduced. There was limited cost information available. Cost information from permit evaluations, vendor provided cost estimates, and information from facilities during site visits were used. Staff obtained costs for packed bed scrubbers with control efficiency of 99% from a permit application and two supplier quotes. Two of the three sources provided costs that reflected the costs for a packed bed scrubber prior to COVID-19. COVID-19 has impacted the cost of materials and staff determined that the costs from the two suppliers were not representative of costs that facilities would incur if they were to install a pack bed scrubber in 2022 or the near future. The capital costs provided by these two sources were $480,000 (permit application quote) and $500,000 (supplier quote). The supplier that provided the quote estimated that today's capital cost for a packed bed scrubber would range from $750,000 to $1,000,000. A second supplier quote was obtained in 2022 and quoted $1,000,000 for capital cost for a packed bed scrubber. Annual operation and maintenance costs were not provided by the three sources. Staff estimated that annual costs, including costs for chemicals for the packed bed scrubber solution, fresh water, wastewater, electricity and other maintenance, would total approximately 10 percent of the capital cost. Capital costs were annualized over a 25 year lifespan for the equipment with an interest rate of 4%. NOx emissions were based on the source test information and the initial BARCT emission limits based on a control efficiency of 99%.

An incremental cost-effectiveness analysis is conducted if multiple initial BARCT concentration limits are identified that vary in stringency and are each cost-effective. A final BARCT concentration limit is established that is both technologically feasible, achievable within the implementation schedule allowed in the proposed rule, cost-effective, and incrementally cost-effective. The initial BARCT emission limit of 0.30 lbs/hr is the only emission limit that is cost-effective, therefore an incremental cost-effectiveness analysis was not conducted to determine the proposed BARCT emission limit.

The cost-effectiveness for the surface treatment metal finishing facility to meet the 0.005 lb/hr NOx emission limit is $360,000 per ton of NOx reduced. The cost-effectiveness for the chemical milling metal finishing facility to meet the 0.08 lb/hr NOx emission limit is $668,000 per ton of NOx reduced. These numbers are considerably higher than the cost effectiveness threshold of $50,000 per ton of NOx reduced as included in the 2016 Air Quality Management Plan. Therefore, it is determined that the initial BARCT emission limit was not cost-effective for the metal finishing facilities.

For precious metal reclamation and expanded graphite foil production, given the facilities are currently already meeting the emission limit, it is cost-effectiveness to meet the NOx emission limit of 0.30 lb/hr.

BARCT Emission Limits

Because requiring a control efficiency of 99% was deemed not cost-effective for the two metal finishing facilities, the emission rates from their two source tests were considered. The two emission rates were 0.29 and 0.23 lb/hr for surface treatment and chemical milling, respectively. Therefore, it is proposed that a mass emission rate of 0.30 lb/hr as BARCT emission limit for all metal finishing, precious metal reclamation, and expanded graphite foil production facilities. Upon releasing the Initial Preliminary Draft Rule Language on August 26, 2022, the facility operator of a precious metal reclamation facility requested the use of a 99% control efficiency as an alternative approach to meet BARCT. Although a control efficiency limit at 99% is deemed technologically feasible, it is not cost-effective to be applied to other operations. To provide regulatory flexibility, an alternate compliance option based on control efficiency is included. Staff is proposing a BARCT emission limit of either 0.30 lb/hr or a control efficiency of 99% for NOx emissions. One or more nitric acid units may be connected to a single APCD, and the emission limit of 0.30 lb/hr or 99% control efficiency applies to the APCD.

Low-Use Exemption

The cost-effectiveness threshold from the 2016 Air Quality Management Plan is $50,000 per ton of NOx reduced. As the amount of potential emission reductions are proportional to the amount of NOx emissions, facilities with low usage of nitric acid might not be cost-effective to install control (i.e., scrubber system). Based on the cost of a packed bed scrubber with 99% control efficiency and the cost effectiveness threshold of $50,000 per ton, staff calculated the amount of NOx emissions where it is cost-effective to implement a control with 99% control efficiency. It is cost-effective for facilities to implement control for a unit that emits more than 11 lb/day of NOx and for a facility with multiple units that emit more than 33 lb/day of NOx combined. As a result, a low-use exemption is included in the PR 1159.1 for facilities that emit below a certain amount of

NOx from their nitric acid unit operations. Facilities that use nitric acid below the threshold will be exempt from controls and source testing requirements but will be required to maintain recordkeeping to demonstrate that the usage of nitric acid is below the threshold.

CHAPTER 3: PROPOSED RULE 1159.1

CHAPTER 3: PROPOSED RULE 1159.1

Introduction

The objective of PR 1159.1 is to reduce NOx emissions from the chemical reaction of nitric acid with metals or decomposition of nitric acid at high temperatures. The following information describes the structure of PR 1159.1 and explains the provisions of the rule. The structure follows those of recently adopted or amended rules by South Coast AQMD for consistency.

Proposed Rule Structure

PR 1159.1 will contain the following subdivisions that will contain all the requirements for the applicable equipment:

- *Purpose*
- *Applicability*
- *Definitions*
- *Requirements*
- *Implementation Schedule*
- *Inspection and Maintenance of Air Pollution Control Device*
- *Monitoring, Recordkeeping, and Reporting Requirements*
- *Source Testing Requirements and Test Methods*
- *Exemptions*

Proposed Rule 1159.1

Subdivision (a) – Purpose

The purpose of the rule is to reduce Nitrogen Oxides (NOx) emissions from chemical reactions of nitric acid with metals or the decomposition of nitric acid at high temperatures.

Subdivision (b) – Applicability

This rule applies to an owner or operator of a facility with a nitric acid tank(s) in operations including but not limited to Metal Finishing, Precious Metal Reclamation, or Expanded Graphite Foil Production. Facilities subject to the rule may not be subject to all the provisions of this rule. Nitric Acid Units that are exempt pursuant to subdivision (i) are exempt from provisions such as requirements for control equipment and demonstration of the emission limits specified in subdivision (d).

Subdivision (c) – Definitions

PR 1159.1 includes definitions for specific terms. Some of the definitions are based on definitions from existing South Coast AQMD rules with slight modifications, while other definitions are unique to PR 1159.1. For certain definitions, additional clarification is provided in this chapter where the definition is used within a specific provision.

- *AIR POLLUTION CONTROL DEVICE (APCD) means equipment installed for the purpose of collecting and reducing emissions from a Nitric Acid Unit(s).*

This definition was added for clarification.

- *EMISSIONS OF NOx means the sum of nitric oxides and nitrogen dioxides emitted, calculated as nitrogen dioxide*

This definition was for clarity.

- *EXPANDED GRAPHITE FOIL PRODUCTION means the production of graphite products from raw graphite flakes.*

This definition was added to specify a type of operation subject to the rule.

- *METAL FINISHING means the treatment of metal surfaces to obtain desired characteristics using open process tanks.*

This definition was added to specify a type of operation subject to the rule.

- *NEW AIR POLLUTION CONTROL DEVICE (New APCD) means an APCD installed, relocated, modified or replaced after [Date of Rule Adoption]*

This definition was added to clarify which APCDs certain provisions apply to.

- *NITRIC ACID UNIT means tank, reactor, vessel, or other container containing nitric acid (HNO_3) where the nitric acid either reacts with a metal or decomposes at high temperatures. A Nitric Acid Unit does not include a container used exclusively to store nitric acid or a Rinse Tank.*

This definition was added to specify which tanks and other containers at facilities this rule applies to. Examples include cleaning and chemical milling tanks that use nitric acid in the tank solution found at metal finishing facilities. A Nitric Acid Unit does not include a container used exclusively to store nitric acid or a Rinse Tank. Wastewater system equipment are not considered Nitric Acid Units.

