

<h1>Regulatory Analysis Form</h1> <p>(Completed by Promulgating Agency)</p> <p><i>(All Comments submitted on this regulation will appear on IRRC's website)</i></p>		<p><b>INDEPENDENT REGULATORY REVIEW COMMISSION RECEIVED</b></p> <p><b>AUG 10 2022</b></p> <p><b>Independent Regulatory Review Commission</b></p> <p>IRRC Number: 3310</p>
<p>(1) Agency: Environmental Protection</p>		
<p>(2) Agency Number: 7 Identification Number: 561</p>		
<p>(3) PA Code Cite: 25 Pa. Code Chapters 121 and 129</p>		
<p>(4) Short Title: Additional RACT Requirements for Major Sources of NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS; and General Provisions</p>		
<p>(5) Agency Contacts (List Telephone Number and Email Address):</p> <p>Primary Contact: Laura Griffin, 717-772-3277, <a href="mailto:laurgriffi@pa.gov">laurgriffi@pa.gov</a>                  Secondary Contact: Brian Chalfant, 717-783-8727, <a href="mailto:bchalfant@pa.gov">bchalfant@pa.gov</a></p>		
<p>(6) Type of Rulemaking (check applicable box):</p> <p><input type="checkbox"/> Proposed Regulation  <input checked="" type="checkbox"/> Final Regulation  <input type="checkbox"/> Final Omitted Regulation</p>		<p><input type="checkbox"/> Emergency Certification Regulation;  <input type="checkbox"/> Certification by the Governor  <input type="checkbox"/> Certification by the Attorney General</p>
<p>(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)</p> <p>This final-form rulemaking amends Chapter 129 (relating to standards for sources) to adopt additional presumptive reasonably available control technology (RACT) requirements and RACT emission limitations for certain major stationary sources of oxides of nitrogen (NO<sub>x</sub>) and volatile organic compound (VOC) emissions in existence on or before August 3, 2018, to address Federal Clean Air Act (CAA) (42 U.S.C.A. §§ 7401—7671q) RACT requirements for the 2015 ozone National Ambient Air Quality Standards (NAAQS) in this Commonwealth. Additionally, this final-form rulemaking amends Chapter 121 (relating to general provisions) to add two definitions and amend two definitions in § 121.1 (relating to definitions) to support the final-form amendments to Chapter 129.</p>		
<p>(8) State the statutory authority for the regulation. Include <u>specific</u> statutory citation.</p> <p>This final-form rulemaking is authorized under section 5(a)(1) of the Air Pollution Control Act (APCA) (35 P.S. § 4005(a)(1)), which grants the Environmental Quality Board (Board) the authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth; and section 5(a)(8), which grants the Board the authority to adopt rules and regulations designed to implement the provisions of the CAA.</p>		

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

Yes, this final-form rulemaking is mandated by Federal law under sections 172, 182 and 184 of the CAA (42 U.S.C.A. §§ 7502, 7511a and 7511c) and the United States Environmental Protection Agency's (EPA) 2015 ozone implementation rule (40 CFR 51.1312 and 51.1316 (relating to requirements for reasonably available control technology (RACT) and reasonably available control measures; and requirements for an Ozone Transport Region)).

Section 109(b) of the CAA (42 U.S.C.A. § 7409(b)) requires the EPA to establish permissible ambient air limits, or NAAQS, for criteria air pollutants, including ozone, at levels that protect public health and welfare, as well as the environment. The limits to protect public health are called primary standards and the limits to protect public welfare and the environment are called secondary standards.

On April 30, 1971, the EPA promulgated primary and secondary NAAQS for photochemical oxidants, which include ozone, under section 109 of the CAA. See 36 FR 8186 (April 30, 1971). These were set at 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. See 44 FR 8202 (February 8, 1979). 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. This revised 1-hour standard was reaffirmed on March 9, 1993. See 58 FR 13008 (March 9, 1993).

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. At this time, 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 nonattainment areas for the 1997 8-hour ozone NAAQS. See 69 FR 23858, 23931 (April 30, 2004). The EPA lowered the 8-hour ozone standards in March 2008 to 0.075 ppm, and in October 2015 to 0.070 ppm. See 73 FR 16436 (March 27, 2008), and 80 FR 65292 (October 15, 2015).

On June 4, 2018, the EPA published finalized designations and classifications for the 2015 8-hour ozone NAAQS with an effective date of August 3, 2018. The following nonattainment area was classified as "marginal" ozone nonattainment: Philadelphia-Wilmington-Atlantic City (the Commonwealth portion of this area includes Bucks, Chester, Delaware, Montgomery and Philadelphia Counties). The remainder of this Commonwealth was designated "unclassifiable/attainment." See 83 FR 25776 (June 4, 2018).

Section 110(a) of the CAA (42 U.S.C.A. § 7410(a)) gives states the primary responsibility for achieving the NAAQS in nonattainment areas and maintaining NAAQS for areas in compliance. Section 110(a) of the CAA provides that each state shall adopt and submit to the EPA a state implementation plan (SIP) to implement measures 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 approved by the EPA, a SIP is legally enforceable under both Federal and state law.

Section 172(c)(1) of the CAA (42 U.S.C.A. § 7502(c)(1)) provides that SIPs for nonattainment areas must include “reasonably available control measures,” including RACT, for affected sources of emissions. RACT is defined 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.” See 44 FR 53761 (September 17, 1979). Therefore, a re-evaluation of what constitutes RACT for affected sources must be fulfilled each time the EPA promulgates a new NAAQS (as was the case in 1997 for the 8-hour ozone standard), or revises a NAAQS (as was the case in 2008 and 2015 for the 8-hour ozone standard). State regulations to control emissions of NO<sub>x</sub> and VOCs from major stationary sources are reviewed by the EPA to determine if the provisions meet the RACT requirements of the CAA and its implementing regulations designed to attain and maintain the ozone NAAQS.

Section 182 of the CAA (42 U.S.C.A. § 7511a) requires that, for areas which exceed the ozone NAAQS, states must develop and implement a program that mandates certain major stationary sources develop and implement a RACT emission reduction program. The entire Commonwealth is treated as a “moderate” ozone nonattainment area for RACT purposes, because this Commonwealth is included in the Ozone Transport Region (OTR) established by operation of law under sections 184 and 176A of the CAA (42 U.S.C.A. §§ 7511c and 7506a). Section 184(b) of the CAA addresses provisions for the SIP of a state included in the OTR. Section 184(b)(1)(B) of the CAA requires that states in the OTR, including this Commonwealth, submit a SIP revision requiring implementation of RACT for all major stationary sources of NO<sub>x</sub> and VOC emissions in the state and not just for those sources that are located in designated nonattainment areas of the state. Consequently, the Commonwealth’s SIP must include regulations applicable Statewide to affected major stationary sources of NO<sub>x</sub> and VOC emissions.

The EPA’s past implementation of regulations for revised NAAQS ozone standards have required OTR states to submit RACT SIP revisions based on the timeframe provided in section 184 of the CAA as measured from the effective date of designations made for those revised NAAQS, rather than from November 15, 1990. This requirement was first codified in 40 CFR 51.916 (relating to what are the requirements for an Ozone Transport Region under the 8-hour NAAQS?) for the 1997 ozone NAAQS, later codified for the 2008 ozone NAAQS in 40 CFR 51.1116 (relating to requirements for an Ozone Transport Region) and most recently codified for the 2015 8-hour ozone NAAQS in 40 CFR 51.1316. Under these provisions, states in the OTR are required to submit SIP revisions addressing the RACT requirements of section 184 of the CAA not later than 2 years after the effective date of designations for nonattainment areas for the revised 2015 ozone NAAQS, or by August 3, 2020, which is 2 years after the effective date of August 3, 2018, for the designations for the 2015 ozone NAAQS. See 83 FR 25776.

States are required to “provide for implementation of RACT as expeditiously as practicable, but no later than January 1 of the fifth year after the effective date of designation,” which was August 3, 2018 for the 2015 ozone NAAQS. See 40 CFR 51.1316(b)(3)(i); see also 40 CFR 51.1312(a)(3)(i). The Commonwealth is therefore required to implement RACT requirements Statewide not later than January 1, 2023, for major stationary sources of NO<sub>x</sub> and VOCs as part of a Federally approved SIP for attaining the 2015 8-hour ozone NAAQS and maintaining the 1997 and 2008 8-hour ozone NAAQS. These major stationary sources include combustion units, municipal solid waste landfills and municipal waste combustors, as well as other sources that are not regulated elsewhere in Chapter 129. If the EPA finds that a state has failed to submit an acceptable SIP revision or has failed to implement the requirements of an approved SIP revision, sanctions will be imposed. However, sanctions cannot be imposed until 18 months after the EPA issues a determination of finding of failure to submit a SIP revision, and sanctions

cannot be imposed if the deficiency has been corrected within the 18-month period after issuance of the finding of failure to submit.

Section 179 of the CAA (42 U.S.C.A. § 7509) authorizes the EPA to use two types of sanctions: 1) withholding of certain Federal highway funds; and 2) imposing what are called “2:1 offsets” on new or modified sources of emissions. Under section 179 of the CAA and its implementing regulations, the Administrator first imposes 2:1 offsets, and then, if the deficiency has not been corrected within 6 months, also applies Federal highway funding sanctions. See 40 CFR 52.31 (relating to selection of sequence of mandatory sanctions for findings made pursuant to section 179 of the Clean Air Act). The Pennsylvania Department of Transportation (PENNDOT) indicated that the Commonwealth received approximately \$1.8 billion in Federal highway funds in 2021, of which approximately \$300 million is estimated to be sanctionable in accordance with the PENNDOT “Pennsylvania 2021 Transportation Improvement Program Financial Guidance” prepared in July 2019.

(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

#### Why the regulation is needed

This final-form rulemaking is needed to satisfy the Federally mandated requirement to adopt and implement RACT for the 2015 8-hour ozone NAAQS. Section 110 of the CAA gives states the primary responsibility for achieving and maintaining the NAAQS. The principal mechanism at the state level for complying with the CAA is the SIP. A SIP includes the regulatory programs, actions and commitments a state will carry out to implement its responsibilities under the CAA. Once approved by the EPA, a SIP is legally enforceable under both Federal and state law.

Section 172(c)(1) of the CAA provides that a SIP for an ozone nonattainment area must include “reasonably available control measures,” including RACT requirements, for major sources of NO<sub>x</sub> and VOC emissions located in the ozone nonattainment area.

Section 182 of the CAA requires that, for areas that exceed the NAAQS for ozone, states shall develop and implement a program that mandates that certain major stationary sources implement RACT. RACT is defined as “the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.” See 44 FR 53761.

Under sections 182(f)(1) and 184(b)(2) of the CAA, these RACT requirements are applicable to all sources in this Commonwealth that emit or have a potential to emit greater than 100 tons per year (TPY) of NO<sub>x</sub>. Under sections 182(b)(2) and 184(b)(2) of the CAA, these RACT requirements are applicable to all sources in this Commonwealth that emit or have a potential to emit greater than 50 TPY of VOCs. NO<sub>x</sub> and VOC emission controls are required Statewide because this entire Commonwealth is considered a “moderate” nonattainment area due to its inclusion in the OTR.

If published in the *Pennsylvania Bulletin* as a final-form rulemaking, the final-form regulation will be submitted to the EPA as a revision to the Commonwealth’s SIP.

### Compelling public interest that justifies the regulation

The public has a significant interest in the reduction of NO<sub>x</sub> and VOC emissions, as well as the reduced formation of ground-level ozone, that would result from implementation of this final-form rulemaking. The EPA is required under section 109 of the CAA to establish NAAQS for six criteria pollutants, including ground-level ozone. The EPA regulates ground-level ozone as a criteria air pollutant because of its widespread adverse public health and welfare and environmental effects.

Ground-level ozone is not emitted directly into the atmosphere but is formed by photochemical reactions between NO<sub>x</sub> and VOCs in the presence of sunlight. Ozone is a highly reactive gas which at sufficient concentrations can produce a wide variety of harmful effects. At elevated concentrations, ground-level ozone can adversely affect human health, vegetation, materials, economic values, and personal comfort and well-being. It can cause damage to important food crops, forests, livestock and wildlife.

Repeated exposure to ground-level ozone pollution may cause a variety of adverse health effects for both healthy people and those with existing conditions including difficulty in breathing, chest pains, coughing, nausea, throat irritation and congestion. It can worsen bronchitis, heart disease, emphysema and asthma, and reduce lung capacity. Asthma is a significant and growing threat to children and adults in this Commonwealth. High levels of ground-level ozone can also affect animals including pets, livestock and wildlife, in ways similar to humans.

Exposure to high levels of ground-level ozone air pollution correlates to increased respiratory disease and higher mortality rates. Ozone can inflame and damage the lining of the lungs. Within a few days, the damaged cells are shed and replaced. Over a long time period, lung tissue may become permanently scarred, resulting in permanent loss of lung function and a lower quality of life. When ambient ozone levels are high, more people with asthma have attacks that require a doctor's attention or use of medication or even hospitalization. Ozone also makes people more sensitive to allergens including pet dander, pollen and dust mites, all of which can trigger asthma attacks. While children, the elderly and those with respiratory problems are most at risk, even healthy individuals may experience increased respiratory ailments and other symptoms when they are exposed to high levels of ambient ozone while engaged in activities that involve physical exertion. The EPA has concluded that there is an association between high levels of ambient ozone and increased hospital admissions for respiratory ailments including asthma. See 73 FR 16436 (March 27, 2008); 80 FR 65292 (October 26, 2015).

This final-form rulemaking establishes presumptive RACT requirements and RACT emission limitations for the owners and operators of affected sources at major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, not regulated elsewhere in Chapter 129. Emissions of NO<sub>x</sub> and VOCs are precursors to the formation of ground-level ozone. High concentrations of ground-level ozone air pollution are a serious threat to public health and welfare. The measures in this final-form rulemaking are reasonably required to attain and maintain the health-based and-welfare-based 2015 8-hour ozone NAAQS, protect the health and livelihoods of this Commonwealth's citizens and residents, and satisfy related CAA requirements.

### Who will benefit from the regulation?

The Department estimates that implementation of the final-form control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors and reduce VOC emissions by as much as 825 TPY from engines and turbines. Implementation of the final-form NO<sub>x</sub> and VOC control measures for the affected major sources will benefit the health and welfare of the

approximately 12.8 million residents and numerous animals, crops, vegetation and natural areas of this Commonwealth by reducing emissions of NO<sub>x</sub> and VOCs. Since ground-level ozone air pollution is transported downwind via regional air currents and meteorological events, the reductions of ground-level ozone in this Commonwealth will also benefit the residents and environment of downwind states.

The EPA estimated that the monetized health benefits of attaining the 2008 8-hour ozone NAAQS of 0.075 ppm, range from \$8.3 billion to \$18 billion on a National basis by 2020. See Final Ozone NAAQS Regulatory Impact Analysis, EPA-452/R-08-003, March 2008. Prorating that benefit to this Commonwealth, based on population, results in a public health benefit of \$337 million to \$732 million. Similarly, the EPA estimated that the monetized health benefits of attaining the 2015 8-hour ozone NAAQS of 0.070 ppm range from \$1.5 billion to \$4.5 billion on a National basis by 2025. See Regulatory Impact Analysis of the Final Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone, EPA-452/R-15-007, September 2015. Prorating that benefit to this Commonwealth, based on population, results in a public health benefit of \$63 million to \$189 million. The Department is not stating that these estimated monetized health benefits would all be the result of implementing the final-form RACT measures, but the EPA estimates are indicative of the benefits to Commonwealth residents of attaining and maintaining the 2008 and 2015 8-hour ozone NAAQS through the implementation of control measures to reduce ozone precursor emissions in the aggregate from different source categories.

In addition to causing adverse human and animal health effects, the EPA has concluded that ozone affects vegetation and ecosystems, leading to reductions in agricultural crop and commercial forest yields by destroying chlorophyll; reduced growth and survivability of tree seedlings; and increased plant susceptibility to disease, pests and other environmental stresses, including harsh weather. In long-lived species, these effects may become evident only after several years or even decades and have the potential for long-term adverse impacts on forest ecosystems. Ozone damage to the foliage of trees and other plants can decrease the aesthetic value of ornamental species used in residential landscaping, as well as the natural beauty of parks and recreation areas. These effects can have adverse impacts including loss of species diversity and changes to habitat quality and water and nutrient cycles. The implementation of additional measures to address ground-level ozone air quality in this Commonwealth is necessary to protect the public health and welfare and the environment. High levels of ground-level ozone can also cause damage to buildings and synthetic fibers, including nylon, and reduced visibility on roadways and

The economic value of the impacts of ground-level ozone on this Commonwealth's farm crops, fruit industries, forests, parks and timber due to high concentrations of ground-level ozone can be calculated, such as crop yield loss from both reduced growth and smaller, lower-quality seeds and tubers with less oil or protein. If ozone episodes last a few days, visible injury to some leaf crops, including lettuce, spinach and tobacco, as well as visible injury to the leaves of ornamental plants, including grass, flowers and shrubs, can appear. Other types of welfare loss may not be quantifiable, such as the reduced aesthetic value of trees growing in heavily visited parks.

Information about the economic benefit of the agricultural industry to this Commonwealth is provided by the Pennsylvania Department of Agriculture (PDA). The agricultural industry generates approximately \$135.7 billion in total economic impact each year and supports 579,000 jobs with \$26.9 billion in earnings. For each job directly supported by Pennsylvania agriculture, another 1.06 jobs are supported across the Commonwealth. For each dollar of direct output, another \$0.62 is generated in economic impact. See Pennsylvania Agriculture: A look at the Economic Impact and Future Trends Version 1,

page 5, Jan. 2018. Reducing ground-level ozone concentrations will serve to protect agricultural yield and reduce losses to production agriculture and agribusiness in this Commonwealth.

This Commonwealth is forested over a total of 16.6 million acres, which represents 58% of its land area. Federal, state, and local government hold 5.1 million acres in public ownership, with the remaining 11.7 million acres in private ownership. See United States Department of Agriculture, Forests of Pennsylvania, 2019. The forest product industry only owns 0.4 million acres of forest, with the remainder held by an estimated 750,000 individuals, families, partnerships, or corporations. This Commonwealth leads the Nation in volume of hardwood with over 120.5 billion board feet of standing sawtimber. See The Pennsylvania State University, Forest Management and Timber Harvesting in Pennsylvania, Sept. 9, 2019.

Further, this Commonwealth leads the Nation in growing 123.2 billion board feet of standing sawtimber species, with 16.8 million acres in forest land. As the leading producer of hardwood lumber in the United States, this Commonwealth also leads in the export of hardwood lumber exporting nearly \$463 million in 2019, and over \$1.1 billion in lumber, logs, furniture and paper products to more than 70 countries around the world. Recent U.S. Forest Service data shows that the State's forest growth-to-harvest rate is better than 2 to 1. Production is estimated at 1 billion board feet of lumber annually. This vast renewable resource puts the hardwoods industry at the forefront of manufacturing in this Commonwealth. The total annual direct economic impact generated by this Commonwealth's wood industry was \$36.8 billion. The industry employed 65,699 people, with \$3.5 billion in wages and salaries earned. Production was 1 billion board feet of lumber annually. (Source: Pennsylvania Hardwoods Development Council.)

Reducing ground-level ozone concentrations will serve to protect the Commonwealth's position as the leader of growing volume of hardwood species and producer of hardwood lumber in the Nation.

The Pennsylvania Department of Conservation and Natural Resources (DCNR) is the steward of the state-owned forests and parks. DCNR awards millions of dollars in construction contracts each year to build and maintain the facilities in its parks and forests. Hundreds of concessions throughout the park system help complete the park experience for both state and out-of-state visitors. State forests, parks and game lands make up 3.9 million acres of forest land. This Commonwealth's 2.2 million-acre state forest system, found in 48 of this Commonwealth's 67 counties, comprises 13% of the forested area in the Commonwealth. The state forest represents one of the largest expanses of public forestland in the eastern United States, making it a priceless public asset. Ozone damage to the foliage of trees and other plants can decrease the aesthetic value of ornamental species used in residential landscaping, as well as the natural beauty of parks and recreation areas. However, the effects of the reduced aesthetic value of trees in heavily visited parks may not be quantifiable. Reducing the concentration of ground-level ozone will help maintain the benefits to this Commonwealth's economy due to tourism.

According to a study conducted by the American Farmland Trust, forestland and farmland yield an average of \$3 in taxes for every \$1 of required governmental services, while residential land costs \$1.11 in services for every \$1 collected in tax revenues. (Source: Forest Management and Timber Harvesting in Pennsylvania, PennState Extension, The Pennsylvania State University, 2019.)

The Department projects that the cost to the owner and operator of an affected source required to install and operate add-on control technology to achieve compliance with an applicable presumptive RACT requirement or RACT emission limitation established in this final-form rulemaking, would be less than \$3,750 maximum per ton of NO<sub>x</sub> emission reductions. (Optimization of existing VOC controls should be

sufficient to meet the VOC standards in this final-form rulemaking, therefore the Department does not anticipate any additional costs to the regulated industry to meet VOC standards). This is the threshold for cost-effectiveness used to determine what constitutes presumptive RACT irrespective of source type and add-on control technology, with some technologies incurring a significantly lower cost. While this final-form rulemaking also allows for case-by-case RACT determinations for sources that cannot meet presumptive RACT requirements, the Department expects that costs incurred for these sources will be comparable to compliance costs associated with presumptive RACT limitations. This cost is minimal compared to the monetized health benefits of attaining and maintaining the NAAQS and to the economic benefits generated by this Commonwealth's agricultural and hardwoods industries.

In sum, adoption and implementation of the control measures in this final-form rulemaking is reasonably necessary to allow the Commonwealth to continue its progress in attaining and maintaining the public health-based and welfare-based 8-hour ozone NAAQS and to satisfy related CAA requirements. The NO<sub>x</sub> and VOC emission reductions achieved through implementation of the regulatory requirements established in this final-form rulemaking and the associated decrease in formation of ground-level ozone will benefit the health and welfare of the residents of this Commonwealth as well as the health of tourists and visitors, with improved ambient air quality and healthier environments. The decrease in ground-level ozone formation will also benefit farmers, loggers, hunters and outdoor enthusiasts and the numerous animals, crops, vegetation and natural areas of this Commonwealth. The agriculture and timber industries and related businesses will benefit directly from reduced economic losses that result from ozone damage to crops and timber. Likewise, the natural areas and infrastructure within this Commonwealth and downwind states will benefit directly from reduced environmental damage and economic losses due to ground-level ozone.

(11) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

No, there are not any provisions in this final-form rulemaking that are more stringent than Federal standards because no companion Federal regulations exist.

Section 110(a) of the CAA provides that each state shall adopt and submit to the EPA a plan to implement measures to enforce the NAAQS or revision to the NAAQS promulgated under section 109(b) of the CAA. Therefore, the evaluation or re-evaluation of what constitutes RACT for affected sources must be fulfilled each time the EPA promulgates a new NAAQS as was the case in 1997, 2008 and 2015 for the 8-hour standard. Section 184(b)(1)(B) of the CAA requires that states in the OTR, including this Commonwealth, submit a SIP revision requiring implementation of RACT for all major stationary sources of NO<sub>x</sub> and VOC emissions in the state and not just for those sources that are located in designated nonattainment areas of the state. Section 182 of the CAA requires that, for areas which exceed the ozone NAAQS, states must develop and implement a program that mandates certain major stationary sources develop and implement a RACT emission reduction program.

(12) How does this regulation compare with those of the other states? How will this affect Pennsylvania's ability to compete with other states?

New Jersey indicates that they are in the process of conducting their RACT analysis for the 2015 ozone NAAQS and have not determined if further RACT rules are required. Connecticut adopted their 2015 ozone NAAQS RACT SIP requirements in conjunction with their 2008 ozone NAAQS RACT SIP requirements, and the 2015 ozone NAAQS RACT requirements have generally remained unchanged.

New York and Maryland are in the process of developing their respective RACT III regulations. No response was received from the other states in the OTR that were contacted (Delaware, Virginia, Massachusetts, Rhode Island, New Hampshire, Vermont and Maine).

This final-form rulemaking will improve the Commonwealth's ability to compete with other states by establishing new additional presumptive RACT requirements and RACT emission limitations. This final-form rulemaking further provides a more administratively efficient and less resource-intensive alternative, in most cases, to the time-consuming and costly case-by-case RACT proposal review procedure that the owners and operators of affected facilities had to complete in the past to meet the RACT requirements implemented under §§ 129.91—129.95 (relating to stationary sources of NO<sub>x</sub> and VOCs) for the 1-hour ozone standard and §§ 129.96—129.100 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs) for the 1997 and 2008 8-hour ozone standards. See 24 Pa.B. 467 (January 15, 1994) and 46 Pa.B. 2036 (April 23, 2016).

The Ozone Transport Commission (OTC) has directed OTC Staff and the OTC Stationary and Area Source (SAS) Committee to perform technical analyses to assist OTC states in developing cost-effective strategies to reduce ozone-forming pollutants as required by section 176A the CAA (42 U.S.C.A. § 7506a). OTC staff and OTC SAS Committee members collect, compile and distribute technical information to support state RACT analyses. Information includes state data on control strategies, regulatory limits and cost-effectiveness. Where possible, the OTC SAS Committee may recommend cost-effectiveness thresholds for presumptive and case-by-case basis RACT determinations. The Department has taken the OTC's recommendations into account in developing this final-form rulemaking and expects that neighboring states in the OTR will likewise consider these recommendations in development of their respective RACT regulations.

(13) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

Yes, this final-form rulemaking developed to meet the Commonwealth's CAA RACT mandate for the 2015 ozone standard will affect certain provisions of the regulations pertaining to glass melting furnaces at 25 Pa. Code §§ 129.301—129.310 and Portland cement kilns at 25 Pa. Code §§ 145.141—145.146.

The Department has determined that certain provisions of the existing regulations, including exemptions from emission requirements for periods of start-up, shutdown, or idling (§ 129.303(a)) do not contain enforceable emission limits and therefore, do not constitute RACT. The exemption from emissions requirements in § 129.303(a) conflicts with the EPA's 2015 Start Up, Shutdown and Malfunction (SSM) Policy (80 FR 33840 (June 12, 2015), which was reinstated by the EPA on September 30, 2021. See [Emissions During Periods of Startup, Shutdown, & Malfunction \(SSM\) | US EPA](#) The EPA has not approved these regulations as RACT, and has previously expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for these sources for the 1997 and 2008 ozone standards. See 76 FR 52283 (August 22, 2011).

Final-form § 129.112(m) has been amended to reflect that the requirements and emission limitations for glass melting furnaces in § 129.112(i) would supersede existing requirements under §§ 129.301—129.310 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent. If an owner or operator cannot meet a presumptive RACT emission limitation established under § 129.112(i), the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

The RACT III final-form rulemaking establishes more stringent presumptive emission limits of 3.0 pounds of NO<sub>x</sub> per ton of clinker produced for a long dry-process cement kiln as defined in § 145.142 and 2.30 pounds of NO<sub>x</sub> per ton of clinker produced for preheater cement kilns and precalciner kilns as defined in § 145.142. These limits were previously 3.44 pounds of NO<sub>x</sub> per ton of clinker produced for a long dry-process cement kiln and 2.36 pounds of NO<sub>x</sub> per ton of clinker produced for preheater cement kilns and precalciner kilns as established in § 145.142 and previously adopted in § 129.97(h) for RACT II. The Department determined that these more stringent limits were technically and economically feasible for RACT III.

This final-form rulemaking does not conflict with any other existing regulations promulgated by this agency or other Commonwealth agencies.

(14) Describe the communications with and solicitation of input from the public, any advisory council/group, small businesses and groups representing small businesses in the development and drafting of the regulation. List the specific persons and/or groups who were involved. (“Small business” is defined in Section 3 of the Regulatory Review Act, Act 76 of 2012.)

The Department consulted with the Air Quality Technical Advisory Committee (AQTAC), the Small Business Compliance Advisory Committee (SBCAC) and the Citizens Advisory Council (CAC) in the development of the proposed rulemaking. On October 17, 2019, and February 13, 2020, the Department provided an overview of the proposed rulemaking to AQTAC. The proposed rulemaking draft Annex A was also discussed with AQTAC at its meeting of April 16, 2020. However, the AQTAC requested additional information for a special meeting on May 7, 2020. At that meeting, AQTAC voted 17-2-0 to concur with the Department’s recommendation to move the proposed rulemaking forward to the Board for consideration. On May 19, 2020, the Department discussed the proposed amendments with the CAC Policy and Regulatory Oversight Committee (PRO Committee). On the recommendation of the PRO Committee, the CAC voted unanimously to concur with the Department’s recommendation to move the proposed rulemaking forward to the Board for consideration. On April 22, 2020, the Department discussed the proposed rulemaking with SBCAC and SBCAC voted unanimously to concur with the Department’s recommendation to move the proposed rulemaking forward to the Board for consideration.

The Department presented the draft final-form Annex A to AQTAC on April 7, 2022, and to the SBCAC on April 27, 2022, and briefed the committees on the comments received on the proposed rulemaking. The Department presented the draft final-form Annex A to the CAC’s PRO Committee on April 14, 2022, and to the CAC on April 19, 2022 and May 18, 2022. Advisory committee meetings are advertised and open to the public.

The Department also works with the Department's provider of the Small Business Stationary Source Technical and Environmental Compliance Assistance services. These services are currently provided by the Environmental Management Assistance Program (EMAP) of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, section 507 of the CAA (42 U.S.C.A. § 7661f) and authorized by the Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209).

Owners or operators of small business can contact EMAP directly for assistance with air quality concerns or compliance. EMAP provides confidential, free one-on-one consulting assistance and onsite

assessments. EMAP also operates a toll-free phone line to field questions from small businesses, as well as from businesses wishing to start up in, or relocate to, this Commonwealth. EMAP operates and maintains a resource-rich environmental assistance web site and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

(15) Identify the types and number of persons, businesses, small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012) and organizations which will be affected by the regulation. How are they affected?

Under the CAA, RACT requirements are applicable to the owners and operators of all subject major facilities and sources of NO<sub>x</sub> and VOC emissions in this Commonwealth. This Federally mandated final-form rulemaking affects the owners and operators of major NO<sub>x</sub> emitting facilities or major VOC emitting facilities, or both, that commenced operation on or before August 3, 2018, and that are not regulated elsewhere in Chapter 129. This final-form rulemaking also applies to the owner and operator of an existing NO<sub>x</sub> facility or VOC facility that commenced operation on or before August 3, 2018, when the installation and operation, or a modification or change in operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, results in the source or facility becoming a major NO<sub>x</sub> emitting facility or major VOC emitting facility as defined in § 121.1 of this final-form rulemaking.

There are at least ten source categories that are affected by this final-form rulemaking: combustion units; municipal solid waste landfills; municipal waste combustors; process heaters; turbines; stationary internal combustion engines; Portland cement kilns; glass melting furnaces; lime kilns; direct-fired heaters, furnaces or ovens; and other sources that are not regulated elsewhere under Chapter 129. The sources included in these ten categories are located at various facility types including fossil fuel-burning and other electric generation; natural gas pipeline transport and distribution; petroleum refining; petroleum and coal products manufacturing; steam and air conditioning supply; fats and oils refining and blending; specialty canning; tobacco products manufacturing; carpet and rug milling; reconstituted wood product manufacturing; paper and paperboard products manufacturing; printing; medicinal and botanical products manufacturing; iron and steel milling, manufacturing and forging; ferroalloy manufacturing; nonferrous metal smelting and refining; semiconductor and related device manufacturing; aircraft manufacturing; chemicals manufacturing; Portland cement manufacturing; railroad rolling stock manufacturing; motorcycle manufacturing; wireless telecommunications carriers; colleges and universities; home health care services; hospitals; pharmaceuticals manufacturing; beer brewing; and biotechnology.

The owners and operators of facilities that will be subject to this final-form rulemaking are subject to the requirements of §§ 129.91—129.95 (RACT I) that were implemented for the 1-hour ozone standard where those RACT emission limitations and requirements are more stringent than the RACT emission limitations and requirements of this final-form rulemaking. The RACT I requirements were effective upon publication in the *Pennsylvania Bulletin* on January 15, 1994 (24 Pa.B. 467).

The owners and operators of facilities that will be subject to this final-form rulemaking are also subject to the RACT regulations at §§ 129.96—129.100 (RACT II) where those RACT emission limitations and requirements are more stringent than the RACT emission limitations and requirements of this final-form rulemaking. The RACT II regulations were promulgated to implement the 1997 and 2008 8-hour ozone standards and were effective upon publication in the *Pennsylvania Bulletin* on April 23, 2016 (46 Pa.B. 2036).

This final-form rulemaking will be applicable to the same businesses that commenced operation of a major NO<sub>x</sub> or VOC emitting facility on or before August 3, 2018, including small businesses, that are already subject to the RACT I or RACT II requirements, or both. The owners and operators of sources that commenced operation on or before August 3, 2018, which installed sources or made modifications, which resulted in those sources becoming a major NO<sub>x</sub> or VOC emitting facility after August 3, 2018 are also subject to this final-form rulemaking. Sources that were otherwise installed at these businesses after August 3, 2018, are already subject to best available technology (BAT) requirements, so the Department will not impose the final-form RACT III requirements on the owners and operators of these facilities. This is because BAT requirements are more stringent than RACT requirements.

RACT requirements are applicable to the owners and operators of all sources in this Commonwealth that emit or have a potential to emit greater than 100 TPY of NO<sub>x</sub> or 50 TPY of VOCs. There are approximately 425 Title V facility owners and operators in this Commonwealth that may be subject to this final-form rulemaking. This final-form rulemaking also includes the following flexibilities for compliance:

- The requirements do not apply to the owner and operator of a NO<sub>x</sub> air contamination source located at a major NO<sub>x</sub> emitting facility that has the potential to emit less than 1 TPY of NO<sub>x</sub> or of a VOC air contamination source located at a major VOC emitting facility that has the potential to emit less than 1 TPY of VOC.
- The requirements do not apply to the owner and operator of a facility that elects to take a Federally enforceable limit below 100 TPY of NO<sub>x</sub> or 50 TPY of VOC.
- The case-by-case requirements do not apply to the owner and operator with a potential emission rate less than 5.0 tons of NO<sub>x</sub> per year or 2.7 tons of VOC per year.

These flexibilities afforded to the owners and operators of potentially affected facilities, including small businesses, in this final-form rulemaking ensure minimal negative impact on their operations. The owners and operators of potentially affected facilities are familiar with the existing requirements for emissions control, emissions reporting and recordkeeping for their entity, and have the professional and technical skills needed for compliance with these final-form requirements.

