Technical Support Document

For Final-Form Rulemaking
Environmental Quality Board
[25 Pa. Code Chs. 121 and 129]
Additional RACT requirements for Major Sources of NO_x and VOCs for the 2015 ozone NAAQS
(RACT III)

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I. Introduction

The U.S. Environmental Protection Agency (EPA) is responsible for establishing National Ambient Air Quality Standards (NAAQS), which are maximum allowable concentrations in the ambient air for the following six pollutants: ground-level ozone; particulate matter; nitrogen dioxide (NO_2); carbon monoxide (CO); sulfur dioxide; and lead. These pollutants are identified as criteria pollutants by the EPA and are considered harmful to public health and welfare, including the environment. Section 109 of the Clean Air Act (CAA) (42 U.S.C.A. § 7409) established two types of NAAQS: primary standards, which are limits set to protect public health; and secondary standards, which are limits set to protect public welfare and the environment, including protection against visibility impairment and from damage to animals, crops, vegetation and buildings. The EPA established primary and secondary ground-level ozone NAAQS to protect public health and welfare.

Ground-level ozone is formed in the atmosphere by photochemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) in the presence of sunlight. In order to reduce ground-level ozone concentrations, the CAA (42 U.S.C.A. §§ 7401—7671q) requires control of sources of VOC and NO_x emissions to achieve emission reductions in nonattainment areas classified as "moderate" or higher. Among effective control measures, reasonably available control technology (RACT) air pollution controls significantly reduce VOC and NO_x emissions from major stationary sources. The CAA NO_X RACT requirements are described by the EPA in the "NO_x Supplement" notice titled, "State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble; Clean Air Act Amendments of 1990 Implementation of Title I; Proposed Rule." See 57 FR 55620, 55624 (November 25, 1992). In the NO_x Supplement notice, the EPA defined RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility." *Id.* at 55624; See also 44 FR 53761, 53762 (September 17, 1979).

Section 110(a)(1) of the CAA (42 U.S.C.A. § 7410(a)) requires states to submit, within 3 years after the EPA's promulgation of a new or revised standard, a state implementation plan (SIP) revision meeting the applicable requirements of section 110(a)(2). Re-evaluation of RACT is required each time a revised ozone NAAQS is promulgated for nonattainment areas. Section 172(c)(1) of the CAA (42 U.S.C.A. § 7502(c)(1)), requires states to develop nonattainment plan provisions "as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at minimum of [RACT]) to provide for the attainment of the [NAAQS]."

A major source in an ozone nonattainment area is defined as any stationary source that emits or has the potential to emit (PTE) NO_x or VOC emissions above a certain applicability threshold that is based on the ozone nonattainment classification of the area: marginal, moderate, serious, or severe. Sections 182(b)(2) and 182(f)(1) of the CAA (42 U.S.C.A. §§ 7511a(b)(2) and 7511a(f)(1)) require states with moderate, or worse, ozone nonattainment areas to implement RACT controls on all stationary sources and source categories covered by a control techniques guidelines (CTG) document issued by the EPA, and on all major sources of VOC and NO_x emissions located in the nonattainment area. The EPA's CTGs establish presumptive RACT control recommendations for various VOC source categories. Presumptive RACT limits are category-wide requirements that are based on capabilities that are general to an emission source category. The CTGs typically identify a particular control level that the EPA recommends as RACT. In some cases, the EPA has issued Alternative Control Technique (ACT) guidelines primarily for NO_x source categories, which in contrast to the CTGs, only present a range for possible control options but do not identify any particular option as the presumptive norm for what is RACT. States are required to implement RACT for the source categories covered by CTGs through a SIP. States may opt to require alternative controls rather than following the recommendations in a CTG. See *NRDC v. EPA*, 571 F.3d 1245, 1254 (D.C. Cir. 2009).

The CAA amendments of 1990 introduced the requirement for existing major stationary sources of NO_x in nonattainment areas to install and operate NO_x RACT. Specifically, section 182(b)(2) of the CAA requires states to adopt RACT provisions for all major sources of VOC in ozone nonattainment areas and section 182(f) requires states to adopt RACT provisions for major stationary sources of NO_x.

Section 302 of the CAA (42 U.S.C.A. § 7602), defines a major stationary source as any facility which has the PTE 100 tons per year (TPY) of any air pollutant. For serious ozone nonattainment areas, a major source is defined by section 182(c) of the CAA as a source that has the PTE 50 TPY of NO_x. For severe ozone nonattainment areas, a major source is defined by section 182(d) of the CAA as a source that has the PTE 25 TPY of any pollutant.

The Ozone Transport Region (OTR) has special provisions for major sources because section 184(a) of the CAA (42 U.S.C.A. § 7511c(a)) requires areas in the OTR to be treated as moderate (or higher) ozone nonattainment. Therefore, in marginal and moderate nonattainment areas and attainment areas in the OTR, a major NO_x source is one with the PTE 100 TPY or more of NO_x. Because the entire Commonwealth is in the OTR and is treated as a moderate nonattainment area, RACT is applicable to major sources of NO_x emissions or VOC emissions, or both, Statewide.

II. 1971 Photochemical Oxidants NAAQS - 0.08 ppm and 1979 and 1993 Ozone NAAQS – 0.12 ppm, averaged over 1 hour (RACT I)

On April 30, 1971, the EPA promulgated primary and secondary NAAQS for photochemical oxidants under section 109 of the CAA. See 36 FR 8186 (April 30, 1971). These standards set an hourly average of 0.08 parts per million (ppm) total photochemical oxidants not to be exceeded more than 1 hour per year. On February 8, 1979, the EPA announced a revision to the then-current 1-hour standard. The EPA's final rulemaking revised the level of the primary 1-hour ozone standard from 0.08 ppm to 0.12 ppm and set the secondary standard identical to the primary standard. See 44 FR 8202 (February 8, 1979). This revised 1-hour standard was reaffirmed on March 9, 1993. See 58 FR 13008 (March 9, 1993).

Section 110(a) of the CAA gives states the primary responsibility for achieving the NAAQS. Section 110(a) of the CAA provides that each state must adopt and submit to the EPA a plan to implement measures (a SIP) to enforce the NAAQS or a revision to the NAAQS promulgated under section 109(b) of the CAA. A SIP includes the regulatory programs, actions and commitments a state will carry out to implement its responsibilities under the CAA. Once a component is approved by the EPA as a revision to the SIP, the SIP component is legally enforceable under both Federal and State law.

Section 182 of the CAA requires that, for areas that exceed the NAAQS for ozone, states must develop and implement a program that mandates that certain major stationary sources develop and implement a RACT program. Under sections 182(f)(1) and 184(b)(2) of the CAA, these RACT requirements are applicable to all sources in Pennsylvania that emit or have a PTE greater than 100 TPY of NO_x. Under sections 182(b)(2) and 184(b)(2) of the CAA, these RACT requirements are applicable to all sources in Pennsylvania that emit or have a PTE greater than 50 TPY of VOCs. NO_x and VOC controls are required Statewide because of the Commonwealth's inclusion in the OTR established by Congress under section 184(a) of the CAA. Additionally, because the five-county Philadelphia area was designated as severe ozone nonattainment for the 1-hour standard in 1979, sources of greater than 25 TPY of either pollutant were required to implement RACT under section 182(d) of the CAA.

Section 182(b)(2) of the CAA provides that for moderate ozone nonattainment areas, a state must revise its SIP to include RACT for sources of VOC emissions covered by a CTG issued by the EPA prior to the area’s date of attainment; sources of VOC emissions covered by a CTG issued prior to November 15, 1990; and all other major stationary sources of VOC emissions located in the area. The EPA has issued RACT recommendations in the form of CTGs for approximately 25 to 30 classes of VOC sources. The CTGs cover many types of source categories, including large graphic arts facilities, industrial surface coating operations, petroleum refineries and gasoline marketing terminals. Over the years, the Department has established regulatory requirements consistent with the RACT recommendations of these CTGs, including establishment of source-specific emission limitations. These regulations include §§ 129.52—129.52e, 129.54—129.69, 129.71—129.75, 129.77, 129.101—129.107 and 129.301—129.310.

The Commonwealth’s RACT regulations under §§ 129.91—129.95 (relating to stationary sources of NO_x and VOCs) (RACT I) were implemented Statewide in January 1994 for the 1979 and 1993 1-hour ozone standard. See 24 Pa.B. 467 (January 15, 1994). These regulations imposed a requirement that the owners and operators of sources and facilities emitting VOCs and NO_x determine if they are a major stationary source of VOCs or NO_x, or both. If a facility is a major stationary source for either or both of these pollutants, the owner and operator shall develop and submit a RACT proposal to the Department and to the EPA for approval. Sources subject to the EPA’s New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) are required to comply with all applicable requirements including requirements and emission limitations that are more stringent than RACT requirements and RACT emission limitations.

Under § 129.92, owners and operators of certain major stationary source categories of NO_x, VOCs, or both, were required to perform a case-by-case RACT analysis using descending order of control effectiveness [top-down RACT analysis]. A top-down RACT analysis ranks the technically feasible air pollution control technologies from most effective control to least effective control. Each technically feasible air pollution control technology is then analyzed for economic feasibility (cost analysis). The highest ranking technically feasible air pollution control technology that is economically feasible is the air pollution control technology that is selected for installation and operation on the source. As an alternative, the final amendments under § 129.93 provided the option for owners and operators of certain specified categories of major NO_x emitting facilities to implement presumptive NO_x RACT requirements. The owners and operators of small industrial boilers were required to make appropriate adjustments to the combustion process to minimize NO_x emissions. The owners and operators of small combustion units and certain other classes of fossil fuel-burning equipment (<20 million Btu/hour) were required to operate the source in accordance with the manufacturer's specifications. The owners and operators of larger combustion units (equal to or greater than 20 million Btu/hour to < 50 million Btu/hour) were required to perform an annual tune-up and make adjustments to provide for a low NO_x emitting operation; and the owners and operators of very large coal-fired combustion units (equal to or greater than 100 million Btu/hour) were required to install a low NO_x burner system with separated overfire air (LNB-SOFA). See § 129.93. An additional alternative was provided under § 129.94 for the owners and operators of major NO_x emitting facilities to submit an averaging plan proposal instead of a case-by-case proposal for an alternative RACT requirement or RACT emission limitation to meet RACT I.

On February 1, 1994, the Department developed guidance for submitting RACT proposals for major NO_x sources which were required to determine the RACT for NO_x emissions on a case-by-case basis (Appendix 1). The guidance recommends that the RACT analysis should include a ranking of all applicable and available control technologies for the affected sources in descending order of control effectiveness. The applicant should examine the most stringent or "top" alternative. If the applicant could show that this top level of control for the source under review is technically or economically infeasible based on the EPA's Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual, then the next most stringent level of control is determined and similarly evaluated. The analysis continues until the RACT level under consideration cannot be eliminated by any substantial or unique technical or economical objection.

In this guidance document, the Department indicated that most states have included presumptive limits for NO_x emissions in their regulations and control measures available to achieve these levels show a range of cost-effectiveness from about $570—1,500 per ton of NO_x emissions reduced. The guidance document also indicated that technologies available to meet the EPA's preliminary presumptive RACT levels for electric utility boilers show a range of cost-effectiveness from about $160—1,300 per ton of NO_x emissions reduced. The EPA document "Evaluation and Costing of NO_x Controls for Existing Utility Boilers in the NESCAUM Region," [EPA 453/R-92-010] shows that the control costs for LNB-SOFA vary from $270—1,590 per ton of NO_x emissions reduced depending on site-specific factors (such as the type of boiler, size of the boiler and the amount of use) (Appendix 2). The control measures available to achieve the levels established as presumptive RACT for utility boilers by other states show a range of cost-effectiveness from about $570—1,500 per ton of NO_x emissions reduced. Two NO_x RACT proposals, discussed in the guidance document (Appendix 1), using LNB-SOFA document costs of $1,222 and $1,298 per ton of NO_x emissions reduced.

Based on the above information, the Department used $1,500 per ton of NO_x emissions reduced as the benchmark cost at which consider the NO_x emissions control option to be cost-effective.

The Department suggested using $1,500 as the benchmark for NO_x emissions control options because it was comparable to but lower than the control cost for sources of VOCs (the other major ozone precursor) to comply with existing RACT regulations based on the EPA's guidelines. For VOCs, the cost-effectiveness benchmark of $3,000 per ton of VOC emissions reduced was used.