- *OPERATING PARAMETER VALUE means a minimum or maximum value established to monitor the proper operation of an Air Pollution Control Device*.

This definition was added to specify which values are required to be recorded for certain provisions.

- *PRECIOUS METAL RECLAMATION means the recovery of valuable metals from scraps.*

This definition is added to specify a type of operation subject to the rule.

- *PROCESS LINE means a series of tanks, including Nitric Acid Units, necessary to conduct a specific process at the facility.*

This definition is added to identify specific groups of Nitric Acid Units that may be required to comply with specific provisions upon no longer being exempt.

- *RECYCLE means the reuse of solution containing nitric acid taken from a Nitric Acid Unit.*

This definition is added to specify the nitric acid that is removed from one Nitric Acid Unit for use in another tank may still participate in the formation of NOx and cannot be considered for Replenishment Adjustment.

- *REPLENISHMENT means the volume of nitric acid added to a Nitric Acid Unit.*

This definition is added to specify the nitric acid that is subject to certain provisions such as recordkeeping, reporting, and exemptions.

- *REPLENISHMENT ADJUSTMENT means the volume of new nitric acid added to a Nitric Acid Unit that replaces nitric acid that is evaporated or disposed of, in part or whole, and is not Recycled at the facility.*

This definition is added to specify the nitric acid that may be excluded from certain calculations for monthly Replenishment totals for the determination of exemptions in subdivision (i).

- *RINSE TANK means any tank where a part is partially or fully submerged into a liquid to remove any residual solution from a Nitric Acid Unit.*

This definition is added to clarify that this type of tank, despite having trace amount of nitric acid in the water due to the intended purpose of the tank, is not considered a Nitric Acid Unit.

Subdivision (d) – Requirements
This subdivision contains requirements for air pollution control devices and labeling of APCDs and nitric acid units.

<u>Control requirements for nitric acid units with APCDS - Paragraph (d)(1)</u>

Applies to Nitric Acid Units that are not exempt pursuant to subdivision (i). Requires a Nitric Acid Unit cannot be operated unless equipped with an APCD that meets certain requirements. APCDs are required to demonstrate with a source test, either an outlet NOx mass emission rate of 0.30 pounds per hour (lb/hr) or 99% control efficiency based on inlet and outlet NOx emissions. The requirements of this paragraph are to be met according to the schedule in subdivision (e).

<u>Labeling requirements for nitric acid units and APCDs – Paragraph (d)(2)</u>

Beginning June 1, 2023, facilities are required to label nitric acid units with South Coast AQMD tank number or other identifier, South Coast AQMD permit number and maximum nitric acid concentration by weight.

Air Pollution Control Device requirements – Paragraph (d)(3)

The provisions apply to APCDs required to comply with paragraph (d)(1). Facilities required to operate an APCD cannot remove or render the APCD inoperable unless it is replaced by another APCD that meets the requirements of paragraph (d)(1). All APCD's must be labeled with permissible operating ranges listed on the equipment's permit including flowrates of scrubber solutions, pHs of scrubber solution, oxidation reduction potential meter range of the scrubber solution, and pressure drop across stages of scrubber systems. Parameters not listed on the permit are not required in the labeling. On and after June 1, 2023 a unit with an APCD complying with subdivision (d)(1) cannot operate unless the APCD is collecting all visible emissions from the nitric acid unit.

Subdivision (e) – Implementation Schedule

Contains schedules for applicable nitric acid units to comply with subparagraph (d)(1)(A).

Schedule for nitric acid units in operation on or before [Date of Adoption] equipped with an APCD – Paragraph (e)(1)

Applies to units that do not meet the criteria for exemption from the requirements of subparagraph (d)(1)(A) and are equipped with an APCD. A source test protocol must be submitted by March 1, 2023. Within 120 days of receiving approval of the source test protocol from the Executive Officer, a source test must be conducted and the requirements of subparagraph (d)(1)(A) must be met by December 31, 2023.

Schedule for New APCDs – Paragraph (e)(2)

Applies to New APCDs , as defined in subdivision (c), for a Nitric Acid Unit(s) that do not meet the criteria for exemption from the requirements of subparagraph (d)(1)(A). This paragraph also applies to APCD equipment that will be added to Nitric Acid Unit(s) or an existing APCD (a modification) that may or may not have been subject to paragraphs (e)(3) or (e)(4).

A source test protocol must be submitted within 60 days of the completion of construction of the APCD. The source test must be conducted within 120 days of receiving approval of the source test protocol from the Executive Officer and the requirements of subparagraph (d)(1)(A) must be met within 270 days from the date of the completion of construction of the APCD.

Schedule for Nitric Acid Units that exceed the Per Nitric Acid Unit Low-Use Threshold or the Reduced Per Nitric Acid Unit Low-Use Threshold – Paragraph (e)(3)

Applies to Nitric Acid Units that exceed the applicable low-use threshold after June 1, 2023.

Subparagraph (e)(3)(A) requires a permit application(s) for installation of an APCD to be submitted within 120 days of the last day of the month the exceedance occurred. An APCD(s) is required for the Nitric Acid Unit(s) that exceeded the threshold and all Nitric Acid Units in the same Process Line, if the Nitric Acid Unit(s) that exceeded the threshold was part of a Process Line. The exceedance of the threshold would not constitute a violation provided the facility complies with all requirements of the implementation schedule for the APCD in this paragraph.

Subparagraph (e)(3)(C) requires that the a source test protocol submittal and source testing occurs according to the schedule in paragraph (e)(2).

Schedule for Nitric Acid Units that exceed the Facility-Wide Low-Use Threshold or the Reduced Facility-Wide Low-Use Threshold – Paragraph (e)(4)

Applies to Nitric Acid Units that exceed the applicable low-use threshold after June 1, 2023.

Subparagraph (e)(4)(A) requires a permit application(s) for installation of an APCD to be submitted within 120 days of the last day of the month the exceedance occurred. An APCD(s) is required for all Nitric Acid Unit(s) at the facility. The exceedance of the threshold would not constitute a violation provided the facility complies with all requirements of the implementation schedule for the APCD(s) in this paragraph.

Subparagraph (e)(4)(B) requires the completion of the construction of the APCD(s) by the permit to construct expiration date

Subparagraph (e)(4)(C) requires that the a source test protocol submittal and source testing occurs according to the schedule in paragraph (e)(2).

Option to Exclude Certain Nitric Acid Units from Controls – Paragraph (e)(5)

Facilities may opt to exclude certain Nitric Acid Units that are required to be equipped with an APCD(s) pursuant to paragraphs (e)(4) or (e)(5).

Subparagraph (e)(4)(A) allows Nitric Acid Units contained in the same Process Line as the Nitric Acid Unit that exceeded the threshold required to be equipped with an APCD to be excluded from the requirement provided that the Nitric Acid Units in the Process Line are excluded and would not be equipped with an APCD comply with the Reduced Per Nitric Acid Unit Low-Use Threshold

Subparagraph (e)(4)(B) allows Nitric Acid Units that are required to be equipped with an APCD(s) to be excluded from the requirement provided the Nitric Acids Units that are excluded and would not be equipped with an APCD(s) comply with the applicable Facility-Wide Threshold.