The Department reviewed its database of regulated facilities with RACT-related permit conditions to determine how many, and which, potentially meet the definition of small business now specified in Section 3 of the Regulatory Review Act, as “in accordance with the size standards described by the [Small Business Administration’s] SBA’s Small Business Size Regulations under 13 CFR Chapter 1 Part 121 (relating to Small Business Size Regulations) or its successor regulation.” The Department cross-referenced facility North American Industry Classification System (NAICS) information from its database with the “Table of Small Business Size Standards Matched to North American Industry Classification System Codes effective August 19, 2019,” obtained from the SBA website at <https://www.sba.gov/document/support--table-size-standards>. The SBA table gives different determination criteria for different NAICS codes. A small business may be defined, for example, by sales or number of employees, or by electric generation capacity in the case of utilities. The Department then accessed the SBA Dynamic Small Business Search database which contains information about small businesses that have registered with the SBA. This self-certifying database incorporates the small business criteria contained in 13 CFR Chapter 1, Part 121, including NAICS codes, when the

owners/operators of such companies register. This registration benefits the owners and operators of small businesses because the database assists government contracting officers in determining whether a company is eligible as a small business.

For electric generation facilities, the Department obtained yearly generation information from the U.S. Energy Information Administration databases at <http://www.eia.gov/electricity/data/eia860/>. This information was correlated with the NAICS table definitions cited above to determine which electric generation facilities could be classified as small businesses.

From these sources, the Department preliminarily determined that the owners and operators of approximately 10-30 affected major facilities under the Department's jurisdiction meet the definition of "small business" specified in Section 3 of the Regulatory Review Act. The Department expects that the negative impact on the owners and operators of these major facilities/small businesses will be minimal due to the flexibilities provided in this final-form rulemaking to achieve compliance with the requirements. The Department will continue to work with EMAP with regard to small businesses.

As these data demonstrate, the owner and operator of a potentially subject facility or source may be classified as a small business under the Federal Small Business Size Regulations under 13 CFR Chapter 1, Part 121, while still emitting sufficient emissions of NO<sub>x</sub> or VOC to be subject to regulations designed to implement RACT. A RACT regulation is a Federal CAA requirement, applicable to the owners and operators of all affected sources that meet the applicable NO<sub>x</sub> or VOC emission thresholds regardless of business size.

Under § 129.113 (relating to facility-wide or system-wide NO<sub>x</sub> emissions averaging RACT operating permit modification general requirements), the owner or operator of an affected major NO<sub>x</sub> emitting facility, including a small business-sized facility, that includes an air contamination source subject to a NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation in § 129.112 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule) that cannot meet the applicable presumptive NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation, may elect to meet the applicable presumptive NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation in § 129.112 by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis. System-wide emissions averaging must be among sources under common control of the same owner or operator in this Commonwealth and within the same ozone nonattainment area. Under § 129.114 (relating to alternative RACT proposal and petition for alternative compliance schedule) the owner or operator of an air contamination source that cannot meet the applicable presumptive RACT requirement or RACT emission limitation of § 129.112 or participate in either a facility-wide or system-wide NO<sub>x</sub> emissions averaging RACT operating permit modification under § 129.113 may propose an alternative NO<sub>x</sub> RACT requirement, NO<sub>x</sub> RACT emission limitation, VOC RACT requirement or VOC RACT emission limitation.

(16) List the persons, groups or entities, including small businesses, that will be required to comply with the regulation. Approximate the number that will be required to comply.

The owners and operators of approximately 425 Title V facilities may be subject to this final-form rulemaking. This final-form rulemaking will apply to the owners and operators of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility, or both, for which no RACT requirements for sources have been otherwise established in Chapter 129. These sources include those that are not regulated elsewhere in Chapter 129 or through implementation of Department regulatory requirements consistent with EPA

RACT recommendations for a source category. The owners and operators of affected facilities existing on or before August 3, 2018, and currently subject to requirements implemented under §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107 may already have the applicable RACT requirements and RACT emission limitations included in their facility permit. The requirements of this final-form rulemaking will also apply where the installation and operation of a new source after August 3, 2018, or a modification or change in operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, results in the source or facility becoming a major NO<sub>x</sub> emitting facility or major VOC emitting facility.

As described in the response to question (15), the Department has preliminarily determined that the owners and operators of approximately 10-30 affected major facilities under the Department's jurisdiction meet the definition of "small business" specified in Section 3 of the Regulatory Review Act. Included in this group are petroleum and coal products manufacturers; electric power generators; paper mills; pharmaceuticals manufacturers; and colleges and universities. The Department expects that any negative impacts on the owners and operators of these small business-sized major facilities will be minimal. In those instances where the owner and operator of a small business-sized major facility is not able to comply with the specified presumptive RACT requirements, the owner and operator may submit a request to meet emission limitations on either a facility-wide or system-wide NO<sub>x</sub> emissions averaging basis. System-wide emissions averaging must be among sources under common control of the same owner or operator in this Commonwealth and within the same ozone nonattainment area. The owner or operator of an air contamination source that cannot meet the applicable presumptive RACT requirement or RACT emission limitation may propose an alternative NO<sub>x</sub> RACT requirement, NO<sub>x</sub> RACT emission limitation, VOC RACT requirement or VOC RACT emission limitation under § 129.114. The flexibility afforded by this final-form rulemaking includes the administratively efficient and less resource intensive process in final-form § 129.114(i)(1) to submit analyses demonstrating that RACT II controls remain RACT for the 2015 8-hour ozone standard. This process does not require the owner or operator to pay a fee or costs for the newspaper notices associated with public participation and public hearing requirements to satisfy the CAA requirements for SIP submittals. This will ensure minimal negative effect on the owners and operators of potentially affected small business-sized major facilities and their operations.

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(17) Identify the financial, economic and social impact of the regulation on individuals, small businesses, businesses and labor communities and other public and private organizations. Evaluate the benefits expected as a result of the regulation.

Due to the diverse types of potentially affected source categories listed in the response to question (15), specific impacts of this final-form rulemaking on industry will vary. The implementation of §§ 129.91—129.95 for attaining and maintaining the 1-hour ozone standard required the Department to submit approximately 600 case-by-case RACT determinations from 1995 to 2006 to the EPA Administrator for Federal approval as revisions to the Commonwealth's SIP. The Department averted a similar issue with the implementation of presumptive RACT standards for certain source categories in §§ 129.96—129.100 whereby optimization of existing control measures may have been necessary to meet the presumptive standards. However, the implementation of the RACT II presumptive standards in 2016 resulted in the Department evaluating and preparing approximately 135 individual case-by-case SIP submittals under §§ 129.96—129.100. This final-form rulemaking establishes applicability requirements for the implementation of specified CAA RACT requirements for the ten identified source types to assist the Commonwealth in attainment of the 2015 8-hour ozone NAAQS and maintenance of the 1997 and 2008

8-hour ozone NAAQS. This final-form rulemaking also establishes presumptive, averaging and alternative RACT requirements for other subject source types. The air pollution control measures in this final-form rulemaking are reasonably necessary to attain and maintain the applicable health-based and welfare-based 8-hour ozone NAAQS in this Commonwealth and to establish consistent standards for the owners and operators of affected facilities that are a major NO<sub>x</sub> emitting facility, a major VOC emitting facility, or both.

Benefits of this final-form rulemaking to the affected owners and operators include implementation of consistent presumptive RACT requirements and RACT emission limitations across this Commonwealth. This will minimize the need for owners and operators to develop a case-by-case RACT permit application with the associated costs and time constraints as well as minimize the downtime to the operation. Implementation of these control measures will allow affected owners and operators to maintain and grow their operations, maintain jobs and staffing levels, and maintain or increase their revenues. In addition, eligible owners and operators will benefit from the administratively efficient and less resource intensive process in final-form § 129.114(i) for submitting analyses demonstrating that RACT II controls remain RACT for the 2015 standard. These owners and operators will not have to pay an application fee or costs for newspaper notices associated with public participation requirements.

Benefits to the Department include the minimization of case-by-case permit reviews and the associated demand on staff resources.

This final-form rulemaking may create economic opportunities for NO<sub>x</sub> and VOC emission control technology innovators, manufacturers and distributors through an increased demand for new or improved equipment. In addition, the owners and operators of regulated facilities may be required to install and operate an emissions monitoring system or equipment necessary for an emissions monitoring method in order to comply with this final-form rulemaking, thereby creating an economic opportunity for the emissions monitoring industry.

As discussed in response to Question 10, this final-form rulemaking also provides significant environmental and health and welfare benefits due to the reductions in NO<sub>x</sub> and VOC emissions, as well as ground-level ozone. Financial impacts of this final-form rulemaking are further discussed in the response to Question 19.

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

Each time the EPA revises the ozone NAAQS, owners and operators of existing facilities subject to RACT are required to re-evaluate what constitutes RACT for their source to achieve the lowest emission limit for NO<sub>x</sub> or VOC emissions that the source is capable of meeting, considering technological and economic feasibility. The Department began implementing RACT I in 1994 under §§ 129.91—129.95 for the 1979 and 1993 1-hour ozone standards. See 24 Pa.B. 467. The Department's case-by-case analysis process under RACT I 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. The RACT II program initiated by the Department in 2016, under §§ 129.96—129.100 for the 1997 and 2008 ozone standards, required 135 case-by-case submissions to the EPA as revisions to the Commonwealth's SIP. See 46 Pa.B. 2036. Many facility owners and operators had to hire consultants or additional staff to complete their case-by-case RACT I and II analyses and proposals and handle the permitting requirements. This final-form rulemaking is designed to significantly reduce or eliminate these costs for most of the owners and operators of potentially affected facilities under §§ 129.111—129.115 due to the establishment and

implementation of presumptive RACT requirements for more source categories than were established under the RACT I and RACT II regulations.

Ozone precursor emission reductions achieved through the implementation of presumptive RACT requirements and RACT emission limitations for the affected sources will assist the Commonwealth in attaining and maintaining the 2015 8-hour ozone NAAQS as well as maintaining the 1997 and 2008 8-hour ozone NAAQS. Given that implementation of RACT requirements is Federally required, the Department estimates that the final-form presumptive RACT requirements and RACT emission limitations will achieve greater emission reductions at a lower cost to the affected owners and operators and to the Commonwealth than instituting another round of case-by-case RACT analyses and determinations for the 2015 ozone NAAQS. Further, these reductions will occur in a timelier manner than implementation of another round of case-by-case determinations for the owner and operator of every affected major source of NO<sub>x</sub> or VOCs as occurred under §§ 129.91—129.95 and 129.96—129.100. For example, the averaging provisions under § 129.113 will provide additional ozone precursor NO<sub>x</sub> emission reductions at the lowest cost while preserving existing emission reductions.

By establishing consistent presumptive RACT requirements and RACT emission limitations Statewide for the owners and operators of an affected major NO<sub>x</sub> emitting facility, major VOC emitting facility, or both, and by providing flexibility in compliance through emissions averaging and case-specific options, the owners and operators of affected facilities will be able to achieve compliance in the most cost-effective manner. Implementation of the final-form control measures will minimize the need for case-by-case determinations and also provide the owners and operators of affected facilities with the flexibility to achieve compliance by meeting the presumptive limits through an emission averaging protocol or by conducting an administratively efficient and less resource intensive analysis under § 129.114(i) to demonstrate that RACT II conditions remain RACT for the 2015 standard before having to resort to a time-consuming and costly case-by-case analysis under § 129.114(d).

Reduced ambient concentrations of ground-level ozone resulting from implementation of this final-form rulemaking will reduce the incidences of hospital admissions for respiratory ailments including asthma and improve the quality of life for citizens overall. While children, the elderly and those with respiratory problems are most at risk, even healthy individuals may experience increased respiratory ailments and other symptoms when they are exposed to high levels of ambient ground-level ozone while engaged in activities that involve physical exertion.

(19) Provide a specific estimate of the costs and/or savings to the **regulated community** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

The Department conducted a generic RACT analysis of existing sources to determine if additional controls represent RACT for the 2015 8-hour ozone NAAQS. This generic analysis identified existing affected source categories by size and fuel type; identified available feasible NO<sub>x</sub> or VOC control options, or both, for each type of existing source; estimated emission reduction potential for each control technology; identified costs for technologies using appropriate updates; and evaluated cost-effectiveness using the guidance provided in the EPA Air Pollution Control Cost Manual, EPA/452/B-02-001, 6th Edition, January 2002, as amended, and as updated in the 7<sup>th</sup> Edition beginning in 2019, for both uncontrolled and controlled sources (combinations of technologies). After conducting this analysis, the Department established as RACT in this final-form rulemaking the emission limitation that is achievable by cost-effective technologies using benchmark cost per ton of emissions reduced.

Based on this analysis, the Department has determined that cost-effective controls represent RACT for the 2015 8-hour ozone NAAQS for ten existing source categories - combustion units; municipal solid waste landfills; municipal waste combustors; process heaters; turbines; stationary internal combustion engines; cement kilns; glass melting furnaces; lime kilns; and direct-fired heaters, furnaces or ovens; as well as other existing source categories that are not regulated elsewhere under Chapter 129. Compliance costs will vary for each source or facility depending on which compliance option is chosen by the owner and operator of the affected source or facility. This final-form rulemaking includes a provision for the owner and operator of an affected facility that cannot meet the applicable presumptive NO<sub>x</sub> RACT requirement or emission limitation to elect to meet the applicable presumptive NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis. Additionally, the owner and operator of an affected source that cannot meet the applicable NO<sub>x</sub> or VOC presumptive RACT requirement or RACT emission limitation may propose an alternative NO<sub>x</sub> RACT requirement, NO<sub>x</sub> RACT emission limitation, VOC RACT requirement or VOC RACT emission limitation on a case-by-case basis.

Under these alternative compliance provisions, the owner or operator is required to demonstrate to the Department's satisfaction that it is economically or technically infeasible to meet the applicable final-form presumptive NO<sub>x</sub> RACT requirement or emission limitation or VOC RACT requirement or emission limitation. The flexibility provided by these alternative compliance provisions may minimize compliance costs incurred by the owner or operator of an affected facility. The owner and operator are required to bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal, as well as application fees. These fees are estimated to be \$4,000 to \$6,000 per facility.

The Department anticipates that the owners and operators of most of the affected sources will be able to meet the applicable presumptive RACT standard without the installation of additional add-on controls, so it is likely that there will be little or no cost incurred by most of the affected owners and operators. Additionally, due to the establishment of more presumptive RACT requirements and RACT emission limitations than were promulgated with RACT I and RACT II, many of these owners and operators will not need to hire consultants or additional staff to perform a case-by-case analysis to determine what control measures are needed at the affected facility to comply with the final-form RACT requirements necessary to meet the 2015 8-hour ozone NAAQS. Further, these owners and operators will not need to purchase and install add-on controls or submit a request for approval to implement a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan or propose an alternative NO<sub>x</sub> RACT requirement, NO<sub>x</sub> RACT emission limitation, VOC RACT requirement or VOC RACT emission limitation on a case-by-case basis.

Compliance costs include the total capital investment of the add-on control equipment, the annual operating costs of the add-on control equipment and the cost-effectiveness of the add-on control equipment in reducing emissions from the source. The cost-effectiveness of the add-on control equipment is calculated by dividing the annual operating costs of the add-on control equipment by the amount of emission reductions achieved annually from operation of the add-on control equipment. It is not possible to provide a precise estimate of the costs that would be incurred by the owner or operator of a specific source due to not knowing what type of add-on control equipment the owner or operator may choose and to the variability in capital investment costs and annual operating costs for the chosen add-on control equipment. Capital investment costs include the purchase and installation costs for the chosen add-on control technology and the costs of monitoring equipment that may be required for the add-on

control equipment, along with delivery costs, start-up costs, initial testing and taxes. Annual operating costs include the costs of electricity or fuel to operate the add-on control technology and the monitoring equipment, if needed, as well as maintenance and repair costs, overhead, capital recovery and property taxes. Precisely estimating the cost-effectiveness of each add-on control technology for each affected source is not possible since the actual amount of emissions reduced will not be known until the add-on control equipment is installed and operated.

While developing a precise estimate of compliance costs for the affected owners and operators is not possible, the Department projected what control technology might be applied to each affected source. For the combustion units and process heaters, combustion turbines, stationary internal combustion engines, Portland cement kilns, glass furnaces, and municipal waste combustor source types, the Department reviewed its permit databases and cataloged existing sources subject to case-by-case NO<sub>x</sub> and VOC emission limitations under the second round of RACT (RACT II) implemented under §§ 129.96—129.100. The information collected included the RACT II emission limitation and required emission control technology for each source. The RACT II uncontrolled emission limitations were used as a baseline to determine technical and economic feasibility for emission controls for the third round of RACT (RACT III) in this final-form rulemaking.

The Department adjusted the RACT II cost benchmarks of \$2,800 and \$5,500 per ton of NO<sub>x</sub> or VOC emissions removed, respectively, by multiplying by the consumer price index (CPI) differential between 2014 and 2020 to arrive at benchmarks of \$3,000 and \$6,000 per ton of NO<sub>x</sub> or VOC emissions removed, respectively, for RACT III. The Department further adjusted cost-effectiveness benchmarks to \$3,750 per ton of NO<sub>x</sub> and \$7,500 per ton of VOC to ensure the implementation of RACT level controls similar to what was done for RACT II. See 46 Pa.B. 2044. The Department concludes that the RACT presumptive limits included in this final-form rulemaking are reasonable as they reflect control levels achieved by the application and consideration of available control technologies, after considering both the economic and technological circumstances of this Commonwealth's sources. The RACT III NO<sub>x</sub> and VOC emission limitations established in this final-form rulemaking were determined from this evaluation.

Using these benchmarks, the Department projects that the cost of complying with the applicable presumptive RACT requirement or RACT emission limitation by installing add-on control technology or by implementing an averaging protocol will be less than \$3,750 per ton of NO<sub>x</sub> emission reductions, no matter which source type and add-on control technology is considered.

The Department initially estimated that the projected maximum total cost of control for the owners and operators of affected sources needing add-on control technology would be \$25 million with sources operating continuously. In response to a comment received from IRRC on the proposed rulemaking, the Department determined that the owners and operators of approximately 115 engines and turbines will be required to install add-on control technology to meet the final-form presumptive NO<sub>x</sub> RACT III emission limitations. Since the publication of the proposed rulemaking, the Department has updated the estimates to reflect that implementation of the final-form control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors and reduce VOC emissions by as much as 825 TPY from engines and turbines, depending on whether sources are already controlled sufficiently to comply with the final-form RACT requirements and what type of control technology is implemented for a source that needs add-on control to achieve compliance. Therefore, the value of \$25 million has been updated to approximately \$36.7 million. The maximum total cost estimate of \$36.7 million was derived from multiplying the estimated 9,800 TPY of NO<sub>x</sub> reduced by the \$3,750 per ton of

NO<sub>x</sub> emissions reduced cost-effectiveness benchmark. The Department does not anticipate any additional costs to the regulated industry to meet the lower VOC standards contained in this final-form rulemaking. Optimization of existing VOC controls should be sufficient to meet the VOC standards in this final-form rulemaking.

In addition, eligible owners and operators will realize savings by using the administratively efficient and less resource intensive process in final-form § 129.114(i)(1) for submitting analyses demonstrating that RACT II controls remain RACT for the 2015 standard. These owners and operators will not have to pay an application fee or costs for newspaper notices associated with public participation requirements. It is estimated that owners and operators will save \$2,500 - \$4,000 each in application fees and \$500 - \$2,000 each in newspaper advertising publication fees that would normally be associated with a full case-by-case under § 129.114(d).

No new legal accounting or consulting procedures are anticipated.

(20) Provide a specific estimate of the costs and/or savings to the **local governments** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

The Department identified 11 local government-owned permitted Title V (major source) landfills and boilers that will likely be subject to this final-form rulemaking. The Department found that all of the landfills already comply with the Federal Plan for Municipal Solid Waste Landfills in 40 CFR Part 62, Subpart OOO (relating to Federal plan requirements for municipal solid waste landfills that commenced construction on or before July 17, 2014 and have not been modified or reconstructed since July 17, 2014) or the New Source Performance Standards in 40 CFR Part 60, Subpart XXX (relating to standards of performance for municipal solid waste landfills that commenced construction, reconstruction, or modification after July 17, 2014), which are adopted and incorporated by reference in § 122.3 (relating to adoption of standards).

The remaining affected sources are boilers rated at less than 50 million British thermal units per hour, engines rated at less than 500 brake horsepower or engines with an operating-hours cap of 500 or fewer hours per year. The Department does not anticipate additional compliance costs or savings for the owners and operators of these sources. Therefore, the Department does not anticipate any costs or savings to local governments due to this final-form rulemaking.

(21) Provide a specific estimate of the costs and/or savings to the **state government** associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

The Department identified 24 State-owned permitted Title V sources that will likely be subject to this final-form rulemaking. None of the owners or operators of these 24 sources are expected to need to install add-on control equipment to comply with this final-form rulemaking.

The Department will likely realize administrative savings with regard to paid salaries and benefits compared to the previous round of case-by-case RACT determinations and permitting requirements implemented under §§ 129.96—129.100 due to the lower amount of review time required under the presumptive RACT program in this final-form rulemaking. The Department may save more than \$3,500 for every 100 hours of review time that may be avoided by the implementation of the presumptive

control measures included in this final-form rulemaking. The flexibilities provided in this final-form rulemaking are designed to minimize or even eliminate the number of case-by-case applications that will need to be reviewed and processed without the final-form presumptive requirements. The review of case-by-case permit applications by the Department requires significantly greater time than review of permit applications that implement presumptive RACT limits or requirements.

The Department will incorporate the new RACT requirements into the Title V operating permits for each affected facility during the normal permit renewal process if less than 3 years remain in the permit term. However, if more than 3 years remain in the permit term, permit modifications will be necessary. See 25 Pa. Code § 127.463(c).

(22) For each of the groups and entities identified in items (19)-(21) above, submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

No additional legal, accounting or consulting procedures are expected for the groups identified in items (19)-(21) above. The final-form amendments do not add or change the existing reporting, recordkeeping or other paperwork requirements for the owners and operators of facilities that will be subject to this final-form rulemaking. The presumptive emission limitations established in this final-form rulemaking will not require the submission of applications for amendments to existing operating permits. These final-form requirements will be incorporated as applicable requirements at the time of permit renewal if less than 3 years remain in the permit term, as specified under § 127.463(c) (relating to operating permit revisions to incorporate applicable standards). If 3 years or more remain in the permit term, the requirements will be incorporated as applicable requirements in the permit within 18 months of the date of promulgation of this final-form rulemaking, as required under § 127.463(b). Most importantly, § 127.463(e) specifies that “[r]egardless of whether a revision is required under this section, the permittee shall meet the applicable standards or regulations promulgated under the Clean Air Act within the time frame required by standards or regulations.” Consequently, upon promulgation as a final-form regulation, §§ 129.111—129.115 will apply to affected owners and operators irrespective of a modification to the operating permit. Therefore, the owner or operator shall comply with the applicable standards or regulations within the time frame specified by the final-form regulation even if the permit is not revised to incorporate the standard or regulation within the specified compliance time frame. The owners and operators of the affected facilities are familiar with the existing requirements for recordkeeping and reporting for their entity and have the professional and technical skills needed for continued compliance with these requirements.

(22a) Are forms required for implementation of the regulation?

No forms are required for implementation of this final-form rulemaking.

(22b) If forms are required for implementation of the regulation, **attach copies of the forms here**. If your agency uses electronic forms, provide links to each form or a detailed description of the information required to be reported. **Failure to attach forms, provide links, or provide a detailed description of the information to be reported will constitute a faulty delivery of the regulation.**

Not applicable, because no forms are required for implementation of this final-form rulemaking.

(23) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

	Current FY Year 21/22	FY +1 Year 22/23	FY +2 Year 23/24	FY +3 Year 24/25	FY +4 Year 25/26	FY +5 Year 26/27
<b>SAVINGS:</b>	\$	\$	\$	\$	\$	\$
Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Savings</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>COSTS:</b>						
Regulated Community	0.00	0.00	36,700,000	36,700,000	36,700,000	36,700,000
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Costs</b>	0.00	0.00	36,700,000	36,700,000	36,700,000	36,700,000
<b>REVENUE LOSSES:</b>						
Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Revenue Losses</b>	0.00	0.00	0.00	0.00	0.00	0.00

(23a) Provide the past three-year expenditure history for programs affected by the regulation.

Program	FY -3 18/19	FY -2 19/20	FY -1 20/21	Current FY 21/22
Environmental Program Management (161-10382)	\$30,932,000	\$27,920,000	\$32,041,000	\$34,160,000
Clean Air Fund Major Emission Facilities (215-20077)	\$17,878,000	\$18,759,000	\$20,801,000	\$20,083,000
Clean Air Fund Mobile and Area Facilities (233-20084)	\$9,369,000	\$9,900,000	\$11,290,000	\$ 11,290,000

(24) For any regulation that may have an adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), provide an economic impact statement that includes the following:

- (a) An identification and estimate of the number of small businesses subject to the regulation.

The Department reviewed its database of regulated facilities with RACT-related permit conditions to determine how many, and which, potentially meet the definition of small business specified in Section 3 of the Regulatory Review Act, as “in accordance with the size standards described by the SBA’s Small Business Size Regulations under 13 CFR Chapter 1 Part 121 (relating to Small Business Size Regulations) or its successor regulation.” The Department cross-referenced facility NAICS information from its database with the “Table of Small Business Size Standards Matched to North American Industry Classification System Codes effective January 7, 2013,” obtained from the SBA website at [http://www.sba.gov/sites/default/files/files/Size\\_Standards\\_Table\(1\).pdf](http://www.sba.gov/sites/default/files/files/Size_Standards_Table(1).pdf). The SBA table gives different determination criteria for different NAICS codes. A small business may be defined by sales or number of employees, or by generation capacity in the case of utilities. The Department then accessed the SBA Dynamic Small Business Search database which contains information about small businesses that have registered with the SBA. This self-certifying database incorporates the small business criteria contained in 13 CFR Chapter 1, Part 121, such as NAICS codes, when the owners/operators of such companies register. This registration benefits small businesses because the database assists government contracting officers in determining whether a company is eligible as a small business.

Finally, the Department contacted the Small Business Development Center and used its access to EMAP programs.

For power generation facilities, the Department obtained yearly generation information from the U.S. Energy Information Administration databases at <http://www.eia.gov/electricity/data/cia860/>. This information was correlated with the NAICS table definitions cited above to determine which power generation facility owners and operators could be classified as small businesses.

From these sources of information, the Department determined that the affected owners and operators of approximately 10-30 facilities under the Department’s jurisdiction meet the definition of “small business” specified in Section 3 of the Regulatory Review Act. These facility owners and operators include petroleum and coal products manufacturers, electric power generators, paper mills, pharmaceutical preparation manufacturers, and colleges and universities. The Department expects that the impact on these small businesses will be minimal. In those cases where a small business is not able to comply with the specified presumptive RACT requirements, owners and operators may submit a request to meet emission limitations by facility-wide or system-wide averaging plan protocol, or may submit a request for an alternative case-specific emission limitation. The flexibility afforded to small businesses in this final-form rulemaking ensures minimal negative impact on their operations.

- (b) The projected reporting, recordkeeping and other administrative costs required for compliance with the proposed regulation, including the type of professional skills necessary for preparation of the report or record.

No new reporting, recordkeeping or other administrative procedures are required in this final-form rulemaking for small businesses. The final-form amendments do not add to or change the existing reporting, recordkeeping or other paperwork requirements for the owners and operators of facilities

subject to this final-form rulemaking. The owners and operators of subject facilities are familiar with the existing requirements for reporting and recordkeeping for their entity and have the professional and technical skills needed for continued compliance with these requirements.

(c) A statement of probable effect on impacted small businesses.

By establishing consistent standards for the affected owners and operators of major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, and by providing flexibilities in compliance through emissions averaging and case-specific options, the owners and operators of these facilities will be able to achieve compliance in the most cost-effective manner. The effects on the regulated community should be very limited and are minimized through these alternative compliance provisions.

(d) A description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation.

The requirement to adopt and implement RACT requirements is Federally mandated. All affected owners and operators, whether or not they meet the designation of small business, that are major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will be required to control emissions to meet the presumptive levels established in this final-form rulemaking. This final-form rulemaking incorporates flexibilities to achieve the final-form presumptive RACT limits and requirements. By establishing consistent RACT standards for the affected owners and operators of major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, and by providing flexibilities in compliance through emissions averaging and case-specific options, the owners and operators of affected facilities will be able to achieve compliance in the most cost-effective manner. These options provide all affected owners or operators, whether small business or not, increased flexibility to meet Federally mandated RACT requirements in the most cost-effective manner.

Many affected owners or operators of a major NO<sub>x</sub> emitting facility, major VOC emitting facility, or both, will not require additional control measures to comply with the final-form RACT requirements. Eligible owners and operators will benefit from the administratively efficient and less resource intensive process in final-form § 129.114(i) for submitting analyses demonstrating that RACT II controls remain RACT for the 2015 standard. These owners and operators will not have to pay an application fee for submittal of these analyses or costs for newspaper notices associated with public participation requirements. The impacts on any small business-sized owner or operator should be very limited and are minimized through the availability of these alternative compliance provisions, including emissions averaging and case-specific options, to demonstrate compliance with the final-form RACT requirements.

No new legal accounting or consulting procedures would be required.

(25) List any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, the elderly, small businesses, and farmers.

RACT is Federally mandated under the CAA and applies to the owners and operators of major air contamination sources of NO<sub>x</sub> or VOC emissions, or both. All affected business owners and operators, whether or not they are considered a small business, that are major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will be required to control emissions, if necessary, to meet the presumptive levels established in this final-form rulemaking. This final-form rulemaking provides flexibilities for demonstrating compliance through emissions averaging and case-by-case RACT determination options.

The owners and operators of affected facilities will be able to achieve compliance in the most cost-effective manner. These options provide all affected owners or operators, whether minorities or small businesses, with increased flexibility to meet Federal RACT requirements in the most cost-effective manner available.

Minorities, the elderly, small businesses and farmers who are not owners or operators of a subject major NO<sub>x</sub> emitting facility or a major VOC emitting facility, or both, will not be affected by this proposed rulemaking.

(26) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

This final-form rulemaking is considered the least burdensome acceptable method of ensuring compliance with the Federal RACT mandate under the CAA. Many owners or operators of subject major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will not need to do anything more to control emissions than they have already done. This final-form rulemaking incorporates flexibilities to comply with the final-form RACT standards. This final-form rulemaking establishes consistent Statewide presumptive RACT standards for the owners and operators of facilities that are major NO<sub>x</sub> emitting or VOC emitting facilities, or both. No new legal accounting or consulting procedures will be required.

(27) In conducting a regulatory flexibility analysis, explain whether regulatory methods were considered that will minimize any adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), including:

- a) The establishment of less stringent compliance or reporting requirements for small businesses.

RACT is Federally mandated. Owners and operators of affected small business-sized major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, have several options available to comply with the final-form RACT requirements. This final-form rulemaking incorporates flexibilities to comply with the final-form presumptive RACT standards. By establishing consistent presumptive RACT standards for the affected owners and operators of major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, and by providing flexibilities in compliance through emissions averaging and case-by-case RACT determinations, the owners and operators of affected facilities that are also small businesses will be able to achieve compliance in the most cost-effective manner. These options provide all affected owners or operators, whether small business-sized or not, increased flexibility to meet the Federally mandated RACT requirements in the most cost-effective manner available.

Many subject owners or operators of major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will not need to do anything more to control emissions than they have already done. Others will be able to meet the requirements using the flexible compliance options provided in this final-form rulemaking. Any negative impacts on affected small business-sized owners and operators should be very limited and will be minimized through the availability of these alternative compliance provisions.

- b) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses.

This final-form rulemaking includes provisions for the affected owners or operators of small business-sized major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, to submit requests for alternative compliance schedules.

- c) The consolidation or simplification of compliance or reporting requirements for small businesses.

The owners and operators of subject small business-sized facilities are familiar with the existing requirements for monitoring, recordkeeping and reporting for their entity under 25 Pa. Code Chapter 127 and have the professional and technical skills needed for continued compliance with these requirements.

- d) The establishment of performance standards for small businesses to replace design or operational standards required in the regulation.

Many affected owners or operators of small business-sized major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will not need to do anything more to control emissions than they have already done. Others will be able to meet the requirements using the flexible compliance options provided in this final-form rulemaking.

- e) The exemption of small businesses from all or any part of the requirements contained in the regulation.

RACT is Federally mandated under the CAA. The owners and operators of all affected businesses, whether or not meeting the designation of small business, that are major NO<sub>x</sub> emitting or major VOC emitting facilities, or both, will be required to control emissions to meet the presumptive RACT levels established in this final-form rulemaking. Alternatively, the owners and operators of affected facilities may elect to participate in an averaging program provided in this final-form rulemaking or submit a case-by-case RACT analysis if the prior two options (presumptive RACT requirements or the averaging program) are not cost-effective. These alternative compliance options provide affected owners or operators, whether small business or not, increased flexibility to meet the Federally mandated RACT requirements in the most cost-effective manner available.

This final-form rulemaking is considered the most flexible as well as least burdensome acceptable method of ensuring compliance with the Federal RACT mandate. This final-form rulemaking incorporates flexibility to achieve Federally mandated RACT standards and establishes consistent RACT standards for the subject owners and operators of major NO<sub>x</sub> emitting or major VOC emitting facilities, or both.

(28) If data is the basis for this regulation, please provide a description of the data, explain in detail how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

RACT is Federally mandated.

The Department has prepared a Technical Support Document (TSD) with Appendices to support this final-form rulemaking. The TSD is attached to this RAF.

The Department reviews its own ambient air quality ozone monitoring data for purposes of reporting to the EPA to establish attainment and maintenance of the NAAQS for all areas of this Commonwealth as discussed in the response to Question 9. The Commonwealth's Ambient Air Monitoring Network is operated in accordance with all network design, siting, monitoring and quality assurance requirements set forth in 40 CFR Part 58 (relating to ambient air quality surveillance).

List of references mentioned in this RAF:

Municipal Waste Combustor Workgroup Report, Prepared by the Ozone Transport Commission Stationary and Area Sources Committee June 2021, accessible online at:  
[20210624 SAS MWC report updated 12 9 21.pdf \(otcair.org\)](#)

The Pennsylvania State University, Forest Management and Timber Harvesting in Pennsylvania, Sept. 9, 2019, accessible online at:  
<https://extension.psu.edu/forest-management-and-timber-harvesting-in-pennsylvania>

PDA, Response to Email Inquiry, Harrisburg, Pennsylvania, Mar. 2, 2020, available on request.