Under §§ 129.91—129.95, case-by-case RACT determinations for approximately 600 facilities were made for attaining and maintaining the 1-hour ozone standard and were submitted to the EPA as RACT SIP revisions. The case-by-case analysis process began in 1995 and was not completed until 2006 due to the need for EPA approval of SIP submittals for the case-by-case RACT determinations. Many facility owners and operators had to hire consultants or additional staff to complete their case-by-case RACT analyses and proposals and handle the permitting requirements. The Department has added more presumptive requirements and emissions limitations under §§ 129.96—129.100 and §§ 129.111—129.115 to provide the subject owners and operators with options to comply without going through the resource intensive and sometimes costly case-by-case process.

III. 1997 Ozone NAAQS – 0.08 ppm and 2008 Ozone NAAQS - 0.075 ppm, averaged over 8 hours (RACT II)

On July 18, 1997, the EPA concluded that revisions to the then-current 1-hour ozone primary standard to provide increased public health protection were appropriate at this time to protect public health with an adequate margin of safety. Further, the EPA determined that it was appropriate to establish a primary standard of 0.08 ppm averaged over 8 hours. The EPA also established a secondary standard equal to the primary standard. See 62 FR 38856 (July 18, 1997). In 2004, the EPA designated 37 counties in this Commonwealth as 8-hour ozone nonattainment areas for the 1997 8-hour ozone NAAQS. See 69 FR 23858, 23931 (April 30, 2004).

On March 27, 2008, the EPA lowered the primary and secondary 8-hour ozone standards from 0.08 ppm to 0.075 ppm. See 73 FR 16436 (March 27, 2008). The EPA made designations for the 2008 8-hour ozone standards on April 30, 2012, with an effective date of July 20, 2012. The EPA designated all or portions of Allegheny, Armstrong, Beaver, Berks, Bucks, Butler, Carbon, Chester, Delaware, Fayette, Lancaster, Lehigh, Montgomery, Northampton, Philadelphia, Washington and Westmoreland counties as nonattainment for the 2008 8-hour ozone NAAQS, with the rest of this Commonwealth designated as unclassifiable/attainment. See 77 FR 30088, 30143 (May 21, 2012). The EPA's 2008 ozone implementation rule required the Department to submit a SIP revision that met the RACT requirements of section 184(b)(2) of the CAA for the entire Commonwealth. See 40 CFR 51.1112 and 51.1116.

The Commonwealth's RACT regulations under §§ 129.96—129.100 (relating to additional RACT requirements for major sources of NO_x and VOCs) (RACT II) were implemented in April 2016, for the 1997 and 2008 8-hour ozone standards. See 46 Pa.B. 2036 (April 23, 2016). The Department's final-form rulemaking established requirements for the implementation of specified RACT control measures for the nine identified source types for attaining and maintaining the 1997 and 2008 8-hour ozone standards. The Department used a top-down approach to determine presumptive NO_x and VOC RACT emissions limits for various source categories. This included searching for and identifying the best methodology, technique, technology or other means for reducing NO_x or VOC emissions while factoring environmental, energy and economic considerations into the analysis. The Department contacted various vendors and reviewed the EPA's CTG and ACT documents. The Department also identified controls installed on existing air contaminant sources in this Commonwealth and identical air contaminant sources in other states. The Department estimated the capital, installation and annual operating costs using the EPA's OAQPS and Control Cost Manual (Sixth edition) and vendor's quotes, as well as input from independent entities such as the PJM Interconnection.

The Department used a specific dollar value per ton of NO_x or VOC emissions reduced as a benchmark to consider a specific control technology's cost-effectiveness. In the absence of guidance for cost-effectiveness benchmark cut-off limits during the RACT II development, the Department determined the cost-effectiveness benchmark number based on the EPA's approved cost-effectiveness benchmark values in the 1990 RACT implementation guidance and used the United States Bureau of Labor Statistics Consumer Price Index (CPI) to calculate the new cost-effectiveness benchmarks. The Department evaluated various NO_x and VOC control technologies for technical and economical feasibility. The Department did not establish a bright-line cost-effectiveness threshold to determine the economic feasibility for implementation of the RACT II requirements. See 57 FR 18074 (April 28, 1992). The Department had used cost-effectiveness benchmarks of $1,500 and $3,000 per ton of NO_x and VOC emissions reduced, respectively, in 1990 dollars, for the implementation of the RACT I requirements for the 1979 1-hour ozone NAAQS in §§ 129.91—129.95. The Department used the CPI and adjusted the $1,500 in 1990 dollars to $2,754 in 2014 dollars. The Department used a NO_x emission control cost-effectiveness upper bound of $2,800 per ton of NO_x emissions reduced and $5,500 per ton of VOC emissions reduced.

Based on the uncontrolled emission rates and control efficiency of technically and economically feasible control options, the Department determined the presumptive RACT II emission limits for NO_x and VOCs. The RACT II final-form rulemaking also incorporated operational flexibility, including the option to request approval to use facility-wide or system-wide NO_X emissions averaging, a source-specific NO_x or VOC emission limitation, or a source-specific NO_x RACT or VOC RACT requirement as alternative methods of compliance. See 25 Pa. Code §§ 129.98—129.99.

The Department determined that certain add-on control technologies represented RACT for the 1997 and 2008 8-hour ozone NAAQS for nine existing source categories that did not have presumptive RACT requirements or emission limitations specified elsewhere in Chapter 129. These nine source categories included combustion units; boilers; process heaters; turbines; stationary internal combustion engines; municipal solid waste landfills; municipal waste combustors (MWCs); cement kilns; and certain other sources that were not regulated elsewhere under Chapter 129. The RACT II final-form rulemaking amended Chapter 129 to adopt presumptive RACT requirements and RACT emission limitations for certain major stationary NO_x and VOC emissions that were subject to § 129.96. See 25 Pa. Code § 129.97 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule).

IV. 2015 Ozone NAAQS - 0.070 ppm averaged over 8 hours (RACT III)

On October 26, 2015, the EPA lowered the primary and secondary 8-hour ozone standards from 0.075 ppm to 0.070 ppm. See 80 FR 65292 (October 26, 2015). The EPA issued the 2015 ozone implementation rule on December 6, 2018 (83 FR 62998). See 40 CFR 51.1306—51.1318. The EPA's 2015 ozone implementation rule requires the Department to submit a SIP revision that meets the RACT requirements of section 184(b)(2) of the CAA for the entire Commonwealth. See 40 CFR 51.1312 and 51.1316.

On *******, 2022 [Date of publication], the Environmental Quality Board amended Chapters 121 and 129 (relating to general provisions; and standards for sources) with additional RACT requirements for major sources of NO_X and VOCs for the 2015 ozone NAAQS. See _ Pa.B. _. The amendments to § 121.1 and the substantive provisions in §§ 129.111—129.115 implement RACT requirements for the 2015 8-hour ozone NAAQS.

(A) Applicability:

The RACT III regulations established in §§ 129.111—129.115 are applicable to the owner and operator of a "major NO_x emitting facility" or a "major VOC emitting facility," or both, in this Commonwealth, that commenced operation on or before August 3, 2018. The owner and operator of a source or facility that commenced operation on or before August 3, 2018, that was not a major NO_x emitting facility or a major VOC emitting facility, but installed a source after August 3, 2018, or made a modification after August 3, 2018, to a source that commenced operation on or before August 3, 2018, that results in the source or the facility meeting the definition of a major NO_x emitting facility or a major VOC emitting facility is also subject to the RACT III regulations.

The owner and operator of a facility that commenced operation on or before August 3, 2018, that is not a major NO_x emitting facility or a major VOC emitting facility on or before December 31, 2022, is not subject to §§ 129.111—129.115. See § 129.111(d). However, if the owner or operator of a facility that complied with § 129.111(d) meets the definition of a major NO_x emitting facility or a major VOC emitting facility after December 31, 2022, then the owner and operator shall comply with the applicable requirements of §§ 129.111—129.115.

Owners and operators of facilities that are major facilities solely for NO_x emissions are only subject to the NO_x RACT requirements. Likewise, owners and operators of facilities that are major facilities solely for VOC emissions are only subject to the VOC RACT requirements. The Statewide RACT III applicability thresholds for NO_x and VOC are 100 and 50 TPY, respectively, and 25 TPY, respectively, for major facilities located in Bucks, Chester, Delaware, Montgomery or Philadelphia County.

The RACT III regulations do not apply to sources that have a PTE less than 1 ton of NO_x or 1 ton of VOC, or both, as applicable, on a 12-month rolling basis. [25 Pa. Code § 129.111].

(B) Presumptive RACT source categories and determination of RACT for the 2015 8-hour ozone NAAQS (RACT III):

It is not possible to provide a precise presumptive RACT NO_x or VOC emission limit for each individual source, or estimate the control costs that may be incurred by the owner or operator, due to the wide range of source types, their size, type of fuel burned and operating characteristics located in this Commonwealth. Therefore, the Department has categorized the existing and affected sources into various source categories to evaluate, analyze and determine the presumptive RACT NO_x or VOC, or both, emissions limitations and requirements. These categories include combustion units and process heaters; municipal solid waste landfills; MWCs; turbines; stationary internal combustion engines; cement kilns; glass melting furnaces; lime kilns; direct-fired heaters, furnaces, ovens and other combustion sources; and other sources that are not regulated elsewhere under Chapter 129.

The Department used a top-down approach in determining presumptive NO_x or VOC, or both, RACT emissions limitations for various source categories. This approach included searching and identifying the reasonably available controls, methodology, techniques, technologies or other means for reducing NO_x or VOC emissions, while factoring technical and economic feasibility considerations into the analysis. The Department reviewed the 2015 ozone implementation rule and EPA guidance documents about air pollution control technologies and associated costs, contacted various vendors for estimated costs for specific technologies, and engaged with neighboring states to learn about their RACT III regulations.

The Department evaluated NO_x control technologies such as Low NO_x Burner (LNB), Dry Low NO_x Combustor (DLNC), Low Emission Combustion (LEC), Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR), and Non-Selective Catalytic Reduction (NSCR) as well as Oxidation Catalyst VOC control technology.

LNB technology reduces NO_x emission by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO_x formation. The two most common types of LNB technology applied to natural gas-fired boilers are staged air burners and staged fuel burners. LNB retrofits typically achieve NO_x emissions reductions in the range of 50%.

DLNC technology involves increasing the air-to-fuel ratio of the mixture so that the peak and average temperatures within the combustor will be less than that of the stoichiometric mixture, thus suppressing thermal NO_x formation. Introducing excess air not only creates a leaner mixture but it also can reduce residence time at peak temperatures. NO_x emissions reductions of up to 30% are achieved using lean primary zone combustion, without increasing CO emissions.

LEC technology achieves lower NO_x emissions by providing sufficient excess air to reduce the maximum combustion temperature and minimize NO_x formation. NO_x emissions from natural gas combustion are formed from nitrogen and oxygen in the combustion air and emissions of NO_x increase significantly at higher combustion temperatures. Engine manufacturers and regulatory agencies use the term “LEC” broadly and a number of technology approaches can be used depending on the type of engine and the NO_x emissions limitation. In many cases, multiple

LEC-related technologies may be required (for example, additional air through new or upgraded turbocharging, higher energy ignition/pre-combustion chambers, and enhanced mixing). NO_x emissions reductions of 30—50% are achieved using lean primary zone combustion without increasing CO emissions.

SCR systems selectively reduce NO_x emissions by injecting ammonia (NH_3) into the exhaust gas stream upstream of a catalyst. NO_x, NH_3 and oxygen (O_2) react on the surface of the catalyst to form nitrogen (N_2) and water (H_2O). The exhaust gas must contain a minimum amount of O_2 and be within a particular temperature range (typically 450°F to 850°F) in order for the SCR system to operate properly. The temperature range is dictated by the catalyst material which is typically made from noble metals, including base metal oxides such as vanadium and titanium, or zeolite-based material. The removal efficiency of an SCR system in good working order is typically from 65—90%. Exhaust gas temperatures greater than the upper limit (850°F) cause NO_x and NH_3 to pass through the catalyst unreacted. Ammonia emissions, called NH_3 slip, may be a consideration when specifying an SCR system.

SNCR technology is a post combustion emissions control technology for reducing NO_x by injecting ammonia or urea into the furnace at a properly determined location without the need of a catalyst. Combustion units with furnace exit temperatures of 1550—1950°F, residence times of greater than 1 second, and high levels of uncontrolled NO_x are required for higher control efficiencies. SNCR technology reduction efficiencies vary over a wide range. Temperature, residence time, type of NO_x reducing reagent, reagent injection rate, uncontrolled NO_x level, distribution of the reagent in the flue gas, and CO and O_2 concentrations all affect the reduction efficiency of the SNCR technology. The median (as a measure of average) reductions for urea-based SNCR systems in various industry source categories range from 25—60%, while median reductions for ammonia-based SNCR systems range from 61—65%.