Alternative to Installing an APCD required by paragraphs (e)(3) or (e)(4) – Paragraph (e)(6)

Paragraph (e)(6) provides an alternative to complying with paragraphs (e)(3) or (e)(4) for an exceedance of an applicable low-use threshold but does not preclude facilities from being subject to paragraphs (e)(3) and (e)(4) for subsequent exceedances. However, this provision may be used for each exceedance.

This provision is allowed when Nitric Acid Units exceed the Per Nitric Acid Unit Low-Use Threshold or the Facility-Wide Low-Use Threshold but can remain below the applicable threshold if Replenishments from a Nitric Acid Unit equipped with an APCD are excluded from the monthly total of Replenishments. Facilities may opt to source test any or all Nitric Acid Unit(s) equipped with an APCD to demonstrate compliance with the requirements in subparagraph (d)(1)(A). Upon demonstrating compliance, Replenishments for the Nitric Acid Unit(s) controlled by the APCD that demonstrated compliance may be excluded from the Replenishments recorded is subparagraph (g)(2)(A) for the month of the exceedance. The remaining Nitric Acid Units that are not connected to the APCD that demonstrated compliance with subparagraph (d)(1)(A) must comply with the applicable low-use threshold. If another exceedance occurs, the Nitric Acid Units are subject to either paragraph (e)(3) or (e)(4), but may use this provision in lieu of complying with paragraph (e)(3) or paragraph (e)(4).

If the APCD fails to demonstrate compliance, a permit must be submitted for an APCD that meets the requirements in subparagraph (d)(1)(A).

Subdivision (f) – Inspection and Maintenance of Air Pollution Control Device

Contains requirements for inspection and maintenance for APCDs. Periodic visual inspections for leaks or malfunctions required per the manufacturer's recommended frequency or quarterly, whichever is more frequent. The APCD is required to be maintained and operated per the manufacturer's recommendation.

Subdivision (g) – Monitoring, Recordkeeping, and Reporting Requirements

<u>Requirements for APCDs – Paragraph (g)(1)</u>
Beginning January 1, 2023, a facility is required to monitor and record the Operational Parameter Values listed on permit of the APCD to ensure proper operation, at least once a week if the APCD for the weeks the APCD is in operation. Parameters include the flowrate, pH, or oxidation reduction potential of the scrubber solution to ensure the scrubbing solution is effective in reducing NOx emissions. Readings of the pressure drop across different stages of the scrubber system can indicate when there is a blockage or problem with the blower motor.

<u>Requirements for Nitric Acid Units – Paragraph (g)(2)</u>

Two years of records are required from all facilities for calendar years 2023 and 2024. The records must contain all Replenishments and nitric acid concentrations for all Nitric Acid Units, all Replenishment Adjustments and include nitric acid concentrations and calculations, and total monthly nitric acid usage in gallons including all nitric acid concentrations used.
Facilities that are exempt from requirements of paragraph (d)(1) and complying with a low-use threshold must continue to record the information specified in subparagraphs (g)(2)(A)-(C) and keep records of this information for the time that any Nitric Acid Unit at the facility is complying with a low-use threshold.

<u>Reporting – Paragraph (g)(3)</u>
Annual reports for calendar years 2023 and 2024 must be prepared that include records pursuant to paragraph (g)(2), identification of heated Nitric Acid Units and Nitric Acid Units equipped with an APCD, and a source test report(s) or source test report number if already evaluated by the South Coast AQMD for any source tests conducted in the previous 5 years from date of rule adoption.

<u>Submittal of annual reports – Paragraph (g)(4)</u>
Facilities are required to submit the report containing the information required in paragraphs (g)(2)-(3) by February 15, 2025.

<u>Recordkeeping – Paragraph (g)(5)</u>
Records required to be kept for 5 years with the most recent 2 years kept on site and readily available to the Executive Officer upon request.

Subdivision (h) – Source Testing Requirements and Test Methods

Requirements for the source test protocol – Paragraph (h)(1)
Contains requirements for the information that must be included in a source test protocol.

Disapproval of a source test protocol – Paragraph (h)(2)
A source test protocol is required to be revised and submitted to the Executive Officer within 30 days of notification of the disapproval of the source test protocol by the executive Officer is electronically distributed.

Frequency of source testing – Paragraph (h)(3)
Facilities are required to source test at least every 5 years from the date of the most recent source test that demonstrated compliance with subparagraph (d)(1)(A).

Subparagraph (h)(3)(A) contains requirements for Nitric Acid Units that are not in operation when required to be source tested and requires that the source test must be conducted no later than the end of 7 consecutive days since the date the source test was required or 15 cumulative days of the APCD operating starting from when the APCD resumes operations.

Qualifications for source testing contractor – Paragraph (h)(4)
A South Coast AQMD- approved contractor under the Laboratory Approval Program must conduct the source test.

Timeline for source test report submittal – Paragraph (h)(5)
Source tests are required to be submitted to the Executive Officer within 60 days of completing the source test.

Requirements for source tests that do not demonstrate compliance – Paragraph (h)(6)
Contains requirements for retesting if the Executive Officer notifies the facility that the source test was not acceptable.

Subdivision (i) – Exemptions
Specifies Nitric Acids Units that are exempt from certain requirements or not subject to the rule.

Exempt Nitric Acid Units – Paragraph (i)(1)
Specifies the criteria for which Nitric Acid Units may be exempt from subdivision (d), paragraphs (e)(1) and (e)(2), subdivision (f), paragraph (g)(1) and subdivision (h). Facilities with Nitric Acid Units Replenishments that total less than the applicable low-use thresholds contained in Table A are exempt from the specified requirements of the rule. Replenishments for Nitric Acid Units that are complying with the requirements of subparagraph (d)(1)(A) are not counted towards the thresholds in Table A.

Facilities with low-use Nitric Acid Units complying with the exemption are subject to both the Per Nitric Acid Unit and Facility-Wide Thresholds contained in Table A. Nitric Acid Units that use different concentrations of nitric acid stock solutions or premixed chemicals containing nitric acid must comply with the Per Nitric Acid Unit Low-Use Threshold associated with the highest nitric acid stock solution or premixed chemical's nitric acid concentration (WT%) used that month for that Nitric Acid Unit. Facilities that use different nitric acid stock solution concentrations or premixed chemicals containing nitric acid must comply with the Facility-Wide Low-Use Threshold associated with the highest nitric acid stock solution or premixed chemical's nitric acid concentration (WT%) used at the facility in a Nitric Acid Unit, excluding Nitric Acid Units complying with the requirements of subparagraph (d)(1)(A), in that month.

Table A – Low-Use Thresholds for Nitric Acid Units

Concentration of Nitric Acid (WT%) Stock Solution or Premixed Chemical based on Safety Data Sheet	Low-Use Thresholds (gallons per month)		
	Per Nitric Acid Unit*	Facility-Wide**	Reduced Facility-Wide for Units **
0-30%	385	1155	231
>30-60%	115	346	69
>60-75%	66	198	40
>75-100%	45	135	27

* *If different nitric acid concentrations are used in an individual Nitric Acid Unit, the threshold for the highest concentration applies.*
** *If different nitric acid concentrations are used for different Nitric Acid Units, the threshold for the highest concentration applies for Facility-Wide and Reduced Facility-Wide Thresholds.*

<u>Disposal Replenishment Adjustments for nitric acid usage – Paragraph (i)(2)</u>

This provision provides an option to exclude certain volumes of nitric acid added to a Nitric Acid Unit because it replaces nitric acid that is disposed of that does not form NOx emissions from the Nitric Acid Unit. Volumes of nitric acid that are removed from a Nitric Acid Unit and not Recycled at the facility may be excluded from Replenishments recorded pursuant to subparagraph (g)(2)(A). If a volume of nitric acid is excluded from the Replenishments, the volume of nitric acid is required to be reported as a Replenishment Adjustment pursuant to subparagraph (g)(2)(B). To determine the volume of nitric acid that may be a Replenishment Adjustment due to disposal, a facility must calculate the volume of nitric acid that is removed from a Nitric Acid Unit for disposal and would not generate NOx emissions from the Nitric Acid Unit. The volumes nitric acid that are recorded as a Replenishment Adjustment and excluded from Replenishments must be equal.