PDA, Pennsylvania Agriculture: A look at the Economic Impact and Future Trends Version 1, Jan. 2018, accessible online at:  
[https://www.agriculture.pa.gov/Documents/PennsylvaniaAgriculture\\_EconomicImpactFutureTrends.pdf](https://www.agriculture.pa.gov/Documents/PennsylvaniaAgriculture_EconomicImpactFutureTrends.pdf)

Pennsylvania DCNR Bureau of Forestry, Our Mission and What We Do, accessible online at:  
<https://www.dcnr.pa.gov/about/Pages/Forestry.aspx>

Regulatory Impact Analysis; Final National Ambient Air Quality Standard for Ozone (EPA, July 2011), accessible online at:  
[https://www.epa.gov/sites/default/files/2020-07/documents/naaqs-o3\\_ria\\_final\\_2008-03.pdf](https://www.epa.gov/sites/default/files/2020-07/documents/naaqs-o3_ria_final_2008-03.pdf)

Regulatory Impact Analysis of the Final Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone (EPA-452/ R-15-007, September 2015), accessible online at:  
[https://www.epa.gov/sites/default/files/2020-07/documents/naaqs-o3\\_ria\\_final\\_2015-09.pdf](https://www.epa.gov/sites/default/files/2020-07/documents/naaqs-o3_ria_final_2015-09.pdf)

United States Department of Agriculture, Forests of Pennsylvania, 2019, accessible online at:  
[https://public.tableau.com/views/FIA\\_OneClick\\_V1\\_2/Factsheet?%3AshowVizHome=no](https://public.tableau.com/views/FIA_OneClick_V1_2/Factsheet?%3AshowVizHome=no)

(29) Include a schedule for review of the regulation including:

- A. The length of the public comment period: 66 days
- B. The date or dates on which any public meetings or hearings were held: September 7, 8, 9, 2021
- C. The expected date of delivery of the final-form regulation: 3rd Quarter 2022
- D. The expected effective date of the final-form regulation: Upon publication in the *Pennsylvania Bulletin*
- E. The expected date by which compliance with the final-form regulation will be required: January 1, 2023
- F. The expected date by which required permits, licenses or other approvals must be obtained: Not Applicable

(30) Describe the plan developed for evaluating the continuing effectiveness of the regulations after its implementation.

The Board is not establishing a sunset date for this final-form rulemaking since it is needed for the Department to carry out its statutory authority. The Department will closely monitor this final-form rulemaking after promulgation in the *Pennsylvania Bulletin* for its effectiveness and recommend updates to the Board as necessary.





**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL  
PROTECTION

## **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<sub>x</sub> and VOCs for the 2015 ozone NAAQS  
(RACT III)**

**April 2022**

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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<sub>2</sub>); 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<sub>x</sub>) 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<sub>x</sub> 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<sub>x</sub> emissions from major stationary sources. The CAA NO<sub>x</sub> RACT requirements are described by the EPA in the “NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> in nonattainment areas to install and operate NO<sub>x</sub> 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<sub>x</sub>.

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<sub>x</sub>. 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<sub>x</sub> source is one with the PTE 100 TPY or more of NO<sub>x</sub>. Because the entire Commonwealth is in the OTR and is treated as a moderate nonattainment area, RACT is applicable to major sources of NO<sub>x</sub> 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<sub>x</sub>. 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> determine if they are a major stationary source of VOCs or NO<sub>x</sub>, 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<sub>x</sub>, 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<sub>x</sub> emitting facilities to implement presumptive NO<sub>x</sub> RACT requirements. The owners and operators of small industrial boilers were required to make appropriate adjustments to the combustion process to minimize NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> sources which were required to determine the RACT for NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions reduced. The EPA document "Evaluation and Costing of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions reduced. Two NO<sub>x</sub> RACT proposals, discussed in the guidance document (Appendix 1), using LNB-SOFA document costs of \$1,222 and \$1,298 per ton of NO<sub>x</sub> emissions reduced.

Based on the above information, the Department used \$1,500 per ton of NO<sub>x</sub> emissions reduced as the benchmark cost at which consider the NO<sub>x</sub> emissions control option to be cost-effective.

The Department suggested using \$1,500 as the benchmark for NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission control cost-effectiveness upper bound of \$2,800 per ton of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions averaging, a source-specific NO<sub>x</sub> or VOC emission limitation, or a source-specific NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions are only subject to the NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> control technologies such as Low NO<sub>x</sub> Burner (LNB), Dry Low NO<sub>x</sub> 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<sub>x</sub> emission by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> formation. Introducing excess air not only creates a leaner mixture but it also can reduce residence time at peak temperatures. NO<sub>x</sub> emissions reductions of up to 30% are achieved using lean primary zone combustion, without increasing CO emissions.

LEC technology achieves lower NO<sub>x</sub> emissions by providing sufficient excess air to reduce the maximum combustion temperature and minimize NO<sub>x</sub> formation. NO<sub>x</sub> emissions from natural gas combustion are formed from nitrogen and oxygen in the combustion air and emissions of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions reductions of 30—50% are achieved using lean primary zone combustion without increasing CO emissions.

SCR systems selectively reduce NO<sub>x</sub> emissions by injecting ammonia (NH<sub>3</sub>) into the exhaust gas stream upstream of a catalyst. NO<sub>x</sub>, NH<sub>3</sub> and oxygen (O<sub>2</sub>) react on the surface of the catalyst to form nitrogen (N<sub>2</sub>) and water (H<sub>2</sub>O). The exhaust gas must contain a minimum amount of O<sub>2</sub> 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<sub>x</sub> and NH<sub>3</sub> to pass through the catalyst unreacted. Ammonia emissions, called NH<sub>3</sub> slip, may be a consideration when specifying an SCR system.

SNCR technology is a post combustion emissions control technology for reducing NO<sub>x</sub> 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<sub>x</sub> are required for higher control efficiencies. SNCR technology reduction efficiencies vary over a wide range. Temperature, residence time, type of NO<sub>x</sub> reducing reagent, reagent injection rate, uncontrolled NO<sub>x</sub> level, distribution of the reagent in the flue gas, and CO and O<sub>2</sub> 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<sub>x</sub>. In an NSCR system, hydrocarbons and CO are oxidized by O<sub>2</sub> and NO<sub>x</sub>. The excess hydrocarbons, CO, and NO<sub>x</sub> pass over a catalyst (usually a noble metal such as platinum, rhodium, or palladium) that oxidizes the excess hydrocarbons and CO to H<sub>2</sub>O and CO<sub>2</sub>, while reducing NO<sub>x</sub> to N<sub>2</sub>. NO<sub>x</sub> 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<sub>2</sub> 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<sub>x</sub> emissions reduction effectiveness without high hydrocarbon emissions. To achieve effective NO<sub>x</sub> emissions reduction performance, the engine may need to be run with a richer fuel adjustment than normal. This exhaust excess O<sub>2</sub> 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<sub>2</sub> within the porous catalyst layer to form CO<sub>2</sub> 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<sub>x</sub> 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<sub>x</sub> or VOC, or both, RACT emissions limitations to determine if additional NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> or VOC emissions reduced, respectively, for RACT III. The Department further adjusted the cost-effectiveness benchmarks to \$3,750 per ton of NO<sub>x</sub> 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<sub>x</sub> 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/aqmguid/collection/cp2/19761209\\_strelow\\_ract.pdf](https://www3.epa.gov/ttn/naaqs/aqmguid/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<sub>x</sub> emissions averaging program under final-form § 129.113 or propose an alternative NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> and VOC emitting source categories:**

The Department evaluated LNB, SCR and SNCR technologies for NO<sub>x</sub> emissions reduction and oxidation catalyst technology for VOC emission reduction for insignificant NO<sub>x</sub> and VOC emitting source categories.

The Department performed a cost-effectiveness analysis for a 50 million Btu/hour combustion unit with an uncontrolled NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> and VOC emitting sources with PTE less than 5 TPY of NO<sub>x</sub> and less than 2.7 TPY of VOC, respectively, with no add-on or inherent NO<sub>x</sub> 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<sub>x</sub> air contamination source that has the potential to emit less than 5 TPY of NO<sub>x</sub>
- 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<sub>x</sub> control technologies and permitted NO<sub>x</sub> 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<sub>x</sub> 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 <sub>x</sub> 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<sub>x</sub> RACT emission rate standards for large MWCs. New Jersey adopted a regulation that established a NO<sub>x</sub> RACT emission rate of 150 ppmvd as determined on a calendar day average. Massachusetts and Maryland established a NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions reduction efficiency to a limitation of 110 ppmvd @ 7% oxygen is approximately \$2,465 per ton of NO<sub>x</sub> 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<sub>x</sub> emissions reduced. See Appendix 5.

The Department analyzed Continuous Emission Monitoring System (CEMS) data from the years 2018 and 2019 for NO<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> emissions reduced with a post-control NO<sub>x</sub> 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<sub>x</sub> emissions reduced for operating SNCR controls compares favorably with the OTC SAS workgroup's cost-effectiveness result of \$3,204 per ton of NO<sub>x</sub> emissions reduced for the installation of LNB technology. The Department's analysis of CEMS

data and the OTC SAS workgroup'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<sub>x</sub> 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<sub>x</sub> @ 7% oxygen. [25 Pa. Code § 129.112(f)]. The owners and operators of MWCs equipped with CEMS shall comply with the NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rates as high as 0.99 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rates as high as 0.11 lb NO<sub>x</sub>/million Btu heat input. This demonstrated emission rate of 0.11 lb NO<sub>x</sub>/million Btu heat input is indicative of tight compliance with the RACT II presumptive NO<sub>x</sub> limit of 0.12 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rates as high as 0.37 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rates as high as 0.27 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emitting facility located in this Commonwealth. The Department analyzed stack test data for this spreader stoker boiler that demonstrates NO<sub>x</sub> emission rates as high as 0.36 lb NO<sub>x</sub>/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<sub>x</sub> emission rates as high as 0.51 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission limitation of 0.45 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions limitation of 0.16 lb NO<sub>x</sub>/million Btu heat input on a 30-day rolling average. The wide range of NO<sub>x</sub> emissions rates demonstrated by CEMS results indicated that NO<sub>x</sub> emissions rates from CFBs firing waste coal are independent of the operation of SNCR control technology; rather, the NO<sub>x</sub> 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<sub>x</sub> emissions rate of 0.16 lb NO<sub>x</sub>/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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> emissions reduced.

SCR control technology has been demonstrated to achieve high levels of NO<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions rate limitation of 0.25 lb NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> emissions control technology. Through comments received on the proposed rulemaking, the Department learned that Solar Turbines does not offer NO<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> emissions reduced.

The Department analyzed test results for these subject turbines that demonstrated NO<sub>x</sub> emissions rates of 40 ppmvd and lower in compliance with the presumptive RACT emission limitation of 42 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> emissions limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

**Presumptive NO<sub>x</sub> 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<sub>x</sub> emissions test results for these subject turbines and determined that these turbines are able to comply with a NO<sub>x</sub> emissions rate of 4 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> RACT emission limitation of 150 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

**Presumptive NO<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> emissions rate limitation using a 30-operating day rolling average. [25 Pa. Code § 129.115(b)(1)].

**Presumptive NO<sub>x</sub> 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<sub>x</sub> RACT emissions rate limitation of 8 ppmvd NO<sub>x</sub> @ 15% oxygen for these subject turbines established in 25 Pa. Code § 129.97(g)(2)(ii)(B) is consistent with the NO<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions rate of 150 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions rate of 96 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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 continue to comply with the existing presumptive RACT emission limitation of 96 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions rates of 3.0 gram NO<sub>x</sub>/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<sub>x</sub>/bhp-hr and engines manufactured on or after July 1, 2010, are required to meet the emission limitation of 1 gram NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/bhp-hr. [25 Pa. Code § 129.112(g)(3)(i)(A)].

**Presumptive NO<sub>x</sub> 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<sub>x</sub> emissions rate limitation of 3.0 gram NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/bhp-hr. [25 Pa. Code § 129.112(g)(3)(ii)(A)].

**Presumptive NO<sub>x</sub> 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 NO<sub>x</sub> emissions rate limitation of 8 gram NO<sub>x</sub>/bhp-hr established in 25 Pa. Code § 129.97(g)(3)(ii) for the installation and operation of SCR control technology with 80% NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>/bhp-hr. [25 Pa. Code § 129.112(g)(3)(iii)].

**Presumptive NO<sub>x</sub> 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<sub>x</sub> emissions rates from natural gas-fired rich-burn engines in this Commonwealth typically range from 13—16 gram NO<sub>x</sub>/bhp-hr. During the development of the RACT II regulation, the Department determined that NSCR with 80% NO<sub>x</sub> emissions removal efficiency is technically and economically feasible and established a NO<sub>x</sub> emissions rate limitation of 2.0 gram NO<sub>x</sub>/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<sub>x</sub> emissions to rates of 2 gram NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rate limitation of 2.0 gram NO<sub>x</sub>/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<sub>x</sub> emission rate limitation of 0.6 gram NO<sub>x</sub>/bhp-hr was a typographical error which is corrected in this final-form rulemaking to the 2.0 gram NO<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions rate for the Lehigh Cement kiln at Nazareth is limited to 2.30 pounds of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>. 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<sub>x</sub> emissions. These options include combustion modifications (low NO<sub>x</sub> 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<sub>x</sub> emissions reduction technique and is best implemented with a complete furnace rebuild. This strategy not only reduces NO<sub>x</sub> 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<sub>x</sub> 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 rulemaking that the owner and operator of a container glass furnace shall comply with the presumptive RACT emission limitation of 4.0 pounds of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> RACT emission rate limitation for fiberglass furnaces of 4.0 pounds of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emission rate limitation of 7 pounds of NO<sub>x</sub> per ton of glass pulled. However, one flat glass furnace in this Commonwealth is operating with a NO<sub>x</sub> emission rate limitation of 26.75 pounds of NO<sub>x</sub> per ton of glass pulled. This glass furnace is not able to meet the presumptive RACT III limit of 7.0 pounds of NO<sub>x</sub> 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<sub>x</sub> emissions rate of 26.75 pounds of NO<sub>x</sub> per ton of glass pulled. The Department determined the cost-effectiveness to be less than \$500 per ton of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> emissions for other glass melting furnaces that demonstrates NO<sub>x</sub> emissions rates of 5.7 pounds of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> Burner and Flue Gas Recirculation can reduce NO<sub>x</sub> emissions by anywhere from 5—60%. The goal of these control techniques is to optimize the efficiency of combustion while minimizing emissions of NO<sub>x</sub>. 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<sub>x</sub> 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<sub>x</sub> emission rate limitation from 6 lb to 4.6 lb of NO<sub>x</sub> 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<sub>x</sub> per hour. [25 Pa. Code § 129.112(j)]. The owners and operators of subject lime kilns equipped with CEMS shall comply with the NO<sub>x</sub> 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<sub>x</sub>/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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> and VOC emissions cannot be employed as they would be for a combustion source. A numerical RACT emission rate limitation for either NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> is primarily formed as thermal NO<sub>x</sub>. Thermal NO<sub>x</sub> 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<sub>x</sub>.

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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> control. Heating the gases would result in additional NO<sub>x</sub> 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<sub>x</sub> emissions from fuel-fired combustion sources such as low-NO<sub>x</sub> burners & ultra-low-NO<sub>x</sub> burners (LNB, ULNB), flue gas recirculation (FGR), overfire air, and oxy-fuel combustion reduce NO<sub>x</sub> 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<sub>x</sub> emissions from EAF ventilation systems. Most NO<sub>x</sub> reduction technologies used for combustion processes are effective only at relatively stable gas flow rates, NO<sub>x</sub> concentrations and temperatures. Since EAFs are cyclical batch processes, no active control technology for NO<sub>x</sub> emissions are technically feasible. The only technically feasible method to control NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> RACT emission limitation by averaging NO<sub>x</sub> 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<sub>x</sub> or VOC emission rate limitations by averaging NO<sub>x</sub> 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<sub>x</sub> emissions or VOC emissions, 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<sub>x</sub> 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.

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## GUIDANCE DOCUMENT ON REASONABLY AVAILABLE CONTROL TECHNOLOGY FOR SOURCES OF NO<sub>x</sub> EMISSIONS

2/01/94

### INTRODUCTION:

Pennsylvania's regulation, Title 25, Environmental Resources, Article III, Chapter 129, Standards for Sources, Section 129.91, requires Reasonably Available Control Technology (RACT) to be determined on a case-by-case basis for major sources or facilities. RACT is defined 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.

Presumptive RACT standards have been established in Section 129.93 for certain select source categories. In many states, presumptive standards are the norm with emission limitations or technologies established for most major categories. However, because Pennsylvania has more sources with a greater degree of diversity, the case-by-case RACT process is preferred.

This document is therefore intended to provide guidance and information needed to examine the case-by-case RACT determinations for the affected sources or facilities. In cases where the regulations have provided presumptive RACT, further details on the rationale for the presumptive standards will be given.

Section I contains a general discussion of the Clean Air Act Amendments (CAAA) and how it affects the Commonwealth. A discussion on the NO<sub>x</sub> emission inventory is included. Section II describes the RACT submittal process and the subsequent case-by-case NO<sub>x</sub> RACT determination procedures. Section III contains the criteria for allowing emission averaging. Section IV includes the guidance on the establishment of final RACT limitations using actual emission data.

Attachment 1 provides a general summary of various NO<sub>x</sub> control strategies, followed by a series of Modules which describe in detail the application of NO<sub>x</sub> RACT for various source categories. The modules are compilation of available information on these source categories. Depending upon the need, specific Modules may be requested by the interested parties. The Modules available are as follows:

- Module 1- Utility Boilers and Boilers  $\geq$  100 MMBtu/hr
- Module 2- Industrial, Commercial, Institutional boilers  
<100 MMBtu/hr
- Module 3- Internal Combustion Engines
- Module 4- Turbines
- Module 5- Glass Furnaces
- Module 6- Process Heaters
- Module 7- Iron and Steel Mills
- Module 8- Cement Manufacturing
- Module 9- Miscellaneous and Presumptive RACT Sources

# Appendix 1

## I. GENERAL DISCUSSION:

The Clean Air Act Amendments (CAAA) of 1990 require Pennsylvania to meet the health-related, ground level ozone National Ambient Air Quality Standard (NAAQS). In the presence of sunlight, oxides of nitrogen (NOx), and volatile organic compounds (VOC) react to form ground level ozone. Ozone is a known respiratory irritant, and may significantly reduce the yield of important food crops. Ozone may also cause degradation of paint, plastics, textiles and rubber. NOx is also a precursor to acid deposition. NOx, in the form of Nitrogen Dioxide, (NO2) is known to aggravate symptoms associated with asthma and bronchitis. NO2 can also increase susceptibility to respiratory infections. Ground level ozone should not be confused with stratospheric ozone which is beneficial and needed in the upper levels of the atmosphere to block harmful radiation from the sun.

Attaining the ozone air quality standard is a statewide problem for Pennsylvania. A number of counties are classified as nonattainment for not meeting the NAAQS. The CAAA created a special classification system of ozone nonattainment areas depending on the severity of the ozone levels within a consolidated metropolitan statistical area (CSMA). Figure 1 shows these classifications for Pennsylvania. Some counties are classified as nonattainment but are not part of a CSMA.

The five-county Pennsylvania portion of the Philadelphia CSMA is classified as a severe area. In fact, there are serious region-wide violations of the ozone standard throughout the entire northeastern United States. The CAAA address this problem of regional nonattainment through the establishment of the Ozone Transport Region (OTR), of which Pennsylvania has been designated as one of its 13 states or political entities. At a minimum, this action requires that any major VOC or NOx source in the entire state of Pennsylvania is subject to the requirements that apply to major sources in ozone areas classified as moderate, even though some Pennsylvania counties are achieving the NAAQS attainment levels. The major sources located in the Philadelphia Metropolitan Statistical Area are subject to the requirements of severe ozone nonattainment area.

The CAAA require areas which exceed NAAQS for ozone to implement NOx RACT programs for all major NOx facilities. The RACT programs are to apply to all facilities which emit or have the potential to emit greater than 100 tons per year of NOx. In the case of severe nonattainment areas such as the five-county Pennsylvania portion of Philadelphia CSMA facilities of greater than 25 tons per year of NOx are subject to RACT requirements.

Regarding the applicability, if the facility's "potential to emit" was above the RACT threshold (e.g 100 TPY) but the actual emissions for the year 1990 calendar year and for the subsequent years were below the threshold, the facility has the option to accept a federally enforceable condition to limit the emissions to be under the applicability

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threshold. Such a condition would make the facility "synthetic minor" and would not be subject RACT requirements. Since the Pennsylvania's operating permit is not currently federally enforceable, the permit amendment with such conditions must be incorporated in to Pa's SIP as revisions in order to make them federally enforceable.

On the other hand, if the facility's actual emissions for the calendar year 1990 were above the RACT applicability threshold, the facility could never be made "synthetic minor" even if the facility is willing to limit the emissions in the future. Thus such facility would be subject to the RACT.

## NOx Emissions Distribution By Source

Statewide, mobile sources make up 31% of the total NOx emissions. The remaining 69% comes from stationary sources. Of the latter, the utility industry accounts for 80% of the total NOx emissions. Natural gas transmission accounts for 5% of the total stationary source NOx emissions while the remaining 15% of NOx is derived from miscellaneous sources. Of these miscellaneous sources, glass manufacturing accounts for slightly greater than 1% of the total NOx emissions and asphalt plants less than 1% of the total. Other industries include miscellaneous utilities at 1%, metallurgical at 3%, chemical industry at less than 1%, refining at 2%, mineral industry at 3%, and all other sources at 5%. (See Figure 2 and Table 1) This information was extracted from Pennsylvania Emission Data System (PEDS). Due to thresholds established for including in the PEDS, all the sources in some source categories such as asphalt plants were not included in the PEDS.

The proposed NOx RACT standards are mandated for the ozone non-attainment areas and are part of the strategy to bring Pennsylvania into attainment of the NAAQS for ozone. Due to the implementation of RACT we anticipate the NOx emissions from stationary sources to be reduced by about 35-40 percent.

Preliminary emissions modeling via ROMNET indicates that the first stage RACT reductions may not be sufficient to achieve NAAQS by the stipulated deadlines. Therefore, additional emission reductions may be necessary to achieve attainment of ozone standard in Pennsylvania.

Other states are in various stages of developing their NOx RACT. A summary of their regulations may be found in Table 2 at the end of this document.

## II. GUIDANCE FOR SUBMITTING RACT PROPOSALS FOR MAJOR NOX SOURCES:

The final regulation does establish presumptive RACT requirements for three major classes of NOx emitters. For certain small combustion units and certain other classes of fossil fuel burning equipment, presumptive RACT is determined to be the operation of the sources in accordance with

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the manufacturer's specifications. For certain larger combustion units, RACT is specified to be an annual tune-up and combustion adjustments to provide for low-NOx emitting operation. For very large coal fired combustion units, presumptive RACT is specified to be a low-NOx burner system with separate overfire air.

Although presumptive RACT requirements are contained in the final regulation for certain NOx sources, a source operator may elect to use a case-by-case analysis to establish RACT requirements.

Facilities which are subject to RACT are required to identify themselves within four months of the date of publication of the final regulations in the Pennsylvania Bulletin. These facilities are required to submit a written proposal for RACT for each source to the Department and EPA within six months of adoption of the regulations. All affected facilities must be in compliance with the NOx RACT regulations by May 31, 1995. This deadline is mandated by the CAAA. Therefore, the owner or operator of a source or facility for which RACT is required must obtain approval for a RACT proposal and implement it by May 31, 1995.

Implementing the plan includes obtaining the required permits, installing the approved NOx control, implementing process changes, and complying with all emission limits established by the Department. An owner or operator seeking a RACT determination, and installing an air pollution control device must also submit an application for a Plan Approval, as specified in Chapter 127.

Because the date of RACT implementation is fixed and not dependent upon intermediate events or other regulation promulgation, some facilities may be tempted to initiate control/process changes in the name of RACT without proper permitting. These industries run the risk of wasting money and time on projects which will not pass the review process. Therefore, facilities should obtain approval prior to proceeding with the implementation of the plan.

The case-by-case RACT determinations will require EPA approval as SIP revisions. The Department will coordinate its review of RACT proposals with EPA. The Department will expedite the SIP hearing and submission to assure EPA action as early as possible. After EPA's approval of the RACT regulation, the RACT program which implements the presumptive RACT requirements will not require SIP approval. Sources meeting the presumptive levels contained in the regulation do not have to prepare an alternative analysis identifying and evaluating different control scenarios.

## **Presumptive RACT requirements for oil/gas fired combustion units**

It was brought to the Department's attention that the language in the regulation (§ 129.93 (b) (4) could be interpreted as the only presumptive RACT requirement for oil, gas and combination oil/gas fired units irrespective of heat input is recordkeeping. As indicated in the

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background material provided to EQB, the Department's intent was for the oil/gas fired units with rated heat inputs greater than 50 million Btu per hour to be handled through the case-by-case process. The record keeping requirement was intended to be applicable to the oil/gas fired units with rated heat inputs equal to or greater than 20 million Btu per hour. The regulation should be read as follows:

§129.93 (b) (4) (Add the underlined language)

(4) For oil, gas and combination oil/gas units subject to subsection (2), the owner and operator shall maintain records including a certification from the fuel supplier of the type of fuel and for each shipment of distillate oils number 1 or 2, a certification that the fuel complies with ASTM D396-78 "Standard Specifications for Fuel Oils". For residual oils minimum recordkeeping includes a certification from the fuel supplier, of the nitrogen content of the fuel, and identification of the sampling method and sampling protocol.

The Department is planning to clarify the intent of Section 129.93 (b) (4) through an amendment to the regulation. Content of RACT Proposal:

The RACT proposal shall include at a minimum:

- 1) A list of each unit subject to the NOx RACT regulations;
- 2) The size or capacity of each affected unit and the types of fuel or fuels combusted in each unit;
- 3) A complete description of each source;
- 4) Estimated NOx emissions and associated support documents;
- 5) RACT analysis including technical and economic support documentation for each affected source;
- 6) A schedule for the implementation of RACT including provisions for demonstrating periodic increments of progress and compliance with RACT
- 7) The testing, monitoring, record keeping and reporting procedures to be used to demonstrate compliance with RACT.
- 8) Additional information requested by the Department that is deemed necessary for the determination of RACT.

Guidance for the Case-by-Case RACT analysis:

RACT is defined 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.

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The RACT analysis must include a ranking of all applicable and available control technologies for the affected source in descending order of control effectiveness. The applicant first examines the most stringent or "top" alternative. If it can be shown that this level of control is technically or economically infeasible for the source under review, 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 economic objection.

## Step-by-step summary of the RACT analysis process:

### STEP 1 : Identify all applicable control technologies

The first step is to identify for each affected source all applicable and available control options. Available control options are those air pollution control technologies or techniques with a practical potential for application to the source. Air pollution control technologies and techniques include the application of production process or methods, control systems, and the fuel combustion techniques for the control of NOx. The control technologies shall include not only existing controls for the source category, but also technology transfer controls applied to similar source categories.

### STEP 2: Eliminate technically infeasible options

In the second step, the technical feasibility of the available control options identified in Step 1 is to be evaluated with respect to the source-specific factors. A demonstration of technical infeasibility should be clearly documented based on physical, or chemical and engineering principles, that technical difficulties would preclude the successful use of the control option on the affected source.

Technically infeasible control options are then eliminated from further consideration in the RACT analysis.

**Availability of Technically Feasible options:** If a technically feasible option cannot be implemented by May 31, 1995 due to temporary inability (for example, manufacturer's inability to supply the equipment on required schedule) such a option cannot be eliminated from RACT consideration. This issue will be dealt as an enforcement issue rather than a RACT determination issue.

### STEP 3: Rank remaining control technologies by control effectiveness

In step 3, all remaining control options not eliminated in Step 2 are ranked and then listed in order of overall control effectiveness for the NOx emissions. The list should present the array of control options and should include as a minimum the following information:

- 1) Baseline (before RACT) emissions

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- 2) control efficiencies
- 3) expected emissions after the application of the control option
- 4) economic impacts (both overall cost effectiveness and incremental cost effectiveness)

However, if the proposal selects the top control option the detailed cost analysis is not needed.

## Cost-effectiveness:

Cost-effectiveness, in terms of dollars per ton of NOx emissions reduction, is the key criterion to be used in assessing the economic feasibility of a control option. In the economic impacts analysis, primary consideration should be given to quantifying the cost of control and not the economic situation of the affected facility. By expressing costs in terms of the amount of emission reduction achieved, comparisons can be more readily performed among the same type of sources for different facilities.

The cost-effectiveness calculations can be conducted on an average or incremental basis. Average cost-effectiveness is calculated as the annualized cost of the control option being considered divided by the baseline emissions minus the control option emission rate, as shown by the following formula:

Average cost effectiveness (\$/ton removed) =

$$\frac{\text{Control option annualized cost (\$/yr)}}{\text{Baseline emission rate - Control option rate (tons/yr)}}$$

The average cost-effectiveness is also referred to as overall or total cost effectiveness.

The baseline emissions rate represents the maximum emissions before the application of the RACT. It should be calculated using either continuous emission monitoring data (CEM), test results or approved emission factors and historic operating data.

The incremental cost effectiveness calculation compares the costs and emission level of a control option to those of the next most stringent option as shown in the following formula:

Incremental Cost (dollars per incremental ton removed) =

$$\frac{\text{Total cost (annualized) of control option - Total cost (annualized) of next option}}{\text{Next control option emission rate - control emission rate}}$$

Incremental cost-effectiveness comparisons should focus on annualized cost and emission reduction differences between dominant control options.

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The incremental cost-effectiveness should be examined in conjunction with the total cost effectiveness in order to justify elimination of a control option. The primary focus will be on the total cost effectiveness.

For the cost estimates to be used in the economic analysis the data supplied by an equipment vendor (i.e., budget estimates or bids) must be used as much as possible. The basis of the estimates must be thoroughly documented in the RACT analysis. The cost analysis must be consistent with OAQPS Control Cost Manual, (Fourth Edition), EPA 450/3-90-006, January 1990 or as revised.

## STEP 4 : Selection of RACT

The Department will generally consider the control option to be cost effective if the total cost effectiveness is no greater than \$1500 per ton of NOx reduced.

In addition to the average cost effectiveness of \$1500/ton, other factors such as the incremental cost effectiveness and other environmental impacts will also be considered in the RACT determination. For example, a control option with average cost effectiveness less than \$1500/ton would not be automatically considered as a RACT option if it causes significant adverse impact on the other media. The adverse side effects of each control option must be factored in the RACT determination process.

We should caution that US EPA Region III has stated that establishing any dollar figure in RACT guidance will not provide for an "automatic" selection or rejection of a control technology or emission limitation as RACT for a source or source category. We also understand that EPA headquarters is planning to finalize a guidance document on cost effectiveness for NOx RACT analysis. The document will suggest that a cost effectiveness of up to \$2,500 is reasonable.

## Rationale for selection of cost effectiveness criteria:

It should be noted that in Pennsylvania the number of affected sources and the types of sources are substantially greater than most of the states in Ozone Transport Region (OTR). Also, the baseline emissions of these sources vary widely. Thus, there is a need for a case-by-case RACT determination as opposed to one set of presumptive limits. While it is appropriate to establish site specific limits the degree of control must be comparable to the other states in OTR.

We applied the following criteria in establishing the cost-effectiveness level. First, the cost of control should be fair and equitable to all. Second, the acceptable control costs should be comparable to costs required to employ the presumptive technology requirements for the large coal fired boilers. Third, the cost effectiveness should be reasonable when compared to the acceptable costs

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established in the existing permitting or regulatory process such as the acceptable costs for BACT determination for new NOx sources and control cost for sources of volatile organic compounds (the other major ozone precursor) to comply with existing RACT regulations based on EPA's guidelines. Finally, the cost-effectiveness should be comparable to that established in other states in the OTR.

The presumptive RACT requirements included in our regulations for coal-fired combustion units with a rated heat input equal to or greater than 100 million Btus per hour, are the installation and operation of low-NOx burners with separated overfire air (LNB-SOFA). As per EPA document "Evaluation and Costing of NOx Controls for Existing Utility Boilers in the NESCAUM Region", the control costs for LNB-SOFA vary from \$270 to \$1,590 per ton of NOx removed depending on site specific factors (such as the type of boiler, size of the boiler and the amount of utilization). 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-\$1500 per ton. In fact, two NOx RACT proposals using LNB-SOFA have documented cost of \$1,222 and \$1,298 per ton.

Therefore, we decided to apply an target limit of one level to all source categories and the level will be set at \$1500 per ton.

The Department suggests using \$1,500 because it is comparable, but, lower than the control cost for sources of volatile organic compounds (the other major ozone precursor) to comply with existing RACT regulations based on EPA's guidelines. For volatile organic compounds, required controls for existing sources are estimated to cost as much as \$3,000 per ton removed.

Also, the cost of presumptive RACT emission limitations for utility boilers in other states have been estimated as \$570 to \$1,500. Finally, the costs to comply with the presumptive NOx RACT emission levels for other sources in other states is as much as \$2,000 per ton removed. It should be noted for BACT determination for NOx emission sources the acceptable cost effectiveness have been as much as \$4,000.

In addition to the average cost effectiveness of \$1500/ton, the other factors such as the incremental cost effectiveness and other environmental impacts will also be considered in the RACT determination.

Therefore, the use of \$1,500 as a target value for one of criteria in the determination of RACT is reasonable.