NSCR technology uses the residual hydrocarbons and CO in the rich-burn engine exhaust as a reducing agent for NO_x. In an NSCR system, hydrocarbons and CO are oxidized by O_2 and NO_x. The excess hydrocarbons, CO, and NO_x pass over a catalyst (usually a noble metal such as platinum, rhodium, or palladium) that oxidizes the excess hydrocarbons and CO to H_2O and CO_2, while reducing NO_x to N_2. NO_x reduction efficiencies are usually greater than 90%, while CO reduction efficiencies are approximately 90%. The NSCR technology is effectively limited to engines with normal exhaust O_2 levels of 4% or less. This includes 4-stroke rich-burn naturally aspirated engines and some 4-stroke rich-burn turbocharged engines. Engines operating with NSCR systems require tight air-to-fuel control to maintain high NO_x emissions reduction effectiveness without high hydrocarbon emissions. To achieve effective NO_x emissions reduction performance, the engine may need to be run with a richer fuel adjustment than normal. This exhaust excess O_2 level would probably be closer to 1%. Lean-burn engines cannot be retrofitted with NSCR technology because of the reduced exhaust temperatures.

Oxidation catalysts (or two-way catalytic converters) are used to reduce hydrocarbon and CO emissions. Specifically, oxidation catalysts are effective for the control of CO, non-methane hydrocarbons, VOCs, and formaldehyde and other hazardous air pollutants. Oxidation catalysts consist of a substrate made up of thousands of small channels. Each channel is coated with a highly porous layer containing precious metal catalysts, such as platinum or palladium. As exhaust gas travels down the channel, hydrocarbons and CO react with O_2 within the porous catalyst layer to form CO_2 and water vapor. The resulting gases then exit the channels and flow through the rest of the exhaust system. Use of an oxidation catalyst can reduce VOC emissions by 50—60%.

After gathering this data, the Department ranked all available control technologies in the order of their control effectiveness. After finding the most effective controls in the list, the Department evaluated the most stringent control for technical and economic feasibility. The Department eliminated the most stringent control and analyzed the second-most stringent control in the list if the most stringent control was determined to be technically infeasible or economically cost-prohibitive. The Department then reviewed the existing allowable NO_x or VOC emissions limitations and actual emissions monitoring test data to establish a baseline emission level to determine economic feasibility for emission controls for this final-form RACT III rulemaking.

After ranking the available control technologies and establishing the baseline emission levels, the Department conducted a generic cost analysis for sources in each source category subject to presumptive NO_x or VOC, or both, RACT emissions limitations to determine if additional NO_x or VOC, or both, controls would represent RACT for the 2015 8-hour ozone NAAQS. The Department performed cost analyses using guidance provided in the EPA Air Pollution Control Cost Manual, EPA/452/B-02- 001, 6th edition, January 2002 and the 7th edition, issued beginning in 2019, vendor’s quotes, and cost data compiled from previous installations inside and outside of the Commonwealth. The cost analyses include the total capital investment of the add-on control equipment, the annual operating costs of the add-on control, and the cost-effectiveness of the control in reducing emissions from the source. Capital investments include costs associated with purchased equipment, installation, monitoring equipment, delivery, start-up and initial testing and taxes. Direct annual costs include the costs of electricity or fuel to operate the add-on control and the monitoring equipment, if needed, maintenance and repair costs. Indirect annual costs include overhead, administrative cost, property taxes, insurance and capital recovery cost. In accordance with the EPA’s guidance in the Control Cost Manual, 7th edition (revised in 2019), the Department used equipment life for SCR at 30 years, for SNCR and other control equipment at 20 years and an annual interest rate of 5.5% to calculate the capital cost recovery factor. The capital cost recovery factor is added to the annual cost to determine annualized cost. The cost-effectiveness of the control is calculated by dividing the annualized costs of the add-on control by the amount of emissions reductions achieved annually from operation of the add-on control.

The Department adjusted the RACT II cost benchmarks of \$2,800 and \$5,500 per ton of NO_x or VOC emissions reduced, respectively, by multiplying by the CPI differential between 2014 and 2020 to arrive at benchmarks of \$3,000 and \$6,000 per ton of NO_x or VOC emissions reduced, respectively, for RACT III. The Department further adjusted the cost-effectiveness benchmarks to \$3,750 per ton of NO_x emission reduced and \$7,500 per ton of VOC emissions reduced to ensure the implementation of RACT-level controls similar to what was done for RACT II. See 46 Pa.B. 2044 (April 23, 2016). The Department determined that the presumptive RACT limitations included in this RACT III final-form rulemaking are reasonable as they reflect control levels achieved by the application and consideration of available control technologies, after considering both the technological and economic circumstances of certain source categories in this Commonwealth. Using these cost-effectiveness benchmarks as a guide, the Department evaluated technically feasible emissions controls for the regulated sources for cost-effectiveness and economic feasibility. The Department additionally considered the RACT guidance on economic feasibility from the EPA, which stated in part that, "*economic feasibility for RACT purposes is largely determined by evidence that other sources in a source category have in fact applied the control technology in question*." And also, "*States may give substantial weight to cost effectiveness in evaluating the economic feasibility of an emission reduction technology*." See 57 FR 18074 (April 28, 1992).

Using the uncontrolled emissions rates of the subject major source categories and the control efficiency of technically and economically feasible control options, the Department determined the presumptive RACT emissions limitations for certain major stationary source categories of NO_x and VOC emissions. The Department also compared these presumptive RACT emissions limitations to presumptive RACT emissions limitations established by other states for similar major stationary source categories.

Compliance costs may vary for the owner and operator of each source or facility depending on the source size, type, operation limitation and which control option is selected by the owner and operator of the affected source or facility. Memorandum from Roger Strelow, Assistant Administrator for Air and Waste, USEPA, to Regional Administrators I-X, "Guidance for determining Acceptability of SIP Regulations in Non-Attainment Areas" (December 9, 1976) at 2, available at:
https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19761209_strelow_ract.pdf; see 57 FR 18070, 18073—18074 (April 28, 1992) and 44 FR 53761, 53762—53763 (September 17, 1979); see also *Nat'l Steel Corp., Great Lakes Steel Div. v. Gorsuch*, 700 F.2d 314, 322–323 (6th Cir. 1983). An owner or operator of an affected source that cannot meet the applicable presumptive RACT emissions limitation may participate in either a facility-wide or system-wide NO_x emissions averaging program under final-form § 129.113 or propose an alternative NO_x or VOC emissions limitation or requirement, or both, on a case-by-case basis under final-form § 129.114.

(C) RACT analysis and proposed NO_x and VOC RACT emission limitations for small source categories:

Combustion units or process heaters with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour:

The Department evaluated LNB technology for NO_x emissions reduction and oxidation catalyst technology for VOC emission reduction for combustion units or process heaters with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour. The Department determined that the cost-effectiveness of LNB technology ranges from approximately $3,536—8,841 per ton of NO_x emissions reduced and from approximately $260,750—651,876 per ton of VOC emissions reduced. See Appendix 3. The Department determined that the installation and operation of LNB and oxidation catalyst control technology options on these combustion units and process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced and $7,500 per ton of VOC emissions reduced. The benchmark is not a hard bright-line number. In this case, the very low end of the range dips slightly under the benchmark. The Department has used its discretion to determine that the installation and operation of LNB and oxidation catalyst control technology on these combustion units and process heaters is not cost-effective.

Therefore, the Department has established in this final-form rulemaking that the existing biennial tune-up requirements in accordance with 40 CFR Part 63, Subpart 63.11223, established in 25 Pa. Code § 129.97(b)(1) continue to represent RACT for combustion units or process heaters with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour. [25 Pa. Code § 129.112(b)(1)(i)].

Insignificant NO_x and VOC emitting source categories:

The Department evaluated LNB, SCR and SNCR technologies for NO_x emissions reduction and oxidation catalyst technology for VOC emission reduction for insignificant NO_x and VOC emitting source categories.

The Department performed a cost-effectiveness analysis for a 50 million Btu/hour combustion unit with an uncontrolled NO_x emissions rate of 5.0 TPY using reference cost data for LNB technology and determined the cost-effectiveness to be approximately $30,981 per ton of NO_x emissions reduced. The Department also performed a cost-effectiveness analysis for a 50 million Btu/hour combustion unit with an uncontrolled VOC emissions rate of 2.7 TPY using reference cost data for oxidation catalyst technology and determined the cost-effectiveness to be approximately $76,139 per ton of VOC emissions reduced. See Appendix 4. The Department determined that the installation and operation of LNB and oxidation catalyst control technology options on these combustion units and process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced and $7,500 per ton of VOC emissions reduced.

Using the results of the above cost analysis, the Department determined that operation of NO_x and VOC emitting sources with PTE less than 5 TPY of NO_x and less than 2.7 TPY of VOC, respectively, with no add-on or inherent NO_x or VOC controls as established in 25 Pa. Code § 129.97(c)(1) and (2) remains RACT for these sources for the 2015 8-hour ozone NAAQS.

Therefore, the Department has established in this final-form rulemaking that the owners and operators of subject units in the source categories below shall continue to comply with the presumptive RACT requirements established in 25 Pa. Code § 129.97(c)(1) and (2) of installation, maintenance, and operation of the source in accordance with the manufacturer's specifications and with good operating practices, as listed below. [25 Pa. Code § 129.112(c)(1)—(11)].

- A NO_x air contamination source that has the potential to emit less than 5 TPY of NO_x
- A VOC air contamination source that has the potential to emit less than 2.7 TPY of VOC
- A natural gas compression and transmission facility fugitive VOC air contamination source that has the potential to emit less than 2.7 TPY of VOC
- A boiler or other combustion source with an individual rated gross heat input less than 20 million Btu/hour

- A combustion turbine with a rated output less than 1,000 bhp
- A lean burn stationary internal combustion engine rated at less than 500 bhp (gross)
- A rich burn stationary internal combustion engine rated at less than 100 bhp (gross)
- An incinerator, thermal oxidizer, catalytic oxidizer or flare used primarily for air pollution control
- A fuel-burning unit with an annual capacity factor of less than 5%
- An emergency standby engine operating less than 500 hours in a 12-month rolling period
- An electric arc furnace

The Department has also established in this final-form rulemaking that the owners and operators of subject units in the source categories below shall comply with the presumptive RACT requirements of installation, maintenance, and operation of the source in accordance with the manufacturer's specifications and with good operating practices for control of the VOC emissions from the combustion unit or combustion source, as listed below. [25 Pa. Code § 129.112(d)].

- combustion unit
- brick kiln
- cement kiln
- lime kiln
- glass melting furnace
- combustion source

(D) Municipal Solid Waste (MSW) Landfills:

The Department has established in this final-form rulemaking that the owner and operator of a MSW landfill constructed, reconstructed or modified on or before July 17, 2014, and have not been modified or reconstructed since July 17, 2014, shall comply with the Federal Plan for Municipal Solid Waste Landfills in 40 CFR Part 62, Subpart OOO. The Federal Plan specifies control of collected MSW landfill emissions through the use of control devices meeting at least one of the following provisions: (1) A non-enclosed flare designed and operated in accordance with the parameters established in § 60.18; or (2) A control system designed and operated to reduce nonmethane organic carbon emissions (NMOC) by 98% by weight; or (3) An enclosed combustor designed and operated to reduce the outlet NMOC concentration to 20 ppm as hexane by volume, dry basis at 3% oxygen, or less. These control requirements are consistent with § 60.752 and § 60.33f. Therefore, the existing requirements continue to represent RACT. [25 Pa. Code § 129.112(e)(1)].

The Department has also established in this final-form rulemaking that the owner and operator of a MSW landfill constructed, reconstructed or modified on or after July 18, 2014, shall comply with the New Source Performance Standards in 40 CFR Part 60, Subpart XXX (relating to standards of performance for municipal solid waste landfills). The control of collected MSW landfill emissions through the use of control devices meeting at least one of the following provisions: (1) An open flare designed and operated in accordance with the parameters established in § 60.18; or (2) A control system designed and operated to reduce NMOC by 98% by weight; or (3) An enclosed combustor designed and operated to reduce the outlet NMOC concentration to 20 ppm as hexane by volume, dry basis at 3% oxygen, or less. These control requirements are consistent with § 60.762 and are adopted and incorporated by reference in § 122.3. [25 Pa. Code § 129.112(e)(2)].