Example: Nitric acid of 68% concentration is used for a Nitric Acid Unit. 40 gallons of the tank solution is removed and disposed of for quality control. The concentration of the tank solution is measured at 62% nitric acid concentration prior to disposal. The facility calculates the amount, in gallons, of new nitric acid at a specific concentration (68% for 42 BE nitric acid) that is equivalent to nitric acid in the portion of tank solution that was removed and disposed of. The volume of new nitric acid (68%) that was calculated is considered Replenishment Adjustments, *and may be excluded from the monthly total Replenishments for that Nitric Acid Unit pursuant to (g)(2)(A) but must be recorded pursuant to (g)(2)(B).*

Subparagraph (i)(2)(A) specifies the records that facilities must have to exclude the disposal Replenishment Adjustments recorded in subparagraph (g)(2)(B) from subparagraph (g)(2)(A). Nitric acid concentration of the removed tank solution, the volume of removed solution, and calculations for determining how much nitric acid can be excluded from recorded Replenishment totals required by subparagraph (g)(2)(C), but are required to be recorded pursuant (g)(2)(B). In addition, removed nitric acid that is Recycled cannot be considered Replenishment Adjustment.

<u>Evaporation Replenishment Adjustments for nitric acid usage – Paragraph (i)(3)</u>
This provision provides an option to exclude certain volumes of nitric acid added to a Nitric Acid Unit because it replaces nitric acid from evaporation loss that does not form NOx emissions from the Nitric Acid Unit. Volumes of nitric acid that are evaporated from a heated tank may be excluded from Replenishments recorded pursuant to subparagraph (g)(2)(A). If a volume of nitric acid is excluded from the Replenishments, the volume of nitric acid is required to be reported as a Replenishment Adjustment pursuant to subparagraph (g)(2)(B). To determine the volume of nitric acid that may be a Replenishment Adjustment due to evaporation, a facility must calculate the volume of nitric acid that is evaporated from a Nitric Acid Unit and would not generate NOx emissions. This adjustment only applies to a heated Nitric Acid Unit that is vented to an APCD installed on or before [Date of Rule Adoption].

Subparagraph (i)(3)(A) specifies the procedure for a facility to determine how much nitric acid is evaporated from a heated tank before forming NOx. A facility may exclude the calculated amount of nitric acid (expressed as gallons of equivalent stock nitric acid solution or premix used for the Nitric Acid Unit) that does not generate NOx due to evaporation.

<u>Nitric Acid Units that report nitric acid usage under RECLAIM – Paragraph (i)(4)</u>
Nitric Acid Units that are demonstrating compliance with the requirements of subparagraph (d)(1)(A) and with reported nitric acid usage under RECLAIM pursuant to Regulation XX are exempt from the requirements paragraphs (g)(2), (g)(3), and (g)(4). Nitric Acid Units at RECLAIM facilities exempt pursuant to paragraph (i)(1) would not be exempt under this paragraph as they are required to demonstrate compliance with the applicable low-use thresholds through recordkeeping of nitric acid use.

<u>Nitric Acid Units not subject to this rule – Paragraph (i)(5)</u>
Nitric Acid Units that are exempt from permitting pursuant to Rule 219 – Equipment Not Requiring a Written Permit Pursuant to Regulation II are exempt from the provisions of this rule.

CHAPTER 4: IMPACT ASSESSMENTS

INTRODUCTION

EMISSION REDUCTIONS

COST-EFFECTIVENESS

SOCIOECONOMIC ASSESSMENT

CALIFORNIA ENVIRONMENTAL QUALITY ACT ASSESSMENT

DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727

COMPARATIVE ANALYSIS

INCREMENTAL COST-EFFECTIVENESS

CHAPTER 4: IMPACT ASSESSMENT

Introduction

Impact assessments were conducted during the PR 1159.1 rule development to assess the environmental and socioeconomic implications of PR 1159.1. These impact assessments include emission reduction calculations, cost-effectiveness and incremental cost-effectiveness analyses, a socioeconomic assessment, and a California Environmental Quality Act (CEQA) analysis. Staff prepared draft findings and a comparative analysis pursuant to Health and Safety Code Sections 40727 and 40727.2, respectively.

Emission Reductions

PR 1159.1 affects 260 facilities including but not limited to metal finishing, precious metal reclamation, and expanded graphite foil production that use nitric acid that forms NOx from the reaction with metals or decomposition. Based on an evaluation of best available information for these facilities, staff determined that one facility may not meet the criteria for exemption from controls and would be required to install a NOx control.

If the facility identified as potentially not able to meet the exemption criteria does not meet the criteria, that facility would need to comply with the control requirements of the rule. The rule requires that facilities that do not meet the exemption criteria install an air pollution control device that meets the proposed emission limit of 0.30 lbs per day or achieves 99% control efficiency. If the facility complies with the emission limit of 0.30 lb/hr, the associated emission reductions would be 0.01 tons per day. If the facility complies with the requirement for an air pollution control device with 99% control efficiency, the associated emission reductions are 0.02 tons per day. Some facilities currently have air pollution control devices that meet the proposed control requirements. No emissions reductions are associated with those facilities.

Costs and Cost-Effectiveness

Health and Safety Code Section 40920.6 requires a cost-effectiveness analysis when establishing BARCT requirements. The cost-effectiveness of a control technology is measured in terms of the control cost in dollars per ton of air pollutant reduced. The costs for control technology includes purchasing, installation, operation and maintenance. The 2016 AQMP established a cost-effectiveness threshold of $50,000 per ton of NOx reduced. Cost-effectiveness that is greater than $50,000 per ton of NOx reduced requires additional analysis and a hearing before the Board on costs.

Packed Bed Scrubbers - Costs

Staff obtained costs for packed bed scrubbers with control efficiency of 99% from a permit application and two supplier quotes. Two of the three sources provided costs that reflected the costs for a packed bed scrubber prior to COVID-19. COVID-19 has impacted the cost of materials and staff determined that the costs from the two suppliers were not representative of costs that facilities would incur if they were to install a pack bed scrubber in 2022 or the near future. The capital costs provided by these two sources were $480,000 (permit application quote) and $500,000 (supplier quote). The supplier that provided the quote estimated that today’s capital cost for a packed bed scrubber would range from $750,000 to $1,000,000. A second supplier quote was obtained in 2022 and quoted $1,000,000 for capital cost for a packed bed scrubber. Annual operation and maintenance costs were not provided by the three sources. Staff estimated that annual costs, including costs for chemicals for the packed bed scrubber solution, fresh water, wastewater, electricity and other maintenance, would total approximately 10 percent of the capital cost.