## STEP 5 : Establishment of RACT Emission Limit

If enough uncertainty exists in establishing a final RACT emission limit with the control option chosen by the above procedure, the Department may establish a never-to-exceed preliminary emission limit. The

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preliminary emission limits for the electric utilities must generally not be less stringent than the emission limits recommended in the EPA's preliminary presumptive RACT levels for electric utility boilers. The final limit is established after adequate actual data is collected with the application of approved technology. The presumptive RACT technology for the coal-fired units with a heat input greater than or equal to 100 Million BTU per hour is "low-NOx burner with a separate OFA". The final limit will be established prior to issuing an operating permit based on the CEM or predictive modeling system or periodic stack test results. In the case of combustion units with a heat input greater than or equal to 250 Million BTU per hour, only a Department-approved CEM system is acceptable for the establishment of the final limit. The CEM system is intended to be any system which meets the performance specification included in the Department's Continuous Source Monitoring Manual. In the case of combustion units with a heat input greater than 100 Million BTU per hour but less than 250 Million BTU per hour source test results may be used in the establishment of limits and the compliance with such limit will be based on the average of three consecutive test runs. A periodic source testing will be required for the verification of the limit. As a minimum, the source testing will be required on annual basis. As the emission data base is established and the data consistently show compliance by a significant margin the testing frequency may be altered. However, the source owner/operator may opt for a predictive modeling program or a CEM system in lieu of periodic testing. The predictive modeling system shall identify and correlate various operating parameters with NOx emission levels through source testing. This predictive modeling program must be approved by the Department. The final limit will be set based upon the available data with an adequate margin for the normal fluctuation of emission levels. The averaging period is generally limited to a 24-hour average in order to protect the hourly ozone standard. Especially for larger sources, a daily averaging may be necessary to accommodate the normal fluctuations of the emission levels. However, the Department may establish a 30-day rolling average in addition to a daily average. The 30-day rolling average may be used to calculate annual baseline emissions for future offset generation. In certain cases the Department may accept the averaging period of 24-hour during the ozone season and a 30 day averaging period during the non-ozone season provided a satisfactory technical/economic justification was made. For the purpose of RACT compliance, the ozone season is defined as the period between April 1 to October 31. The detailed procedure can be found in section IV of this document.

## Guidance for coal-fired units proposing to employ the presumptive RACT

For coal-fired combustion units with a rated heat input equal to or greater than 100 million Btus per hour, presumptive RACT requirements are the installation and operation of low-Nox burners with separated overfire air. A low-NOx burner with separated overfire air is defined as a burner design capable of reducing the formation of oxides of nitrogen (NOx) emissions through sub-stoichiometric combustion of fuel by means of a burner assembly consisting of two or more stages and the addition of

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secondary combustion air introduced downstream of the burner location. It is intended that the system be designed to employ the highest degree of staging practicable.

For example, in the case of a tangentially fired (T-fired) combustion unit proposing ABB's Low-NOx Concentric Firing System (LNCFS), presumptive RACT technology is the LNCFS III version unless it is shown that LNCFS III is not feasible either technically or economically. If a LNCFS system or an equivalent low-NOx burner with a SOFA, is proposed as RACT for a T-fired unit the RACT analysis need not address the feasibility of post combustion technologies. However, if LNCFS III is not proposed as RACT the RACT analysis must demonstrate satisfactorily that LNCFS III is not feasible.

#### Procedure to generate Emission Reduction Credits:

Emission reduction credit (ERC) is defined as a permanent, enforceable, quantifiable and specific reduction which can be considered as a reduction for the purpose of offsetting increases.

"Surplus" emission reductions are reductions not otherwise required by the applicable state implementation plan (SIP) and not already relied upon for SIP planning purposes, and not used by the source to meet any other regulatory requirements. Thus, emission reductions necessary to meet RACT or other statutory requirements such as acid rain limitations are not considered surplus and may not be creditable for emission offsets. In order for NOx emission reductions to be creditable, a federally enforceable RACT determination must have been made. Any reduction beyond the reductions required by RACT is eligible as surplus and thus available for netting or ERC banking purposes. As stated earlier RACT is defined as the lowest emission limitation that a particular source is capable of meeting by application of a control technology that is reasonably available. Therefore, "surplus" cannot be created with the approved RACT control option by merely achieving a lower emission level than the final limit without implementing additional control measures (not including the measures needed to optimize the selected RACT control option) or curtailment of operation. The "surplus" reductions can be achieved by any method, including curtailment of operation (operational limitation, production limits), improved control technologies or measures, shutdown or some combination thereof.

The following procedures will be followed to quantify creditable ERC's generated through the installation of control measures which are determined by the Department to be clearly more stringent than the RACT requirements. The emission reductions achieved via this "overcontrol" must necessarily be greater than reductions that would reasonably be expected from RACT measures.

1. The initial and most important task is to determine the appropriate RACT control technology and estimated emission level reflecting the application of the chosen RACT technology. The Department will use the available technical information in defining this technology and estimating

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the corresponding emission levels. RACT level will be the lowest emission limitation that a particular source is capable of meeting by application of a control technology that is reasonably available. It is also important that these estimated emission levels accurately reflect the maximum degree of control achieved or capable of achievement by similar sources that actually employ similar controls as RACT.

2. After the installation and emission testing of the "overcontrol" technology and establishment of the final NOx emission limit, the comparison will be made between this final emission limit achieved through "overcontrol" and the emission level previously determined for the Department-approved RACT control system. The difference between these two emission rates will be the emission rate used with the fuel consumption data to calculate creditable emission reductions.

3. If an applicant wishes to bank the ERCs due to "overcontrol" prior to installation of "overcontrol" technology, a federally enforceable NOx emission limit reflecting the "overcontrol" will be included in the plan approval. The difference between the NOx limit and the emission level previously determined for the Department-approved RACT control system will be the emission rate used with the fuel consumption data to calculate creditable emission reductions.

It should be noted that the new source which intends to use the ERCs created by the "overcontrol" of this existing source cannot commence operation until the successful implementation of the "overcontrol" technology.

**Example:** A utility might opt to install an SCR system in lieu of the presumptive RACT technology of LNB-SOFA system on a tangentially-fired boiler with a baseline emission rate of 0.80lb NOx/MMBtu. The existing data on LNB-SOFA on T-fired boilers indicate that up to 50% emission reduction could be achieved by this system. Therefore the the projected emission level after the application of RACT technology is 0.40lb NOx/MMBtu. After the SCR retrofit, the unit achieves an emission rate of 0.13 lb NOx/MMBtu. The difference between 0.40 and 0.13 or 0.27 lb NOx/MMBtu is the rate used with the fuel analysis and consumption data to calculate the creditable NOx ERC's.

### III. NOx EMISSION AVERAGING FOR RACT COMPLIANCE:

The Department may approve emission averaging among facilities to provide flexibility in complying with the RACT requirements provided the following criteria are met:

1) The NOx emission reductions achieved through the RACT averaging plan must be no less than the emission reductions that would be achieved by complying with the RACT requirement on a source specific basis.

2) The averaging program shall include a tons per year emission

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cap for each facility that in the aggregate is less than the aggregate of the emissions that would occur from each facility complying individually. In addition, each source shall have an emission rate limit such as lb/mmBTU to provide for independent verification and enforcement of the averaging program.

3) No credit shall be given for emission reductions that are achieved through the shutdown or curtailment of an operation included in the averaging program.

4) The ambient impact from the averaging program must be less than or equivalent to the impact from each source complying individually. This equivalence must be demonstrated both spatially and temporally.

5) The averaging program must be approved as a SIP revision prior to becoming effective.

6) The sources involved in the averaging program shall be required to continuously monitor and record the emissions. In addition the participating facilities are required to establish telemetry links between the facilities to provide real time emission data to all facilities affected by the averaging. For an averaging proposal involving sources at a single facility, the Department may approve alternate requirements provided the proposal demonstrates that the alternate methodologies are credible, workable, replicable and fully enforceable and adequately quantify emissions from all sources participating in the averaging program.

7) The emission averaging programs must be subject to an adequate enforcement mechanism. All the parties involved in the averaging should be held responsible for exceedances of the final RACT requirements.

## Emission Averaging:

The emission averaging program may allow some emission sources to emit at a rate that is higher than the RACT rate (which was determined on a case-by-basis) as long as there is a compensating population of emission sources emitting at a rate that is lower than the RACT emission limitation. The allowable emission rate is proportional to the production level. The aggregate of actual emissions from the sources participating in the program must not exceed the aggregate of allowable emissions of those sources.

## Air Quality Equivalence:

Traditionally, demonstrations of air quality equivalence required modeling. The modeling demonstrations may be waived, if:

1) the credit generating source in the averaging plan is located in an area with an equal or higher non-attainment designation than the credit consuming source; or,

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2) all sources included in the averaging plan are located within the attainment areas and located in the same broad vicinity; or,

3) all the sources included in the averaging plan are located within the same non-attainment area.

4) all the sources included in the averaging proposal which are not located within the same nonattainment area but are located less than 200 kilometers from any other source involved in the averaging proposal.

## Step-by-Step Procedure:

1) Identify the RACT allowable emission levels for each source participating in the averaging plan through case-by-case analysis.

2) The Department sets an allowable source-specific emission rate for each source so that the following equation is met for the maximum allowable averaging period of 24 hours.

$$\sum_{i=1-N} (\text{Case-by-case RACT Allowable } ER_i) \times (\text{Projected Activity Level}_i) \geq \sum_{i=1-N} (\text{Source Specific Allowable } ER_i) \times (\text{Projected Activity Level}_i)$$

Where  $i$  = each emission source participating in the averaging plan  
 $N$  = the total number of emission units participating in the averaging plan.  
Source Specific Allowable  $ER_i$  = Department imposed emission rate limit for emission source  $i$ .

Projected activity level  $i$  = Estimate of future activity level for emission source  $i$

3) The aggregate of actual emissions from the sources participating in the plan must not exceed the aggregate of allowable emissions of those sources. The compliance will be verified by the following equation:

$$\sum_{i=1-N} (\text{Source Specific Allowable } ER_i) \times (\text{Actual Activity Level}_i) \geq \sum_{i=1-N} (\text{Actual Emission Rate}_i) \times (\text{Actual Activity Level}_i)$$

## IV. ESTABLISHMENT OF EMISSION LIMITATIONS FOR COAL-FIRED COMBUSTION UNITS WITH RATED HEAT INPUT GREATER THAN 100 MMBTU/HR:

Following the installation of approved RACT technology, Section 129.91 (j) requires the Department to determine the RACT emission limitation for combustion units with rated heat inputs greater than 100 MMBtu/hr. The determination of this maximum limit is to be based upon emissions data obtained either from approved continuous emission monitoring system or an alternate approved methodology. The following

# Appendix 1

procedure shall be used for establishing the final RACT emission limit. The Department may approve an alternate methodology if it was demonstrated that the alternate methodology is more appropriate than the one included in the guidance document. In cases involving multiple sources emitting through a single stack, the methodology to establish the individual emission limits will be approved on a case-by-case basis.

1. A minimum of 90% valid daily averages for a period not less than six months and no more than a year is required. Conventionally, arithmetic average of hourly emission rate (lb/mmBTU) is used calculate the daily average. As an alternate, the facility may use the mass-weighted method, i.e. dividing the total mass of NOx emitted for the day by the total heat input over the same period. The CEM must be certified for the approved method.

A longer period (longer than a year) may be approved if it is demonstrated that a longer period is necessary to represent the normal operation.

2. The data from step one is to be subjected to the Shapiro-Wilk Test of Normality. In this test, data is to be subjected to analysis in two formats. First, the raw data is tested for normal distribution. Second, the existing data is converted to natural logs and tested for log-normal distribution. Based upon these two analysis, the distribution with the highest resulting Shapiro-Wilk statistic will become the distribution for determining the emission limit.

Note: Shapiro-Wilk routines are available through the SAS statistical programs.

3. If the Shapiro-Wilk's test indicates normal distribution, the arithmetic mean of daily average of the data will be used in the final emission limit calculation. The arithmetic mean of the data is defined as follows:

$$\text{Arithmetic mean} = \frac{\sum_{i=1}^n X_i}{n} \quad \text{Where } n = \text{number of data points} \\ \text{and } X_i = \text{ith data point}$$

If the Shapiro-Wilk's test indicates log-normal is the best distribution, then the geometric mean of the data will be used in the final emission calculation. The geometric mean is defined as:

$$\text{Geometric mean} = \exp\left[ \frac{\sum_{i=1}^n (\ln X_i)}{n} \right]$$

Where exp = the natural antilog of the expression

4. The final emission limit is then determined from the following equation (based on one exceedence per year):

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NOx RACT GUIDANCE

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For normally distributed data:

Emission rate = Arithmetic mean + (2.777 \* Standard Deviation)

\*

For log normally distributed data:

Emission rate = Median \* (Geometric dispersion)<sup>2.777</sup>

Where Geometric dispersion = antilogarithm of standard deviation of the logarithm of data.

Median = 50th percentile of the distribution of  $x_i$

The calculated emission limit must not generally exceed the preliminary limit imposed in the RACT approval.

Reference: Municipal Waste Combustion: Background Information for Promulgated Standards and Guidelines-Summary of Public Comments and Responses Appendices A to C, U.S. EPA, EPA-450/3-91-004, December 1990.

# Appendix 2



## NORTHEAST STATES FOR COORDINATED AIR USE MANAGEMENT (NESCAUM)

### MEMBERS:

CONNECTICUT BUREAU OF AIR MANAGEMENT  
MAINE BUREAU OF AIR QUALITY CONTROL  
MASSACHUSETTS DIVISION OF AIR QUALITY CONTROL  
NEW HAMPSHIRE AIR RESOURCES DIVISION

NEW JERSEY OFFICE OF ENERGY  
NEW YORK DIVISION OF AIR RESOURCES  
RHODE ISLAND DIVISION OF AIR AND HAZARDOUS MATERIALS  
VERMONT AIR POLLUTION CONTROL DIVISION

### NESCAUM Stationary Source Committee Recommendation On NO<sub>x</sub> RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines

September 18, 1992

The NESCAUM Stationary Source Review Committee is one of nine technical Committees established by the NESCAUM Board of Directors. The purpose of the committee is to provide an opportunity for engineers who review permits for new and existing sources to discuss common technical issues and provide some measure of consistency in the review of permits in the region. This recommendation has been developed in response to Sections 182(f) and 182(b)(2) of the Clean Air Act Amendments of 1990 (CAAA), which require states to impose Reasonably Available Control Technology (RACT) for sources that have the potential to emit nitrogen oxides (NO<sub>x</sub>) in excess of specified threshold amounts and are located in ozone nonattainment areas or in the ozone transport region. RACT is defined as follows:

"the lowest emission limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility"

The CAAA requires states to develop and submit NO<sub>x</sub> RACT regulations to the US EPA by November 15, 1992. All regulated sources must be in compliance with the NO<sub>x</sub> RACT regulations by May 31, 1995.

In the Northeast, approximately 40 percent of the annual NO<sub>x</sub> emissions are from stationary sources and 60 percent are from mobile sources. NO<sub>x</sub> emissions react photochemically with volatile organic compounds (VOC) to form ground-level ozone. NO<sub>x</sub> emissions also react to form gaseous and particulate acids and other toxic air pollutants. Large portions of the NESCAUM region are currently in nonattainment for ozone, and up to 35 million people are exposed to unhealthy ozone levels each summer in the Northeast. The US EPA's Regional Oxidant Modeling for Northeast Transport (ROMNET) Report (June 1991), which is regarded as the most sophisticated analysis of the regional ozone problem, indicates that a NO<sub>x</sub> emission reduction of more than 55%, in conjunction with substantial VOC emission reductions, will be necessary to achieve the ozone health standard. In 1987, NO<sub>x</sub> emissions from all sources in the NESCAUM region totaled approximately 1.6 million tons. NO<sub>x</sub> emissions from the three source categories addressed in this recommendation constitute a large fraction of total NO<sub>x</sub> emissions in the NESCAUM region (ranging from 10 to 15% of total NO<sub>x</sub> emissions for individual states).

Based on this information and the requirement of 1990 CAAA, the committee has developed NO<sub>x</sub> RACT recommendations for: (1) Industrial Boilers, (2) Internal

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## Appendix 2

Combustion Engines, and (3) Combustion Turbines. The NO<sub>x</sub> RACT limits presented here attempt to account for variations in fuel type, design of combustion units and heat input rate.

For all units (industrial boilers, internal combustion engines, and combustion turbines) with high uncontrolled emission rates, which make a clear technical demonstration that NO<sub>x</sub> RACT emission limits are not feasible, states may set higher unit-specific alternative emission limitations. Such limitations would be based on the capabilities of all available and applicable technology for combustion modification.

### *NO<sub>x</sub> RACT for Industrial Boilers*

Industrial boilers are steam-generating units that supply electric power and/or heat to an industrial, institutional or commercial operation, excluding boilers used by electric utilities to generate electricity.

The recommendation for NO<sub>x</sub> RACT for industrial boilers takes into account the maximum heat input rate of the boilers (in million of Btus/hour) and is as follows.

#### 1. Small Boilers (Boilers < 50 MMBtu/hr)

NO<sub>x</sub> RACT for small boilers will require appropriate adjustment of combustion process to minimize NO<sub>x</sub> emissions. The requirements for combustion adjustment will be developed by the individual states.

#### 2. Medium-Size Boilers (Heat Input Rate $\geq$ 50 MMBtu/hr but less than 100 MMBtu/hr)

- a. For boilers in this size range burning wood, coal or some fuel other than oil or gas, NO<sub>x</sub> RACT will be determined by the individual states on a case-by-case basis.
- b. For boilers in this size range burning natural gas, the recommended NO<sub>x</sub> RACT limit is a performance-based standard of 0.10 lb/MMBtu, to be met on a 1-hour averaging basis.
- c. For boilers in this size range burning #2 oil, the recommended NO<sub>x</sub> RACT limit is a performance-based standard of 0.12 lb/MMBtu, to be met on a 1-hour averaging basis.
- d. For boilers in this size range burning #4, #5, or #6 oil, the recommended NO<sub>x</sub> RACT is a technology-based standard requiring joint application of low-NO<sub>x</sub> burners and flue gas recirculation (with minimum circulation of 10 percent). In addition, sources will be required periodically to provide the states with data on nitrogen content of #4, #5 or #6 oil (percent weight basis).
- e. For b) and c) above, the performance-based standards are to be met on an annual, one-hour source test basis at steady state, maximum load conditions (average of three, one-hour stack tests).

#### 3. Large Boilers (Boilers $\geq$ 100 MMBtu/hr)

The Committee recommends that all large industrial boilers, burning oil, gas coal or other fuels (for example wood), be treated the same as electric utility boilers and must

# Appendix 2

comply with NO<sub>x</sub> RACT for electric utilities boilers, as published by NESCAUM ("NESCAUM Stationary Source Committee Recommendation on NO<sub>x</sub> RACT for Utility Boilers," August 12, 1992).

## *NO<sub>x</sub> RACT for Internal Combustion Engines*

The emission standards for internal combustion engines are for the control of NO<sub>x</sub> from existing internal combustion engines with a maximum heat input rate exceeding 3 MMBtu/hr. All proposed levels are based on a one-hour averaging period. Lean-Burn engines are those in which the amount of oxygen in the engine exhaust gases is 1.0% or more, by weight. Rich-burn engines are those in which the amount of oxygen in the engine exhaust gases is less than 1.0%, by weight. Rated brake horsepower (bhp) is as specified by the manufacturer and listed on the nameplate.

### 1. Rich-Burn Engines

- a. 1.5 grams per bhp-hr for gas-fired units

### 2. Lean-Burn Engines

- a. 2.5 grams per bhp-hr for gas-fired units
- b. 8 grams per bhp-hr for oil-fired units

The Stationary Source Review Committee believes that these NO<sub>x</sub> RACT limits are achievable through the application of three-way catalysts for rich-burn engines, and through the use of retarded engine timing or separate circuit after-cooling for lean-burn engines.

## *NO<sub>x</sub> RACT for Combustion Turbines*

The emission standards outlined below are for the control of NO<sub>x</sub> from existing combustion turbines. The recommendation applies to combustion turbines rated at 25 MMBtu/hr or above (maximum heat input rate).

The proposed levels are based on a one-hour averaging period.

### 1. Simple Cycle Combustion Turbines

- a. 55 parts per million volume dry (ppvmd) (corrected to 15% oxygen) for gas-fired turbines without oil back-up.
- b. 75 ppmvd (corrected to 15% oxygen) for oil-fired turbines
- c. for gas-fired turbines with oil back-up:
  1. 55 ppmvd (15% oxygen) when operating on gas
  2. 75 ppmvd (15% oxygen) when operating on oil

### 2. Combined Cycle Combustion Turbines

- a. 42 ppmvd (corrected to 15 % oxygen) for gas-fired turbines without oil back-up

## Appendix 2

- b. 65 ppmvd (corrected to 15% oxygen) for oil-fired turbines
- c. For gas-fired turbines with oil back-up:
  - 1. 42 ppmvd (15% oxygen) when operating on gas
  - 2. 65 ppmvd (15% oxygen) when operating on oil

The Stationary Source Review Committee believes that these NO<sub>x</sub> RACT limits are achievable through the application of water or steam injection and dry low-NO<sub>x</sub> combustion technology. Higher emission limits may be specified for an individual unit, on a case-by-case basis, if the owner of the stationary combustion turbine can make a demonstration that water injection is not feasible or that low-NO<sub>x</sub> combustors are not available for the make and model of turbine. Water injection not being feasible refers to either the unavailability of water (i.e., restrictions placed on water use), excessive costs associated with purifying the water (i.e., cleaning up salt water) or other factors associated with either the turbine or the location of the turbine, at the discretion of the states and the US EPA.

These recommendations were adopted by the NESCAUM Board of Directors on September 17, 1992.

### Appendix 3

LNB Cost analysis for combustion unit greater than 20 and less than 50 MMBtu/hr		20	50	Reference
Boiler Size (MMBtu/hr)		20	50	Reference
<b>DIRECT COSTS</b>				
Equipment Cost		\$128,700	\$128,700	Washington State Dept of Ecology (2006) adjusted with CPI for 2020
Instrumentation and Monitoring		\$12,870	\$12,870	(Typical 10% of EC)
Freight		\$7,722	\$7,722	6% of EC
Tax		\$7,722	\$7,722	6% of EC
Total Purchased Equipment Cost (TEC)		\$157,014	\$157,014	
<b>Direct Installation Cost</b>				
Foundation and Support		\$12,561	\$12,561	8% of TEC
Handling and Erection		\$21,982	\$21,982	14% of TEC
Electric		\$6,281	\$6,281	4% of TEC
Piping		\$3,140	\$3,140	2% of TEC
Painting		\$1,570	\$1,570	1% of TEC
<b>Indirect Installation Costs</b>				
Engineering and Supervision		\$15,701	\$15,701	10% of TEC
Construction and Field Expenses		\$7,851	\$7,851	5% of TEC
Contractor fees		\$15,701	\$15,701	10% of TEC
Contingencies		\$4,710	\$4,710	3% of TEC
<b>Other Indirect Costs</b>				
Startup and Testing		\$4,710	\$4,710	3% of TEC
<b>TOTAL CAPITAL COST (TCC)</b>		<b>\$251,222</b>	<b>\$251,222</b>	
<b>Direct Annual Costs</b>				
Electricity		\$26,280	\$26,280	Vendor's assumption of \$52,580 for 100 MMBtu/hr boiler
Material & Maintenance		\$12,561	\$12,561	5% of TCC (Most vendors)
<b>Indirect Annual Costs</b>				
Overhead		\$7,537	\$7,537	60% of Maintenance (EPA's O&MPS)
Property Tax+Ins.+Admn.		\$10,049	\$10,049	4% of TCC - O&MPS
Capital Recovery (5.5% @ 20 yrs)		\$21,027	\$21,027	
<b>TOTAL ANNUALIZED COST</b>		<b>\$77,454</b>	<b>\$77,454</b>	
<b>COST EFFECTIVENESS (\$/Ton of NOx removed)</b>				
Uncontrolled NOx emissions (lb/MMBtu)		0.2	0.2	
Uncontrolled NOx emissions (tons/year)		17.52	43.80	
NOx removed TPY (50% Eff.)		8.76	21.90	
<b>COST EFFECTIVENESS (\$/Ton of NOx removed)</b>		<b>\$8,841.78</b>	<b>\$3,536.71</b>	
<b>Oxidation Catalyst cost analysis for combustion unit greater than 20 and less than 50 MMBtu/hr</b>				
Boiler Size (MMBtu/hr)		20	50	Reference
<b>DIRECT COSTS</b>				
Equipment Cost		\$232,788	\$232,788	Grays Harbor Energy Project for 30 MMBtu/hr auxiliary boiler
Instrumentation and Monitoring		\$23,279	\$23,279	(Typical 10% of EC)
Freight		\$13,967	\$13,967	6% of EC
Tax		\$13,967	\$13,967	6% of EC
Total Purchased Equipment Cost (TEC)		\$284,002	\$284,002	

### Appendix 3

Direct Installation Cost				
Foundation and Support	\$22,720		\$22,720	8% of TEC
Handling and Erection	\$39,760		\$39,760	14% of TEC
Electric	\$11,360		\$11,360	4% of TEC
Piping	\$5,680		\$5,680	2% of TEC
Painting	\$2,840		\$2,840	1% of TEC
Indirect Installation Cost				
Engineering and Supervision	\$28,400		\$28,400	10% of TEC
Construction and Field Expenses	\$14,200		\$14,200	5% of TEC
Contractor fees	\$28,400		\$28,400	10% of TEC
Contingencies	\$8,520		\$8,520	3% of TEC
Other Indirect Costs				
Startup and Testing	\$8,520		\$8,520	3% of TEC
<b>TOTAL CAPITAL COST (TCC)</b>	<b>\$454,403</b>		<b>\$454,403</b>	
Direct Annual Costs				
Electricity	\$5,226		\$5,226	\$1,500 for 2500 hrs operation
Catalyst replacement	\$5,000		\$5,000	
Material & Maintenance	\$22,720		\$22,720	5% of TCC (Most vendors)
Indirect Annual Costs				
Overhead	\$13,632		\$13,632	60% of Maintenance (EPA's OADPS)
Property Tax + Ins + Admin.	\$18,176		\$18,176	4% of TCC - OADPS
Capital Recovery (5.5% @ 20 yrs)	\$38,034		\$38,034	
<b>TOTAL ANNUALIZED COST</b>	<b>\$102,788</b>		<b>\$102,788</b>	
Uncontrolled VOC emissions (lb/MMBtu)	0.0036		0.0036	VOC emission at 3 ppm corrected at 3% oxygen
Uncontrolled VOC emissions (ton/year)	0.32		0.79	
VOC removed TPY (50% Eff.)	0.16		0.39	
<b>COST EFFECTIVENESS (\$/ton of VOC removed)</b>	<b>\$651,876.31</b>		<b>\$260,750.52</b>	

# Appendix 4

LNB Cost analysis for combustion unit with uncontrolled NOx emission at 5 tons per year		Reference
Boiler Size (MMBtu/hr)	50	
<b>DIRECT COSTS</b>		
Equipment Cost	\$128,700	Washington State Dept of Ecology (2006) adjusted with CPI for 2020
Instrumentation and Monitoring	\$12,870	(Typical 10% of EC)
Freight	\$7,722	6% of EC
Tax	\$7,722	6% of EC
Total Purchsed Equipment Cost (TEC)	\$157,014	
<b>Direct Installation Cost</b>		
Foundation and Support	\$12,561	8% of TEC
Handling and Erection	\$21,982	14% of TEC
Electric	\$6,281	4% of TEC
Piping	\$3,140	2% of TEC
Painting	\$1,570	1% of TEC
<b>Indirect Installation Cost</b>		
Engineering and Supervision	\$15,701	10% of TEC
Construction and Field Expenses	\$7,851	5% of TEC
Contractor fees	\$15,701	10% of TEC
Contingencies	\$4,710	3% of TEC
<b>Other Indirect Costs</b>		
Startup and Testing	\$4,710	3% of TEC
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>	<b>\$251,222</b>	
<b>Direct Annual Costs</b>		
Electricity	\$26,280	Vendor's assumption of \$52.580 for 100 MMBtu/hr boiler
Material & Maintenance	\$12,561	5% of TCI (Most vendors)
<b>Indirect Annual Costs</b>		
Overhead	\$7,537	60% of Maintenance (EPA's OAQPS)
Property Tax+Ins.+Admn.	\$10,049	(4% of TCI - OAQPS)
Capital Recovery (5.5% @ 20 yrs)	\$21,027	
<b>TOTAL ANNUALIZED COST</b>	<b>\$77,454</b>	
<b>Uncontrolled NOx emissions (tons/year)</b>		
	5.00	
<b>NOx removed TPY (50% Eff.)</b>		
	2.50	

# Appendix 4

COST-EFFECTIVENESS (\$/Ton NOx removed)		\$30,981.60
Oxidation Catalyst cost analysis for combustion unit with uncontrolled VOC emission at 2.7 tons per year		
Boiler Size (MMBtu/hr)	50	Reference
<b>DIRECT COSTS</b>		
Equipment Cost	\$232,788	Grays Harbor Energy Project for 30 MMBtu/hr auxiliary boiler
Instrumentation and Monitoring	\$23,279	(Typical 10% of EC)
Freight	\$13,967	6% of EC
Tax	\$13,967	6% of EC
Total Purchased Equipment Cost (TEC)	\$284,002	
<b>Direct Installation Cost</b>		
Foundation and Support	\$22,720	8% of TEC
Handling and Erection	\$39,760	14% of TEC
Electric	\$11,360	4% of TEC
Piping	\$5,680	2% of TEC
Painting	\$2,840	1% of TEC
<b>Indirect Installation Cost</b>		
Engineering and Supervision	\$28,400	10% of TEC
Construction and Field Expenses	\$14,200	5% of TEC
Contractor fees	\$28,400	10% of TEC
Contingencies	\$8,520	3% of TEC
<b>Other Indirect Costs</b>		
Startup and Testing	\$8,520	3% of TEC
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>	<b>\$454,403</b>	
<b>Direct Annual Costs</b>		
Electricity	\$5,226	\$1,500 for 2500 hrs operation
Catalyst replacement	\$5,000	
Material & Maintenance	\$22,720	5% of TCI (Most vendors)
<b>Indirect Annual Costs</b>		
Overhead	\$13,632	60% of Maintenance (EPA's OAQPS)
Property Tax+Ins.+Admn.	\$18,176	(4% of TCI - OAQPS)
Capital Recovery (5.5% @ 20 yrs)	\$38,034	

# Appendix 4

TOTAL ANNUALIZED COST	\$102,788
Uncontrolled VOC emissions (tons/year)	2.70
VOC removed TPY (50% Eff.)	1.35
COST-EFFECTIVENESS (\$/Ton VOC removed)	\$76,139.15

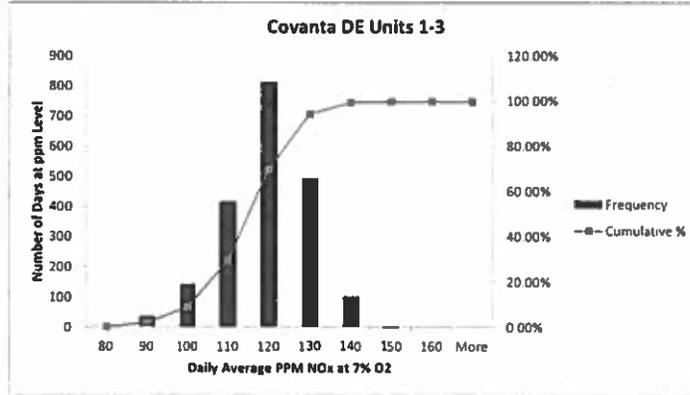
# Appendix 5

Cost Analysis for SNCR for Municipal Waste Combustor		
Cost estimate	Assumed average large MWC in PA	Factors Used
Daily throughput municipal waste (tpd waste)	500	Assumed average large combustor (Range 300 - 600 tpd)
Hrs/Yr	8760	
Reference NOx emissions in lbs/hr	109.00	Permit limit for Covanta Plymouth 109 lb/hr and 180 ppm@7%O2
Total Capital Cost	\$1,392,000	Based on \$464,000 for 200 tpd MWC at Olmstead, MN for 2007
TOTAL CAPITAL COST (TCC)	\$1,726,080.00	With CPI from 2007 - 2020 (1.24)
Direct Annual Costs		
Electricity	\$95,124	\$0.0676 kw/hr
Chemical Cost (Urea/Ammonia)	\$88,500	Based on \$29,500 for 200 tpd MWC at Olmstead, MN for 2007
Administration (3% of maintenance+labor)	\$3,154	3% of maintenance +labor
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	100% of maintenance labor
Indirect Annual Costs		
Annualized Capital Recovery Cost (20 yrs at 5.5%)	\$144,473	TCC*0.0837
Property Taxes (1% of TCC-OAQPS)	\$17,261	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$17,261	1% of TCC (OAQPS)
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	60% of Maintenance Cost (OAQPS)
TOTAL ANNUALIZED COST	\$470,892	This is close to Annual Operating cost*3 for Olmstead for 200 tpd MWC
Uncontrolled NOx TPY	477.42	
NOx removed TPY (40% Eff.)	190.97	
COST-EFFECTIVENESS (\$/Ton NOx removed)	\$2,465.82	

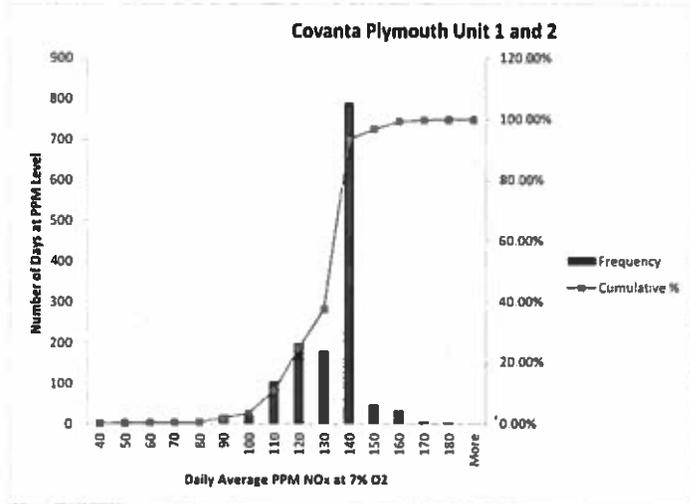
# Appendix 6

## NOx emission test results from all MWCs for 2018 and 2019

Bin	Frequency	Cumulative %
80	1	0.05%
90	35	1.78%
100	143	8.86%
110	418	29.55%
120	818	70.05%
130	496	94.60%
140	103	99.70%
150	5	99.95%
160	1	100.00%
More	0	100.00%

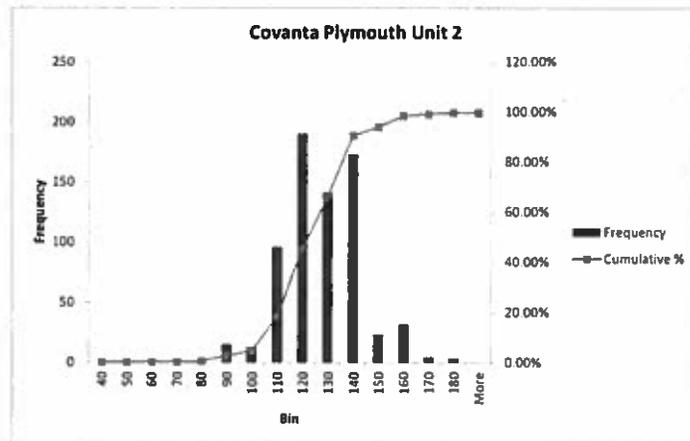


Bin	Frequency	Cumulative %
40	1	0.07%
50	1	0.14%
60	2	0.28%
70	0	0.28%
80	2	0.42%
90	21	1.91%
100	27	3.46%
110	104	10.80%
120	199	24.84%
130	180	37.54%
140	792	93.44%
150	48	96.82%
160	34	99.22%
170	7	99.72%
180	4	100.00%
More	0	100.00%