The EPA issues guidance, in the form of a CTG, in place of regulations where the guidelines will be "substantially as effective as regulations" in reducing VOC emissions from a product or source category in ozone nonattainment areas. On October 27, 2016, the EPA issued the Control Techniques Guidelines for the Oil and Natural Gas Industry (EPA 453/B–16–001) (O&G CTG) which provided information to assist states in determining what constitutes RACT for VOC emissions from select oil and natural gas industry emission sources. See 81 FR 74798 (October 27, 2016). The EPA requires the owner or operator of a subject source to reduce VOC emissions by 95.0% by weight or greater by routing emissions to a control device such as a flare. This final-form rulemaking requires VOC emissions to be routed to a flare or other control device that achieves reductions of VOC emissions of at least 98% by weight, which is greater than the 95.0% by weight control that the EPA identified in the O&G CTG as consistent with section 111 of the CAA.

(E) Municipal Waste Combustors:

The Department studied several references to evaluate various NO_x control technologies and permitted NO_x emissions rates for existing MWCs. The study included various permitted MWCs in other states and also a June 2021 "Municipal Waste Combustor Workgroup Report" prepared by the Ozone Transport Commission (OTC) Stationary and Area Sources (SAS) Committee (OTC SAS Report).

Appendix A of the OTC SAS Report, regarding "OTR Large MWC Actual and Proposed Emissions," lists NO_x emissions limits in parts per million by volume, dry basis (ppmvd) for various large size MWCs operating in various OTR states as follows:

State	Permit NO_x limit range (ppmvd)
CT	120 - 150
MD	140 - 150
MA	146-150
ME	180 - 230
NH	205
NJ	150
NY	150 - 205
PA	135 - 180
VA	110

Several OTR states have proposed or revised NO_x RACT emission rate standards for large MWCs. New Jersey adopted a regulation that established a NO_x RACT emission rate of 150 ppmvd as determined on a calendar day average. Massachusetts and Maryland established a NO_x RACT emissions rate of 150 ppmvd for large MWCs. Connecticut adopted a 150 ppmvd limit for mass burn waterwall combustors on a 24-hour daily average.

The Department evaluated SCR technology for combustors firing municipal waste and found that performance of SCR can be detrimentally affected if the catalyst becomes de-activated due to poisoning or masking. Catalyst poisoning can occur if the catalyst is exposed to sufficient amounts of certain heavy metals that are present in the flue gas as a result of MSW combustion. Catalyst masking can occur when the catalyst surface becomes coated with a foreign material, preventing the flue gas from physically coming into contact with the catalyst. The Department also evaluated whether any existing MWCs in the OTR are equipped with SCR, but could not identify any. Therefore, the Department determined that adding SCR NO_x emissions control technology would likely not be considered RACT because of its technical infeasibility.

Appendices 5 and 6 provide an analysis of cost to control NO_x emissions from MWCs based on the Department's review of cost data for a reference MWC in Olmstead, Minnesota and of emissions monitoring data from calendar years 2018 and 2019 for the 19 MWCs located in this Commonwealth. Ten MWCs in this Commonwealth are equipped with SNCR controls and these ten MWCs are permitted with an allowable NO_x emissions rate between 135—180 ppmvd @ 7% oxygen. Nine MWCs in this Commonwealth are operating without SNCR controls and are permitted with an allowable NO_x emissions rate of 180 ppmvd @ 7% oxygen.

The Department evaluated the cost-effectiveness for operating SNCR controls on uncontrolled MWCs using an estimated throughput of 500 tons per day (tpd) of municipal waste and year 2007 control cost data adjusted to 2020 dollars from the reference MWC located in Olmstead, Minnesota. The Department found that the cost-effectiveness to retrofit uncontrolled MWCs with SNCR controls operating with 40% NO_x emissions reduction efficiency to a limitation of 110 ppmvd @ 7% oxygen is approximately $2,465 per ton of NO_x emissions reduced and, therefore is an economically feasible option for MWCs located in this Commonwealth compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced. See Appendix 5.

The Department analyzed Continuous Emission Monitoring System (CEMS) data from the years 2018 and 2019 for NO_x emissions from the 19 MWCs located in this Commonwealth. The Department determined that MWCs equipped with SNCR controls are capable of achieving an emissions rate limitation of 110 ppmvd NO_x @ 7% oxygen using a daily average. See Appendix 6.

The Department also reviewed the June 2021 OTC SAS Report. The OTC SAS workgroup performed a cost analysis for installation and operation of LNB technology on an MWC controlled with SNCR with a baseline NO_x emissions rate of 180 ppmvd. The OTC SAS workgroup estimated the cost-effectiveness for installation and operation of LNB technology in conjunction with the SNCR at $3,204 per ton of NO_x emissions reduced with a post-control NO_x emissions rate of 110 ppmvd. The OTC SAS workgroup concluded that based on the workgroup's cost analysis for LNB technology and its review of engineering studies of similar MWCs in the OTR, a control level of 110 ppmvd on a 24-hour averaging period is likely achievable for most large MWCs in the OTR. The Department's cost-effectiveness result of approximately $2,465 per ton of NO_x emissions reduced for operating SNCR controls compares favorably with the OTC SAS workgroup's cost-effectiveness result of $3,204 per ton of NO_x emissions reduced for the installation of LNB technology. The Department's analysis of CEMS data and the OTC SAS workgoup's review of engineering studies both support the conclusion that a control level of 110 ppmvd @ 7% oxygen using a daily average basis is achievable for the large MWCs located in this Commonwealth.

Based on the Department's review of NO_x emissions data from the MWCs located in this Commonwealth, the Department's independent cost-effectiveness analysis, and the information contained in the OTC SAS workgroup's report, the Department has established in this final-form rulemaking that the owner and operator of an MWC subject to § 129.111 shall comply with the presumptive RACT emission limitation of 110 ppmvd NO_x @ 7% oxygen. [25 Pa. Code § 129.112(f)]. The owners and operators of MWCs equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average will be considered valid if it contains at least 18 valid hourly averages reported at any time during the calendar day as required in the Quality Assurance Section of the Department's Continuous Source Monitoring Manual. [25 Pa. Code § 129.115(b)(3)].

(F) Combustion Units or Process Heaters:

Presumptive NO_x RACT requirements for a natural gas-fired, propane-fired or liquid petroleum gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour:

Most natural gas-fired, propane-fired or liquid petroleum gas-fired combustion units or process heaters with a rated heat input equal to or greater than 50 million Btu/hour are equipped with LNB technology. The Department analyzed stack test data for combustion units or process heaters in this size range that demonstrate NO_x emission rates as high as 0.99 lb NO_x/million Btu heat input. The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $8,905—18,334 per ton of NO_x emissions reduced. See Appendix 7. The Department determined the installation and operation of SCR control technology on these combustion units and process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas-fired, propane-fired or liquid petroleum gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall continue to comply with the existing presumptive RACT emission limitation of 0.10 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(i)]. The owners and operators of subject combustion units and process heaters equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive NO_x RACT requirements for a distillate oil-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour:

Most oil-fired combustion units or process heaters located in this Commonwealth with a rated heat input equal to or greater than 50 million Btu/hour units are equipped with LNB technology. The Department analyzed stack test data for distillate oil-fired combustion units or process heaters in this size range that demonstrate NO_x emission rates as high as 0.11 lb NO_x/million Btu heat input. This demonstrated emission rate of 0.11 lb NO_x/million Btu heat input is indicative of tight compliance with the RACT II presumptive NO_x limit of 0.12 lb NO_x/million Btu heat input established in 25 Pa. Code § 129.97(g)(1)(ii). The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $6,719—13,899 per ton of NO_x emissions reduced. See Appendix 8. The Department determined the installation and operation of SCR control technology on these distillate oil-fired combustion units and process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a distillate oil-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall continue to comply with the existing presumptive RACT emission limitation of 0.12 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(ii)]. The owners and operators of subject distillate oil-fired combustion units and process heaters equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive NO_x RACT requirements for a residual oil-fired or other liquid fuel-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour:

Most residual oil-fired or other liquid fuel-fired combustion units or process heaters located in this Commonwealth with a rated heat input equal to or greater than 50 million Btu/hour are equipped with LNB technology. The Department analyzed stack test data for residual oil-fired or other liquid fuel-fired combustion units or process heaters in this size range that demonstrate NO_x emission rates as high as 0.37 lb NO_x/million Btu heat input. The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $4,400—8,552 per ton of NO_x emissions reduced. See Appendix 9. The Department determined the installation and operation of SCR control technology on these residual oil-fired or other liquid fuel-fired combustion units or process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a residual oil-fired or other liquid fuel-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall continue to comply with the existing presumptive RACT emission limitation of 0.20 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(iii)]. The owners and operators of subject residual oil-fired or other liquid fuel-fired combustion units or process heaters equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive NO_x RACT requirements for a refinery gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour:

Most refinery gas-fired combustion units or process heaters located in this Commonwealth with a rated heat input equal to or greater than 50 million Btu/hour units are equipped with LNB technology. The Department analyzed stack test data for refinery gas-fired combustion units or process heaters in this size range that demonstrate NO_x emission rates as high as 0.27 lb NO_x/million Btu heat input. The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $3,730—7,387 per ton of NO_x emissions reduced. See Appendix 10. The Department determined the installation and operation of SCR control technology on these refinery gas-fired combustion units or process heaters to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced. The benchmark is not a hard bright-line number. In this case, the very low end of the range dips slightly under the benchmark. The Department has used its discretion to determine that the installation and operation of SCR control technology on these subject units is not cost-effective.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a refinery gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall continue to comply with the existing presumptive RACT emission limitation of 0.25 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(iv)]. The owners and operators of subject refinery gas-fired combustion units or process heaters equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive NO_x RACT requirements for a coal-fired combustion unit with a rated heat input equal to or greater than 50 million Btu/hour and less than 250 million Btu/hour:

The Department has identified only one unit in this category that commenced operation prior to August 3, 2018, and still operating today – a spreader stoker boiler – at a major NO_x emitting facility located in this Commonwealth. The Department analyzed stack test data for this spreader stoker boiler that demonstrates NO_x emission rates as high as 0.36 lb NO_x/million Btu heat input. The Department also analyzed stack test data for boilers that existed prior to April 23, 2016, the date of promulgation for §§ 129.96—129.100 (RACT II). These boilers are no longer operating, but the stack test data for these coal-fired combustion units is included in the evaluation for the RACT limit for the 2015 8-hour ozone NAAQS as it would not be appropriate to set a presumptive limit for the 2015 8-hour ozone NAAQS based on one data point. Most of these previously operating coal-fired combustion units were equipped with LNB technology because they were not spreader stoker boilers. The stack test data for these coal-fired boilers demonstrate NO_x emission rates as high as 0.51 lb NO_x/million Btu heat input.

The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $4,338—8,247 per ton of NO_x emissions reduced. See Appendix 11. The Department determined the installation and operation of SCR control technology on these coal-fired combustion units to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

The Department also evaluated these same subject boilers for the cost-effectiveness for the installation and operation of SNCR control technology and determined that the cost-effectiveness ranges from $5,409—11,273 per ton of NO_x emissions reduced. See Appendix 12. The Department determined the installation and operation of SNCR control technology on these coal-fired combustion units to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a coal-fired combustion unit with a rated heat input equal to or greater than 50 million Btu/hour and less than 250 million Btu/hour shall continue to comply with the existing presumptive RACT NO_x emission limitation of 0.45 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(v)]. The owners and operators of subject coal-fired combustion units equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive NO_x RACT requirements for a circulating fluidized bed (CFB) combustion unit firing primarily Bituminous waste (gob) coal or firing primarily Anthracite waste (culm) coal with a rated heat input equal to or greater than 250 million Btu/hour:

The Department analyzed CEMS NO_x emissions data for 3 years (2018—2020) for all CFBs located in this Commonwealth firing waste coal using the EPA's Clean Air Markets Division (CAMD) calculator. https://www.epa.gov/airmarkets; https://www.epa.gov/airmarkets/doing-business-camd. See Appendix 13 for the CAMD calculated results for two sizes of boilers. These units were permitted under RACT II with a NO_x emissions limitation of 0.16 lb NO_x/million Btu heat input on a 30-day rolling average. The wide range of NO_x emissions rates demonstrated by CEMS results indicated that NO_x emissions rates from CFBs firing waste coal are independent of the operation of SNCR control technology; rather, the NO_x emission rates are based on the variable characteristics and chemical composition of the waste coal being burned. The Department further evaluated the EPA CAMD data for the 3 years (2018—2020) using a daily average and determined that these units, except Scrubgrass Unit 2, near Kennerdell PA, are capable of meeting the NO_x emissions rate of 0.16 lb NO_x/million Btu heat input on a daily average basis.