Cost-Effectiveness

For the cost-effectiveness analysis, staff assumed a capital cost of $1,000,000 and an annual cost of $100,000. The cost-effectiveness is estimated based on the present value of the retrofit cost, which was calculated according to the capital cost (equipment and installation) plus the annual operating cost (recurring expenses over the useful life of the control equipment multiplied by a present worth factor). In the cost-effectiveness calculation, staff assumed a uniformed series present worth factor (PWF) at a 4% interest rate and a 25-year equipment life expectancy.

$$PWV = TIC + (PWF \times AC)$$

PWV = present worth value ($)
TIC = total installed cost ($)
AC = annual cost ($)
PWF = uniform series present worth factor (15.622)

Emissions information was limited for the cost-effectiveness analysis for facilities subject to the rule. For four facilities, including three RECLAIM and one non-RECLAIM facility, emissions were determined with source test records. For the remaining eight RECLAIM facilities and 249 non-RECLAIM facilities emissions were determined by annual emissions reports, discussion with facilities, or emissions profiles.

Cost-Effectiveness for Facilities with Source Test Information

Four facilities had source test information that showed compliance with the proposed emission limit 0.30 lb/hr.

Table 4-1 – Cost-Effectiveness – Facilities with Source Test Information

Operation	Source Test Result	Cost-effectiveness
Metal finishing	0.29 lb/hr	Already in Compliance
Metal finishing	0.23 lb/hr	Already in Compliance
Precious metal reclamation	0.26 lb/hr	Already in Compliance
Expanded graphite foil production	0.26 lb/hr	Already in Compliance

Cost-Effectiveness for Facilities without Source Test Information

To determine the cost-effectiveness for facilities without source test data, staff calculated the amount of uncontrolled NOx emissions from a nitric acid unit or multiple nitric acid units that would result in the installation of a packed bed scrubber with 99 percent control efficiency being cost-effective. The inlet mass flowrate to a packed bed scrubber with 99% control efficiency would need to be at a minimum of 11 lbs/day for the implementation of the packed bed scrubber to be cost-effective. Since single or multiple nitric acid units may be controlled by one packed bed scrubber. Staff established a threshold of 11 lbs/day of NOx (equivalent to about 2.1 gallons per day of 68% by weight nitric acid use) emitted from a single Nitric Acid Unit and facility-wide threshold of 33 lbs/day as being cost-effective to implement a control with 99% control efficiency.

RECLAIM facilities

Eight out of the eleven RECLAIM facilities did not have source test data to determine the cost-effectiveness. In addition, not all RECLAIM facilities have controls that are designed to control NOx. Emissions/usage information for these facilities was obtained from facilities and AER reports. Based on the usage information provided by facilities and reported emissions in the 2017 AER, it is not cost-effective for seven of the eight RECLAIM facilities to install an APCD to meet the control requirements of the rule. One facility may have emissions above the applicable thresholds and would result in the installation of an air pollution control device being cost-effective. Staff is gathering more information from the facility to better understand if the facility would have NOx emissions above the threshold.

Non-RECLAIM Facilities

There are 249 non-RECLAIM facilities subject to the rule with 12 facilities that reported emissions through the 2021 AER program. The reported emissions from the 12 facilities are below the emissions threshold in which it is cost-effective for facilities to implement a control. For the remaining facilities, category profiles were developed to estimate the NOx emissions. Staff needed to estimated emissions from the remaining facilities using limited data. Data was obtained data from facility survey responses, permits and facility staff. The information was used to develop category average profiles for the remaining 237 facilities.

A category profile was developed to estimate the number of nitric acid units for chemical milling, surface treatment, and precious metal reclamation facilities. There were no expanded graphite foil production non-RECLAIM facilities. Another category profile was developed to estimate the amount of nitric acid usage for nitric acid unit types, that included surface treatment units, chemical milling units and precious metal reclamation units. NOx emissions were estimated based on the amount of nitric acid usage.

Estimated Number of Nitric Acid Units at Non-RECLAIM Facilities

Three types of industries are subject to PR 1159.1: (1) metal finishing including both surface treatment and chemical milling, (2) precious metal reclamation and (3) expanded graphite production. There are no expanded graphite foil production non-RECLAIM facilities.

As seen in Table 2-4, among the 249 non-RECLAIM facilities, 240 are surface treatment facilities, with 6 facilities in chemical milling and three facilities in precious metal reclamation. Out of the 240 metal finishing facilities, data is available for 83 facilities and the average number of number of tanks at surface treatment facilities was six tanks. Chemical milling facilities contain both surface treatment and chemical milling tanks. Out of the six chemical milling facilities, data is available from four facilities, and on average, there are two chemical milling tanks and five surface treatment tanks for each chemical milling facility. The 3 precious metal facilities have a total of three permitted nitric acid tanks, one at each facility. Table 2-4 summarizes the category average profiles for the number of nitric acid tanks for each facility category.

Table 2-4 – Estimated Number of Nitric Acid Units for Facility Categories

Facility category	Number of facilities with data	Average nitric acid units per facility
Metal finishing - surface treatment	83 out of 240	6
Metal finishing - chemical milling	4 out 6	2 (chemical milling)
		5 (surface treatment)
Precious metal reclamation	3 out 3	1

Estimated Nitric Acid Usage at Non-RECLAIM Facilities

There were four methods identified to estimate NOx emissions. Those methods included: calculating mass of metal removed or dissolved, using emissions factors used in emissions reporting, using an approximation for NOx emissions generated per amount of nitric acid used, and using source test information. Source tests provide the most accurate information, however, limited source test data was available and only represented large facilities. Using the mass of metal removed or dissolved is not common approach to estimating NOx emissions and is challenging to track. Staff determined using an approximation of NOx generated per amount of nitric acid used would be the best method to estimate NOx emissions because the approximation is more accurate than emissions factors used in reporting and usage is more commonly tracked.

NOx emissions were estimated based on nitric acid usage. Staff obtained usage information from surveys, permits and facility representatives. Usage was identified for each process tank type: surface treatment, chemical, and precious metal reclamation. The average usage in surface treatment process tanks, chemical milling process tanks, and precious metal reclamation tanks was calculated. Nitric acid usage was then determined for each nitric acid unit category based off average. Table 2-5 summarizes the category average profiles for the amount of nitric acid used for each unit category.

Table 2-5 – Estimated Amount of Nitric Acid Usage for Each Unit Category

Nitric acid unit category	Number of units with data	Average usage per unit (gallons/day)
Surface treatment	109	0.36
Chemical milling	6	2.1
Precious metal reclamation	1	0.1

Estimated NOx Emissions at Non-RECLAIM Facilities

NOx emissions were calculated based on usage. To calculate the amount of NOx generated from usage, the following assumptions were made:

- 1 mole of NOx will form 1 mole of nitric acid,
- NOx is 50% NO and 50% NO_2, and

- NOx emissions are not dependent on process type or type of metal.

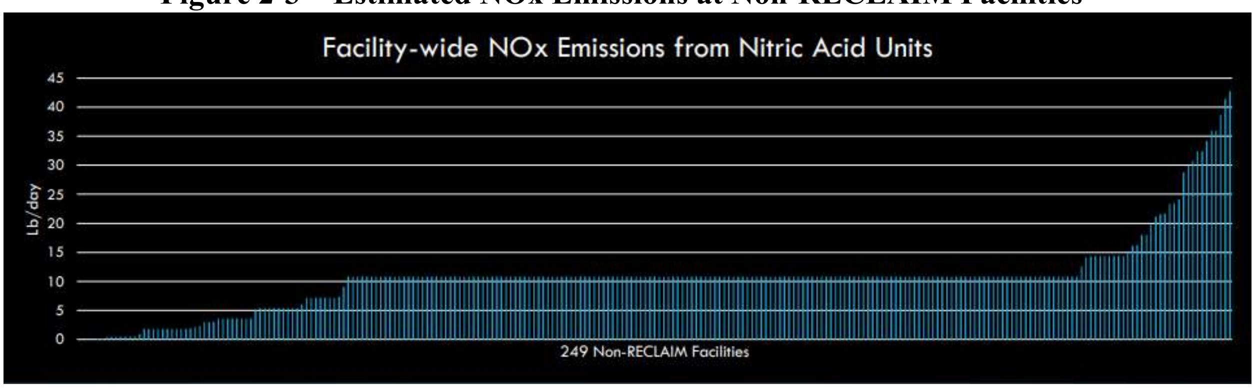
The approximation is then determined for nitric acid solution at a given concentration. Based on these assumptions, for nitric acid solution at 68% nitric acid by weight, one gallon of nitric acid produces five pounds of NOx emissions. Table 2-6 summarizes the category average profiles for the amount of NOx emissions for each unit category based on an assumption of nitric acid solution at 68% weight.