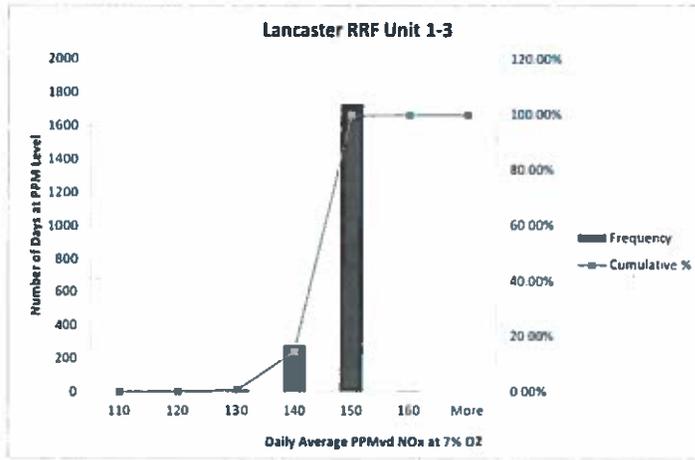
45 days over 150 PPM Nox  
 41 days occurred on unit 2  
 All but 5 of the 42 days occurred from 11/7/2019  
 to 1/8/2020

Bin	Frequency	Cumulative %
40	0	0.00%
50	0	0.00%
60	2	0.29%
70	0	0.29%
80	2	0.57%
90	15	2.72%
100	13	4.58%
110	96	18.31%
120	191	45.64%
130	142	65.95%
140	173	90.70%
150	24	94.13%
160	32	98.71%
170	5	99.43%
180	4	100.00%
More	0	100.00%

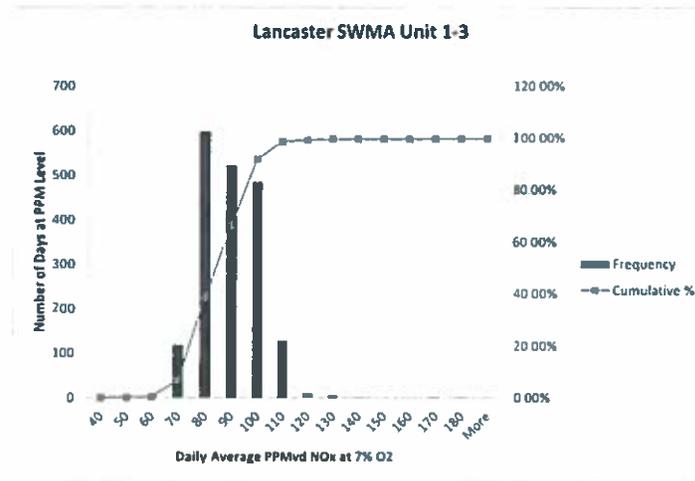


# Appendix 6

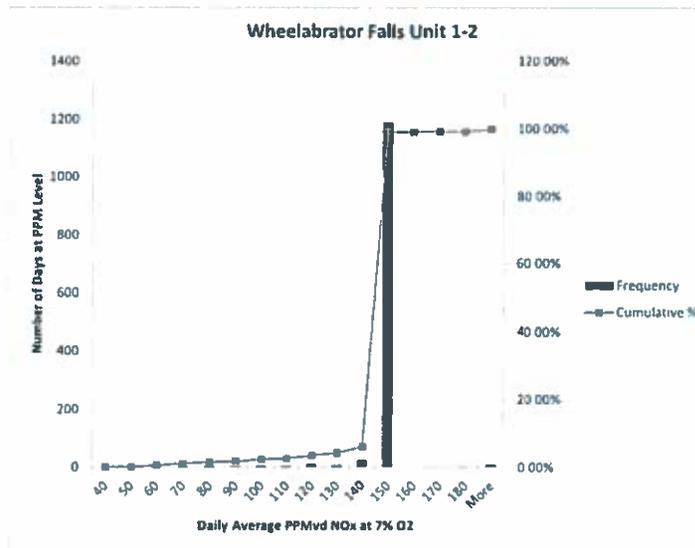
Bin	Frequency	Cumulative %
110	0	0.00%
120	1	0.05%
130	14	0.74%
140	281	14.57%
150	1733	99.85%
160	2	99.95%
More	1	100.00%



Bin	Frequency	Cumulative %
40	0	0.00%
50	2	0.11%
60	7	0.48%
70	120	6.83%
80	600	38.61%
90	523	66.31%
100	485	92.00%
110	130	98.89%
120	11	99.47%
130	6	99.79%
140	1	99.84%
150	0	99.84%
160	0	99.84%
170	2	99.95%
180	1	100.00%
More	0	100.00%



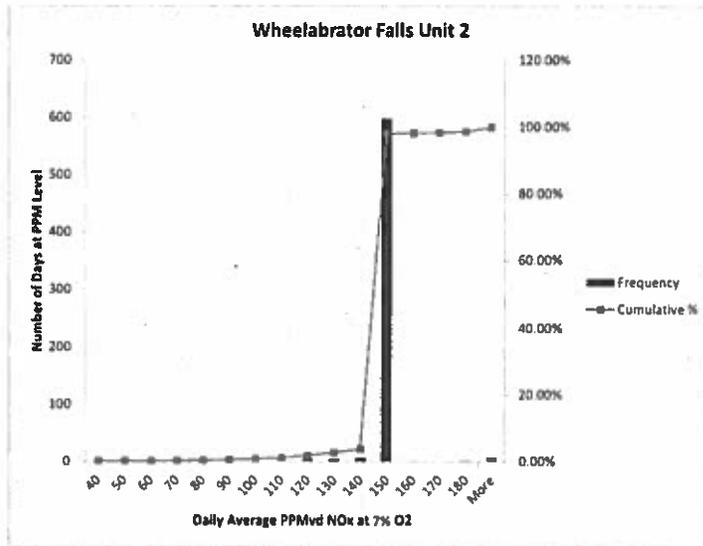
Bin	Frequency	Cumulative %
40	1	0.08%
50	1	0.16%
60	7	0.70%
70	5	1.09%
80	5	1.48%
90	4	1.79%
100	7	2.34%
110	4	2.65%
120	11	3.51%
130	10	4.29%
140	25	6.24%
150	1191	99.06%
160	1	99.14%
170	1	99.22%
180	2	99.38%
More	8	100.00%



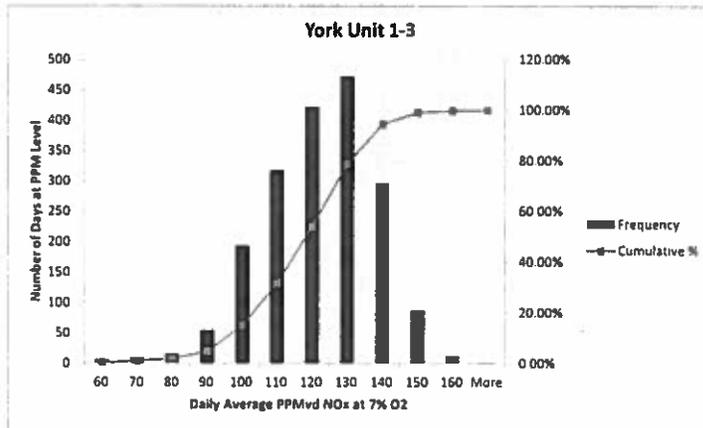
12 days over 150 PPM Nox  
All occurred on unit 2

# Appendix 6

Bin	Frequency	Cumulative %
40	1	0.16%
50	0	0.16%
60	0	0.16%
70	1	0.31%
80	1	0.47%
90	1	0.63%
100	1	0.79%
110	2	1.10%
120	5	1.89%
130	5	2.67%
140	7	3.77%
150	600	98.11%
160	1	98.27%
170	1	98.43%
180	2	98.74%
More	8	100.00%

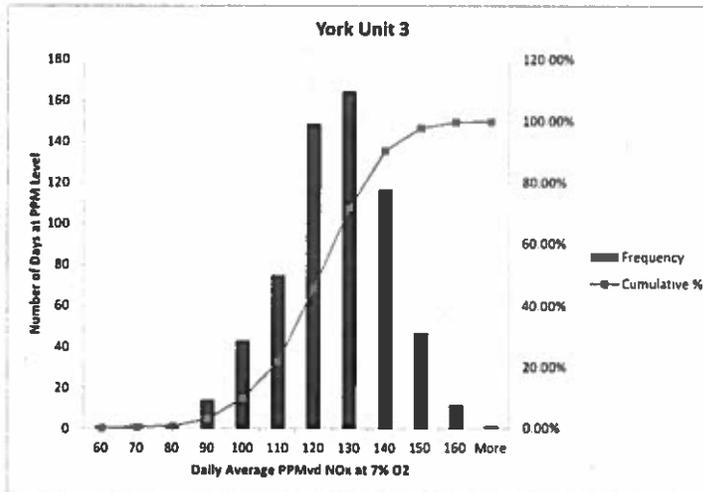


Bin	Frequency	Cumulative %
60	7	0.37%
70	10	0.90%
80	16	1.74%
90	55	4.64%
100	194	14.86%
110	319	31.66%
120	424	54.00%
130	474	78.98%
140	297	94.63%
150	88	99.26%
160	13	99.95%
More	1	100.00%



14 days over 150 PPM Nox  
 13 days occurred on unit 3  
 All but 2 of the 13 days occurred from 4/18/2018 to 5/20/2018

Bin	Frequency	Cumulative %
60	1	0.16%
70	2	0.48%
80	2	0.80%
90	14	3.03%
100	43	9.87%
110	75	21.82%
120	149	45.54%
130	165	71.82%
140	117	90.45%
150	47	97.93%
160	12	99.84%
More	1	100.00%



# Appendix 7

Cost Analysis for SCR for NG, propane, or liquid petroleum gas-fired combustion unit or process heater equal or > 50 MMBtu/hr		
Boiler Capacity MMBtu/hr	50	250
Hrs/Yr	8760	8760
NOx emissions (lb/MMBtu)	0.1	0.1
Factors/Reference used		
TOTAL CAPITAL COST (TCC) in 2016	\$1,884,950	\$5,365,750
TOTAL CAPITAL COST (TCC)	\$2,054,596	\$5,848,668
EPA cost spreadsheet for 50 MMBtu and 250 MMBtu/hr for 2016 TCC in 2020 with CPI 1.09 from 2016 to 2020		
Direct Annual Costs		
Electricity	\$16,595.25	\$82,975.16
Chemical Cost (Urea/Ammonia)	\$9,156.00	\$45,778.91
Catalyst Replacement (costs/No. of years)	\$4,738.23	\$23,691.15
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850
Maintenance Material	\$32,850	\$32,850
EPA cost spreadsheet for 50 MMBtu and 250 MMBtu/hr for 2016 EPA cost spreadsheet for 50 MMBtu and 250 MMBtu/hr for 2016 EPA cost spreadsheet for 50 MMBtu and 250 MMBtu/hr for 2016 Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day 100% of maintenance labor		
Indirect Annual Costs		
Administration (3% of maintenance+labor)	\$3,154	\$3,154
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$141,356	\$402,388
Property Taxes (1% of TCC-OAQPS)	\$20,546	\$58,487
Insurance (1% of TCC-OAQPS)	\$20,546	\$58,487
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00
TOTAL ANNUALIZED COST	\$321,211	\$780,080
3% of maintenance +labor TCC*0.0688 1% of TCC (OAQPS) 1% of TCC (OAQPS) 60% of Maintenance Cost (OAQPS)		
Uncontrolled NOx TPY	21.90	109.50
NOx removed TPY (80% Eff.)	18	88
COST-EFFECTIVENESS (\$/Ton NOx removed)	\$18,334	\$8,905

# Appendix 8

SCR Cost Analysis for distillate oil-fired combustion unit or process heater equal or > 50 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.12	0.12	
TOTAL CAPITAL COST (TCC) in 2016	\$1,557,377	\$4,433,271	EPA cost spreadsheet for 50 and 250 MMBtu
TOTAL CAPITAL COST (TCC) in 2020	\$1,697,541	\$4,832,265	With CPI 1.09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Electricity	\$18,829.75	\$94,146.57	EPA cost spreadsheet for 50 and 250 MMBtu
Chemical Cost (Urea/Ammonia)	\$10,987.20	\$54,934.91	EPA cost spreadsheet for 50 and 250 MMBtu
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
Catalyst Replacement (costs/No. of years)	\$4,773.11	\$23,863.37	EPA cost spreadsheet for 50 and 250 MMBtu
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance+labor
Property Taxes (1% of TCC-OAQPS)	\$16,975	\$48,323	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$15,574	\$44,333	1% of TCC (OAQPS)
Annulized Capital Recovery Cost (30 yrs at 5.5%)	\$116,791	\$332,460	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
TOTAL ANNUALIZED COST	\$292,204	\$706,334	
Uncontrolled NOx TPY	26.28	131.40	
NOx removed TPY (80% Eff.)	21	105	
COST-EFFECTIVENESS (\$/Ton NOx removed)	\$13,899	\$6,719	



# Appendix 10

SCR Cost Analysis for refinery gas-fired combustion unit or process heater equal to or > 50 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/Reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.25	0.25	
TOTAL CAPITAL COST (TCC) in 2016	\$1,894,950	\$5,365,750	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
TOTAL CAPITAL COST (TCC) in 2020	\$2,054,596	\$5,848,668	With CPI 1.09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Electricity	\$16,595.25	\$82,975	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
Chemical Cost (Urea/Ammonia)	\$22,888.91	\$114,447	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Catalyst Replacement (costs/No. of years)	\$4,996.56	\$24,981	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance + labor
Property Taxes (1% of TCC-OAQPS)	\$20,546	\$58,487	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$20,546	\$58,487	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$129,685	\$369,164	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
TOTAL ANNUALIZED COST	\$323,531	\$816,813	
Uncontrolled NOx TPY	54.75	273.75	
NOx removed TPY (80% Eff)	44	219	
COST-EFFECTIVENESS (\$/Ton NOx removed)	\$7,387	\$3,730	

# Appendix 11

SCR Cost Analysis for coal-fired combustion unit between 50 - 250 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/Reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.45	0.45	
TOTAL CAPITAL COST (TCC) in 2016	\$4,806,258	\$13,280,762	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
TOTAL CAPITAL COST (TCC) in 2020	\$5,238,821	\$14,476,031	With CPI 1.09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$360,431	\$995,951	TCC*0.0688
Electricity	\$18,073.29	\$90,366	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
Chemical Cost (Urea/Ammonia)	\$41,200.91	\$206,005	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Catalyst Replacement (costs/No. of years)	\$17,468.34	\$19,763	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance +labor
Property Taxes (1% of TCC-OAQPS)	\$52,388	\$144,760	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$52,388	\$144,760	1% of TCC (OAQPS)
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
<b>TOTAL ANNUALIZED COST</b>	<b>\$650,223</b>	<b>\$1,709,879</b>	
Uncontrolled NOx TPY	98.55	492.75	
NOx removed TPY (80% Eff.)	79	394	
<b>COST-EFFECTIVENESS (\$/Ton NOx removed)</b>	<b>\$8,247</b>	<b>\$4,338</b>	

Appendix 12

SNCR Cost Analysis for coal-fired combustion unit between 50 - 250 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/Reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.45	0.45	
TOTAL CAPITAL COST (TCC) in 2016	\$1,766,776	\$4,045,623	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
TOTAL CAPITAL COST (TCC) in 2020	\$1,925,786	\$4,409,729	With CPI 1.09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Electricity	\$832.76	\$4,164	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Water Cost	\$683.43	\$3,419	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Ash Cost	\$263.78	\$1,318	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Fuel Cost	\$3,325.59	\$16,628	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Chemical Cost (Urea/Ammonia)	\$59,838.82	\$299,196	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance+labor
Property Taxes (1% of TCC-OAQPS)	\$19,258	\$44,097	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$19,258	\$44,097	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$121,554	\$278,339	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
TOTAL ANNUALIZED COST	\$333,288	\$799,532	
Uncontrolled NOx TPY	98.55	492.75	
NOx removed TPY (30% Eff.)	30	148	
COST-EFFECTIVENESS (\$/ton NOx removed)	\$11,273	\$5,409	

# Appendix 13

Control technology	Control efficiency	Uncontrolled emission level lb/Mmbtu	Size of boiler Mmbtu/hr	Cost per ton of NOx 2016	Cost per ton of NOx 2020
SNCR	30%	0.16	250	\$5,747	\$6,207
SNCR	30%	0.16	500	\$4,395	\$4,747

## SAMPLE CALCULATION

### Data Inputs

Enter the following data for your combustion unit:

Is the combustion unit a utility or industrial boiler?  Utility  Industrial

Is the SNCR for a new boiler or retrofit of an existing boiler?  New  Retrofit

Please enter a retrofit factor equal to or greater than 0.24 based on the level of difficulty. Enter 1 for projects of average retrofit difficulty.

Complete all of the highlighted data fields:

What is the maximum heat input?

What is the highest heating value?

What is the estimated actual annual fuel input?

Is the boiler a fluid bed boiler?  Yes  No

Enter the net plant heat input?

If the NPHR is not known, enter the fuel type:

Default NPHR	10 MMBtu/MW
Fuel Oil	11 MMBtu/MW
Natural Gas	8.2 MMBtu/MW

What type of fuel does the unit burn?

Provide the following information for coal-fired boilers:

Type of coal burned:

Enter the sulfur content (wt%) or appropriate SO<sub>2</sub> emission rate:

Select the

ash content (wt%):

\*The sulfur content of 1.84% is a default value. See below for data source. Enter actual value, if known.

\*The ash content of 9.7% is a default value. See below for data source. Enter actual value, if known.

Note: The table below is pre-populated with default values for HHV, HS, KAH, and cost. Please enter the actual values for these parameters in the table below. If the actual value for any parameter is not known, you may use the default values provided.

Parameter	Default Value	Actual Value
HHV (Btu/lb)	10,000	
HS (wt%)	1.84	
KAH (wt%)	9.7	
Cost (\$/ton)	5,000	

# Appendix 13

Enter the following design parameters for the proposed SNCR:

Number of days the SNCR	365 days
Inlet NO <sub>x</sub> Emissions (lb/MMBtu)	0.16 lb/MMBtu
Outlet NO <sub>x</sub> Emissions (NO <sub>x</sub> )	0.12 lb/MMBtu
Estimated Normalized Sto.	1.22
Concentration of reagent	29 Percent
Density of reagent as stored	56 lb/ft <sup>3</sup>
Concentration of reagent in	10 percent
Number of days reagent is	14 days
Estimated equipment life	30 Years

Plant Elevation

250 feet above sea level

Densities of typical SNCR reagents:

50% urea solution 71 lb/ft<sup>3</sup>  
29.4% aqueous NH<sub>3</sub> 56 lb/ft<sup>3</sup>

Select the reagent used

Ammonia

Enter the cost data for the proposed SNCR:

Desired dollar year CEPCI for 2016	2016	2016 CEPCI
Annual Interest Rate (i)	5.5 Percent*	
Fuel (Cost <sub>fuel</sub> )	2.40 \$/MMBtu*	
Reagent (Cost <sub>reagent</sub> )	0.29 \$/gallon for a 29 percent solution of ammonia	
Water (Cost <sub>water</sub> )	0.0042 \$/gallon*	
Electricity (Cost <sub>elec</sub> )	0.0676 \$/kWh*	
Ash Disposal (for coal-fired)	48.80 \$/ton*	

CEPCI = Chemical Engineering Plant Cost Index

\* 5.5 percent is the default bank prime rate. User should enter current bank prime rate available at <http://www.federalreserve.gov/releases/h15/>

\* The values marked are default values. See the table below for the default values used and their references. Enter actual values, if a known.

Note: The use of CEPCI in this spreadsheet is not an endorsement of the index, but is there merely to allow for availability of a well known cost index to spreadsheet users. Use of other well known cost indexes (e.g., MCSI) is acceptable.

Maintenance and Administrative Charges Cost Factors:

Maintenance Cost Factor (f)	0.015
Administrative Charges Factor (a)	0.03

# Appendix 13

Data Sources for Default Values Used in Calculations.

Data Element	Default Value	Source for Default Value	If you used your own site-specific values, please enter the value used and the reference source
Ammoniacal Nitrogen Cost (\$/gallon)	\$0.39/gallon of 29% Ammonia	U.S. Geological Survey, Minerals Commodity Summaries, January 2017 <a href="https://minerals.usgs.gov/minerals/pubs/commodity/nitrogen/mcs-2017-nitro.pdf">https://minerals.usgs.gov/minerals/pubs/commodity/nitrogen/mcs-2017-nitro.pdf</a>	
Water Cost (\$/gallon)	0.00417	Average water rates for industrial facilities in 2013 compiled by Black & Veatch. (see 2013/2013 "50 Largest Cities Water/Wastewater Rate Survey" Available at <a href="http://www.iawq.org/who_we_are/community/RAC/doc/2014/50-Largest-Cities-Brochure-Water-wastewater-rate-survey.pdf">http://www.iawq.org/who_we_are/community/RAC/doc/2014/50-Largest-Cities-Brochure-Water-wastewater-rate-survey.pdf</a> )	
Electricity Cost (\$/kWh)	0.0974	U.S. Energy Information Administration, Electric Power Monthly, Table 5.3, Published December 2017. Available at <a href="https://www.eia.gov/electricity/monthly/epm_table.php?t=epm_5_3_a">https://www.eia.gov/electricity/monthly/epm_table.php?t=epm_5_3_a</a> .	
Fuel Cost (\$/MMBtu)	7.40	U.S. Energy Information Administration, Electric Power Annual 2016, Table 7.4, Published December 2017. Available at <a href="https://www.eia.gov/electricity/annual/pdf/epa.pdf">https://www.eia.gov/electricity/annual/pdf/epa.pdf</a> .	
Alpha Disposal Cost (\$/ton)	48.8	Waste Business Journal, The Cost to Landfill MSW Continues to Rise Despite Soft Demand, July 11, 2017. Available at <a href="http://www.wastebusinessjournal.com/news/mbj0170711A.htm">http://www.wastebusinessjournal.com/news/mbj0170711A.htm</a> .	
Percent sulfur content for Coal (% weight)	1.84	Average sulfur content based on U.S. coal data for 2016 compiled by the U.S. Energy Information Administration (EIA) from data reported on EIA Form EIA-923, Power Plant Operations Report. Available at <a href="http://www.eia.gov/electricity/data/eia923/">http://www.eia.gov/electricity/data/eia923/</a> .	
Percent ash content for Coal (% weight)	9.23	Average ash content based on U.S. coal data for 2016 compiled by the U.S. Energy Information Administration (EIA) from data reported on EIA Form EIA-923, Power Plant Operations Report. Available at <a href="http://www.eia.gov/electricity/data/eia923/">http://www.eia.gov/electricity/data/eia923/</a> .	
Higher Heating Value (HHV)	11,841	2016 coal data compiled by the Office of Oil, Gas, and Coal Supply Statistics, U.S. Energy Information Administration (EIA) from data reported on EIA Form EIA-923, Power Plant Operations Report. Available at <a href="http://www.eia.gov/electricity/data/eia923/">http://www.eia.gov/electricity/data/eia923/</a> .	
Interest Rate (%)	5.5	Default bank prime rate	

## SNCR Design Parameters

The following design parameters for the SNCR were calculated based on the values entered on the Data Inputs tab. These values were used to prepare the costs shown on the Cost Estimate Tab.

Parameter	Equation	Calculated Value	Unit
Maximum Annual Heat Input Rate (Q <sub>h</sub> ) =	HHV × Max. Fuel Rate =	2500 MMBtu/hour	
Maximum Annual Fuel Consumption (Fuel) =	(Q <sub>h</sub> × 1 DEG Btu/MMBtu) × B760/HHV =	365,000,000 lb/year	
Actual Annual fuel consumption (MActual) =		365,000,000 lb/year	
Heat Rate Factor (HRF) =	NPHR/ID =	1.00	
Total System Capacity Factor (CF <sub>total</sub> ) =	(MActual/HRuel) × (SNCR/31.5) =	1,000 fraction	
Total operating time for the SNCR (t <sub>op</sub> ) =	CF <sub>total</sub> × B760 =	8760 hours	
NOx Removal Efficiency (EF) =	(NO <sub>x, in</sub> - NO <sub>x, out</sub> )/NO <sub>x, in</sub> =	30 percent	

# Appendix 13

NO <sub>x</sub> removed per hour =	$NO_{x,r} = EF \times Q_p =$	12.00 lb/hour
Total NO <sub>x</sub> removed per year =	$(NO_{x,r} \times EF \times Q_p \times L_{yr}) / 2000 =$	52.56 tons/year
Coal Factor (Coal) <sub>1</sub> =	1 for bituminous; 1.05 for sub bituminous; 1.07 for lignite (weighted average is used for coal blends)	1.07
SO <sub>2</sub> emission rate =	$(NS/100) \times (64/32) \times (1 \times 10^6) / HHV =$	> 3 lbs/MMBtu
Elevation Factor [ELEV] <sub>1</sub> =	14.7 psia/P =	
Atmospheric pressure at 250 feet above sea level (P) <sub>1</sub> =	$21.16 \times [(59 - (0.0035 \times h)) + 459.7] / 518.6 \text{ } ^{\circ} R \text{ } ^{1.548} =$	14.6 psia
Retrofit Factor (RF) <sub>1</sub> =	Retrofit to existing boiler.	1.00

Not applicable; elevation factor does not apply to plants located at elevations below 500 feet.

\* Equation is from the National Air pollutants and Space Administration (NASA), Earth Atmosphere Model, Available at <https://spaceflight.nasa.gov/education/rocket/atmos.html>.

Reagent Data: Ammonia  
 Molecular Weight of Reagent (MW)<sub>1</sub> = 17.03 g/mole  
 Density = 56 lbs/gallon

Parameter	Equation	Calculated Value	Units
Reagent consumption rate (m <sub>reagent</sub> ) =	$(NO_{x,r} \times Q_p \times NSR \times MW_{reagent}) / (MW_{coal} \times SR) =$ (where SR = 1 for NH <sub>3</sub> ; 2 for Urea)		18 lb/hour
Reagent Usage Rate (m <sub>ur</sub> ) =	$m_{reagent} / C_{reagent} =$	62	lb/hour
Estimated tank volume for reagent storage =	$(m_{ur} \times 7.4805) / \text{Reagent Density} =$ (m <sub>ur</sub> = 7.4805 x 1,000 gal = 24 hours/day)/Reagent Density =	8.3	gal/hour
		2,800	gallons (storage needed to store a 14 day reagent supply rounded up to the nearest 100 gallons)

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) <sub>1</sub> =	$i(1+i)^n / [(1+i)^n - 1] =$ Where i = Equipment Life and i = Interest Rate	0.0658

Parameter	Equation	Calculated Value	Units
Electricity Usage:			
Electricity Consumption (P) <sub>1</sub> =	$(0.47 \times NO_{x,r} \times NSR \times Q_p) / \text{NPHR} =$	2.3	kWh/hour
Water Usage:			
Water consumption (Q <sub>w</sub> ) =	$(m_{ur} / \text{Density of water}) \times [(C_{water} / C_{reagent}) - 1] =$	14	gallons/hour
Fuel Data:			
Additional fuel recovered to evaporate water in injected reagent (Δfuel) <sub>1</sub> =	$H_v \times m_{reagent} \times [(1/C_{fuel}) - 1] =$	0.15	MMBtu/hour
Ash Disposal:			
Additional ash produced due to increased fuel consumption (Ash) <sub>1</sub> =	$(\Delta \text{fuel} \times \text{Ash} \times 1 \times 10^6) / \text{HHV} =$	2.3	lb/hour

## Cost Estimate

Total Capital Investment (TCI)

For Coal-Fired Boilers:

$$TCI = 1.3 \times (\text{SNCR}_{\text{unit}} + \text{APH}_{\text{unit}} + \text{BOP}_{\text{unit}})$$

For Fuel Oil and Natural Gas-fired Boilers:

$$TCI = 1.3 \times (\text{SNCR}_{\text{unit}} + \text{BOP}_{\text{unit}})$$

Capital costs for the SNCR (SNCR <sub>unit</sub> ) =	\$687,243 in 2016 dollars
Air Pre-Heater Costs (APH <sub>unit</sub> ) <sup>*</sup> =	\$895,698 in 2016 dollars
Balance of Plant Costs (BOP <sub>unit</sub> ) =	\$935,477 in 2016 dollars

# Appendix 13

Total Capital Investment (TCI) = \$3,267,573 in 2016 dollars  
 \* This factor applies because the boiler burns bituminous coal and emits equal to or greater than 0.315/MMBtu of sulfur dioxide

**SNCR Capital Costs (SNCR<sub>cap</sub>)**

For Coal-Fired Utility Boilers:  
 $SNCR_{cap} = 220,000 \times (B_{low} \times HRF)^{0.42} \times CoalF \times BTF \times ELEVF \times RF$   
 For Fuel Oil and Natural Gas-Fired Utility Boilers:  
 $SNCR_{cap} = 147,000 \times (B_{low} \times HRF)^{0.42} \times ELEVF \times RF$   
 For Coal-Fired Industrial Boilers:  
 $SNCR_{cap} = 220,000 \times (0.1 \times Q_p \times HRF)^{0.42} \times CoalF \times BTF \times ELEVF \times RF$   
 For Fuel Oil and Natural Gas-Fired Industrial Boilers:  
 $SNCR_{cap} = 147,000 \times (Q_p/NPHR) \times HRF)^{0.42} \times ELEVF \times RF$

SNCR Capital Costs (SNCR<sub>cap</sub>) = \$582,343 in 2016 dollars

**Air Pre-Heater Costs (APH<sub>cap</sub>)**

For Coal-Fired Utility Boilers:  
 $APH_{cap} = 69,000 \times (B_{low} \times HRF \times CoalF)^{0.19} \times AHF \times RF$   
 For Coal-Fired Industrial Boilers:  
 $APH_{cap} = 69,000 \times (0.1 \times Q_p \times HRF \times CoalF)^{0.19} \times AHF \times RF$

Air Pre-Heater Costs (APH<sub>cap</sub>) = \$895,698 in 2016 dollars  
 \* This factor applies because the boiler burns bituminous coal and emits equal to or greater than 0.315/MMBtu of sulfur dioxide

**Balance of Plant Costs (BOP<sub>cap</sub>)**

For Coal-Fired Utility Boilers:  
 $BOP_{cap} = 320,000 \times (B_{low})^{0.12} \times (NO_{removed}/hr)^{0.12} \times BTF \times RF$   
 For Fuel Oil and Natural Gas-Fired Utility Boilers:  
 $BOP_{cap} = 213,000 \times (B_{low})^{0.12} \times (NO_{removed}/hr)^{0.12} \times RF$   
 For Coal-Fired Industrial Boilers:  
 $BOP_{cap} = 320,000 \times (0.1 \times Q_p)^{0.12} \times (NO_{removed}/hr)^{0.12} \times BTF \times RF$   
 For Fuel Oil and Natural Gas-Fired Industrial Boilers:  
 $BOP_{cap} = 213,000 \times (Q_p/NPHR)^{0.12} \times (NO_{removed}/hr)^{0.12} \times RF$

Balance of Plant Costs (BOP<sub>cap</sub>) = \$935,477 in 2016 dollars

## Annual Costs

**Total Annual Cost (TAC)**  
 TAC = Direct Annual Costs + Indirect Annual Costs  
 Direct Annual Costs (DAC) = \$75,802 in 2016 dollars  
 Indirect Annual Costs (IDAC) = \$226,278 in 2016 dollars  
 Total annual costs (TAC) = DAC + IDAC = \$302,081 in 2016 dollars

**Direct Annual Costs (DAC)**  
 DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electricity Cost) + (Annual Water Cost) + (Annual Fuel Cost) + (Annual Ash Cost)

Annual Maintenance Cost =	0.015 x TCI =	\$49,014 in 2016 dollars
Annual Reagent Cost =	$Q_{ash} \times Cost_{reag} \times L_{re}$	\$21,355 in 2016 dollars
Annual Electricity Cost =	$P \times Cost_{elec} \times L_{op}$	\$1,358 in 2016 dollars
Annual Water Cost =	$Q_{water} \times Cost_{water} \times L_{op}$	\$518 in 2016 dollars
Additional Fuel Cost =	$\Delta Fuel \times Cost_{fuel} \times L_{op}$	\$3,076 in 2016 dollars
Additional Ash Cost =	$\Delta Ash \times Cost_{ash} \times L_{op} \times (1/7000)^*$	\$481 in 2016 dollars

# Appendix 13

Direct Annual Cost = \$75,802 in 2016 dollars

Indirect Annual Cost (IDAC)  
 IDAC = Administrative Charges + Capital Recovery Costs

Administrative Charges (AC) = \$1,470 in 2016 dollars  
 Capital Recovery Costs (CR) = \$24,809 in 2016 dollars  
 Indirect Annual Cost (IDAC) = AC + CR = \$236,279 in 2016 dollars

## Cost Effectiveness

Cost Effectiveness = Total Annual Cost/ NO<sub>x</sub> Removed/year

Total Annual Cost (TAC) = \$302,081 per year in 2016 dollars  
 NO<sub>x</sub> Removed = 53 tons/year  
 Cost Effectiveness = \$5,717 per ton of NO<sub>x</sub> removed in 2016 dollars

Cost Effectiveness = \$6,207 per ton of NO<sub>x</sub> removed in 2020 dollars



# Appendix 14

Number of days the SCR operates (N <sub>SCR</sub> )	365 days
Number of days the boiler operates (N <sub>BO</sub> )	365 days
NOx (ppm) (NO <sub>x</sub> ) in SCR	0.15 %/volume
Chemical (SCR) emissions (PO <sub>2</sub> ) from SCR	0.012 %/volume
Noncombustion (SCR) factor (NSF)	0.15%

\*The value of 0.15% is based on the chemical emission factor of 1 lb/MMBtu.