The Department evaluated waste coal-fired CFB units with a baseline emission rate of 0.16 lb NO_x/million Btu heat input and determined that the cost-effectiveness for the installation and operation of SNCR control technology ranges from $4,747—6,207 per ton of NO_x emissions reduced. See Appendix 13. The Department determined the installation and operation of SNCR control technology on these CFBs firing waste coal to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

SCR control technology has been demonstrated to achieve high levels of NO_x emissions reduction on several types of combustion sources, including pulverized coal-fired and stoker-type coal-fired boilers, but has not been demonstrated on CFB boilers firing waste coal. This technology could potentially be transferred to a CFB boiler, but not without significant difficulty. Installation and operation of the SCR control technology upstream of the baghouse is technically infeasible because the particulate matter loading upstream of the baghouse will contain a very high percentage of alkaline particulate matter that would likely preclude effective SCR operation. Installation and operation of SCR control technology downstream of the baghouse is technically infeasible because the exhaust gas temperature at the downstream location is too low to support effective SCR operation. Location of the SCR downstream of the baghouse would require installation and operation of an additional burner, which would reduce the combustion unit's efficiency for generating electricity; the added burner would also emit air pollutants.

The Department evaluated the waste coal-fired CFB units with a baseline emission rate of 0.16 lb NO_x/million Btu heat input and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $5,507—9,060 per ton of NO_x emissions reduced. See Appendix 14. The Department determined the installation and operation of SCR control technology on these CFBs firing waste coal to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced. These cost-effectiveness determinations do not include the costs that would be incurred for installation and operation of a burner to heat the exhaust gas downstream of the baghouse.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a CFB combustion unit firing primarily bituminous waste (gob) coal or firing primarily anthracite waste (culm) coal with a rated heat input equal to or greater than 250 million Btu/hour shall comply with the presumptive RACT emission limitation of 0.16 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(g)(1)(vi)]. The owners and operators of subject CFBs equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

The Department has also established in this final-form rulemaking that the owner or operator of a CFB waste coal-fired combustion unit shall control the NO_x emissions each operating day by operating the installed air pollution control technology and combustion controls at all times consistent with the technological limitations, manufacturer's specifications, good engineering and maintenance practices and good air pollution control practices for controlling emissions. [25 Pa. Code § 129.112(g)(1)(vi)(C)].

Presumptive NO_x RACT requirements for a solid fuel-fired combustion unit that is not a coal-fired combustion unit with a rated heat input equal to or greater than 50 million Btu/hour:

The Department analyzed stack test data for solid fuel-fired combustion units that are not coal-fired combustion units with a rated heat input equal to or greater than 50 million Btu/hour. The stack test data analysis demonstrates that these units are complying with the existing NO_x emissions rate limitation of 0.25 lb NO_x/million Btu heat input established in 25 Pa. Code § 129.97(g)(1)(vii).

The Department evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from $7,562—13,971 per ton of NO_x emissions reduced. See Appendix 15. The Department determined the installation and operation of SCR control technology on these subject solid fuel-fired combustion units to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

The Department also evaluated various sizes of subject boilers and determined that the cost-effectiveness for the installation and operation of SNCR control technology ranges from $7,840—18,200 per ton of NO_x emissions reduced. See Appendix 16. The Department determined the installation and operation of SNCR control technology on these subject solid fuel-fired combustion units to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a solid fuel-fired combustion unit that is not a coal-fired combustion unit with a rated heat input equal to or greater than 50 million Btu/hour shall continue to comply with the existing presumptive RACT emission limitation of 0.25 lb NO_x/million Btu heat input established in 25 Pa. Code § 129.97(g)(1)(vii). [25 Pa. Code § 129.112(g)(1)(vii)]. The owners and operators of subject combustion units equipped with CEMS shall comply with the NO_x emissions rate limitation using a daily average. The daily average shall be calculated by summing the total pounds of pollutant emitted for the calendar day and dividing that value by the total heat input to the source for the same calendar day. The daily average for the source shall include all emissions that occur during the entire day. [25 Pa. Code § 129.115(b)(4)].

Presumptive VOC RACT requirements for a combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour, brick kiln, cement kiln, lime kiln, glass melting furnace or combustion source:

The typical amount of VOC emissions from a natural gas-fired, distillate oil-fired, residual oil-fired or other liquid fuel-fired, refinery gas-fired, coal-fired or solid fuel-fired combustion unit or process heater that is not a coal-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour, or from a brick kiln, cement kiln, lime kiln, glass melting furnace or combustion source range from 0.002 to 0.05 lb VOC/million Btu heat input, that is, very close to zero VOC emissions. The Department evaluated oxidation catalyst technology for for the control of VOC emissions from these sources using an average uncontrolled VOC emissions rate of 0.01 lb VOC/million Btu heat input with 60% VOC emission control efficiency. The Department determined the cost-effectiveness of oxidation catalyst technology on these sources ranges from approximately $59,992 to approximately $75,875 per ton of VOC emissions reduced due to the low amounts of VOC emissions. See Appendix 17. Therefore, the Department determined that the installation and operation of oxidation catalyst technology on these sources to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

The Department has established in this final-form rulemaking that the owner and operator of a natural gas-fired, distillate oil-fired, residual oil-fired or other liquid fuel-fired, refinery gas-fired, coal-fired or solid fuel-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour, or a brick kiln, cement kiln, lime kiln, glass melting furnace or combustion source shall continue to comply with the existing presumptive VOC RACT emission requirements of installation, maintenance and operation in accordance with the manufacturer's specifications and with good operating practices established in 25 Pa. Code § 129.97(d). [25 Pa. Code § 129.112(d)].

(G) Combustion Turbines:

The Department notes that changes to the proposed requirements for combined cycle or combined heat and power combustion turbines and for simple cycle or regenerative cycle combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 180 MW were made in this final-form rulemaking as a result of comments received on the proposed rulemaking. Section 129.112(g)(2) is amended from proposed to this final-form rulemaking to clarify the applicable presumptive RACT emission limitations for combined cycle or combined heat and power combustion turbines and for simple cycle or regenerative cycle combustion turbines.

Proposed § 129.112(g)(2)(i) established the applicable presumptive RACT emission limitations for the owner or operator of a combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 brake horsepower (bhp) and less than 180 MW. Final-form § 129.112(g)(2)(i) establishes the applicable presumptive RACT emission limitations for the owner or operator of a combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp, rather than the proposed rated output of less than 180 MW. The applicable presumptive RACT emission limitations for subject turbines are established in § 129.112(g)(2)(i)(A)—(D). Clause (A) establishes the limitation of 120 ppmvd NO_x @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (B) establishes the limitation of 5 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (C) establishes the limitation of 150 ppmvd NO_x @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Final-form § 129.112(g)(2)(ii) establishes the applicable presumptive RACT emission limitations for the owner or operator of a combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp, rather than the proposed rated output of equal to and greater than 1,000 bhp, and less than 180 MW. The applicable presumptive RACT emission limitations for subject turbines are established in § 129.112(g)(2)(ii)(A)—(D). Clause (A) establishes the limitation of 42 ppmvd NO_x @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (B) establishes the limitation of 5 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (C) establishes the limitation of 96 ppmvd NO_x @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Proposed § 129.112(g)(2)(ii) is renumbered in this final-form rulemaking to § 129.112(g)(2)(iii). Final-form § 129.112(g)(2)(iii) establishes the applicable presumptive RACT emission limitations for the owner or operator of a combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW. The applicable presumptive RACT emission limitations for subject turbines are established in § 129.112(g)(2)(iii)(A)—(D). Clause (A) establishes the limitation of 4 ppmvd NO_x @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (B) establishes the limitation of 2 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (C) establishes the limitation of 8 ppmvd NO_x @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation of 2 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Proposed § 129.112(g)(2)(iii) is renumbered in this final-form rulemaking to § 129.112(g)(2)(iv). Final-form § 129.112(g)(2)(iv) establishes the applicable presumptive RACT emission limitations for the owner or operator of a simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp, rather than the proposed rated output of less than 3,000 bhp. The applicable presumptive RACT emission limitations for subject turbines are established in § 129.112(g)(2)(iv)(A)—(D). Clause (A) establishes the limitation of 120 ppmvd NO_x @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (B) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (C) establishes the limitation of 150 ppmvd NO_x @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Proposed § 129.112(g)(2)(iv) is renumbered in this final-form rulemaking to § 129.112(g)(2)(v). Final-form § 129.112(g)(2)(v) establishes the applicable presumptive RACT emission limitations for the owner or operator of a simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 4,100 bhp, rather than the proposed rated output of equal to or greater than 3,000 bhp, and less than 60,000 bhp. The applicable presumptive RACT emission limitations for subject turbines are established in § 129.112(g)(2)(v)(A)—(D). Clause (A) establishes the limitation of 42 ppmvd NO_x @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (B) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel. Clause (C) establishes the limitation of 96 ppmvd NO_x @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Presumptive NO_x RACT and VOC RACT requirements for a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp:

Most of the natural gas-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp in this Commonwealth are manufactured by Solar Turbines and used for natural gas compression applications. The Department assumed for the proposed rulemaking that natural gas-fired combined cycle combustion or combined heat and power turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp could use DLNC as the NO_x emissions control technology. Through comments received on the proposed rulemaking, the Department learned that Solar Turbines does not offer NO_x control technologies, including DLNC, for subject turbines rated below 4,100 bhp. Based on information provided by Solar Turbines, there are other turbine manufacturers that do offer DLNC technology for their new turbines rated at less than 4,100 bhp but these turbines are limited to electric generating applications. At this time, the Department is not aware of other turbine manufacturer equipment that can be used for a natural gas compression application.

The Department evaluated natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp with an existing RACT II emissions rate limitation of 150 ppmvd NO_x @ 15% oxygen and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from approximately $22,750—27,861 per ton of NO_x removed. See Appendix 18. The Department determined the installation and operation of SCR control technology on these turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

The Department analyzed stack test results for natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp. The Department also analyzed test results for natural gas-fired turbines rated between 1,000 bhp and 4,100 bhp provided by the vendor. Based on the available test results, the Department determined that these turbines can comply with an emissions rate limitation of 120 ppmvd NO_x @ 15% oxygen.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp, shall comply with the presumptive RACT emission limitation of 120 ppmvd NO_x @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(i)(A)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department also analyzed VOC emissions data and determined that existing natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp are able to meet 5 ppmvd VOC (as propane) or lower @ 15% oxygen.

The Department evaluated natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines between 1,000 and 4,100 bhp with an uncontrolled VOC emissions rate of 5 ppmvd VOC (as propane) @ 15% oxygen for control with oxidation catalyst technology. The Department determined that the cost-effectiveness for the installation and operation of oxidation catalyst technology ranged from approximately $32,052—94,104 per ton of VOC emissions reduced. See Appendix 19. The Department determined the installation and operation of oxidation catalyst technology on these turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall comply with the presumptive RACT emissions rate limitation of 5 ppmvd VOC (as propane) @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(i)(B)].

Presumptive NO_x RACT and VOC RACT requirements for a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp and less than 180 megawatts (MW):

Most of the large combined cycle turbines in this category are equipped with DLNC.

The Department evaluated varying sizes of subject turbines with a rated output equal to or greater than 4,100 bhp and less than 60,000 bhp with an existing RACT II emissions rate limitation of 42 ppmvd NO_x @ 15% oxygen for the installation and operation of SCR control technology. The Department determined that the cost-effectiveness for the installation and operation of SCR control technology on these turbines ranges from approximately $9,304—39,059 per ton of$NO_x$ emissions reduced. See Appendix 20. The Department determined the installation and operation of SCR control technology on these turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

The Department analyzed test results for these subject turbines that demonstrated NO_x emissions rates of 40 ppmvd and lower in compliance with the presumptive RACT emission limitation of 42 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(A).

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp and less than 180 MW shall continue to comply with the existing presumptive RACT emission limitation of 42 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(A). [25 Pa. Code § 129.112(g)(2)(ii)(A)]. The owners and operators of subject turbines equipped with

CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department also analyzed VOC emissions data and determined that existing natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 4,100 bhp are able to meet 5 ppm VOC (as propane) or lower @ 15% oxygen.