Table 2-6 – Estimated NOx Emissions for Each Unit Category

Nitric acid unit category	NOx emission per unit (lb/day)
Surface treatment	1.8
Chemical milling	10.5
Precious metal reclamation	0.5

The NOx emissions estimated assumes no controls for any units at non-RECLAIM facilities. NOx emissions range from less than one pound per day to approximately 43 lb/day. Figure 2-3 shows the NOx emissions that were estimated for the 249 non-RECLAIM facilities.

Figure 2-3 – Estimated NOx Emissions at Non-RECLAIM Facilities*



*Reported emissions are represented for the 12 facilities with reported emissions.

The resulting NOx emissions at facilities showed six facilities with emissions above the threshold in which it would be cost-effective to add controls to meet the proposed emission limit. Staff contacted these facilities to obtain more accurate usage information. Based on the discussions with the facilities, no facilities are anticipated to be above the NOx emissions threshold. It is not cost-effective to require these facilities to add NOx controls with their current estimated nitric acid usage.

Cost-Effectiveness Summary

There are three RECLAIM facilities and one non-RECLAIM facility with controls that are currently meeting the proposed emission limit. It is cost-effective for the facilities to continue to meet the proposed emission limit with their current controls.

Of the RECLAIM facilities that do not have source test data, based on discussions with facilities and 2017 AER, staff determined it is not cost-effective for all facilities, with the exception of one facility, to install controls to meet the proposed emission limit. Staff is currently gathering additional information from the facility with the potential to have uncontrolled emissions that would result in the installation of a control to be cost-effective. If controls are cost-effective for this facility, the facility would be required to install controls to meet the 0.30 lb/hr emission limit or 99% control efficiency. The estimated baseline NOx emissions at the facility, based on 200 gallons per month of 63% by weight nitric acid usage, totals 1.39 lb/hr (33.36 lb/day) of NOx. The cost-effectiveness for this facility to meet the emission limit of 0.30 lb/hr is $22,000 per ton of NOx reduced. The cost-effectiveness for the facility to meet 99% control efficiency is $17,000 per ton of NOx reduced.

For the 249 non-RECLAIM facilities, estimated emissions are below the threshold in which it would be cost-effective to install controls. None of the non-RECLAIM facilities are anticipated to be required to install based on their current estimated emissions.

Baseline NOx Emission Summary

Baseline emission represent the total emissions from nitric acid units in the PR 1159.1 universe. Approximately 1.34 tons per day of NOx emissions are estimated from the operation of nitric acid tanks from a total of 260 facilities. Non-RECLAIM facilities make up the majority of the NOx emissions, as there are more non-RECLAIM facilities than RECLAIM facilities (249 and 11 facilities respectively). Over 99% of the emissions were estimated based on nitric acid usage from facility survey which may have included recycled or discarded portions of unreacted solution. The conversion from nitric acid usage to NOx emissions are based on conservative engineering assumptions. Therefore, the actual NOx emissions from this universe are likely lower than those estimated. Table 2-X summarizes the NOx emissions from the PR 1159.1 universe.

Table 2-X – PR 1159.1 Baseline NOx Emissions

Facility	NOx Emissions (ton/day)	Number of facilities
RECLAIM	0.004[a] (Reported)	5
	0.027 (Estimated)	6
Non-RECLAIM	0.008 (Reported through AER)	12
	1.3 (Estimated)	237

[a] 2017 RECLAIM reported emissions

California Environmental Quality Act Assessment

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l) and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is currently reviewing the proposed project (PR 1159.1) to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

Socioeconomic Impact Assessment

A socioeconomic impact assessment will be conducted and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing, which is anticipated to be on December 2, 2022.

Draft Findings under Health and Safety Code Section 40727

Requirements to Make Draft Findings
Health and Safety Code Section 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. In order to determine compliance with Health and Safety Code Section 40727, Health and Safety Code Section 40727.2 requires a written analysis comparing the proposed rule with existing regulations, if the rule meets certain requirements. The following provides the draft findings.

Necessity
A need exists to adopt PR 1159.1 to provide NOx emission limits for nitric acid tanks used in metal finishing, precious metal reclamation and expanded graphite foil production operations to reflect current BARCT emission limits.

Authority
The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40506, 40510, 40702, 40725 through 40728, 41508, 41700, and 42300 et seq.

Clarity
PR 1159.1 is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency
PR 1159.1 is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non-Duplication
PR 1159.1 will not impose the same requirements as or in conflict with any existing state or federal regulations. The proposed amended 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: AB 617, Health and Code Sections 39002, 40001, 40406, 40506, 40702, 40440(a), 40725 through 40728.5, 40920.6, and 42300 et seq.

Comparative Analysis

Health and Safety Code Section 40727.2 requires a comparative analysis of the proposed rule with any Federal or District rules and regulations applicable to the same source. A comparative analysis is presented below in Table 4-2.

Table 4-2 – Comparative Analysis

Rule Element	Proposed Rule 1159.1	RECLAIM	Equivalent Federal Regulation
Applicability	Nitric acid units used in metal finishing, precious metal reclamation, expanded graphite foil production operations	Facilities regulated under NOx or SOx RECLAIM program (South Coast AQMD Reg. XX)	None
Requirements	Not operate units without APCD NOx controls meet: • 0.3 lb/hr of NOx; or • 99% control efficiency Parametric monitoring • Flowrate • pH • Oxidation reduction potential • Pressure drop Labeling of tanks and APCD	Vent equipment to [APCD] whenever this equipment is in operation. Emission limit related permit conditions • 50 gallons of nitric acid (70%)/month • 20 lbs of nitric acid per day • 200,000 pieces per month • 5 ppmv NOx • 99% control efficiency • 330 lbs of nitric acid (98%)/hr Parametric monitoring • Flowrate • pH • Oxidation reduction potential • Pressure drop	None
Reporting	One-Time Report for 2 years (2023 and 2024) of nitric acid usage	Quarterly Certification of Emissions Report (QCER) Annual Permit Emissions Program (APEP) report	None
Monitoring	• Source testing every 5 years for units not complying with low-use exemption • Visual inspections on control equipment per manufacturers recommendations or at least every quarter	Source testing every • five and half (5.5) years; or • five-year period	None
Recordkeeping	•2 years of monthly usage records •Ongoing monthly usage records for units complying with low-use exemption • Weekly recording of control device operating parameters •All records kept for minimum of 5 years	Maintain records to demonstrate compliance with [conditions]	None

Incremental Cost-Effectiveness

Health and Safety Code section 40920.6 requires an incremental cost-effectiveness analysis for Best Available Retrofit Control Technology (BARCT) rules or emission reduction strategies when there is more than one control option which would achieve the emission reduction objective of the proposed amendments relative to ozone, carbon monoxide, sulfur oxides, oxides of nitrogen, and their precursors. Incremental cost-effectiveness is the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control options as compared to the next less expensive control option.