Estimated operating life of the catalyst (L <sub>SCR</sub> )	21,000 hours
Estimated SCR replacement life (L <sub>SCR</sub> )	10 years*
Estimated SCR replacement life (L <sub>SCR</sub> )	10 years (2.0E+01)
Concentration of nitrogen as stated (C <sub>N</sub> )	50 percent*
Density of nitrogen as stated (ρ <sub>N</sub> )	71 lb/cubic feet*
Number of days nitrogen is stored (N <sub>SCR</sub> )	18 days

\*The nitrogen content (mass) of SO<sub>2</sub> and density of 71 lb/cu ft are based on the standard conditions for air. The nitrogen content (mass) of SO<sub>2</sub> is based on the standard conditions for air.

Number of SCR reactor channels (N <sub>SCR</sub> )	1
Number of catalyst layers (N <sub>SCR</sub> )	3
Number of empty catalyst layers (N <sub>SCR</sub> )	1
Assessing the design provided by vendor	3 years
Volume of the catalyst layer (V <sub>SCR</sub> )	1000 cubic feet
"Unit" is one of the following:	
Unit: Cubic feet	
Unit: cubic meters	

Gas temperature of the SCR inlet (T <sub>SCR</sub> )	450 °F
Rate rate fed to calcinator flow rate factor (R <sub>SCR</sub> )	400 (1.0E+02) from 1000000000

1.0E+02 = 100

Dimensions of SCR (L x W x H)	72 ft high x 54 ft wide x 10 ft deep
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Select the request and

Current dollar year (CPI for 2019)	2019
Annual interest rate (i)	5.5 Percent*
Request (K <sub>SCR</sub> )	1.60E+11 (1.60E+11)
Electricity (K <sub>SCR</sub> )	8.00E+10 kWh
Catalyst cost (K <sub>SCR</sub> )	127 million dollars (1.27E+08)
Operator labor cost	60 (6.0E+01) (60)
Operator hours/day	8.00 (8.00)

Note: The use of (CPI) in this spreadsheet is not an endorsement of the value, but it there needs to other for availability of a work item cost index for (CPI) is acceptable.

Maintenance Cost Factor (MCF)	0.25
Administrative Charges Factor (ACF)	0.25

SCR = Chemical Engineering Plant Cost Index

1.1 percent is the inflation rate from year stated until year is base price city location of request for (CPI) (2019) (1.1).

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# Appendix 14

<p>For Coal-Fired Utility Boilers &gt;25MW  <math>APMC = 69,000 \times (B_{max} \times \text{Coal}^{0.75} + \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>APMC = 69,000 \times (B1 + C1) \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math></p>	<p>For Coal-Fired Industrial Boilers &gt;250 MW/Boiler/Power  <math>APMC = 69,000 \times (B1 + C1) \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math></p>
<p>For Coal-Fired Utility Boilers &gt;25MW  <math>BAC = 579,000 \times (B_{max} \times \text{Coal}^{0.75} + \text{Coal}^{1.75}) \times IEFM \times BF</math>  <math>BPC = 579,000 \times (B1 + C1) \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times IEFM \times BF</math></p>	<p>For Coal-Fired Industrial Boilers &gt;250 MW/Boiler/Power  <math>BAC = 579,000 \times (B1 + C1) \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times IEFM \times BF</math></p>
<p>Value of Plant Costs (BOP<sub>plant</sub>) = \$10,137,000 in 2016 dollars</p>	
<b>Annual Costs</b>	
<p>Total Annual Costs (TAC)  <math>TAC = \text{Direct Annual Costs} + \text{Indirect Annual Costs}</math></p>	<p>Direct Annual Costs (DAC)  <math>DAC = 110,320,750 \text{ in } 2016 \text{ dollars}</math>  <math>DAC = 110,320,750 \text{ in } 2016 \text{ dollars}</math>  <math>DAC = 110,320,750 \text{ in } 2016 \text{ dollars}</math></p>
<p>Indirect Annual Costs (IAC)  <math>IAC = DAC \times DAC</math></p>	<p>Indirect Annual Costs (IAC)  <math>IAC = 110,320,750 \times 0.0001 = 11,032,075 \text{ in } 2016 \text{ dollars}</math></p>
<p>Annual Maintenance Cost  <math>AMC = 0.005 \times ICI</math>  <math>AMC = 0.005 \times (C_{\text{Coal}} \times \text{Coal}^{1.75} + C_{\text{Coal}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>AMC = 0.005 \times (C_{\text{Coal}} \times \text{Coal}^{1.75} + C_{\text{Coal}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>	<p>Annual Maintenance Cost (AMC)  <math>AMC = 0.005 \times (C_{\text{Coal}} \times \text{Coal}^{1.75} + C_{\text{Coal}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>AMC = 0.005 \times (C_{\text{Coal}} \times \text{Coal}^{1.75} + C_{\text{Coal}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>AMC = 0.005 \times (C_{\text{Coal}} \times \text{Coal}^{1.75} + C_{\text{Coal}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>
<p>Annual Electricity Cost  <math>EC = P \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math>  <math>EC = P \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math></p>	<p>Annual Electricity Cost (EC)  <math>EC = P \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math>  <math>EC = P \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math>  <math>EC = P \times C_{\text{Coal}} \times \text{Coal}^{1.75} \times AMF \times BF</math></p>
<p>Annual Catalyst Replacement Cost  <math>ARC = P_{\text{Catalyst}} \times (C_{\text{Catalyst}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Catalyst}} \times (C_{\text{Catalyst}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>	<p>Annual Catalyst Replacement Cost (ARC)  <math>ARC = P_{\text{Catalyst}} \times (C_{\text{Catalyst}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Catalyst}} \times (C_{\text{Catalyst}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Catalyst}} \times (C_{\text{Catalyst}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>
<p>Annual Fuel Cost  <math>FC = P_{\text{Fuel}} \times (C_{\text{Fuel}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>FC = P_{\text{Fuel}} \times (C_{\text{Fuel}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>	<p>Annual Fuel Cost (FC)  <math>FC = P_{\text{Fuel}} \times (C_{\text{Fuel}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>FC = P_{\text{Fuel}} \times (C_{\text{Fuel}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>FC = P_{\text{Fuel}} \times (C_{\text{Fuel}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>
<p>Annual Capital Recovery Cost  <math>ARC = P_{\text{Capital}} \times (C_{\text{Capital}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Capital}} \times (C_{\text{Capital}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>	<p>Annual Capital Recovery Cost (ARC)  <math>ARC = P_{\text{Capital}} \times (C_{\text{Capital}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Capital}} \times (C_{\text{Capital}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ARC = P_{\text{Capital}} \times (C_{\text{Capital}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>
<p>Annual Administrative Charge &amp; Capital Recovery Cost  <math>ACC = P_{\text{Admin}} \times (C_{\text{Admin}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ACC = P_{\text{Admin}} \times (C_{\text{Admin}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>	<p>Annual Administrative Charge &amp; Capital Recovery Cost (ACC)  <math>ACC = P_{\text{Admin}} \times (C_{\text{Admin}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ACC = P_{\text{Admin}} \times (C_{\text{Admin}} \times \text{Coal}^{1.75}) \times AMF \times BF</math>  <math>ACC = P_{\text{Admin}} \times (C_{\text{Admin}} \times \text{Coal}^{1.75}) \times AMF \times BF</math></p>
<p>Annual Total Annual Costs (TAC)  <math>TAC = DAC + IAC + AMC + EC + ARC + FC + ACC</math>  <math>TAC = 110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075</math></p>	<p>Annual Total Annual Costs (TAC)  <math>TAC = 110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075</math>  <math>TAC = 110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075</math></p>
<p>Cost Effectiveness  <math>CE = \frac{\text{Total Annual Costs}}{\text{Annual Electricity Cost}}</math>  <math>CE = \frac{110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075}{11,032,075}</math></p>	<p>Cost Effectiveness (CE)  <math>CE = \frac{110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075}{11,032,075}</math>  <math>CE = \frac{110,320,750 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075 + 11,032,075}{11,032,075}</math></p>

# Appendix 15

SCR Cost Analysis for other solid fuel-fired combustion unit equal to or greater than 50 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/Reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.25	0.25	
TOTAL CAPITAL COST (TCC) in 2016	\$4,599,871	\$12,972,142	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
TOTAL CAPITAL COST (TCC) in 2020	\$5,013,859	\$14,139,635	With CPI 1.09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Electricity	\$18,073.29	\$90,366	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Chemical Cost (Urea/Ammonia)	\$22,888.91	\$114,447	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Catalyst Replacement (costs/No. of years)	\$17,468.34	\$87,343	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Maintenance Labor - \$60/hr. 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr. 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance +labor
Property Taxes (1% of TCC-OAQPS)	\$50,139	\$141,396	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$50,139	\$141,396	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$344,954	\$972,807	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
<b>TOTAL ANNUALIZED COST</b>	<b>\$611,935</b>	<b>\$1,656,029</b>	
Uncontrolled NOx TPY	54.75	273.75	
NOx removed TPY (80% Eff.)	44	219	
<b>COST-EFFECTIVENESS (\$/Ton NOx removed)</b>	<b>\$13,971</b>	<b>\$7,562</b>	

# Appendix 16

SNCR Cost Analysis for other solid fuel-fired combustion unit equal to or greater than 50 MMBtu/hr			
Boiler Capacity MMBtu/hr	50	250	Factors/Reference used
Hrs/Yr	8760	8760	
NOx emissions (lb/MMBtu)	0.25	0.25	
TOTAL CAPITAL COST (TCC) in 2016	\$1,706,180	\$3,920,603	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
TOTAL CAPITAL COST (TCC) in 2020	\$1,859,736	\$4,273,457	With CPI : 09 from 2016 to 2020
<b>Direct Annual Costs</b>			
Electricity	\$462,16	\$2,313	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Water Cost	\$380.41	\$1,900	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Ash Cost	\$146.06	\$732	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Additional Fuel Cost	\$1,847.55	\$9,238	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material	\$32,850	\$32,850	100% of maintenance labor
Chemical Cost (Urea/Ammonia)	\$33,243.91	\$166,221	EPA spreadsheet for 50 and 250 mmbtu/hr boilers
<b>Indirect Annual Costs</b>			
Administration (3% of maintenance+labor)	\$3,154	\$3,154	3% of maintenance +labor
Property Taxes (1% of TCC-OAQPS)	\$18,597	\$42,735	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS)	\$18,597	\$42,735	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (30 yrs at 5.5%)	\$117,385	\$269,737	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost)	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
<b>TOTAL ANNUALIZED COST</b>	<b>\$298,934</b>	<b>\$643,884</b>	
Uncontrolled NOx TPY	54.75	273.75	
NOx removed TPY (30% Ef.)	16	82	
<b>COST-EFFECTIVENESS (\$/Ton NOx removed)</b>	<b>\$18,200</b>	<b>\$7,840</b>	

# Appendix 17

Cost Analysis for Oxidation Catalyst for combustion units and process heaters equal to or greater than 50 MMBtu/hr						
Boiler Size (MMBtu/hr)	50	100	150	200	250	Factors/References
TOTAL CAPITAL COST						
TOTAL CAPITAL COST (TCC)	\$455,667	\$911,333	\$1,367,000	\$1,822,667	\$2,278,333	Company's proposed estimate
Catalyst Replacement	\$43,333	\$52,000	\$78,000	\$93,600	\$112,320	Company Estimate for 30 MMBtu
Taxes, Insurance, Administration	\$18,227	\$36,453	\$54,680	\$72,907	\$91,133	4% of TEC
Capital Recovery (5.5% @ 20 yrs)	\$38,139	\$76,279	\$114,418	\$152,557	\$190,697	TCC*0.0837
TOTAL ANNUALIZED COST	\$99,699	\$164,732	\$247,098	\$319,064	\$394,150	
Uncontrolled VOC emissions (lb/MMBtu)	0.0100	0.0100	0.0100	0.0100	0.0100	An average uncontrolled VOC emission rate
Uncontrolled VOC emissions (tons/year)	2.19	4.38	6.57	8.76	10.95	
VOC removed TPY (60% Eff.)	1.31	2.63	3.94	5.26	6.57	
COST-EFFECTIVENESS (\$/ton NOx removed)	\$75,874.66	\$62,683.38	\$62,683.38	\$60,704.69	\$59,992.36	

# Appendix 18

Cost Analysis for SCR for NG-fired combined cycle combustion turbines between 1000 and 4100 HP			
	HP	1000	4100
Operating Hours (h)	H	8760	8760
Fuel Consumption (MMBtu/h)	FC	10.99	21.99
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>			
SCR Catalyst Housing and Control System			
Based on vendors quote	A	\$2,629,336.46	\$3,234,608.16
Based on vendor's Quote	A'	\$70,585.47	\$120,051.63
PA sales tax of 6% (1.06*(A-A'))	B	\$2,861,917.25	\$3,555,939.37
0.30B /DAOPS	0.30B	\$858,575.18	\$1,066,781.81
Direct Installation Costs	0.31B	\$887,194.35	\$1,102,341.20
Indirect Installation Costs	0.32B	\$686,860.14	\$853,425.45
Contingencies	C	\$5,876,947.08	\$7,302,121.50
<b>Total Capital Costs</b>			
<b>Direct Annual Costs</b>			
Power Costs	PC*H*PP	\$1,122.45	\$3,367.36
Reductant Costs	RC*H*RC	\$20,006.53	\$60,019.58
SCR Catalyst Replacement Costs			
H/SC*SCC		\$8,978.71	\$26,936.12
Replacement Parts	Vendor's quote	\$4,976.13	\$4,976.13
Operating Labor	OW*OH*SY	\$11,804.10	\$11,804.10
Maintenance Labor	MW*MH*SY	\$6,493.35	\$6,493.35
<b>Total Direct Annual Costs</b>	E	\$53,381.26	\$113,596.63
<b>Indirect Annual Costs</b>			
Overhead	0.6D	\$3,896.01	\$3,896.01
Property Tax	0.02C	\$52,586.73	\$64,692.16
Insurance	0.01C	\$26,293.36	\$32,346.08
Administrative	0.02C	\$52,586.73	\$64,692.16
Capital Recovery	5.5% for 30 years= .0688	\$404,333.96	\$689,320.27
<b>Total Indirect Annual Costs</b>	F	\$539,686.79	\$854,946.69
<b>TOTAL ANNUALIZED COST</b>			
Control Efficiency	CE	80%	80%
Potential to Emit (TPY)	PTE	26.61	53.22
Annual Estimated NOx Removal (TPY)	NR	21.29	42.57
<b>COST-EFFECTIVENESS (\$/ton NOx removed)</b>	G/NR	\$27,861.63	\$22,750.12
<b>Assumptions:</b>			
Power Consumption Rate (kW)	PC	Cost Manual Estimate (GP5A Turbine Ref sheet)	
Industrial Retail Power Price (\$/MWh)	PP	EIA Data	1.73
Reductant Consumption Rate (gal/h)	RC	Cost Manual Estimate (GP5A Turbine Ref sheet)	0.914
Reductant Price (\$/gal)	RP	Vendor quote (Ret-Reductant consumption price)	\$2.50
SCR Catalyst Cost (\$)	SCC	Cost Manual Estimate (GP5A Turbine Ref sheet)	\$20,499.33
SCR Catalyst Life (h)	SCL	Vendor's quote	20,000
Operator Wages (\$/h)	OW	MSC quote (Ret-Reductant consumption price)	\$21.56
Operator Hours per Shift (h)	OH		0.50
Shifts per Year	SY	3 shifts/day*365 days/year	1,095
Maintenance Wages (\$/h)	MW	MSC quote (Ret-Reductant consumption price)	\$23.72

# Appendix 18

Maintenance Hours per Shift	MH			0.25
Interest Rate	IR			5.50%
Equipment Life (y)	EL			30
NOx Emission Rate (ppm)	N		1.50E-04	1.5E-04
Molar Volume @ 14.7 psi and 70 F (scf/lb-mol)	MV			386.80
Molecular Weight of NO2 (lb/lb-mol)	MW			46.01
Fuel Volume (scf/MMBtu)	FD			8,743
Oxygen Content	OC			15%
NOx Emission Rate (lb/MMBtu)	NER		0.5526	0.5526

# Appendix 19

Cost Analysis for oxidation catalyst for NG-fired combined cycle combustion turbines between 1000 - 4100 BHP			
	Cost	Costs	Costs
Uncontrolled NMNEHC as propane (ppm @ 15% O2)	5	5	5
HP	1,000	1,500	4,100
MW	0.708215297	1.062322946	2.90366272
Hrs/Yr	8760	8760	8760
Heat Input (MMBtu/hr)	11.06	16.59	45.346
NMNEHC Emission Rate (lb/MMBtu)	0.017659376	0.017659376	0.017659376
Total Uncontrolled NMNEHC emissions in Tons per Year	0.86	1.28	3.51
Total NMNEHC Removed in Tons per Year (60%)	0.51	0.77	2.10
<b>TOTAL CAPITAL COST</b>			
Oxidation Catalyst Purchased Equipment Costs	\$96,566	\$96,891	\$110,981
Direct Installation Costs (0.30PEC)	\$28,970	\$29,667	\$33,294
Total Indirect Installation Costs (0.27PEC)	\$26,073	\$26,701	\$29,965
Project Contingency (0.15)(DIC+IIC)	\$8,256	\$8,455	\$9,489
Total Capital Investment	\$159,865	\$163,714	\$183,729
<b>Direct Annual Costs</b>			
Operating and Supervisory Labor Costs	\$18,889	\$18,889	\$18,889
Maintenance Cost	\$2,897	\$2,967	\$3,329
Natural Gas Penalty	\$2,864	\$3,997	\$10,924
Catalyst Disposal	\$21	\$32	\$87
Annual Catalyst Replacement Cost	\$2,317	\$3,476	\$9,500
<b>Indirect Annual Costs</b>			
Overhead (60% of Maintenance - EPA's OAQPS)	\$1,738	\$1,780	\$1,998
Property Tax+Ins.+Admin. (4% of TCI - EPA OAQPS)	\$6,395	\$6,549	\$7,349
Capital Recovery (5.5% @ 20 yrs)	\$13,381	\$13,703	\$15,378
<b>Direct Annual Costs</b>	\$26,788	\$29,359	\$42,729
<b>Indirect Annual Costs</b>	\$21,513	\$22,031	\$24,725
<b>TOTAL ANNUALIZED COST</b>	\$48,302	\$51,391	\$67,454
<b>COST-EFFECTIVENESS (\$/Ton NMNEHC removed)</b>	\$94,104.00	\$66,748.15	\$32,052.93

# Appendix 20

Cost Analysis for SCR for NG-fired combined cycle turbines between 4100 and 60000 HP									
	HP	4100	6000	11500	15900	30000	60000		
Turbine Horsepower (bhp)									
Operating Hours (h)	H	8760	8760	8760	8760	8760	8760		60000
Fuel Consumption (MMBtu/h)	FC	10.99	21.99	80.17	117.58	190.80	309.10		8760
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>									
SCR Catalyst Housing and Control System	A	\$905,690.28	\$1,009,562.72	\$1,291,111.68	\$1,550,792.76	\$2,321,635.56	\$3,961,726.60		
Reductant Storage Tank	A'	\$33,614.46	\$42,103.48	\$65,113.22	\$86,335.80	\$149,333.33	\$283,370.64		
Total Purchased Equipment Costs	B	\$995,663.02	\$1,114,766.17	\$1,437,598.40	\$1,735,356.27	\$2,619,227.02	\$4,499,803.08		
Direct Installation Costs	0.30B	\$298,698.91	\$334,429.85	\$431,279.52	\$520,606.88	\$785,768.11	\$1,349,940.92		
Indirect Installation Costs	0.31B	\$308,655.54	\$345,577.51	\$445,655.50	\$537,960.44	\$811,960.38	\$1,394,938.96		
Contingencies	0.24B	\$238,959.13	\$267,543.88	\$345,023.62	\$416,485.51	\$628,614.49	\$1,079,952.74		
Total Capital Costs	C	\$2,044,594.02	\$2,289,172.34	\$2,952,108.31	\$3,563,554.11	\$5,378,582.69	\$9,240,345.63		
<b>Direct Annual Costs</b>									
Power Costs	PC*H*PP	\$940.74	\$2,822.23	\$8,872.44	\$9,005.94	\$14,614.11	\$29,228.22		
Reductant Costs	RC*H*RC	\$5,598.25	\$16,794.76	\$52,814.87	\$77,461.83	\$125,698.71	\$251,397.42		
SCR Catalyst Replacement Costs	H/SC*SCC	\$13,139.57	\$39,418.71	\$54,532.38	\$68,471.44	\$90,531.72	\$181,063.43		
Replacement Parts	Vendor's quote	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13		
Operating Labor	OW*OH*SY	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10		
Maintenance Labor	MW*MH*SY	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35		
Total Direct Annual Costs	E	\$42,952.15	\$82,309.28	\$139,493.28	\$178,212.79	\$254,118.12	\$484,962.65		
Indirect Annual Costs									
Overhead	0.6D								
Property Tax	0.02C								
Insurance	0.01C								
Administrative	0.02C								
Capital Recovery	5.5%								
Total Indirect Annual Costs	F	\$189,848.59	\$270,472.01	\$347,130.62	\$417,835.16	\$627,715.99	\$1,074,270.97		
<b>TOTAL ANNUALIZED COST</b>									
Control Efficiency	G	\$232,800.74	\$352,781.30	\$486,623.90	\$596,047.95	\$881,834.11	\$1,559,203.62		
Potential to Emit (TPY)	CE	80%	80%	80%	80%	80%	80%		
Annual Estimated NOx Removal (TPY)	PTE	7.45	14.90	54.33	79.69	129.31	209.48		
COST-EFFECTIVENESS (\$/ton NOx removed)	NR	5.96	11.92	43.46	63.75	103.45	167.58		
Assumptions.	G/NR	\$39,058.09	\$29,594.58	\$11,195.82	\$9,350.01	\$8,524.61	\$9,304.30		
Power Consumption Rate (kW)	PC	1.45	4.35	13.67	13.87	22.51	45.03		
Industrial Retail Power Price (\$/kWh)	PP	\$0.0741	\$0.0741						
Reductant Consumption Rate (gal/h)	RC	0.256	0.767	2.412	3.537	5.740	11.479		
Reductant Price (\$/gal)	RP	\$29,999.02	\$89,997.06	\$124,503.16	\$156,327.48	\$206,693.42	\$413,366.84		
SCR Catalyst Cost (\$)	SCC	Vendor's quote	20,000						
SCR Catalyst Life (h)	SCL	MSC quote (Ref-Reductant consumption price)	\$21.56						
Operator Wages (\$/h)	OW	3 shifts/day*365 days/year	1,095						
Operator Hours per Shift (h)	OH		0.50						
Shifts per Year	SY		1,095						
Maintenance Wages (\$/h)	MW		\$23.72						



Appendix 21

Cost Analysis for oxidation catalyst for NG-fired Combined cycle combustion turbines rated between 4,100 - 60,000 Bhp					
	Cost	Costs	Costs	Costs	Costs
Uncontrolled NMNEC as propane (ppm @ 15% O2)	5	5	5	5	5
HP	4,100	15,900	30,000	60,000	60,000
MW	2,903,662.72	11,260,623.23	21,246,458.92	42,492,917.85	42,492,917.85
Hrs/Yr	8760	8760	8760	8760	8760
Fuel Consumption (MMBtu/h)	37,578	117,58	190.8	378,568	378,568
NMNEHC Emission Rate (lb/MMBtu)	0.017659376	0.017659376	0.017659376	0.017659376	0.017659376
Total Uncontrolled NMNEHC emissions in Tons per Year	2.91	9.09	14.76	29.28	29.28
Total NMNEHC Removed in Tons per Year (60%)	1.74	5.46	8.85	17.57	17.57
<b>TOTAL CAPITAL COST</b>					
Oxidation Catalyst Purchased Equipment Costs	\$96,785	\$205,918	\$215,090	\$215,090	\$215,090
Direct Installation Costs (0.30PEC)	\$29,035	\$61,775	\$64,527	\$64,527	\$64,527
Total Indirect Installation Costs (0.27PEC)	\$26,132	\$55,598	\$58,074	\$58,074	\$58,074
Project Contingency (0.15)(DIC+IIC))	\$8,275	\$17,606	\$18,390	\$18,390	\$18,390
Total Capital Investment	\$160,227	\$340,897	\$356,082	\$356,082	\$356,082
<b>Direct Annual Costs</b>					
Operating and Supervisory Labor Costs	\$18,889	\$18,889	\$18,889	\$18,889	\$18,889
Maintenance Cost	\$2,904	\$6,178	\$6,453	\$6,453	\$6,453
Natural Gas Penalty	\$12,553	\$28,325	\$45,964	\$45,964	\$45,964
Catalyst Disposal	\$130	\$336	\$637	\$637	\$637
Annual Catalyst Replacement Cost	\$14,204	\$36,641	\$69,512	\$69,512	\$69,512
<b>Indirect Annual Costs</b>					
Overhead (60% of Maintenance (EPA OAOQS))	\$1,742	\$3,707	\$3,872	\$3,872	\$3,872
Property Tax+Ins.+Admn. (4% of TCI - OAOQS)	\$6,409	\$13,636	\$14,243	\$14,243	\$14,243
Capital Recovery (5.5% @ 20 yrs)	\$13,411	\$28,533	\$29,804	\$29,804	\$29,804
<b>TOTAL ANNUALIZED COST</b>	\$70,242	\$136,446	\$189,373	\$189,373	\$189,373
<b>COST-EFFECTIVENESS (\$/Ton NMNEHC removed)</b>	\$40,277.24	\$25,004.91	\$21,386.45	\$10,778.87	\$10,778.87

# Appendix 22

Cost Analysis for oxidation catalyst for NG or Oil-fired simple cycle combustion turbines between 1000 - 4100 BHP		
	Cost	Costs
Uncontrolled NMNEHC as propane (ppm @ 15% O2)	9	9
HP	1,000	1,500
MW	0.708215297	1.062322946
Hrs/Yr	8760	8760
Heat Input (MMBtu/hr)	11.06	16.59
NMNEHC Emission Rate (lb/MMBtu)	0.031786877	0.031786877
Total Uncontrolled NMNEHC emissions in Tons per Year	1.54	2.31
Total NMNEHC Removed in Tons per Year (60%)	0.92	1.39
<b>TOTAL CAPITAL COST</b>		
Oxidation Catalyst Purchased Equipment Costs	\$96,566	\$98,891
Direct Installation Costs (0.30PEC)	\$28,970	\$29,667
Total Indirect Installation Costs (0.27PEC)	\$26,073	\$26,781
Project Contingency (0.15(DIC+IIC))	\$8,256	\$8,455
Total Capital Investment	\$159,865	\$163,729
<b>Direct Annual Costs</b>		
Operating and Supervisory Labor Costs	\$18,889	\$18,889
Maintenance Cost	\$2,897	\$2,967
Natural Gas Penalty	\$2,664	\$3,997
Catalyst Disposal	\$21	\$32
Annual Catalyst Replacement Cost	\$2,317	\$3,476
<b>Indirect Annual Costs</b>		
Overhead (60% of Maintenance - EPA's OAQPS)	\$1,738	\$1,780
Property Tax+Ins.+Admn. (4% of TCI - EPA OAQPS)	\$6,395	\$6,549
Capital Recovery (5.5% @ 20 yrs)	\$13,381	\$13,703
<b>Direct Annual Costs</b>	\$26,788	\$29,359
<b>Indirect Annual Costs</b>	\$21,513	\$22,031
<b>TOTAL ANNUALIZED COST</b>	\$48,302	\$51,391
<b>COST-EFFECTIVENESS (\$/Ton NMNEHC removed)</b>	\$52,280.00	\$37,082.31

# Appendix 23

Cost Analysis for SCR for NG-fired simple cycle turbines between 4100 and 60000 HP									
	HP	4100	11150	15900	30000	60000			
Turbine Horsepower (bhp)		4100	11150	15900	30000	60000			
Operating Hours (h)	H	8760	8760	8760	8760	8760			
Fuel Consumption (MMBtu/h)	FC	21.99	80.17	117.58	190.80	309.10			
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>									
SCR Catalyst Housing and Control System									
Reductant Storage Tank	A	\$905,690.28	\$1,291,111.68	\$1,550,792.76	\$2,321,635.56	\$3,961,726.60			
Total Purchased Equipment Costs	B	\$33,614.46	\$65,113.22	\$86,135.80	\$149,333.33	\$263,370.64			
Direct Installation Costs	0.30B	\$995,663.02	\$1,437,598.40	\$1,735,356.27	\$2,619,227.02	\$4,499,803.08			
Indirect Installation Costs	0.31B	\$298,698.91	\$431,279.52	\$520,606.88	\$785,768.11	\$1,349,940.92			
Contingencies	0.24B	\$308,655.54	\$445,655.50	\$537,960.44	\$811,960.38	\$1,394,938.96			
Total Capital Costs	C	\$2,044,594.02	\$2,952,108.31	\$3,563,554.11	\$5,378,582.69	\$9,240,345.63			
Direct Annual Costs									
Power Costs	PC*H*PP	\$2,822.23	\$8,872.44	\$9,005.94	\$14,614.11	\$29,228.22			
Reductant Costs	RC*H*RC	\$16,794.76	\$52,814.87	\$77,461.83	\$125,698.71	\$251,397.42			
SCR Catalyst Replacement Costs	H/SC*SCC	\$26,936.12	\$54,532.38	\$68,471.44	\$90,531.72	\$181,063.43			
Replacement Parts	Vendor's quote	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13			
Operating Labor	OW*OH*SY	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10			
Maintenance Labor	D MW*MH*SY	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35			
Total Direct Annual Costs	E	\$69,826.69	\$139,493.28	\$178,212.79	\$254,118.12	\$484,962.65			
Indirect Annual Costs									
Overhead	0.6D	\$3,896.01	\$3,896.01	\$3,896.01	\$3,896.01	\$3,896.01			
Property Tax	0.02C	\$18,113.81	\$25,822.23	\$31,015.86	\$46,432.71	\$79,234.53			
Insurance	0.01C	\$9,056.90	\$12,911.12	\$15,507.93	\$23,216.36	\$39,617.27			
Administrative	0.02C	\$18,113.81	\$25,822.23	\$31,015.86	\$46,432.71	\$79,234.53			
Capital Recovery	5.5% for 30 years = 0.688	\$193,009.68	\$278,679.02	\$336,399.51	\$507,738.21	\$872,288.63			
Total Indirect Annual Costs	F	\$242,190.20	\$347,130.62	\$417,835.16	\$627,715.99	\$1,074,270.97			
<b>TOTAL ANNUALIZED COST</b>	G	\$312,016.89	\$486,623.90	\$596,047.95	\$881,834.11	\$1,559,233.62			
Control Efficiency	CE	80%	80%	80%	80%	80%			
Potential to Emit (TPY)	PTE	14.90	54.33	79.69	129.31	209.48			
Annual Estimated NOx Removal (TPY)	NR	11.92	43.46	63.75	103.45	167.58			
<b>COST-EFFECTIVENESS (\$/ton NOx removed)</b>	G/NR	\$26,174.89	\$11,195.82	\$9,350.01	\$8,524.61	\$9,304.30			
Assumptions:									
Power Consumption Rate (kW)	PC	Cost Manual Estimate (GPSA Turbine Ref sheet)	4.35	13.67	13.87	22.51			45.03
Industrial Retail Power Price (\$/kWh)	PP	EIA Data	\$0.0741						
Reductant Consumption Rate (gal/h)	RC	Cost Manual Estimate (GPSA Turbine Ref sheet)	0.767	2.412	3.537	5.740			11.479
Reductant Price (\$/gal)	RP	Vendor quote (Ref.Reductant consumption price)	\$2.50						
SCR Catalyst Cost (\$)	SCC	Cost Manual Estimate (GPSA Turbine Ref sheet)	\$61,497.99	\$124,503.16	\$156,327.48	\$206,693.42			\$413,386.84
SCR Catalyst Life (h)	SCL	Vendor's quote	20,000						
Operator Wages (\$/h)	OW	MSC quote (Ref.Reductant consumption price)	\$21.56						
Operator Hours per Shift (h)	OH		0.50						
Shifts per Year	SY		1,095						
Maintenance Wages (\$/h)	MW	MSC quote (Ref.Reductant consumption price)	\$23.72						

# Appendix 23

Maintenance Hours per Shift	MH								
Interest Rate	IR				0.25				
Equipment Life (y)	EL				5.50%				
NOx Emission Rate (ppm)	N				30				
Molar Volume @ 14.7 psi and 70 F (scf/lb-mol)	MV				4.2E-05	4.2E-05	4.2E-05	4.2E-05	4.2E-05
Molecular Weight of NO2 (lb/lb-mol) *	MW				386.80				
Fuel Volume (scf/MMBtu)	FD				46.01				
Oxygen Content	OC				8.743				
NOx Emission Rate (lb/MMBtu)	NER				15%				
					0.1547	0.1547	0.1547	0.1547	0.1547

# Appendix 24

Cost Analysis for oxidation catalyst for NG or Oil-fired simple cycle turbines rated between 4,100 - 60,000 Bhp			
	Cost	Costs	Costs
Uncontrolled NMNEC as propane (ppm @ 15% O2)	9	9	9
HP	4,100	15,900	30,000
MW	2,90368272	11,26062323	21,24645892
Hrs/Yr	8760	8760	8760
Fuel Consumption (MMBtu/h)	37.578	117.58	190.8
NMNEHC Emission Rate (lb/MMBtu)	0.031786877	0.031786877	0.031786877
Total Uncontrolled NMNEHC emissions in Tons per Year	5.23	16.37	26.56
Total NMNEHC Removed in Tons per Year (60%)	3.14	9.82	15.94
<b>TOTAL CAPITAL COST</b>			
Oxidation Catalyst Purchased Equipment Costs	\$111,063	\$166,169	\$232,016
Direct Installation Costs (0.30PEC)	\$33,319	\$49,851	\$69,605
Total Indirect Installation Costs (0.27PEC)	\$29,987	\$44,866	\$62,644
Project Contingency (0.15(DIC+IIC))	\$9,496	\$14,207	\$19,837
Total Capital Investment	\$183,865	\$275,093	\$384,102
<b>Direct Annual Costs</b>			
Operating and Supervisory Labor Costs	\$18,889	\$18,889	\$18,889
Maintenance Cost	\$3,332	\$4,985	\$6,960
Natural Gas Penalty	\$12,553	\$28,325	\$45,964
Catalyst Disposal	\$130	\$338	\$637
Annual Catalyst Replacement Cost	\$9,500	\$36,841	\$69,512
<b>Indirect Annual Costs</b>			
Overhead (60% of Maintenance (EPA OAQPS))	\$1,999	\$2,991	\$4,176
Property Tax+Ins.+Admn. (4% of TCI - OAQPS)	\$7,355	\$11,004	\$15,364
Capital Recovery (5.5% @ 20 yrs)	\$15,389	\$23,025	\$32,149
<b>TOTAL ANNUALIZED COST</b>	\$69,147	\$126,398	\$193,651
<b>COST-EFFECTIVENESS (\$/Ton NMNEHC removed)</b>	\$22,027.64	\$12,868.63	\$12,149.80
			\$9,441.50