The Department evaluated natural gas or noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 4,100 bhp and less than 60,000 bhp for control with oxidation catalyst technology for control of VOC emissions. The Department determined that the cost-effectiveness for the installation and operation of oxidation catalyst technology ranged from approximately $10,778—40,277 per ton of VOC emissions reduced. See Appendix 21. The Department determined the installation and operation of oxidation catalyst technology on these turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp and less than 180 MW shall continue to comply with the existing presumptive RACT emissions rate limitation of 5 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(C). [25 Pa. Code § 129.112(g)(2)(ii)(B)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Presumptive NO_x RACT and VOC RACT requirements for a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW:

The natural gas and noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 180 MW in this Commonwealth are equipped with DLNC and SCR control technology. The Department analyzed NO_x emissions test results for these subject turbines and determined that these turbines are able to comply with a NO_x emissions rate of 4 ppmvd NO_x @ 15% oxygen.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW shall continue to comply with the existing presumptive RACT emissions limitation of 4 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(A). [25 Pa. Code § 129.112(g)(2)(iii)(A)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department analyzed test results for these subject turbines that demonstrated VOC emission rates of 2 ppmvd VOC (as propane) or lower @ 15% oxygen in compliance with the presumptive RACT emission limitation of 2 ppmvd VOC @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(C).

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW shall continue to comply with the existing presumptive RACT emissions limitation of 2 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(C). [25 Pa. Code § 129.112(g)(2)(iii)(B)].

Presumptive NO_x RACT and VOC RACT requirements for a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp:

Based on a review of the Department's records in databases and permits, there are no combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp powered solely by fuel oil in this Commonwealth. There are turbines of this type that use oil as a start-up fuel before switching to natural gas. The existing requirements for these turbines are consistent with the requirements in 40 CFR Part 60, Subpart KKKK, regarding standards of performance for stationary combustion turbines.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall continue to comply with the existing presumptive NO_x RACT emission limitation of 150 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(B) and with the existing presumptive VOC RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(D). [25 Pa. Code § 129.112(g)(2)(i)(C)] and [25 Pa. Code § 129.112(g)(2)(i)(D)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Presumptive NO_x RACT and VOC RACT requirements for a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp and less than 180 MW:

Based on a review of the Department's records in databases and permits, there are no combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 4,100 bhp and less than 180 MW powered solely by fuel oil in this Commonwealth. There are turbines of this type that use oil as a start-up fuel before switching to natural gas. The existing requirements for these turbines are consistent with the requirements in 40 CFR Part 60, Subpart KKKK.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 4,100 bhp and less than 180 MW shall continue to comply with the existing presumptive RACT emission limitation of 96 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(B) and with the existing presumptive RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(i)(D). [25 Pa. Code § 129.112(g)(2)(ii)(C)] and [25 Pa. Code § 129.112(g)(2)(ii)(D)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Presumptive NO_x RACT and VOC RACT requirements for a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW:

The existing NO_x RACT emissions rate limitation of 8 ppmvd NO_x @ 15% oxygen for these subject turbines established in 25 Pa. Code § 129.97(g)(2)(ii)(B) is consistent with the NO_x emissions rate limitations for fuel oil-fired turbines equipped with SCR control technology.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW shall continue to comply with the existing presumptive RACT emission limitation of 8 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(B). [25 Pa. Code § 129.112(g)(2)(iii)(C)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department analyzed test results for these subject turbines that demonstrated VOC emissions rates of 2 ppmvd VOC (as propane) or lower @ 15% oxygen in compliance with the presumptive RACT emission limitation of 2 ppmvd VOC @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(D).

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW shall continue to comply with the existing presumptive RACT emission limitation of 2 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(D). [25 Pa. Code § 129.112(g)(2)(iii)(D)].

Presumptive NO_x RACT and VOC RACT requirements for a natural gas or a noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp:

Most of the natural gas-fired simple cycle turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp in this Commonwealth are manufactured by Solar Turbines and used for natural gas compression applications. Solar Turbines does not offer NO_x control technologies, including DLNC, for subject turbines rated below 4,100 bhp. Based on information provided by Solar Turbines, there are other turbine manufacturers that do offer DLNC technology for their new turbines rated at less than 4,100 bhp but these turbines are limited to electric generating applications. At this time, the Department is not aware of other turbine manufacturer equipment that can be used for a natural gas compression application.

The Department evaluated natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp with the existing presumptive RACT emissions rate limitation of 150 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(iii)(A) and determined that the cost-effectiveness for the installation and operation of SCR control technology ranges from approximately $22,750—27,861 per ton of NO_x removed. See Appendix 18. The Department determined the installation and operation of SCR control technology on these turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

The Department analyzed stack test results for natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp. The Department also analyzed test results for natural gas-fired simple cycle turbines with a rated output between 1,000 bhp and 4,100 bhp provided by the vendor. Based on the available test results, the Department determined that these turbines can comply with an emissions rate limitation of 120 ppmvd NO_x @ 15% oxygen.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall comply with the presumptive RACT emission limitation of 120 ppmvd NO_x @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(iv)(A)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department analyzed test results for these subject turbines that demonstrated VOC emission rates of 9 ppmvd VOC (as propane) or lower at 15% oxygen in compliance with the presumptive RACT emission limitation of 9 ppmvd VOC @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(ii)(D).

The Department evaluated natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp with uncontrolled VOC emissions rates of 9 ppmvd (as propane) @ 15% oxygen for control of VOC emissions with oxidation catalyst technology. The cost-effectiveness ranges from approximately $17,807—52,280 per ton of VOC emissions reduced. See Appendix 22. The Department determined the installation and operation of oxidation catalyst technology on these subject turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall continue to comply with the existing presumptive RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(iii)(C). [25 Pa. Code § 129.112(g)(2)(iv)(B)].

Presumptive NO_x RACT and VOC RACT requirements for a natural gas or a noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp:

All turbines in this category are equipped with DLNC. The Department analyzed NO_x emissions test results for thirteen natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp and found ten of them are able to achieve a NO_x emissions rate of 42 ppmvd @ 15% oxygen. The owners and operators of natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to greater than 6,000 bhp are currently required to comply with the presumptive RACT NO_x emissions rate limitation of 42 ppmvd @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(iv)(A).

The Department evaluated turbines in this category with an uncontrolled NO_x emissions rate of 42 ppmvd @ 15% oxygen for the installation and operation of SCR control technology. The Department determined that the cost-effectiveness for the installation and operation of SCR control technology on these turbines ranges from approximately $8,525—26,175 per ton of NO_x emissions reduced. See Appendix 23. The Department determined the installation and operation of SCR control technology on these turbines to be a cost-prohibitive option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced. Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp shall continue to comply with the existing presumptive RACT emission limitation of 42 ppmvd NO_x @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(v)(A)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Most of the subject turbines in this size category meet the VOC emissions rate of 9 ppmvd VOC (as propane) @ 15% oxygen. The Department evaluated these turbines for control of VOC emissions with oxidation catalyst technology. The cost-effectiveness ranges from approximately $9,441—22,027 per ton of VOC emissions reduced. See Appendix 24. The Department determined the installation and operation of oxidation catalyst technology on these subject turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp shall comply with the presumptive RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(v)(B)].

Presumptive NO_x RACT and VOC RACT requirements for a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp:

Based on a review of the Department's records in databases and permits, there are no simple cycle or regenerative cycle combustion turbines with a rated output equal to greater than 1,000 bhp and less than 4,100 bhp powered solely by fuel oil in this Commonwealth. There are turbines of this type that use oil as a start-up fuel before switching to natural gas.

The Department evaluated turbines in this category with a NO_x emissions rate of 150 ppmvd NO_x @ 15% oxygen for the installation and operation of SCR control technology. The Department determined that the cost-effectiveness for the installation and operation of SCR control technology on these turbines ranges from approximately $21,643—26,506 per ton of NO_x emissions reduced. See Appendix 25. The Department determined the installation and operation of SCR control technology on these turbines to be a cost-prohibitive option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall continue to comply with the existing presumptive RACT emission limitation of 150 ppmvd NO_x @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(iii)(B). [25 Pa. Code § 129.112(g)(2)(iv)(C)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

The Department evaluated subject turbines with uncontrolled VOC emissions rates of 9 ppmvd (as propane) @ 15% oxygen for control of VOC emissions with oxidation catalyst technology. The cost-effectiveness ranges from approximately $17,807—52,280 per ton of VOC emissions reduced. See Appendix 22. The Department determined the installation and operation of oxidation catalyst technology on these subject turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 4,100 bhp shall continue to comply with the existing presumptive RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen established in 25 Pa. Code § 129.97(g)(2)(iii)(D). [25 Pa. Code § 129.112(g)(2)(iv)(D)].

Presumptive NO_x RACT and VOC RACT requirements for a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp:

Based on a review of the Department's records in databases and permits, there are no fuel oil-fired simple cycle or regenerative cycle combustion turbines with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp powered solely by fuel oil in this Commonwealth. There are turbines of this type that use oil as a start-up fuel before switching to natural gas.

The Department evaluated turbines in this category subject to the presumptive RACT NO_x emissions rate of 96 ppmvd NO_x @ 15% oxygen for the installation and operation of SCR control technology. The Department determined that the cost-effectiveness for the installation and operation of SCR control technology on these turbines ranges from approximately $8,518—23,498 per ton of NO_x emissions reduced. See Appendix 26. The Department determined the installation and operation of SCR control technology on these turbines to be a cost-prohibitive option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department is has established in this final-form rulemaking that the owner and operator of a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp shall continue to comply with the existing presumptive RACT emission limitation of 96 ppmvd NO_x @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(v)(C)]. The owners and operators of subject turbines equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Most of the subject turbines in this size category meet the VOC emissions rate of 9 ppmvd VOC (as propane) @ 15% oxygen. The Department evaluated these turbines for control of VOC emissions with oxidation catalyst technology. The cost-effectiveness ranges from approximately $9,441—22,027 per ton of VOC emissions reduced. See Appendix 24. The Department determined the installation and operation of oxidation catalyst technology on these subject turbines to be cost-prohibitive compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a fuel oil-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to greater than 4,100 bhp and less than 60,000 bhp shall comply with the presumptive RACT emission limitation of 9 ppmvd VOC (as propane) @ 15% oxygen. [25 Pa. Code § 129.112(g)(2)(v)(D)].

(H) Stationary Internal Combustion Engines:

Presumptive NO_x RACT requirements for a natural gas or a noncommercial gaseous fuel-fired lean burn stationary internal combustion engine with a rating equal to or greater than 500 bhp and less than 3,500 bhp:

Most of these engines are equipped with LEC technology. Test results for natural gas-fired engines above 500 bhp demonstrate NO_x emissions rates of 3.0 gram NO_x/bhp-hr or lower. Engines manufactured on or after July 1, 2007, and subject to 40 CFR Part 60, Subpart JJJJ are required to meet the emission limitation of 2 gram NO_x/bhp-hr and engines manufactured on or after July 1, 2010, are required to meet the emission limitation of 1 gram NO_x/bhp-hr.

The Department evaluated engines with a rating equal to or greater than 500 bhp and less than 3,500 bhp for the installation and operation of SCR control technology. The Department determined that the cost-effectiveness for the installation and operation of SCR control technology on these engines ranges from approximately $3,871—10,449 per ton of NO_x emissions reduced. See Appendix 27. The Department determined the installation and operation of SCR control technology on these engines to be a cost-prohibitive option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department is has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired lean burn stationary internal combustion engine with a rating equal to or greater than 500 bhp and less than 3,500 bhp shall comply with the presumptive RACT emission limitation of 3.0 gram NO_x/bhp-hr. [25 Pa. Code § 129.112(g)(3)(i)(A)].

Presumptive NO_x RACT requirements for a natural gas or a noncommercial gaseous fuel-fired lean burn stationary internal combustion engine with a rating equal to or greater than 3,500 bhp:

Most of these engines in this Commonwealth are equipped with LEC technology with a NO_x emissions rate limitation of 3.0 gram NO_x/bhp-hr.

The Department evaluated subject engines with a rating equal to or greater than 3,500 bhp for the installation and operation of SCR control technology with 80% NO_x emissions reduction efficiency. The Department determined that the cost-effectiveness for the installation and operation of this SCR control technology on these engines ranges from approximately $3,326—3,676 per ton of NO_x emissions reduced. See Appendix 28. The Department determined the installation and operation of this SCR control technology on these engines to be an economically feasible option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has determined that the installation and operation of this SCR control technology on these subject engines to be technically and economically feasible and is determined to be RACT for the 2015 8-hour ozone standard. The Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired lean burn stationary internal combustion engine with a rating equal to or greater 3,500 bhp shall comply with the presumptive RACT emission limitation of 0.6 grams NO_x/bhp-hr. [25 Pa. Code § 129.112(g)(3)(ii)(A)].