Incremental cost-effectiveness is calculated as follows:

$$\text{Incremental cost-effectiveness} = (C_{alt} - C_{proposed}) / (E_{alt} - E_{proposed})$$

Where:

$C_{proposed}$ is the present worth value of the proposed control option;
$E_{proposed}$ are the emission reductions of the proposed control option;
C_{alt} is the present worth value of the alternative control option; and
E_{alt} are the emission reductions of the alternative control option

The proposed rule will require facilities to meet an emission limit of 0.30 lb/hr or have an air pollution control device with 99% control efficiency. Facilities subject to these requirements meet the 0.30 lb/hr emission limit with varying control efficiencies, ranging from 44% to 99%, for their air pollution control devices. The progressively more stringent potential control option would be to require 99% control efficiency for their air pollution control devices and not propose the requirement as an option. There is no cost for the proposed control option of meeting either the 0.30 lb/hr emission limit or 99% control efficiency as facilities already have controls installed and are meeting the 0.30 lb/hr emission limit. The present worth value of the proposed control option is zero and the emission reductions are also zero. The present worth value of the alternative control option is $5,124,416 to require 99% control and the emission reductions are 11.0 tons per day. The incremental cost-effectiveness to require facilities to install controls that meet 99% control efficiency is $466,000 per ton of NOx reduced.

$$\text{Incremental cost-effectiveness} = (\$5{,}124{,}416 - \$0) / (11.0 - 0) = \$466{,}000 \text{ per ton of NOx reduced}$$

The incremental cost analysis presented above demonstrates that the alternative control option is not viable when compared to the control strategy of the proposed rule.

APPENDIX A – LIST OF AFFECTED FACILITIES

APPENDIX A: LIST OF FACILITIES

Table A-1: Facilities Affected by PR 1159.1

Facility ID	Facility Name
10010	3M UNITEK CORPORATION
102270	A & G ELECTROPOLISH
176446	A 2 Z PLATING CO
149179	A V PLATING, ANGEL SEDANO DBA
152173	A&A PLATING COMPANY
25087	AAA PLATING & INSPECTION, INC
45489	ABBOTT CARDIOVASCULAR SYSTEMS, INC
62266	ACCURATE ANODIZING, INC
114536	ACCURATE PLATING COMPANY
71553	ACE CLEAR WATER ENTERPRISES
17325	ACE CLEARWATER ENTERPRISES
58416	ACTIVE MAGNETIC INSPECTION
107011	ACTIVE PLATING INC
136197	ADVANCE TECH PLATING
154448	ADVANCED BIONICS LLC
173518	ADVANCED BIONICS, LLC
70220	AERO CHROME PLATING
111944	AERO ELECTRIC CONNECTOR, INC.
173558	AEROFIT, LLC
175126	AEROJET ROCKETDYNE OF DE, INC.
145232	AIR INDUSTRIES COMPANY, LLC
6815	AIR INDUSTRIES CORP
21321	AIRCRAFT X-RAY LABS INC
4346	ALCO CAD-NICKEL PLATING C
102730	ALERT PLATING COMPANY
47835	ALL METALS PROCESSING OF ORANGE CO., LLC
178908	ALLFAST FASTENING SYSTEMS, LLC
117435	ALLOY PROCESSING
7437	ALLOYS CLEANING INC
94719	ALUMINUM PRECISION PROD INC,ALU FORGE CO
36522	ALUMINUM PRECISION PRODUCTS INC
37801	AMERICAN ETCHING & MFG CO
8015	ANADITE INC
16951	ANAPLEX CORP
144438	ANDRES TECHNICAL PLATING
184767	ANOCHEM COATINGS
160399	ANODIZING INDUSTRIES, INC
142479	ANODIZING INDUSTRIES, INC.

7011	ANODYNE INC
189684	APCT ANAHEIM
189170	APCT OC
115329	ARTCRAFT PLATING & FINISHING CO., INC.
55661	ARTISTIC SILVER PLATING INC
121756	ASSOCIATED PLATING CO INC
133243	ASTECH ENGINEERED PRODUCTS INC.
93049	ATK SPACE SYSTEMS INC
17060	AUTOMATION PLATING CORP
127901	AUTOMATION PLATING CORP.
147364	AVIATION REPAIR SOLUTIONS INC.
117912	AVIBANK MANUFACTURING INC
144106	AVK INDUSTRIAL PRODUCTS
189752	AVNEX SURFACE FINISHING INC.
130292	B G DETECTION SERVICES
121215	BARKEN'S HARDCHROME, INC
13618	BARRY AVE PLATING CO INC
146448	BEO-MAG PLATING INC
18814	BLACK OXIDE IND INC
137801	BODYCOTE THERMAL PROCESSING
17489	BRISTOL INDUSTRIES
42645	BRITE PLATING CO INC
13911	BROWN-PACIFIC WIRE INC
70778	BURBANK PLATING SERVICE CORP
171832	C & R PLATING, INC.
76490	CADILLAC PLATING INC
15216	CAL AURUM IND
9120	CAL ELECTROPLATING INC
147653	CALIFORNIA FAUCETS
1953	CAL-TRON PLATING INC
148925	CHERRY AEROSPACE
18460	CHRISTENSEN PLATING WKS INC
180575	CHROMADORA, INC
145401	CIRCUIT SERVICES LLC
18031	CLA-VAL CO, GRISWOLD INDUSTRIES DIV
112968	COAST PLATING INC
175222	COASTLINE METAL FINISHING INC
63111	CONNELL PROCESSING INC, CONNELL PROC CORP
20600	CONTINENTAL FORGE CO
192593	CPI SATCOM & ANTENNA TECHNOLOGIES INC.
126536	CPP - POMONA
24756	CRANE CO, HYDRO-AIRE DIV
175218	DANCO EN

21392	DANCO METAL SURFACING
53481	DANCO METAL SURFACING
10955	DANCO METAL SURFACING, ANOMIL ENT., INC.
145507	DENTIUM USA
144198	DESIGNED METAL CONNECTIONS
141966	DICKSON TESTING CO. INC.
46563	DIP BRAZE INC
5723	DUCOMMUN AEROSTRUCTURES, INC
125051	DUCOMMUN AEROSTRUCTURES, INC
140811	DUCOMMUN AEROSTRUCTURES, INC
6763	DUNHAM METAL PROCESSING, CHUCK DUNHAM
45938	E.M.E. INC/ELECTRO MACHINE & ENGINEERING
136148	E/M COATING SERVICES
126964	EDWARDS LIFESCIENCES LLC
44861	EEMUS MFG CORP
82621	ELECTRO ADAPTER INC
143630	ELECTRODE TECH INC, REID METAL FINISHING
9823	ELECTROLURGY INC.
117799	ELECTROMATIC, INC.
94035	ELECTRON PLATING III
23349	ELECTRONIC PRECISION SPECIALTIES INC
129444	ELEMENT MATERIALS TECHNOLOGY
186519	EMBEE PROCESSING
47329	FINE QUALITY METAL FINISHING CO
105966	FINELINE CIRCUITS & TECHNOLOGY INC
164581	FLARE GROUP DBA AVIATION EQUIPMENT PROCE
186898	FMH AEROSPACE CORP
2978	FOTO-KEM /FOTO TRONICS
142267	FS PRECISION TECH LLC
148373	FULLERTON CUSTOM WORKS INC
13488	GCG CORP
115497	GLOBAL COMMUNICATION SEMICONDUCTORS INC.
116004	GOLDEN STATE MAGNETIC & PENETRANT LAB IN
11998	GOODRICH CORPORATION
76262	GRAPHIC DIES INC
158699	GSP ACQUISITION CORP/GARDENA SPECIALIZED
12841	HARTWELL CORP
40829	HAWKER PACIFIC AEROSPACE
123774	HERAEUS PRECIOUS METALS NO. AMERICA, LLC
158146	HERMETIC SEAL CORP/AMETEK
103703	HIGHTOWER PLATING & MANUFACTURING CO
11192	HI-SHEAR CORPORATION