# Appendix 25

Cost Analysis for SCR for oil-fired simple cycle turbines between 1000 and 4100 HP			
	HP	1000	4100
Operating Hours (h)	H	8760	8760
Fuel Consumption (MMBtu/h)	FC	10.99	21.99
<b>TOTAL CAPITAL INVESTMENT (TCI)</b>			
SCR Catalyst Housing and Control System	A	\$2,629,336.46	\$3,234,608.16
Reductant Storage Tank	A'	\$70,585.47	\$120,051.63
Total Purchased Equipment Costs	B	\$2,861,917.25	\$3,555,939.37
Direct Installation Costs	0.30B	\$858,575.18	\$1,066,781.81
Indirect Installation Costs	0.31B	\$887,194.35	\$1,102,341.20
Contingencies	0.24B	\$686,866.14	\$853,425.45
Total Capital Costs	C	\$5,876,947.08	\$7,302,121.50
<b>Direct Annual Costs</b>			
Power Costs	PC*H*PP	\$1,122.45	\$3,367.36
Reductant Costs	RC*H*RC	\$20,006.53	\$60,019.58
SCR Catalyst Replacement Costs	H/SC*SCC	\$8,978.71	\$26,936.12
Replacement Parts	Vendor's quote	\$4,976.13	\$4,976.13
Operating Labor	OW*OH*SY	\$11,804.10	\$11,804.10
Maintenance Labor	MW*MH*SY	\$6,493.35	\$6,493.35
Total Direct Annual Costs	E	\$53,381.26	\$113,596.63
<b>Indirect Annual Costs</b>			
Overhead	0.6D	\$3,896.01	\$3,896.01
Property Tax	0.02C	\$52,586.73	\$64,692.16
Insurance	0.01C	\$26,293.36	\$32,346.08
Administrative	0.02C	\$52,586.73	\$64,692.16
Capital Recovery	F	\$404,333.96	\$689,320.27
Total Indirect Annual Costs	F	\$539,696.79	\$854,946.69
<b>TOTAL ANNUALIZED COST</b>			
Control Efficiency	CE	80%	80%
Potential to Emit (TPY)	PT*E*FC*H	27.97	55.94
Annual Estimated NOx Removal (TPY)	NR	22.37	44.75
COST-EFFECTIVENESS (\$/ton NOx removed)	G/NR	\$26,506.45	\$21,643.56
<b>Assumptions:</b>			
Power Consumption Rate (kW)	PC	Cost Manual Estimate (GP5A Turbine Ref sheet)	1.73
Industrial Retail Power Price (\$/kWh)	PP	EIA Data	5.19
Reductant Consumption Rate (gal/h)	RC	Cost Manual Estimate (GP5A Turbine Ref sheet)	0.914
Reductant Price (\$/gal)	RP	Vendor quote (Rel-Reductant consumption price)	2.741
SCR Catalyst Cost (\$)	SCC	Cost Manual Estimate (GP5A Turbine Ref sheet)	\$2.50
SCR Catalyst Life (h)	SCL	Vendor's quote	\$20,499.33
Operator Wages (\$/h)	OW	MSC quote (Rel-Reductant consumption price)	20,000
Operator Hours per Shift (h)	OH		0.50
Shifts per Year	SY	3 shifts/day*365 days/year	1,095
Maintenance Wages (\$/h)	MW	MSC quote (Rel-Reductant consumption price)	\$23.72

# Appendix 25

Maintenance Hours per Shift	MH			0.25
Interest Rate	IR			5.50%
Equipment Life (y)	EL			30
NOx Emission Rate (ppm)	N		1.50E-04	1.5E-04
Molar Volume @ 14.7 psi and 70 F (sc/lb-mol)	MV			386.60
Molecular Weight of NO2 (lb/lb-mol)	MW			46.01
Fuel Volume (sc/MMBtu)	FD			9.190
Oxygen Content	OC			15%
NOx Emission Rate (lb/MMBtu)	NER		0.5609	0.5609

Appendix 26

Cost Analysis for SCR for Oil-fired simple cycle turbines between 4100 and 60000 HP									
	HP	4100	11150	15900	30000	60000			
Turbine Horsepower (bhp)	HP	4100	11150	15900	30000	60000			
Operating Hours (h)	H	8760	8760	8760	8760	8760			
Fuel Consumption (MMBtu/h)	FC	21.99	80.17	117.58	190.80	309.10			
TOTAL CAPITAL INVESTMENT (TCI)									
SCR Catalyst Housing and Control System	A	\$2,070,149.22	\$2,951,112.41	\$3,544,669.17	\$5,306,595.56	\$9,055,375.09			
Reductant Storage Tank	A'	\$76,833.04	\$148,830.22	\$197,338.97	\$341,333.33	\$647,704.33			
Total Purchased Equipment Costs	B	\$2,275,801.20	\$3,285,939.19	\$3,966,528.63	\$5,986,804.62	\$10,285,264.19			
Direct Installation Costs	0.30B	\$682,740.36	\$985,781.76	\$1,189,958.59	\$1,796,041.39	\$3,085,578.26			
Indirect Installation Costs	0.31B	\$705,498.37	\$1,018,641.15	\$1,229,623.87	\$1,855,909.43	\$3,188,431.90			
Contingencies	0.24B	\$546,192.29	\$788,625.41	\$951,966.87	\$1,436,833.11	\$2,468,463.41			
Total Capital Costs	C	\$4,673,357.76	\$6,747,676.14	\$8,145,266.53	\$12,293,903.29	\$21,120,790.01			
Direct Annual Costs									
Power Costs	PC*H*PP	\$3,097.33	\$9,742.04	\$10,281.36	\$16,683.75	\$33,367.49			
Reductant Costs	RC*H*RC	\$38,369.66	\$120,719.70	\$177,055.61	\$287,311.34	\$574,622.68			
SCR Catalyst Replacement Costs	H/SCL*SCC	\$26,936.12	\$54,532.38	\$68,471.44	\$90,531.72	\$181,063.43			
Replacement Parts	Vendor's quote	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13	\$4,976.13			
Operating Labor	OW*OH*SY	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10	\$11,804.10			
Maintenance Labor	MW*MH*SY	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35	\$6,493.35			
Total Direct Annual Costs	E	\$91,676.69	\$208,267.71	\$279,081.99	\$417,800.38	\$812,327.18			
Indirect Annual Costs									
Overhead	0.6D	\$3,896.01	\$3,896.01	\$3,896.01	\$3,896.01	\$3,896.01			
Property Tax	0.02C	\$41,402.98	\$59,022.25	\$70,893.38	\$106,131.91	\$181,107.50			
Insurance	0.01C	\$20,701.49	\$29,511.12	\$35,446.69	\$53,065.96	\$90,553.75			
Administrative	0.02C	\$41,402.98	\$59,022.25	\$70,893.38	\$106,131.91	\$181,107.50			
Capital Recovery	F	\$441,164.97	\$636,980.63	\$768,913.16	\$1,160,544.47	\$1,993,802.58			
Total Indirect Annual Costs	F	\$548,568.44	\$788,432.26	\$950,042.63	\$1,429,770.26	\$2,450,467.34			
TOTAL ANNUALIZED COST									
Control Efficiency	G	\$640,245.13	\$996,699.97	\$1,229,124.62	\$1,847,570.64	\$3,262,794.52			
Potential to Emit (TPY)	CE	80%	80%	80%	80%	80%			
Annual Estimated NOx Removal (TPY)	PTE	34.06	124.19	182.14	295.56	478.81			
COST-EFFECTIVENESS (\$/ton NOx removed)	NR	\$23,498.01	\$10,032.40	\$6,435.38	\$7,813.88	\$8,518.06			
Assumptions:									
Power Consumption Rate (kW)	PC	Cost Manual Estimate (GP5A Turbine Ref sheet)	4.772	15.008	15.839	25.702	51.40		
Industrial Retail Power Price (\$/MWh)	PP	EIA Data	\$0.0741						
Reductant Consumption Rate (gal/h)	RC	Cost Manual Estimate (GP5A Turbine Ref sheet)	1.752	5.512	8.085	13.119	26.238		
Reductant Price (\$/gal)	RP	Vendor quote (Rel-Reductant consumption price)	\$2.50						
SCR Catalyst Cost (\$)	SCC	Cost Manual Estimate (GP5A Turbine Ref sheet)	\$61,497.99	\$124,503.16	\$156,327.48	\$206,693.42	\$413,386.84		
SCR Catalyst Life (h)	SCL	Vendor's quote	20,000						
Operator Wages (\$/h)	OW	MSC quote (Rel-Reductant consumption price)	\$21.56						
Operator Hours per Shift (h)	OH		0.50						
Shifts per Year	SY		3 shifts/day	365 days/year					
Maintenance Wages (\$/h)	MW	MSC quote (Rel-Reductant consumption price)	\$23.72						





# Appendix 28

Cost Analysis for SCR for natural gas-fired lean-burn engines rated at Greater than 3500 BHP									
Engine Horsepower (bhp)	HP	3500	4000	4500	4735	5000			
Operating Hours (hr)	H	8760	8760	8760	8760	8760			
SCR Catalyst Housing and Control System	A	\$516,231.53	\$563,503.89	\$610,776.25	\$632,994.26	\$658,048.62			
Reductant Storage Tank	A	\$22,994.80	\$25,824.80	\$28,654.80	\$29,984.90	\$31,484.80			
Total Purchased Equipment Costs	B	\$539,226.33	\$589,328.69	\$639,431.05	\$662,979.16	\$689,533.42			
Direct Installation Costs	0.30B	\$179,562.37	\$196,246.45	\$212,930.54	\$220,772.06	\$229,614.63			
Indirect Installation Costs	0.31B	\$185,547.78	\$202,788.00	\$220,028.23	\$228,131.13	\$237,268.45			
Contingencies	0.24B	\$143,649.89	\$156,997.16	\$170,344.43	\$176,617.65	\$183,691.70			
TOTAL CAPITAL COST (TCC)	C	\$1,229,104.40	\$1,343,306.98	\$1,457,509.55	\$1,511,184.76	\$1,571,712.13			
Direct Annual Costs									
Power Costs	PC*H*PP	\$5,547.07	\$6,160.27	\$6,773.47	\$7,061.67	\$7,386.66			
Reductant Costs	RC*H*RC	\$98,472.75	\$112,540.29	\$126,607.83	\$133,219.57	\$140,675.35			
SCR Catalyst Replacement Costs	H*SC*1.11	\$13,572.71	\$14,317.03	\$15,101.35	\$15,460.59	\$15,865.68			
Operating Labor plus 15% for Supervisor	OW*OH*SY*1.15	\$13,574.72	\$13,574.72	\$13,574.72	\$13,574.72	\$13,574.72			
Maintenance Labor plus Materials	MW*MH*SY*2	\$12,986.70	\$12,986.70	\$12,986.70	\$12,986.70	\$12,986.70			
Total Direct Annual Costs	E	\$144,153.95	\$159,599.00	\$175,044.06	\$182,303.24	\$190,489.12			
Indirect Annual Costs									
Overhead	0.6D	\$7,792.02	\$7,792.02	\$7,792.02	\$7,792.02	\$7,792.02			
Property Tax	0.02C	\$24,582.09	\$26,866.14	\$29,150.19	\$30,223.70	\$31,434.24			
Insurance	0.01C	\$12,291.04	\$13,433.07	\$14,575.10	\$15,111.85	\$15,717.12			
Administrative	0.02C	\$24,582.09	\$26,866.14	\$29,150.19	\$30,223.70	\$31,434.24			
Capital Recovery (5.5% @ 30 yrs)		\$84,565.01	\$92,426.76	\$100,284.51	\$103,977.66	\$108,142.27			
Total Indirect Annual Costs	F	\$153,816.25	\$167,384.13	\$180,952.01	\$187,328.91	\$194,519.89			
TOTAL ANNUALIZED COST	G	\$297,970.19	\$326,983.13	\$355,996.07	\$369,632.15	\$385,009.01			
Control Efficiency	CE	80%	80%	80%	80%	80%			
Potential to Emit (TPY)	PTE	101.30	115.77	130.24	137.04	144.71			
Annual Estimated NOx Removal (TPY)	NR	81.04	92.62	104.19	109.64	115.77			
COST EFFECTIVENESS (\$/Ton of NOx removed)	G/NR	\$3,676.84	\$3,530.50	\$3,417	\$3,371	\$3,326			
Assumptions:									
Power Consumption Rate (kW)	PC	8.55	9.49	10.43	10.88	11.38			
Industrial Retail Power Price (\$/MWh)	PP	EIA Data							
Reductant Consumption Rate (gal/hr)	RC	4.496	5.139	5.781	6.083	6.424			
Reductant Price (\$/gal)	RP	Vendor's quote							
SCR Catalyst Cost (\$)	SCC	\$27,917.04	\$29,489.14	\$31,061.24	\$31,800.13	\$32,633.34			
SCR Catalyst Life (hr)	SCL	Vendor's quote							
Operator Wages (\$/hr)	OW	MSC quote (\$21.56/hr)							
Operator Hours per Shift (hr)	OH								
Shifts per Year	SY	3 shifts/day*365 days/year							
Maintenance Wages (\$/hr)	MW	MSC quote							
Maintenance Hours per Shift	MH								
Interest Rate	IR								
Equipment Life (yr)	EL								
NOx Emission Rate (g/bhp-hr)	NER	Uncontrolled NOx Emissions >500 bhp							

# Appendix 29

Engine Horsepower (bhp)		Cost Analysis for SCR for oil-fired engines greater than 500 BHP																							
HP	Operating Hours (h)	500		1000		1500		2000		2500		3000		3500		4000		4500		4735		5000			
		8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	
SCR Catalyst Housing and Control System																									
A	QAOPS	\$160,950.00	\$321,900.00	\$444,222.00	\$666,333.00	\$888,444.00	\$1,111,555.00	\$1,334,666.00	\$1,557,777.00	\$1,780,888.00	\$2,004,000.00	\$2,227,111.00	\$2,450,222.00	\$2,673,333.00	\$2,896,444.00	\$3,119,555.00	\$3,342,666.00	\$3,565,777.00	\$3,788,888.00	\$4,012,000.00	\$4,235,111.00	\$4,458,222.00	\$4,681,333.00	\$4,904,444.00	
Vendor's quote																									
B	QAOPS with PA sales tax of 6%	\$6,014.80	\$12,029.60	\$16,711.52	\$25,067.28	\$33,423.04	\$50,134.56	\$66,846.08	\$83,557.60	\$100,269.12	\$133,692.16	\$167,115.20	\$200,538.24	\$267,384.32	\$334,230.40	\$401,076.48	\$467,922.56	\$534,768.64	\$601,614.72	\$768,460.80	\$935,306.88	\$1,102,152.96	\$1,268,999.04	\$1,435,845.12	\$1,602,691.20
Total Purchased Equipment Costs																									
B	QAOPS	\$176,964.80	\$353,929.60	\$460,933.52	\$691,401.28	\$921,869.04	\$1,361,803.56	\$1,801,738.08	\$2,241,672.60	\$2,681,607.12	\$3,121,541.64	\$3,561,476.16	\$4,001,410.68	\$4,441,345.20	\$4,881,279.72	\$5,321,214.24	\$5,761,148.76	\$6,201,083.28	\$6,641,017.80	\$7,080,952.32	\$7,520,886.84	\$7,960,821.36	\$8,400,755.88	\$8,840,690.40	
Direct Installation Costs																									
0.08B	QAOPS	\$55,094.81	\$110,189.62	\$146,919.48	\$219,879.24	\$289,839.00	\$434,758.56	\$579,678.12	\$724,597.68	\$905,747.04	\$1,187,662.72	\$1,570,578.40	\$2,053,494.08	\$2,736,409.76	\$3,619,325.44	\$4,502,241.12	\$5,385,156.80	\$6,268,072.48	\$7,150,988.16	\$8,033,903.84	\$8,916,819.52	\$9,800,000.00	\$10,683,180.48	\$11,566,360.96	
Indirect Installation Costs																									
0.18B	QAOPS	\$54,864.63	\$109,729.26	\$146,309.00	\$219,463.50	\$289,277.33	\$433,915.50	\$578,553.67	\$723,191.84	\$904,989.80	\$1,186,787.76	\$1,568,585.72	\$2,050,383.68	\$2,732,181.64	\$3,613,979.60	\$4,495,777.56	\$5,377,575.52	\$6,259,373.48	\$7,141,171.44	\$8,022,969.40	\$8,904,767.36	\$9,786,565.32	\$10,668,363.28	\$11,550,161.24	
Contingencies																									
D.24B	QAOPS (0.15)(B)(0.30)(0.31B)	\$42,475.85	\$84,951.70	\$113,269.00	\$170,903.25	\$227,871.00	\$341,806.75	\$455,742.50	\$579,678.25	\$703,614.00	\$827,549.75	\$951,485.50	\$1,075,421.25	\$1,200,000.00	\$1,324,578.75	\$1,449,157.50	\$1,573,736.25	\$1,698,315.00	\$1,822,893.75	\$1,947,472.50	\$2,072,051.25	\$2,196,630.00	\$2,321,208.75	\$2,445,787.50	
TOTAL CAPITAL COST (TCC)																									
C	SUM(ROW 7 - 10 with CPI)	\$363,433.95	\$726,867.90	\$969,311.52	\$1,453,774.28	\$1,938,237.00	\$2,877,700.76	\$3,817,164.52	\$4,756,628.28	\$5,696,092.04	\$7,120,115.20	\$9,044,138.36	\$11,468,161.52	\$14,892,184.68	\$18,316,207.84	\$22,740,231.00	\$27,164,254.16	\$31,588,277.32	\$36,012,300.48	\$40,436,323.64	\$44,860,346.80	\$49,284,369.96	\$53,708,393.12	\$58,132,416.28	
Direct Annual Costs																									
Power Costs																									
PC1	PP	\$993.15	\$1,986.30	\$2,979.45	\$4,469.18	\$5,958.90	\$8,938.35	\$11,917.80	\$15,897.25	\$19,876.70	\$25,856.15	\$31,835.60	\$37,815.05	\$43,794.50	\$49,773.95	\$55,753.40	\$61,732.85	\$67,712.30	\$73,691.75	\$79,671.20	\$85,650.65	\$91,630.10	\$97,609.55	\$103,589.00	
Reduction Costs																									
RC1	PP	\$22,243.60	\$44,487.20	\$66,730.80	\$100,096.20	\$133,461.60	\$200,192.40	\$266,823.20	\$333,454.00	\$400,084.80	\$526,773.12	\$653,461.44	\$780,149.76	\$906,838.08	\$1,033,526.40	\$1,160,214.72	\$1,286,903.04	\$1,413,591.36	\$1,540,279.68	\$1,666,968.00	\$1,793,656.32	\$1,920,344.64	\$2,047,032.96	\$2,173,721.28	
SCR Catalyst Replacement Costs																									
HSCL	SCC*1.11	\$2,390.06	\$4,780.12	\$7,170.18	\$10,755.27	\$14,340.36	\$21,510.54	\$28,680.72	\$35,850.90	\$43,021.08	\$56,361.44	\$73,148.56	\$90,035.68	\$106,922.80	\$123,809.92	\$140,697.04	\$157,584.16	\$174,471.28	\$191,358.40	\$208,245.52	\$225,132.64	\$242,019.76	\$258,906.88	\$275,794.00	
Operating Labor plus 15% for Supervisor																									
OW	OH*SY*1.15	\$13,574.72	\$27,149.44	\$40,724.16	\$61,086.24	\$81,448.32	\$122,172.48	\$162,896.64	\$210,529.44	\$274,039.04	\$358,451.84	\$471,269.12	\$614,086.40	\$798,503.68	\$1,034,920.96	\$1,332,338.24	\$1,700,755.52	\$2,149,172.80	\$2,677,590.08	\$3,285,007.36	\$3,972,424.64	\$4,739,841.92	\$5,597,259.20	\$6,454,676.48	
Maintenance Labor plus Materials																									
D	MW*MT*SY*2	\$12,986.70	\$25,973.40	\$38,960.10	\$57,940.15	\$71,920.20	\$107,880.30	\$141,840.40	\$187,800.50	\$243,760.60	\$311,680.80	\$402,200.96	\$516,261.12	\$654,321.28	\$826,381.44	\$1,032,441.60	\$1,272,501.76	\$1,546,561.92	\$1,854,622.08	\$2,296,682.24	\$2,778,742.40	\$3,300,802.56	\$3,872,862.72	\$4,494,922.88	
Total Direct Annual Costs																									
E	Sum(Row 12, Row 17)	\$57,146.22	\$114,292.44	\$171,438.66	\$257,158.50	\$335,288.32	\$506,169.04	\$671,049.86	\$884,930.68	\$1,153,811.50	\$1,485,692.32	\$1,899,573.14	\$2,403,453.96	\$3,007,334.78	\$3,811,215.60	\$4,915,096.42	\$6,318,977.24	\$8,022,858.06	\$10,026,738.88	\$12,330,619.70	\$15,034,500.52	\$18,138,381.34	\$21,642,262.16	\$25,546,142.98	
Indirect Annual Costs																									
Overhead																									
0.8D	QAOPS	\$7,792.02	\$15,584.04	\$23,376.06	\$35,168.08	\$46,960.10	\$69,752.12	\$92,544.14	\$121,336.16	\$158,128.18	\$204,920.20	\$261,712.22	\$338,504.24	\$435,296.26	\$562,088.28	\$718,880.30	\$906,672.32	\$1,124,464.34	\$1,382,256.36	\$1,680,048.38	\$2,017,840.40	\$2,405,632.42	\$2,843,424.44	\$3,331,216.46	
Property Tax																									
0.02C	QAOPS using PA property tax of 2%	\$7,260.68	\$14,521.36	\$21,782.04	\$32,673.06	\$43,564.08	\$65,346.10	\$87,128.12	\$114,910.14	\$151,692.16	\$198,474.18	\$255,256.20	\$332,038.22	\$428,820.24	\$547,602.26	\$698,384.28	\$881,166.30	\$1,106,948.32	\$1,372,730.34	\$1,688,512.36	\$2,144,294.38	\$2,640,076.40	\$3,175,858.42	\$3,751,640.44	
Insurance																									
0.01C	QAOPS	\$3,634.34	\$7,268.68	\$10,903.02	\$16,354.53	\$21,806.04	\$32,757.55	\$43,709.06	\$58,160.57	\$75,612.08	\$98,063.59	\$125,515.10	\$160,966.61	\$206,418.12	\$261,869.63	\$332,321.14	\$422,772.65	\$533,224.16	\$663,675.67	\$824,127.18	\$1,014,578.69	\$1,237,030.20	\$1,492,481.71	\$1,779,933.22	
Administration																									
0.02C	QAOPS	\$7,268.68	\$14,537.36	\$21,806.04	\$32,709.06	\$43,612.08	\$65,494.10	\$87,376.12	\$115,258.14	\$153,140.16	\$191,022.18	\$248,904.20	\$316,786.22	\$404,668.24	\$512,550.26	\$640,432.28	\$798,314.30	\$986,196.32	\$1,204,078.34	\$1,461,960.36	\$1,759,842.38	\$2,097,724.40	\$2,475,606.42	\$2,893,488.44	
Capital Recovery (5.5% @ 30 yrs)																									
F	Sum(Row 20 Row 24)	\$25,004.26	\$50,008.52	\$75,012.78	\$112,519.17	\$149,025.42	\$223,531.81	\$298,038.10	\$397,544.39	\$522,050.68	\$671,556.97	\$866,063.26	\$1,104,569.55	\$1,394,075.84	\$1,733,582.13	\$2,133,088.42	\$2,602,594.71	\$3,252,101.00	\$4,001,607.29	\$4,951,113.58	\$6,100,619.87	\$7,450,126.16	\$9,000,000.00	\$10,750,000.00	
Total Indirect Annual Costs																									
G	Sum(Row 20 Row 24)	\$59,967.97	\$119,935.94	\$179,903.91	\$271,856.37	\$363,809.74	\$545,763.11	\$727,716.48	\$969,670.85	\$1,281,625.22	\$1,663,579.59	\$2,125,533.96	\$2,710,088.33	\$3,437,642.70	\$4,315,197.07	\$5,458,251.44	\$6,876,305.81	\$8,694,360.18	\$10,822,414.55	\$13,374,468.92	\$16,326,523.29	\$19,678,577.66	\$23,430,632.03	\$27,582,686.40	
TOTAL ANNUALIZED COST																									
H	E+F	\$108,116.20	\$216,232.40	\$324,348.60	\$496,514.87	\$657,098.06	\$971,681.33	\$1,290,864.52	\$1,719,047.71	\$2,235,637.90	\$2,910,230.09	\$3,740,822.28	\$4,765,414.47	\$6,000,006.66	\$7,568,598.85	\$9,526,549.04	\$12,084,500.23	\$15,142,451.42	\$18,818,873.61	\$23,195,295.80	\$28,300,904.99	\$34,156,504.18	\$40,402,103.37	\$47,147,692.56	
Control Efficiency																									
CE	E/F	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	
Potential to Earn (PE)																									
PTE	ER*(HP*(454 g/h*2000 lb/h))	38.59	77.18	115.77	173.65	231.53	347.31	463.09	617.45	823.23	1,089.01	1,444.79	1,926.57	2,512.35	3,301.13	4,292.91	5,584.69	7,176.47	9,168.25	11,660.03	14,651.81	18,143.59	22,135.37	26,127.15	
Annual Estimated NOx Removal (TPY)																									
NR	PTE/CE	30.87	61.74	92.61	139.72	185.22	278.64	372.06	498.76	661.64	874.52	1,166.03	1,551.38	2,036.68	2,628.19	3,421.70	4,417.00	5,654.14	7,241.28	9,228.42	11,715.56	14,702.70	18,189.84	22,176.98	
COST EFFECTIVENESS (\$/ton of NOx removed)																									
GNR	Sum(Row 20 Row 24)	\$3,503.35	\$7,006.70	\$10,510.05	\$15,765.08	\$21,019.43	\$31,774.46	\$42,528.81	\$56,373.84	\$74,152.45	\$97,931.06	\$127,709.67	\$167,488.28	\$217,266.89	\$283,045.50	\$364,824.11	\$464,602.72	\$592,381.33	\$750,160.94	\$947,940.55	\$1,184,720.16	\$1,466,500.00	\$1,798,279.84	\$2,180,059.68	
Assumptions:																									
Power Consumption Rate (kW)																									
PC	QAOPS	1.53	3.06	4.59	6.12	7.65	11.48	15.31	20.14	26.97	35.80	46.63	60.46	78.29	101.12	129.95	164.78	209.61	264.44	330.27	418.10	526.93	655.76	804.59	
Industrial Retail Power Price (\$/MWh)																									
PP	EA Data	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	\$0.0741	
Reduction Consumption Rate (g/h)																									
RC	QAOPS	2.488	4.976	7.464	11.196	14.928	22.392	29.856	39.808	52.744	69.680	91.576	119.472	156.368	201.824	262.280	338.736	434.192	554.648	704.104	893.560	1,127.016	1,405.472	1,728.928	
Reduction Price (\$/g)																									
RP	Vendor's quote	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50	
SCR Catalyst Cost (\$)																									
SCC	QAOPS	\$4,916.00	\$9,832.00	\$14,748.00	\$22,122.00	\$29,496.00	\$43,734.00	\$57,972.00	\$76,630.00	\$100,868.00	\$134,106.00	\$177,344.00	\$230,582.00	\$293,820.00	\$381,058.00	\$494,296.00	\$637,534.00	\$814,772.00	\$1,032,010.00	\$1,289,248.00	\$1,606,486.00	\$2,003,724.00	\$2,500,962.00	\$3,108,200.00	
SCR Catalyst Life (h)																									
SCL	Vendor's quote	20,000	20,000	2																					

# Appendix 30

Cost Analysis for NSCR for rich-burn engines

Based on E - C/R INC's Cost-Analysis done for EPA in June 2010					
	100	300	800	1500	3000
HP	100	300	800	1500	3000
Hrs	8760	8760	8760	8760	8760
Total Capital Cost (TCC) in 2010	\$15,139.00	\$17,240.00	\$33,103.00	\$44,223.00	\$89,644.00
Total Capital Cost (TCC) in 2020 (CPI 1.18)	\$17,864.02	\$20,343.20	\$39,061.54	\$52,183.14	\$105,779.92
Total Annual Operating Cost (TAOC)	\$5,466.00	\$8,465.00	\$10,723.00	\$12,306.00	\$18,773.00
Total Annual Operating Cost (TAOC) in 2020 (CPI 1.18)	\$6,449.88	\$9,988.70	\$12,653.14	\$14,521.08	\$22,152.14
Uncontrolled NOx Gms/bhp-hr	16	16	16	16	16
Uncontrolled NMHC Gms/bhp-hr	1.00	1.00	1.00	1.00	1.00
Uncontrolled NOx tons per year	15.44	46.31	123.49	231.54	463.08
Uncontrolled NMHC tons per year	0.96	2.89	7.72	14.47	28.94
NOx removed TPY (80% Eff.)	12.35	37.05	98.79	185.23	370.47
NMHC removed TPY (50% Eff.)	0.48	1.45	3.86	7.24	14.47
Total NOx, NMHC removed	12.83	38.49	102.65	192.47	384.94
Cost-Effectiveness (\$/Ton NOx removed) 2010 Dollars	\$522.30	\$269.62	\$128.08	\$78.39	\$59.80
Cost-Effectiveness in 2020 Dollars with CPI 1.18	\$616.32	\$318.16	\$151.13	\$92.50	\$70.56
Uncontrolled NOx Emissions used for this cost analysis - 16 gms/bhp-hr					
Uncontrolled NMHC Emissions used for this cost analysis - 1.0 gms/bhp-hr					
Typical NOx Control Efficiency 80%					
HC Control Efficiency 50%					
TCC = Direct Costs (DC) + Indirect Costs (IC)					
DC = Purchased Equipment Cost (PEC) + Direct Installation Costs (DIC)					
PEC includes Costs for Control Device and Auxiliary Equipment (EC), Instrumentation (10% of EC), and Sales Tax and Freight (6% each of EC)					
DIC includes Foundation and Supports (8% of PEC), Handling and Erection (14% of PEC), and Electric (4% of PEC), Piping (2% of PEC), insulation (1% of PEC), and painting (1% of PEC)					
IC Indirect Installation Costs (ICC) + Contingencies (C)					
ICC includes Engineering (10% of PEC), Construction and Field expenses (5% of PEC), Contractor Fees (10% of PEC), Startup (2% of PEC), and Performance test (1% of PEC)					
C is assumed to be 3% of PEC					
TAC = DAC + IAC					
DAC includes Utilities, Operating Labor, maintenance, Annual Compliance test, Catalytic Cleaning, Catalyst replacement, Catalyst Disposal					
IAC includes Overhead, Fuel Penalty, Property Tax, Insurance, Administrative Charges, and Capital Recovery (10% for 10 years)					

# Appendix 31

Cost Analysis for oxidation catalyst for IC engines						
	Cost	Costs	Costs	Costs	Costs	Costs
Uncontrolled NMHC gms/hp-hr	1	1	1	1	1	1
HP	2500	2000	1500	1000	750	500
Hrs/Yr	8760	8760	8760	8760	8760	8760
Capital Cost:						
<b>TOTAL CAPITAL COST (TCC) (2009)</b>	<b>\$35,069.00</b>	<b>\$28,669.00</b>	<b>\$22,269.00</b>	<b>\$15,869.00</b>	<b>\$12,669.00</b>	<b>\$9,469.00</b>
<b>Direct Annual Costs</b>						
On-Site Testing	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00
Catalyst replacement (3 yrs Operating life)	\$11,689.67	\$9,556.33	\$7,423.00	\$5,289.67	\$4,223.00	\$3,156.33
Maintenance (5% of TCC)	\$1,753.45	\$1,433.45	\$1,113.45	\$793.45	\$633.45	\$473.45
<b>Indirect Annual Costs</b>						
Capital Recovery (5.5 % @ 20 yrs)	\$2,935.28	\$2,399.60	\$1,863.32	\$1,328.24	\$1,060.40	\$792.56
Overhead (60% of Maintenance - OAOQS)	\$1,052.07	\$860.07	\$668.07	\$476.07	\$380.07	\$284.07
PropertyTax+Ins.+Admn. (4% of TCC - OAOQS)	\$1,402.76	\$1,146.76	\$890.76	\$634.76	\$506.76	\$378.76
<b>TOTAL ANNUALIZED COST</b>	<b>\$23,833.22</b>	<b>\$20,396.21</b>	<b>\$16,959.20</b>	<b>\$13,522.18</b>	<b>\$11,803.68</b>	<b>\$10,085.17</b>
Total Uncontrolled NMHC emissions in Tons per Year	24.12	19.30	14.47	9.65	7.24	4.82
Total NMHC Removed in Tons per Year (60%)	14.47	11.58	8.68	5.79	4.34	2.89
Cost-Effectiveness (\$/Ton NMHC removed) in 2009	\$1,646.92	\$1,761.77	\$1,953.19	\$2,336.02	\$2,718.86	\$3,484.53
<b>COST-EFFECTIVENESS (\$/Ton NMHC removed) in 2020 with CPI</b>	<b>\$1,976.31</b>	<b>\$2,114.13</b>	<b>\$2,343.83</b>	<b>\$2,803.23</b>	<b>\$3,262.63</b>	<b>\$4,181.43</b>

Reference: June 28, 2010-Control Costs for Existing Stationary SI RICE  
 From: Bradley Nelson, ECR, Inc.To: Melanie King, EPA OAOQS/SPPD/ESG  
[https://19january2017snapshot.epa.gov/sites/production/files/2014-02/documents/5\\_2011\\_citcostmemo\\_exis\\_si.pdf](https://19january2017snapshot.epa.gov/sites/production/files/2014-02/documents/5_2011_citcostmemo_exis_si.pdf)