Presumptive NO_x RACT requirements for a liquid fuel or dual-fuel-fired stationary internal combustion engine with a rating equal to or greater than 500 bhp:

The Department evaluated diesel engines with a rating equal to or greater than 500 bhp and less than 5,000 bhp with an existing RACT II NOx emissions rate limitation of 8 gram NOx/bhp-hr established in 25 Pa. Code § 129.97(g)(3)(ii) for the installation and operation of SCR control technology with 80% NO_x emissions reduction efficiency. The Department determined that the cost-effectiveness for the installation and operation of this SCR control technology on these engines ranges from approximately $2,543—3,503 per ton of NO_x emissions reduced. See Appendix 29. The Department determined the installation and operation of this SCR control technology on these engines to be an economically feasible option compared to the Department's cost-effectiveness benchmark of $3,750 per ton of NO_x emissions reduced.

Therefore, the Department has determined that the installation and operation of this SCR control technology on these subject engines to be technically and economically feasible and is determined to be RACT for the 2015 8-hour ozone standard. The Department has established in this final-form rulemaking that the owner and operator of a liquid fuel or dual-fuel-fired stationary internal combustion engine with a rating equal to or greater than 500 bhp shall comply with the presumptive RACT emission limitation of 1.6 gram NO_x/bhp-hr. [25 Pa. Code § 129.112(g)(3)(iii)].

Presumptive NO_x RACT requirements for a natural gas or a noncommercial gaseous fuel-fired rich burn stationary internal combustion engine with a rating equal to or greater than 100 bhp:

Uncontrolled NO_x emissions rates from natural gas-fired rich-burn engines in this Commonwealth typically range from 13—16 gram NO_x/bhp-hr. During the development of the RACT II regulation, the Department determined that NSCR with 80% NO_x emissions removal efficiency is technically and economically feasible and established a NO_x emissions rate limitation of 2.0 gram NO_x/bhp-hr for rich-burn engines with ratings equal to or greater than 500 bhp.

Most of the rich-burn engines with ratings greater than 500 bhp in this Commonwealth are retrofitted with NSCR or equivalent technology that reduces NO_x emissions to rates of 2 gram NO_x/bhp-hr or less. The Department evaluated the economic feasibility for the installation and operation of NSCR technology for engines with ratings as low as 100 bhp. NO_x emissions removal efficiency for NSCR technology varies from 80—95% depending on the size of the engines from small to large. The cost analysis was performed with an average 80% NO_x emissions reduction efficiency and 50% VOC emissions reduction efficiency. The Department determined that the cost-effectiveness ranges from approximately $70—616 per ton of NO_x emissions reduced and per ton of VOC emissions reduced. See Appendix 30.

Based on these evaluations, the Department has lowered the applicability to engines as small as 100 bhp. The Department has established in this final-form rulemaking that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired rich burn stationary internal combustion engine with a rating equal to or greater than 100 bhp shall comply with the presumptive RACT NO_x emission rate limitation of 2.0 gram NO_x/bhp-hr and with the presumptive RACT VOC emission rate limitation of 0.5 gram VOC/bhp-hr. [25 Pa. Code § 129.112(g)(3)(iv)(A)] and [25 Pa. Code § 129.112(g)(3)(iv)(B)].

The Department notes that the proposed presumptive RACT NO_x emission rate limitation of 0.6 gram NO_x/bhp-hr was a typographical error which is corrected in this final-form rulemaking to the 2.0 gram NO_x/bhp-hr .

Presumptive VOC RACT requirements for all internal combustion engines:

The Department evaluated the economic feasibility for the installation and operation of oxidation catalyst technology on internal combustion engines with ratings equal to or greater than 500 bhp with an existing VOC emission rate limitation of 1.0 gram VOC/bhp-hr. The Department determined that the cost-effectiveness ranges from approximately $1,976–4,181 per ton of VOC emissions reduced. See Appendix 31. The Department determined the installation and operation of oxidation catalyst technology on the subject engines to be an economically feasible option compared to the Department's cost-effectiveness benchmark of $7,500 per ton of VOC emissions reduced.

The Department also reviewed stack test results for a sample of internal combustion engines and found the VOC emissions rate to be 0.5 gram VOC/bhp-hr or lower.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of subject lean-burn internal combustion engines with ratings equal to or greater than 500 bhp shall comply with the presumptive RACT VOC emission rate limitation of 0.5 gram VOC/bhp-hr, excluding formaldehyde. [25 Pa. Code § 129.112(g)(3)(i)(B)] and [25 Pa. Code § 129.112(g)(3)(ii)(B)].

(I) Portland Cement Kilns:

The EPA has evaluated SCR control technology systems for installation and operation at cement kilns and has found that their use at cement kilns is technically feasible. A review of the summary of comments received regarding the Consent Decree between Lehigh Cement and the EPA dated March 27, 2020, however, demonstrates that the installation and operation of SCR control technology is cost prohibitive for many cement kilns and would increase the cost per ton of clinker to the extent that it may render the cement plant economically non-viable. Therefore, the Department has determined that the installation and operation of SCR control technology for cement kilns in this Commonwealth is an economically infeasible option.

Long wet-process cement kiln:

All long wet-process cement kilns in this Commonwealth are equipped with and operating SNCR control technology. The Department evaluated NO_x emissions reduction test results for a long wet-process cement kiln located at Armstrong Cement.

Based on the review of these test results, the Department has established in this final-form rulemaking that the owner and operator of a long wet-process cement kiln shall continue to comply with the existing presumptive RACT emission limitation of 3.88 pounds of NO_x per ton of clinker produced established in 25 Pa. Code § 129.97(h)(1). [25 Pa. Code § 129.112(h)(1)]. The owners and operators of subject cement kilns equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Long dry-process cement kiln:

All long dry-process cement kilns in this Commonwealth are equipped with and operating SNCR control technology. The Department evaluated NO_x emissions reduction test results for a long dry-process cement kiln located at Evansville Cement.

In response to the Consent Decree between Lehigh Cement Evansville and the EPA, the Department established a limit of 3.0 pounds of NO_x per ton of clinker produced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a long dry-process cement kiln shall comply with the presumptive RACT emission limitation of 3.0 pounds of NO_x per ton of clinker produced. [25 Pa. Code § 129.112(h)(2)]. The owners and operators of subject cement kilns equipped with CEMS shall comply with the NO_x emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Preheater and Precalciner cement kilns:

Precalciner cement kilns in this Commonwealth are equipped with and operating SNCR control technology.

SCR control technology systems applied to cement preheater/precalciner (PH/PC) kilns can be either “low-dust” or “high-dust” systems depending on their location after or before the particulate matter control device. In both types of systems, capital costs include the cost of the SCR catalyst and reactor, the costs to upgrade or replace kiln induced draft fans when the SCR control technology is added to existing PH/PC kilns, and the costs of the reagent delivery system, storage, and instrumentation. Because of the problems of catalyst plugging, the high-dust system requires a catalyst cleaning mechanism such as pressurized air nozzles or sonic horns. The low-dust system avoids costs associated with catalyst cleaning. Operating costs for both types of systems include operating labor and maintenance costs, reagent costs, and the electricity for reagent pumping. High-dust SCR systems incur higher energy costs for catalyst cleaning. Operating costs also include catalyst replacement every few years.

The EPA’s “Alternative Control Techniques Document Update - NO_X Emissions from New Cement Kilns” (EPA-453/R-07-006 November 2007) document establishes that the average cost-effectiveness of SCR for PH/PC kilns is approximately $4,200 per ton of NO_x emissions reduced. Therefore, the Department has determined the installation and operation of SCR control technology to be a cost-prohibitive option for PH/PC cement kilns.

In response to the Consent Decree between Lehigh Cement and the EPA, the NO_x emissions rate for the Lehigh Cement kiln at Nazareth is limited to 2.30 pounds of NO_x per ton of clinker produced.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a PH/PC cement kiln shall comply with the presumptive RACT emission limitation of 2.30 pounds of NO_x per ton of clinker produced. [25 Pa. Code § 129.112(h)(3)]. The owners and operators of subject cement kilns equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

VOC RACT for all cement kilns:

Based on the Department's cost analysis performed for the installation and operation of oxidation catalyst technology for combustion units and combustion sources, add-on controls such as oxidation catalyst technology is cost-prohibitive for combustion units or sources located at cement plants. See Appendix 17. Therefore, the Department established in this final-form rulemaking that the owner and operator of a subject cement kiln shall continue to comply with the existing presumptive VOC RACT requirements of installation, maintenance, and operation of the source in accordance with manufacturer's specifications and with good operating practices established in 25 Pa. Code § 129.97(d). [25 Pa. Code § 129.112(d)].

(J) Glass Melting Furnaces:

There are several glass melting furnaces in this Commonwealth that are major source emitters of NO_x. Most of the glass furnaces in this Commonwealth are equipped with SCR, LNB or Oxy-Firing and Air Staging controls.

Several alternative control technologies are available for glass manufacturing facilities to limit NO_x emissions. These options include combustion modifications (low NO_x burners, oxy-fuel firing, oxygen-enriched air staging), process modifications (fuel switching, batch preheat, electric boost), and post combustion modifications (fuel reburn, SNCR, SCR). Oxy-firing is an effective NO_x emissions reduction technique and is best implemented with a complete furnace rebuild. This strategy not only reduces NO_x emissions by as much as 85%, but reduces energy consumption, increases production rates by 10—15%, and improves glass quality by reducing defects. Oxy-firing is a demonstrated technology and has penetrated all segments of the glass melting industry.

The Department performed cost analyses for the installation and operation of SCR control technology on those glass melting furnaces that are equipped with LNB or Oxy-Firing controls.

Container glass furnaces:

All existing container glass furnaces in this Commonwealth are equipped with Oxy-firing and LNB. The Department performed a cost analysis for the installation and operation of SCR control technology on these subject furnaces. The Department determined that the cost-effectiveness ranges from approximately $4,356 - $5,064 per ton of NO_x emissions reduced. See Appendix 32. The Department determined the installation and operation of SCR control technology to be cost-prohibitive for these subject glass furnaces.

Therefore, the Department has established in this final-form rulemakig that the owner and operator of a container glass furnace shall comply with the presumptive RACT emission limitation of 4.0 pounds of NO_x per ton of glass pulled, which is consistent with the recommended emission limit in the OTC's "Identification and Evaluation of Candidate Control

Measures Final Technical Support Document" and 25 Pa. Code § 129.304. [25 Pa. Code § 129.112(i)(1)]. The owners and operators of subject glass furnaces equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Pressed or Blown glass furnaces:

All existing pressed or blown glass furnaces in this Commonwealth are equipped with SCR control technology.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a pressed or blown glass furnace shall comply with the presumptive RACT emission limitation of 7.0 pounds of NO_x per ton of glass pulled, which is consistent with the recommended emission limit in the OTC's "Identification and Evaluation of Candidate Control Measures Final Technical Support Document" and with 25 Pa. Code § 129.304. [25 Pa. Code § 129.112(i)(2)]. The owners and operators of subject glass furnaces equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Fiberglass furnaces:

No fiberglass furnace subject to RACT has been found in in this Commonwealth. If a fiberglass furnace in this Commonwealth becomes subject to RACT, the Department has established in this final-form rulemaking a NO_x RACT emission rate limitation for fiberglass furnaces of 4.0 pounds of NO_x per ton of glass pulled. [25 Pa. Code § 129.112(i)(3)]. The owners and operators of subject glass furnaces equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

This emission limit is also consistent with the recommended emission limit in the OTC's "Identification and Evaluation of Candidate Control Measures Final Technical Support Document" and 25 Pa. Code § 129.304.

Flat glass furnaces:

Most flat glass furnaces in this Commonwealth are equipped with Oxy-firing and LNB or SCR control technology with a controlled NO_x emission rate limitation of 7 pounds of NO_x per ton of glass pulled. However, one flat glass furnace in this Commonwealth is operating with a NO_x emission rate limitation of 26.75 pounds of NO_x per ton of glass pulled. This glass furnace is not able to meet the presumptive RACT III limit of 7.0 pounds of NO_x per ton of glass pulled. The Department performed a cost analysis for the installation and operation of SCR control technology on flat glass furnaces with an uncontrolled NO_x emissions rate of 26.75 pounds of NO_x per ton of glass pulled. The Department determined the cost-effectiveness to be less than $500 per ton of NO_x emissions reduced. See Appendix 32.