11818	HIXSON METAL FINISHING
800003	HONEYWELL INTERNATIONAL INC
134931	HOWMET GLOBAL FASTENENING SYSTEMS INC.
134943	HOWMET GLOBAL FASTENING SYSTEMS INC
134944	HOWMET GLOBAL FASTENINGS SYSTEMS INC
1216	HRL LABORATORIES, LLC
153546	HUCK INTERNATIONAL INC
133930	HYDROFORM USA
103286	IDEAL ANODIZING INC
91548	II-VI AEROSPACE & DEFENSE
171275	IMPRESA AEROSPACE, LLC
58876	INDUSTRIAL MFG CO LLC DBA AROOWHEAD PROD
15703	INDUSTRIAL TECTONICS INC
180672	INFINEON TECHNOLOGIES AMERICAS CORP.
139666	ISU PETASYS INC
186454	JD PROCESSING, INC
62852	JENCO PLATING & ANODIZING INC
236	K & L ANODIZING CORP
93702	KCA ELECTRONICS INC
35006	KINSBURSKY BROTHERS INC
112911	KVR INVESTMNT GRP, PACIFIC PLATING, DBA
71455	L.N.L. ANODIZING
144010	L-3 ELECTRON DEVICES
155797	LA GAUGE COMPANY
140017	LA HABRA PLATING COMPANY
22467	LEFIELL MFG CO
132333	LM CHROME CORP
12748	LMDD ENTER. INC., DIXON HARD CHROME,DBA
41229	LUBECO INC
167413	M & R PLATING CORPORATION
108315	M J B CHROME PLATING & POLISHING
10132	MAGNESIUM ALLOY PROD. CO
14700	MAGPARTS INC
56547	MARCEL ELECTRONICS
46547	MARK MCRILEY CO
107149	MARKLAND MANUFACTURING INC
17473	MECHANICAL METAL FINISHING CO
192123	MEGGITT (ORANGE COUNTY), INC.
109573	METAL CHEM
122365	METAL FINISHING MARKETERS INC
20280	METAL SURFACES INTERNATIONAL, LLC
73339	MID VALLEY ANODIZING

167001	MISTRAS GROUP, INC.
6663	MITCHELL LAB INC
139550	MONITOR POLISHING & PLATING, INC.
133358	MONOGRAM AEROSPACE FASTENERS
102334	MOOG, INC
136913	MORRELL'S ELECTRO PLATING, INC
140513	MS AEROSPACE INC
129249	MULTICHROME / MICROPLATE CO., INC
135284	MURRIETTA CIRCUITS INC
2047	NATIONAL TECHNICAL SYSTEM
42712	NEUTRON PLATING INC
800328	NMB TECHNOLOGIES CORPORATION
18294	NORTHROP GRUMMAN SYSTEMS CORP
800409	NORTHROP GRUMMAN SYSTEMS CORPORATION
8408	OMNI METAL FINISHING INC
186803	ORCHID ORTHOPEDIC SOLUTIONS
140871	PAC RANCHO, INC.
153092	PACIFIC AERODYNAMIC INC
173247	PACIFIC CHROME SERVICES
22991	PACIFIC MAGNETIC & PENETRANT CO INC
80799	PALM SPRINGS PLATING
9151	PICO RIVERA PLATING INC
5076	PIONEER CIRCUITS INC
14802	PLATERONICS PROCESSING, INC
177440	PLATINUM SURFACE COATING, INC.
588	PRECIOUS METALS PLATING C
69454	PRECISION AEROSPACE CORP
24570	PRECISION ANODIZING & PLATING INC
130017	PRECISION CONTROL FINISHING, INC.
171391	PRECISION HERMETIC TECHNOLOGY, INC.
48300	PRECISION TUBE BENDING
150186	PRIME PLATING
182848	QAP METAL FINISHING
52525	QUAKER CITY PLATING & SILVERSMITH LTD
144835	QUALITY ALUMINUM FORGE A DIV OF GEL IND
76769	QUALITY CONTROL PLATING
148912	QUINSTAR TECHNOLOGY, INC.
114009	R.L. ANDODIZING, RAYMOND LANE, DBA
166352	RAH INDUSTRIES
172044	RANTEC MICROWAVE SYSTEMS
16556	RAPID ANODIZING INC.
95189	RBC TRANSPORT DYNAMICS CORP
152443	REAL PLATING

94272	RGF ENTERPRISES INC
100806	ROBINSON HELICOPTER CO INC
800113	ROHR, INC
128230	S. LETVIN & SONS
24244	S.T. & I. INC.
39965	SAFE PLATING INC
177461	SAFRAN ELECTRONICS&DEFENSE,AVIONICS USA
10444	SANDERS SERVICE INC
125806	SANTEC, INC
89731	SANTOSHI CORP, ALUM-A-COA
159128	SEMICOA CORPORATION
105598	SENIOR AEROSPACE SSP
192413	SERFLEX L.L.C.
37603	SGL TECHNICAL
115662	SONIC INDUSTRIES INC
1808	SONIC PLATING CO, INC
36738	SORENSON ENGINEERING INC, FRANK SORENSON
194740	SOUTH COAST CIRCUITS INC
183467	SPACE EXPLORATION TECHNOLOGIES
142710	SPECTRUM PLATING CO
151453	SPS TECHNOLOGIES, LLC
169990	SPS TECHNOLOGIES, LLC
5743	STABILE PLATING CO INC
18845	STUTZMAN PLATING CO
181234	SUNVAIR
165015	SUPERFORM USA
154669	SUPERIOR CONNECTOR PLATING, INC.
128150	SUPERIOR PROCESSING
122432	SUPREME PLATING & COATING, L DE LA ROSA
114016	TA MFG CO TA AEROSPACE
131749	TECT
173517	TELEDYNE REYNOLDS INC. DBA TELEDYNE RELA
800067	THE BOEING COMPANY
131232	THE BOEING COMPANY-C13 FACILITY
173544	THE BUYERS, INC.
12282	THE PRECISION COIL SPRING
137438	THERMAL VAC TECHNOLOGY
24718	TIODIZE CO INC
125265	TRIDENT PLATING INC
62986	TTM TECHNOLOGIES INC
170894	TTM TECHNOLOGIES NORTH AMERICA, LLC. (VIASYSTEMS TECHNOLOGIES CORP, LLC.)
12170	VACCO INDUSTRIES

109562	VALLEY PLATING WORKS INC
25304	VALLEY PLATING WORKS, INC
106838	VALLEY-TODECO, INC
24209	VALMONT GEORGE INDUSTRIES
14495	VISTA METALS CORPORATION
177089	WATERSTONE FAUCETS
10966	WEBER METALS INC
113268	WEST COAST AEROSPACE
166762	WEST VALLEY PLATING, INC
158848	WESTERN FILTER - A DIV. OF DONALDSON CO.