Since most flat glass furnaces are equipped with Oxy-firing and LNB or SCR control technology, the Department has established in this final-form rulemaking that the owner and operator of a flat glass furnace shall comply with the presumptive RACT emission limitation of 7.0 pounds of NO_x per ton of glass pulled, which is consistent with the recommended emission limit in the OTC's "Identification and Evaluation of Candidate Control Measures Final Technical Support Document" and 25 Pa. Code § 129.304. [25 Pa. Code § 129.112(i)(4)]. The owners and operators of subject glass furnaces equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

All other glass melting furnaces:

All other glass furnaces are equipped with LNB or Air Staging controls. The Department performed an incremental cost analysis for the installation and operation of SCR control technology on these subject glass melting furnaces and found the cost-effectiveness to be higher than $4,000 per ton of NO_x emissions reduced. The Department determined the installation and operation of SCR control technology on these subject glass melting furnaces to be cost-prohibitive. See Appendix 33.

The Department evaluated a test result for NO_x emissions for other glass melting furnaces that demonstrates NO_x emissions rates of 5.7 pounds of NO_x or lower per ton of glass pulled. Therefore, the Department has established in this final-form rulemaking that the owner and operator of any other type of glass melting furnace shall comply with the presumptive RACT emission limitation of 6.0 pounds of NO_x per ton of glass pulled, which is consistent with 25 Pa. Code § 129.304. [25 Pa. Code § 129.112(i)(5)]. The owners and operators of subject glass melting furnaces equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

(K) Lime Kilns:

The Department evaluated SCR control technology for a long rotary kiln. The EPA's (SCR) RACT/BACT/LAER Clearinghouse (RBLC) does not show this technology as being applied to either long rotary or preheater lime kilns. SCR control technology is generally not considered to be a technically feasible option for long rotary lime kilns because of particulate fouling, especially with calcium-based particulates. The optimum temperature for the operation of SCR controls is significantly higher than the exhaust gas temperatures from a long rotary kiln (typically less than 500°F) and the fluctuation and variability of the exhaust gas temperature in a long rotary kiln hinders the control efficiency of SCR controls. Therefore, the Department has determined SCR control technology to be a technically infeasible option.

SNCR control technology has not been applied to a long rotary lime kiln where the reagent must be injected into the calcining zone of the kiln. The location of the injection point is critical to the level of NO_x reductions. The optimal location of the injection point in a long rotary kiln is variable and the ability to match the injection location to the NO_x concentration is difficult and inaccurate. Failure to match the required criteria could result in poor effectiveness of the ammonia reagent or by-product generation of NO_x from the ammonia reagent, or both. SNCR control technology has not been installed at a long rotary kiln in this Commonwealth and currently is not a reasonable control alternative. Therefore, the Department has determined the installation and operation of SNCR control technology on long rotary lime kilns to be a technically infeasible option.

Combustion/burner optimization techniques such as Low Excess Air, Overfire Air, Low NO_X Burner and Flue Gas Recirculation can reduce NO_x emissions by anywhere from 5—60%. The goal of these control techniques is to optimize the efficiency of combustion while minimizing emissions of NO_x. The Department reviewed the operating permit for long rotary lime kiln No. 5 at Carmeuse Lime, Inc. The kiln incorporates combustion controls using multi-channel, multi-fuel feed burners. Carmeuse has an on-going program designed to minimize NO_x emissions through combustion of various fuels. Where applicable, depending on fuel type, product mix, and process conditions, the program incorporates an appropriate combustion/burner optimization technique. During the RACT II evaluation of this kiln, the Department revised the NO_x emission rate limitation from 6 lb to 4.6 lb of NO_x per hour with combustion/burner optimization for Kiln No. 5 at Carmeuse Lime, Inc.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a subject lime kiln shall comply with the presumptive RACT emission limitation of 4.6 lb of NO_x per hour. [25 Pa. Code § 129.112(j)]. The owners and operators of subject lime kilns equipped with CEMS shall comply with the NO_x emission rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

Direct-fired Heater, Furnace, Oven or other combustion source with a rated heat input equal to or greater than 20 million Btu/hour:

The Department believes that the direct-fired heaters, furnaces, ovens or other combustion sources located in this Commonwealth are generally natural gas-fired with emission characteristics similar to natural gas, propane or LPG-fired combustion units or process heaters.

Therefore, the Department has established in this final-form rulemaking that the owner and operator of a subject direct-fired heater, furnace, oven or other combustion source with a rated heat input equal to or greater than 20 million Btu/hour shall comply with the presumptive RACT emission limitation of 0.10 lb NO_x/million Btu heat input. [25 Pa. Code § 129.112(k)]. The owners and operators of subject sources equipped with CEMS shall comply with the NO_x emission rate limitation using a daily average. [25 Pa. Code § 129.115(b)(5)].

(L) Electric Arc Furnace:

The Department evaluated several electric arc furnaces (EAFs) as part of case-by-case determinations for RACT II. The Department determined that no NO_x or VOC emission control technology is technically feasible for EAFs. This is because EAFs do not use combustion and are batch processes. Since there is no combustion, methods used to alter NO_x and VOC emissions cannot be employed as they would be for a combustion source. A numerical RACT emission rate limitation for either NO_x or VOC is not appropriate. The Department has determined that the presumptive RACT III requirement of the installation, maintenance and operation of EAFs in accordance with the manufacturer's specifications and with good operating practices is consistent with previous RACT determinations and is appropriate as discussed below.

NO_x RACT:

An EAF is a furnace that heats charged material by means of an electric arc. In an EAF, the charged material is directly exposed to an electric arc and the current in the furnace terminals passes through the charged material. In an EAF, NO_x is primarily formed as thermal NO_x. Thermal NO_x is formed when oxygen and nitrogen molecules dissociate into individual atoms at temperatures above 2000°F. Individual nitrogen and oxygen atoms combine to make NO_x.

The first step of a RACT analysis is to identify available control technologies. The following control technologies were identified as having the potential to reduce NO_x emissions from EAFs:

- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)
- Catalyst Filters
- Good Operating and Management Practices

The second step in a RACT analysis is to eliminate technically infeasible options. The following control technologies were eliminated as technically infeasible:

- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)
- Catalyst Filters

SNCR requires a high but very specific temperature range and a minimum residence time at the temperature to be effective. The reaction requires a stable exhaust gas volumetric flow rate, a stable temperature range and a stable NO_x concentration. The stable conditions are not achievable in batch processes. Therefore, SNCR is a technically infeasible control technology for EAFs.

SCR uses a catalyst in the presence of injected ammonia at 500°F to 750°F to reduce NO_x concentrations. The reaction requires a stable temperature range in the gas entering the catalyst. Particulate matter present in the exhaust stream adversely affects the catalyst. If the SCR is placed upstream of a particulate filter, catalyst poisoning, fouling and masking will occur because of the high particulate emissions from the EAF. If the SCR is placed after a fabric filter, the gases will be too cold for effective reaction for NO_x control. Heating the gases would result in additional NO_x emissions. Also, use of SCR has not been commercially demonstrated on EAF steel making operations. Therefore, SCR is a technically infeasible control technology.

Catalyst filters with embedded SCR catalyst material are used in specially designed baghouses and have not been demonstrated on steel making process operations. These systems are not listed in the RBLC for EAF sources. Therefore, catalyst filters are a technically infeasible control technology.

Other typical common technologies used for the control of NO_x emissions from fuel-fired combustion sources such as low-NO_x burners & ultra-low-NO_x burners (LNB, ULNB), flue gas recirculation (FGR), overfire air, and oxy-fuel combustion reduce NO_x generated during the combustion of fuel. These types of controls are not feasible for application on an EAF because EAFs do not use a fuel source. Therefore, these common technologies used for fuel-fired combustion sources are not technically feasible for use with EAFs.

There are no known technically feasible or commercially demonstrated add-on control technologies for production-related NO_x emissions from EAF ventilation systems. Most NO_x reduction technologies used for combustion processes are effective only at relatively stable gas flow rates, NO_x concentrations and temperatures. Since EAFs are cyclical batch processes, no active control technology for NO_x emissions are technically feasible. The only technically feasible method to control NO_x from EAFs is continued use of good operating and management practices.

VOC RACT:

VOC emissions from EAFs originate from contamination of scrap material used to make specialty stainless steel. Residual oil, plastic and other organic material in the scrap contributes to VOC formation during the initial period of scrap heating in the furnace. At an operating temperature greater than 2000°F, an EAF performs as an efficient organic materials oxidizer. There is no information to indicate that any EAF in the United States has active VOC emission controls or that suitable controls are available. However, listed below are various technologies that have been identified for the control of VOC emissions:

- Catalytic Incineration/Oxidation
- Thermal Incineration/Oxidation
- Carbon Adsorption
- Absorption (Scrubbing)
- Refrigerated Condensers
- Flares
- Good Operating and Management Practices

None of the technologies listed above have been commercially demonstrated on EAFs, but rather are more likely applicable to traditional VOC gas stream sources. Therefore, the control technologies are deemed technically infeasible and have been eliminated as potential RACT technologies. The only technically feasible method to control VOC from EAFs is continued use of good operating and management practices.

Based on the above, the Department determined that no add-on or inherent NO_x or VOC controls are technically feasible for use with EAFs.

Therefore, the Department has established in this final-form rulemaking that the owners and operators of subject EAFs shall continue to comply with the presumptive RACT requirements of installation, maintenance, and operation of the source in accordance with manufacturer's specifications and with good operating practices. [25 Pa. Code § 129.112(c)(11)].

(M) Alternative RACT proposals and petitions for alternative compliance schedules:

Owners and operators of sources that cannot meet presumptive RACT requirements or emission limitations established in this final-form rulemaking for certain source categories may elect to meet the applicable NO_x RACT emission limitation by averaging NO_x emissions on either a facility-wide or system-wide basis. [25 Pa. Code § 129.113(a)].

Owners and operators of sources that cannot meet presumptive RACT requirements or presumptive NO_x or VOC emission rate limitations by averaging NO_x emissions on either a facility-wide or system-wide basis will be required to evaluate RACT requirements on a case-by-case basis for NO_x emissions or VOC emisisons, or both. [25 Pa. Code § 129.114(a), (b) and (c)].

Owners and operators of sources that are subject to the RACT III regulatory requirements but do not have presumptive RACT requirements or RACT emission rate limitations for the sources shall evaluate RACT requirements or RACT emission rate limitations on a case-by-case for NO_x emissions and VOC emissions as applicable.

Case-by-case RACT proposals must be submitted to the appropriate regional office by December 31, 2022. [25 Pa. Code § 129.114(d)(1)].

The owner or operator shall complete the implementation of the case-by-case RACT within 1 year after the effective date of adoption of the rulemaking. [25 Pa. Code § 129.114(d)(4)].

If an owner or operator is going to install a control device as part of a case-by-case RACT determination, the owner or operator may petition the Department for an alternate compliance schedule. [25 Pa. Code § 129.114(l)].

The case-by-case RACT proposal shall be submitted in accordance with the procedures specified in 25 Pa. Code § 129.114(d).

The proposal must also include testing, monitoring, recordkeeping, and reporting requirements to show compliance with the proposed case-by-case RACT.

(N) Compliance Demonstration:

An owner or operator must demonstrate compliance with the RACT III regulation by January 1, 2023. An owner or operator subject to RACT III may have the following compliance options:

1) Compliance with presumptive RACT requirements or RACT emission limitations, or both.
2) Facility-wide or system-wide averaging.

3) Case-by-case RACT determinations.

The owner or operator of a source with CEMS shall demonstrate compliance with the applicable presumptive RACT emission limitations using a 30-operating day rolling average basis except for MWCs subject to § 129.112(f), combustion units or process heaters subject to § 129.112(g)(1) and direct-fired heaters, furnaces, ovens or other combustion sources subject to § 129.112(k). [25 Pa. Code § 129.115(b)(1)].

The clinker production rate for Portland cement kilns is calculated in accordance with 40 CFR 63.1350(d). [25 Pa. Code § 129.115(b)(2)].

For an MWC with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, using a daily average. [25 Pa. Code § 129.115(b)(3)].

For a direct-fired heater, furnace, oven or other combustion source subject to § 129.112(k) with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, using a daily average. [25 Pa. Code § 129.115(b)(5)].

For an air contamination source without a CEMS, monitoring and testing in accordance with a Department-approved emissions source test that meets the requirements of Chapter 139, Subchapter A (relating to sampling and testing methods and procedures). The source test shall be conducted to demonstrate initial compliance and subsequently on a schedule set forth in the applicable permit. [25 Pa. Code § 129.115(b)(6)].

(O) Recordkeeping and Reporting:

The owner or operator of a source shall comply with all applicable recordkeeping and reporting requirements established in 25 Pa. Code § 129.115. This includes compliance with the monitoring, recordkeeping and reporting requirements in the applicable regulations under 25 Pa. Code, Part I, Subpart C, Article III (relating to air resources) and the requirements established in the applicable plan approvals or operating permits, or both, for the subject facilities or sources.