# Appendix 32

## Cost Analysis for SCR at Container and Flat glass furnaces

	VITRO GLASS/CARLSLE WORKS 6 flat at 26.75 lbs/ton	OWENS-BROCKWAY GLASS CONTAINER INC/CRENSHAW starting at 4 lbs/ton	OWENS BROCKWAY GLASS/CHERRY ST container starting at 4 lbs/ton	ARDAGH GLASS PORT ALLEGANY PLT container starting at 4 lbs/ton	Factors Used
Boiler Capacity MMBtu/hr	224	66.3	8760	8760	For Vitro - MMBtu/hr calculated from fuel flow in permit
Hrs/Yr	8760	8760	8760	8760	
NOx emissions (lb/MMBtu)	3.49	0.77	0.78	0.91	Vitro - 29.2 ton glass pulled per hours in permit
<b>TOTAL CAPITAL COST</b>					
Equipment Cost (TEC) = (1)	\$5,250,000.00	\$2,975,852.00	\$2,975,852.00	\$2,975,852.00	Estimated based on similar size natural gas-fired boilers
Auxiliaries = (2)					
Instrumentation & Controls = (3)	\$525,000	\$297,585	\$297,585	\$297,585	10% of TEC
Sales Tax (6% of EC) = (4)	\$315,000	\$178,551	\$178,551	\$178,551	6% of EC
Freight (6% of EC) = (5)	\$315,000	\$178,551	\$178,551	\$178,551	6% of EC
Total Equipment Cost (TEC) = (6) = (1)+(2)+(3)+(4)+(5)	\$6,405,000	\$3,630,539	\$3,630,539	\$3,630,539	
<b>INSTALLATION COSTS</b>					
Direct Installation					
Foundation and Support = (7)	\$512,400	\$290,443	\$290,443	\$290,443	8% of TEC
Handling and Erection = (8)	\$896,700	\$508,276	\$508,276	\$508,276	14% of TEC
Electrical = (9)	\$296,200	\$145,222	\$145,222	\$145,222	4% of TEC
Piping (10)	\$128,100	\$72,611	\$72,611	\$72,611	2% of TEC
Insulation for duct work (11)	\$64,050	\$36,305	\$36,305	\$36,305	1% of TEC
Painting (12)	\$64,050	\$36,305	\$36,305	\$36,305	1% of TEC
Total Direct Installation Cost = (13) = (7)+(8)+(9)+(10)+(11)+(12)	\$1,921,500	\$1,089,162	\$1,089,162	\$1,089,162	
Indirect Installation					
Engineering and Supervision = (14)	\$840,500	\$363,054	\$363,054	\$363,054	10% of TEC
Construction Field = (15)	\$320,250	\$181,527	\$181,527	\$181,527	5% of TEC
Construction or Contractor Fees = (16)	\$640,500	\$363,054	\$363,054	\$363,054	10% of TEC
Contingencies = (17)	\$192,150	\$108,916	\$108,916	\$108,916	3% of TEC
Startup and performance Tests = (18)	\$192,150	\$108,916	\$108,916	\$108,916	3% of TEC
Total Indirect Cost = (19) = (14)+(15)+(16)+(17)+(18)	\$1,985,550	\$1,125,467	\$1,125,467	\$1,125,467	
<b>TOTAL CAPITAL COST (TCC) = (20) = (13) + (19)</b>	<b>\$10,312,050</b>	<b>\$5,845,168</b>	<b>\$5,845,168</b>	<b>\$5,845,168</b>	
Direct Annual Costs					
Electricity = (22)	\$76,124	\$76,124	\$76,124	\$76,124	\$0.0576 kWhr (generated from 200 MMBtu quote)
Chemical Cost (Urea/Ammonia) = (23)	\$206,606	\$103,303	\$103,303	\$103,303	Estimated from EPA cost spreadsheet
Catalyst Replacement (costs/No. of years) = (24)	\$47,528	\$23,764	\$23,764	\$23,764	Estimated from EPA cost spreadsheet
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day = (28)	\$32,850	\$32,850	\$32,850	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material = (29)	\$32,850	\$32,850	\$32,850	\$32,850	100% of maintenance labor
Indirect Annual Costs					
Administration (3% of maintenance+labor) = (25)	\$3,154	\$3,154	\$3,154	\$3,154	3% of maintenance+labor
Property Taxes (1% of TCC-OAQPS) = (26)	\$103,121	\$58,452	\$58,452	\$58,452	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS) = (27)	\$103,121	\$58,452	\$58,452	\$58,452	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (30 yrs at 5.5%) = (21)	\$709,469	\$402,148	\$402,148	\$402,148	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost) = (30)	\$39,420.00	\$39,420.00	\$39,420.00	\$39,420.00	60% of Maintenance Cost (OAQPS)
<b>TOTAL ANNUALIZED COST = (31) = Sum from (21) through (30)</b>	<b>\$1,354,241</b>	<b>\$830,515</b>	<b>\$830,515</b>	<b>\$830,515</b>	
Uncontrolled NOx TPY = (32)	3,421.22	238.27	227.76	204.98	
NOx removed TPY (80% Eff) = (33)	2,736.97	190.62	182.21	163.99	
<b>COST EFFECTIVENESS (\$/Ton of NOx removed) = (34) = (31)/(33)</b>	<b>\$494.79</b>	<b>\$4,356.97</b>	<b>\$4,568.06</b>	<b>\$5,064.51</b>	
Calculated theoretical emissions after control (lbs NOx/ton glass)	5.35	0.80	0.80	0.80	% remainder after control/uncontrolled
RACT II emission limit (lbs NOx/ton glass) and \$129,304	7.00	4.00	4.00	4.00	

# Appendix 33

Cost Analysis for SCR for all other glass furnaces		
	Cost estimate	PQ CORP/CHESTER other starting at 6 lbs/ton
Furnace Capacity MMBtu/hr	50	Factors Used From Permit
Hrs/Yr	8760	
NOx emissions (lb/MMBtu)	1.20	Based on -10 ions of glass pulled
TOTAL CAPITAL COST		
DIRECT CAPITAL COST	\$2,975,852.00	manipulated to agree with line 33 for 250 mmbtu
Equipment Cost (EC) = (1)		
Auxiliaries = (2)		
Instrumentation & Controls = (3)	\$297,585	10% of EC
Sales Tax (6% of EC) = (4)	\$178,551	6% of EC
Freight (6% of EC) = (5)	\$178,551	6% of EC
Total Equipment Cost (TEC) = (6) = (1)+(2)+(3)+(4)+(5)	\$3,630,539	
INSTALLATION COSTS		
Direct Installation		
Foundation and Support = (7)	\$290,443	8% of TEC
Handling and Erection = (8)	\$508,276	14% of TEC
Electrical = (9)	\$145,222	4% of TEC
Piping (10)	\$72,611	2% of TEC
Insulation for duct work (11)	\$36,305	1% of TEC
Painting (12)	\$36,305	1% of TEC
Total Direct Installation Cost = (13) = (7)+(8)+(9)+(10)+(11)+(12)	\$1,089,162	
Indirect Installation		
Engineering and Supervision = (14)	\$363,054	10% of TEC
Construction, Field = (15)	\$181,527	5% of TEC
Construction or Contractor Fees = (16)	\$363,054	10% of TEC
Contingencies = (17)	\$108,916	3% of TEC
Startup and performance Tests = (18)	\$108,916	3% of TEC
Total Indirect Cost = (19) = (14)+(15)+(16)+(17)+(18)	\$1,125,467	
TOTAL CAPITAL COST (TCC) = 20 = (6) + (13) + (19)	\$5,845,168	EPA cost spreadsheet for 250 MMBtu (Appendix 7)
Direct Annual Costs		
Electricity = (22)	\$76,124	\$0.0676 kw/hr (prorated from 200 MMBtu quote)
Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day = (28)	\$32,850	Maintenance Labor - \$60/hr, 30 min/shift, 3 shifts/day
Maintenance Material = (29)	\$32,850	100% of maintenance labor
Chemical Cost (Urea/Ammonia) = (23)	\$103,303	from EPA cost spreadsheet for 250 MMBtu
Catalyst Replacement (costs/No. of years) = (24)	\$35,964	from EPA cost spreadsheet for 250 MMBtu
Indirect Annual Costs		
Administration (3% of maintenance+labor) = (25)	\$3,154	3% of maintenance + labor
Property Taxes (1% of TCC-OAQPS) = (26)	\$58,452	1% of TCC (OAQPS)
Insurance (1% of TCC-OAQPS) = (27)	\$58,452	1% of TCC (OAQPS)
Annualized Capital Recovery Cost (5.5% @ 30 yrs) = (21)	\$402,148	TCC*0.0688
Overhead (44% of Labor cost + 12% Material Cost) = (30)	\$39,420.00	60% of Maintenance Cost (OAQPS)
TOTAL ANNUALIZED COST = (31) = Sum from (21) through (30)	\$842,715	
Uncontrolled NOx TPY = (32)	262.80	
NOx removed TPY (80% Eff.) = (33)	210.24	
COST-EFFECTIVENESS (\$/Ton NOx removed) = (34) = (31)/(33)	\$4,008.35	
Calculated theoretical emissions after control (lbs NOx/ton glass)	1.03	% remainder after control/uncontrolled
RACT II emission limit (lbs NOx/ton glass) and \$129,304	6.00	



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Check if applicable. No Attorney General Approval  
or objection within 30 days after submission.

**NOTICE OF FINAL RULEMAKING**

**DEPARTMENT OF ENVIRONMENTAL PROTECTION  
ENVIRONMENTAL QUALITY BOARD**

**Additional RACT Requirements for Major Sources of NO<sub>x</sub> and VOCs  
for the 2015 Ozone NAAQS**

**25 Pa. Code Chapters 121 and 129**

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Department of Agriculture  
Washington, D. C.

**FINAL-FORM RULEMAKING  
ENVIRONMENTAL QUALITY BOARD  
[25 PA. CODE CHS. 121 AND 129]**

**Additional RACT Requirements for Major Sources of  
NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS**

The Environmental Quality Board (Board) amends Chapters 121 and 129 (relating to general provisions; and standards for sources) to read as set forth in Annex A. This final-form rulemaking amends Chapter 129 to establish additional presumptive reasonably available control technology (RACT) requirements and RACT emission limitations for certain major stationary sources of oxides of nitrogen (NO<sub>x</sub>) and volatile organic compound (VOC) emissions in existence on or before August 3, 2018, to address the Federal requirements for the 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) (42 U.S.C.A. §§ 7401—7671q).

This final-form rulemaking amends Chapter 121 to add new terms to and amend existing terms in § 121.1 (relating to definitions) to support the final-form amendments to Chapter 129.

This final-form rulemaking will be submitted to the United States Environmental Protection Agency (EPA) for approval as a revision to the Commonwealth's State Implementation Plan (SIP) following promulgation of this final-form rulemaking.

This final-form rulemaking was adopted by the Board at its meeting on August 9, 2022.

*A. Effective Date*

This final-form rulemaking will be effective upon publication in the *Pennsylvania Bulletin*.

*B. Contact Persons*

For further information, contact Viren Trivedi, Chief, Division of Permits, Bureau of Air Quality, Rachel Carson State Office Building, P.O. Box 8468, Harrisburg, PA 17105-8468, (717) 783-9476; or Jesse C. Walker, Assistant Counsel, Bureau of Regulatory Counsel, Rachel Carson State Office Building, P.O. Box 8464, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the Pennsylvania Hamilton Relay Service, (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This final-form rulemaking is available on the Department of Environmental Protection's (Department) web site at [www.dep.pa.gov](http://www.dep.pa.gov) (select "Public Participation," then "Environmental Quality Board" and then navigate to the Board meeting of August 9, 2022).

*C. Statutory Authority*

This final-form rulemaking is authorized under section 5(a)(1) of the Air Pollution Control Act (APCA) (35 P.S. § 4005(a)(1)), which grants the Board the authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this

Commonwealth; and section 5(a)(8) of the APCA, which grants the Board the authority to adopt rules and regulations designed to implement the provisions of the CAA.

#### *D. Background and Purpose*

This final-form rulemaking establishes §§ 129.111—129.115 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs for the 2015 ozone NAAQS) to meet CAA requirements for the control of ground-level ozone. Emissions of NO<sub>x</sub> and VOCs are precursors for ground-level ozone formation. Ground-level ozone, a public health and welfare hazard, is not emitted directly to the atmosphere from air contamination sources, but forms from the photochemical reaction between emissions of VOCs and NO<sub>x</sub> in the presence of sunlight.

Ground-level ozone is a highly reactive gas which at sufficient concentrations can produce a wide variety of harmful public health and welfare effects. At elevated concentrations, ground-level ozone can adversely affect human and animal health, vegetation, materials, economic values, and personal comfort and well-being. It can cause damage to important food crops, forests, livestock and wildlife. Repeated exposure to ground-level ozone pollution may cause a variety of adverse health effects for both healthy people and those with existing conditions including difficulty in breathing, chest pains, coughing, nausea, throat irritation and congestion. It can worsen bronchitis, heart disease, emphysema and asthma, reduce lung capacity and lead to increased morbidity. Asthma is a significant and growing threat to children and adults. High levels of ground-level ozone also affect animals including pets, livestock and wildlife in ways similarly to humans.

The EPA is responsible for establishing NAAQS, or maximum allowable concentrations in the ambient air, for six criteria air pollutants considered harmful to public health and welfare, including the environment: ground-level ozone; particulate matter; nitrogen dioxide (NO<sub>2</sub>); carbon monoxide; sulfur dioxide; and lead. Section 109 of the 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.

On April 30, 1971, the EPA promulgated primary and secondary NAAQS for photochemical oxidants, which include ozone, under section 109 of the CAA. See 36 FR 8186 (April 30, 1971). These were set at 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. See 44 FR 8202 (February 8, 1979). The final rule 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. This revised 1-hour standard was reaffirmed on March 9, 1993. See 58 FR 13008 (March 9, 1993).

Section 110(a) of the CAA (42 U.S.C.A. § 7410(a)) gives states the primary responsibility for achieving the NAAQS. Section 110(a) of the CAA provides that each state shall 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 approved by the EPA, a SIP is legally enforceable under both Federal and state law.

Section 172(c)(1) of the CAA (42 U.S.C.A. § 7502(c)(1)) provides that SIPs for nonattainment areas must include "reasonably available control measures," including RACT, for affected sources of emissions. RACT is defined as the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. See 44 FR 53762 (September 17, 1979). Section 182 of the CAA (42 U.S.C.A. § 7511a) requires that, for areas that exceed the NAAQS for ozone, states shall develop and administer a program that mandates that certain major stationary sources implement RACT. Under sections 182(f)(1) and 184(b)(2) of the CAA (42 U.S.C.A. §§ 7511a(f)(1) and 7511c(b)(2)), these RACT requirements are applicable to all sources in this Commonwealth that emit or have a potential to emit 100 tons per year (TPY) or more of NO<sub>x</sub>. Under sections 182(b)(2) and 184(b)(2) of the CAA, these RACT requirements are applicable to all sources in this Commonwealth that emit or have a potential to emit at least 50 TPY of VOCs. Sources that emit or have the potential to emit equal to or greater than these levels are classified as "Title V" facilities or "major" facilities or sources. The owners and operators of these facilities are subject to the permitting requirements of Title V of the CAA, namely sections 501—507 of the CAA (42 U.S.C.A. §§ 7661—7661f). For more detail, see § 121.1 for the regulatory definitions of the terms "major facility," "major NO<sub>x</sub> emitting facility," "major VOC emitting facility" and "Title V facility."

For RACT implementation purposes, this entire Commonwealth is treated as a "moderate" ozone nonattainment area, because this Commonwealth is included in the Ozone Transport Region (OTR) established by operation of law under sections 176A and 184 of the CAA (42 U.S.C.A. §§ 7506a and 7511c). Section 184(b) of the CAA addresses provisions for the SIP of a state included in the OTR. Section 184(b)(1)(B) of the CAA requires that states in the OTR, including this Commonwealth, submit a SIP revision requiring implementation of RACT for all major stationary sources of NO<sub>x</sub> and VOC emissions in the state and not just for those sources that are located in designated nonattainment areas of the state. The RACT requirements established in this final-form rulemaking apply to the owners and operators of all major facilities or sources in this Commonwealth that emit or have a potential to emit equal to or greater than 100 TPY of NO<sub>x</sub> or 50 TPY of VOCs, as required under section 184 of the CAA for states in the OTR. Consequently, the Commonwealth's SIP must include RACT regulations applicable Statewide to the owners and operators of affected major stationary sources of NO<sub>x</sub> and VOC emissions. The Commonwealth's RACT regulations under §§ 129.91—129.95 (relating to stationary sources of NO<sub>x</sub> and VOCs) were implemented Statewide in January 1994 for the 1979 and 1993 1-hour ozone standard. See 24 Pa.B. 467 (January 15, 1994). Additionally, because the five-county Philadelphia area was designated as severe ozone nonattainment for the 1979 1-hour standard, the owners and operators of existing sources of 25 TPY or more of either pollutant in the five-county Philadelphia area were required under section 182(d) of the CAA to implement the RACT requirements in §§ 129.91—129.95. These requirements remain applicable to the owners and operators of these sources of 25 TPY or more in the five-county Philadelphia area.

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. At this time, the EPA also established a secondary standard equal to the primary standard. See 62 FR 38856 (July 18, 1997). Because ozone monitoring data is measured out to three decimal places, the standard effectively became 0.084 ppm because of rounding; areas with ozone levels as high as 0.084 ppm were considered as meeting the 0.08 ppm standard. See 73 FR 16436 (March 27, 2008). 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 2008 8-hour ozone standard is expressed to a level of three decimal places rather than two decimal places as in the 1997 standard. See 72 FR 37818 (July 11, 2007); 73 FR 16436. 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 "marginal" nonattainment for the 2008 8-hour ozone NAAQS, with the rest of this Commonwealth designated unclassifiable/attainment. See 77 FR 30088, 30143 (May 21, 2012).

The Commonwealth's RACT regulations under §§ 129.96—129.100 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs) were implemented in April 2016 for the 1997 and 2008 8-hour ozone standards. See 46 Pa.B. 2036 (April 23, 2016).

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). Like the 2008 8-hour ozone standard, the 2015 8-hour ozone standard is expressed to a level of three decimal places. See 79 FR 75234 (December 17, 2014); 80 FR 65292. The EPA made designations for the 2015 8-hour ozone standards on June 4, 2018, with an effective date of August 3, 2018. On June 4, 2018, the EPA designated Bucks, Chester, Delaware, Montgomery and Philadelphia Counties as "marginal" nonattainment, with the rest of this Commonwealth designated attainment/unclassifiable. See 83 FR 25776, 25828 (June 4, 2018). The Department's preliminary analysis of the 2021 ambient air ozone season monitoring data shows that all ozone samplers in this Commonwealth are monitoring attainment of the 2015 8-hour ozone NAAQS except these two: the Bristol sampler in Bucks County and the Philadelphia Air Management Services Northeast Airport sampler in Philadelphia County; all ozone samplers in this Commonwealth are projected to monitor attainment of the 1997 and 2008 8-hour ozone NAAQS.

The EPA's final rules to implement the 2008 and 2015 8-hour ozone NAAQS require states with areas classified as "moderate" nonattainment or higher to submit a demonstration, as a revision to the SIP, that their current regulations fulfill 8-hour ozone RACT requirements for all control technique guideline (CTG) categories and all major non-CTG sources. See 80 FR 12264 (March 6, 2015) and 83 FR 62998 (December 6, 2018). This requirement applies to this entire Commonwealth due to its Statewide designation of "moderate" ozone nonattainment as a

member of the OTR. Therefore, a re-evaluation of what constitutes RACT for affected sources in this Commonwealth must be fulfilled each time the EPA revises a NAAQS. This was the case in 1997 when the EPA replaced the 1993 1-hour ozone standard with the 8-hour ozone standard and was the case in 2008 and again in 2015 when the EPA lowered the 8-hour ozone standard. State regulations to control emissions of NO<sub>x</sub> and VOCs from major stationary sources will be reviewed by the EPA to determine if the provisions meet the RACT requirements of the CAA and its implementing regulations designed to attain and maintain the ozone NAAQS. Therefore, the Commonwealth must submit a SIP revision to demonstrate how it will attain and maintain the 2015 8-hour ozone standard in the nonattainment areas.

The EPA's past implementation of regulations for revised NAAQS ozone standards have required OTR states to submit RACT SIP revisions based on the timeframe provided in section 184 of the CAA as measured from the effective date of designations made for those revised NAAQS, rather than from November 15, 1990. This requirement was first codified in 40 CFR 51.916 (relating to what are the requirements for an Ozone Transport Region under the 8-hour NAAQS?) for the 1997 8-hour ozone NAAQS, later codified for the 2008 8-hour ozone NAAQS in 40 CFR 51.1116 (relating to requirements for an Ozone Transport Region) and most recently codified for the 2015 8-hour ozone NAAQS in 40 CFR 51.1316 (relating to requirements for an Ozone Transport Region). Under these provisions, states in the OTR were required to submit SIP revisions addressing the RACT requirements of section 184 of the CAA for the revised 2015 8-hour ozone NAAQS not later than 2 years after the effective date of August 3, 2018, or by August 3, 2020. See 83 FR 25776. The Commonwealth has missed this deadline, but the Department is working to submit the required SIP revision to the EPA as quickly as possible.

To address the Commonwealth's RACT obligations under section 184 of the CAA, the Department conducted a generic RACT analysis to determine if additional NO<sub>x</sub> or VOC emissions limitations or controls beyond those established for the 1997 and 2008 8-hour ozone NAAQS under §§ 129.96—129.100 would represent RACT for the 2015 8-hour ozone NAAQS. This generic analysis identified existing affected source categories by size and fuel type; identified available technically and economically feasible control options for NO<sub>x</sub> or VOC emissions, or both, for each type of existing source category; estimated emission reduction potential for each control technology; identified costs for technologies, using appropriate updates; and evaluated cost-effectiveness using the guidance provided in the EPA Air Pollution Control Cost Manual, EPA/452/B-02-001, 6th Edition, January 2002, as amended, and as updated in the 7th Edition beginning in 2019, for both uncontrolled and controlled sources (combinations of technologies). After conducting this analysis, the Department determined what constitutes RACT for each affected source category in this Commonwealth.

Based on this analysis, the Board has determined that additional cost-effective controls represent RACT for the 2015 8-hour ozone NAAQS beyond those established for the 1997 and 2008 8-hour ozone NAAQS. The RACT emission limitations and requirements being implemented for the 2015 ozone NAAQS are at least as stringent as the RACT emission limitations and requirements for the 1979, 1997 and 2008 ozone NAAQS. To the extent that a prior RACT emission limitation or requirement established for the 1979, 1997 or 2008 ozone NAAQS is more stringent, the owner and operator of the affected source shall comply with the more stringent emission limitation or requirement. There are ten existing source categories that

are affected by this final-form rulemaking: combustion units; municipal solid waste landfills; municipal waste combustors; process heaters; turbines; stationary internal combustion engines; cement kilns; glass melting furnaces; lime kilns; and combustion sources including direct-fired heaters, furnaces or ovens; as well as other existing source categories that are not regulated elsewhere under Chapter 129.

The final-form RACT requirements apply to the owners and operators of subject facilities or sources in this Commonwealth that emit or have a potential to emit 100 TPY or more of NO<sub>x</sub> or 50 TPY or more of VOCs, including those located in Bucks, Chester, Delaware, Montgomery and Philadelphia Counties. There are approximately 500 Title V facilities in this Commonwealth under the Department's jurisdiction whose owners and operators may be subject to this final-form rulemaking. The Department preliminarily determined that the owners and operators of approximately 10—30 affected major facilities or sources under the Department's jurisdiction meet the definition of "small business" specified in section 3 of the Regulatory Review Act (71 P.S. § 745.3). The owners and operators of the affected facilities or sources are familiar with the existing requirements for emissions control, recordkeeping and reporting for their entity and have the professional and technical skills needed for compliance with these final-form requirements.

The Board has determined that this final-form rulemaking fulfills the requirements for RACT re-evaluation. As more fully discussed in section E of this preamble, the Board is establishing a compliance option hierarchy whereby the owner or operator of a source or facility that is subject to § 129.111 (relating to applicability) that cannot meet the presumptive RACT requirements and RACT emission limitations under § 129.112 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule) may apply for a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan under § 129.113 (relating to facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements) or an alternative case-by-case RACT determination under § 129.114 (relating to alternative RACT proposal and petition for alternative compliance schedule). The Board provides the owners and operators of certain affected facilities or sources with a less resource intensive demonstration established under § 129.114(i) of this final-form rulemaking as an alternative to performing a complete case-by-case RACT analysis. This less resource intensive demonstration may be used by an owner or operator of a subject source or facility to demonstrate that the previous case-by-case determination made under §§ 129.96—129.100 (RACT II) remains RACT for the 2015 8-hour ozone standard. For the owners and operators of eligible subject sources, this approach will likely reduce the consulting costs that an owner or operator may choose to incur. Additionally, there is no fee due to the Department to submit an analysis under final-form § 129.114(i).

The Department must ensure that the 1997, 2008 and 2015 8-hour ozone NAAQS are attained and maintained by implementing permanent and Federally enforceable control measures. Reductions in ozone precursor emissions that are achieved following the adoption and implementation of RACT emission control measures for source categories covered by this final-form rulemaking will assist the Commonwealth in making substantial progress in attaining and maintaining the 1997, 2008 and 2015 8-hour ozone NAAQS. The Board has determined that the requirements of this final-form rulemaking are reasonably necessary to attain and maintain the

health-based and welfare-based 8-hour ozone NAAQS in this Commonwealth and to satisfy related CAA requirements.

The Department presented the draft final-form Annex A to the Air Quality Technical Advisory Committee on April 7, 2022, and to the Small Business Compliance Advisory Committee on April 27, 2022, and briefed the committees on the comments received on the proposed rulemaking. The Department presented the draft final-form Annex A to the Citizens Advisory Council's (CAC) Policy and Regulatory Oversight Committee on April 14, 2022, and to the CAC on April 19, 2022. At its meeting on May 18, 2022, the CAC concurred with the Department's recommendation to present this final-form rulemaking to the Board for consideration. Advisory committee meetings are advertised and open to the public.

#### *E. Summary of Final-Form Rulemaking and Changes from Proposed to Final-Form Rulemaking*

##### *§ 121.1. Definitions*

This section contains definitions relating to the air quality regulations. This final-form rulemaking amends § 121.1 to add the terms “combustion source” and “natural gas compression and transmission facility fugitive VOC air contamination source” to support the final-form amendments to Chapter 129.

This final-form rulemaking amends the definition of the proposed term “combustion source.” The proposed definition of “combustion source” specified under subparagraph (i) that this is a stationary device that combusts solid, liquid or gaseous fuel used to produce heat or energy for industrial, commercial or institutional use by direct heat transfer. Subparagraph (ii) specified that the term does not include brick kilns, cement kilns or lime kilns. This final-form rulemaking amends the term “combustion source” to specify that it is limited to §§ 129.111—129.115 by adding the words “For purposes of §§ 129.111—129.115 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs for the 2015 ozone NAAQS):” before subparagraph (i). No changes are made to subparagraph (i) from proposed to this final-form rulemaking. Subparagraph (ii) is amended from proposed to this final-form rulemaking to exclude three additional source categories: glass melting furnaces; a source listed in § 129.112(g)(2) or (3) (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule); and a source subject to § 129.112(g)(4). These changes are made in response to comments received on the proposed rulemaking.

No changes are made to the term and definition of “natural gas compression and transmission facility fugitive VOC air contamination source” from proposed to this final-form rulemaking.

This final-form rulemaking amends the definitions of two existing terms in § 121.1. The definition of the term “major NO<sub>x</sub> emitting facility” is amended under subparagraph (v) to add the words “For purposes of §§ 129.91—129.95 (relating to stationary sources of NO<sub>x</sub> and VOCs), twenty-five” before TPY to clarify that for purposes of §§ 129.91—129.95, a major NO<sub>x</sub> emitting facility is a facility which emits or has the potential to emit NO<sub>x</sub> from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than 25 TPY for a facility located in Bucks, Chester, Delaware, Montgomery or

Philadelphia County. The Commonwealth's RACT regulations under §§ 129.91—129.95 were promulgated on January 15, 1994, and applicable Statewide for the 1979 and 1993 1-hour ozone standard. See 24 Pa.B. 467. The definition of this term is further amended to add subparagraph (vi), which states that “For purposes of §§ 129.96—129.100 and 129.111—129.115 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs; and additional RACT requirements for major sources of NO<sub>x</sub> and VOCs for the 2015 ozone NAAQS), one hundred TPY Statewide.” Subparagraph (vi) clarifies that for purposes of §§ 129.96—129.100 and 129.111—129.115, a major NO<sub>x</sub> emitting facility is a facility which emits or has the potential to emit NO<sub>x</sub> from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than 100 TPY and this rate is applicable Statewide. The Commonwealth's RACT regulations under §§ 129.96—129.100 were promulgated on April 23, 2016, and applicable Statewide for the 1997 and 2008 8-hour ozone standards. See 46 Pa.B. 2036. These changes are made in response to comments received on the proposed rulemaking.

Likewise, the definition of the term “major VOC emitting facility” is amended under subparagraph (iv) to add the words “For purposes of §§ 129.91—129.95, twenty-five” before TPY to clarify that for purposes of §§ 129.91—129.95, a major VOC emitting facility is a facility which emits or has the potential to emit VOCs from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than 25 TPY for a facility located in Bucks, Chester, Delaware, Montgomery or Philadelphia County. The definition of this term is further amended to add subparagraph (v), which states that “For purposes of §§ 129.96—129.100 and 129.111—129.115, fifty TPY Statewide.” Subparagraph (v) clarifies that for purposes of §§ 129.96—129.100 and 129.111—129.115, a major VOC emitting facility is a facility which emits or has the potential to emit VOCs from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than 50 TPY and this rate is applicable Statewide. These changes are made in response to comments received on the proposed rulemaking.

No other changes are made to this section from proposed to this final-form rulemaking.

#### *§ 129.111. Applicability*

Subsection (a) provides that, except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major NO<sub>x</sub> emitting facility that commenced operation on or before August 3, 2018, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major VOC emitting facility that commenced operation on or before August 3, 2018, for which a requirement or emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107. The owner or operator shall identify and list the sources and facilities subject to this subsection as specified in paragraphs (1) and (2) in the written notification required under § 129.115(a) (relating to written notification, compliance demonstration and recordkeeping and reporting requirements).

Subsection (a) is amended from proposed to this final-form rulemaking to add the words “that commenced operation on or before August 3, 2018,” after “major NO<sub>x</sub> emitting facility” and to

delete the words “were in existence” after “major VOC emitting facility that” and add the words “commenced operation” to clarify that construction or installation of the affected emissions unit at the major NO<sub>x</sub> emitting facility or at the major VOC emitting facility had been completed and the emissions unit had begun operating on or before August 3, 2018. The date of August 3, 2018, is the effective date of the designations for the 2015 8-hour ozone standards. On June 4, 2018, the EPA designated Bucks, Chester, Delaware, Montgomery and Philadelphia Counties as “marginal” nonattainment, effective August 3, 2018, with the rest of this Commonwealth designated attainment/unclassifiable. See 83 FR 25776, 25828.

Paragraph (1) is amended from proposed to this final-form rulemaking to clarify that the owner or operator shall identify and list in the written notification required under § 129.115(a) the sources and facilities that commenced operation on or before August 3, 2018, for which a requirement or emission limitation has not been established in the specified sections. Proposed paragraph (1) did not include the words “that commenced operation on or before August 3, 2018.” Sources and facilities that commenced operation after August 3, 2018, at a major NO<sub>x</sub> emitting facility or at a major VOC emitting facility are subject to a best available technology (BAT) analysis and do not need to be included in the written notification required under § 129.115(a).

Paragraph (2) is amended from proposed to this final-form rulemaking to clarify that the owner or operator shall identify and list in the written notification required under § 129.115(a) the sources and facilities that commenced operation on or before August 3, 2018, and are subject to the specified sections. The specified sections established RACT emission limitations and RACT requirements consistent with the EPA CTGs for the specified categories of sources. The owner or operator of a source or facility that is subject to one of these specified sections shall comply with the applicable RACT requirements and RACT emission limitations and is not subject to the RACT requirements and RACT emission limitations of §§ 129.111—129.115.

Subsection (a) and (a)(1) and (2) are further amended from proposed to this final-form rulemaking to delete the group of sections “129.71—129.73” and “129.75” and add the group of sections “129.71—129.75” inclusive of § 129.74 (relating to control of VOC emissions from fiberglass boat manufacturing materials). These sections establish RACT requirements and RACT emission limitations consistent with the recommendations provided by the EPA in the applicable CTG documents. The owners and operators of sources of emissions or facilities that are subject to the requirements of one or more of §§ 129.71—129.75 are not subject to §§ 129.111—129.115 for these sources of emissions or facilities.

The changes to subsection (a) and (a)(1) and (2) are made in response to comments received on the proposed rulemaking.

Subsection (b) provides that, except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a NO<sub>x</sub> emitting facility that commenced operation on or before August 3, 2018, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a VOC emitting facility that commenced operation on or before August 3, 2018, when the installation and operation of a new source after August 3, 2018, or a modification or change in

operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, results in the source or facility meeting the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility and for which a requirement or an emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107. The owner or operator shall identify and list the sources and facilities subject to this subsection as specified in paragraphs (1) and (2) in the written notification required under § 129.115(a).

Subsection (b) is amended from proposed to this final-form rulemaking to add the words “that commenced operation on or before August 3, 2018,” after “NO<sub>x</sub> emitting facility” and after “VOC emitting facility,” add the words “and operation” after “installation,” add the words “after August 3, 2018,” after “of a new source” and “change in operation,” delete the words “an existing” and insert the word “a” before “source” and delete the word “after” following “source,” and add the words “that commenced operation on or before” before the words “August 3, 2018, results in.” These amendments clarify that the owner and operator of a source or a facility that is not major on or before August 3, 2018, becomes subject to §§ 129.111—129.115, as applicable, when the installation and operation of a new source after August 3, 2018, or a modification or change in operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, results in the source or the facility meeting the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility. These changes are made in response to comments received on the proposed rulemaking.

Subsection (b) and (b)(1) and (2) are amended from proposed to this final-form rulemaking to delete the group of sections “129.71—129.73” and “129.75” and add the group of sections “129.71—129.75” inclusive of § 129.74. These sections establish RACT requirements and RACT emission limitations consistent with the recommendations provided by the EPA in the applicable CTG documents. The owners and operators of sources of emissions or facilities that are subject to the requirements of one or more of §§ 129.71—129.75 are not subject to §§ 129.111—129.115 for these sources of emissions or facilities.

The changes to subsection (b) and (b)(1) and (2) are made in response to comments received on the proposed rulemaking.

Subsection (c) establishes that §§ 129.112—129.114 do not apply to the owner and operator of a NO<sub>x</sub> air contamination source that has the potential to emit less than 1 TPY of NO<sub>x</sub> located at a major NO<sub>x</sub> emitting facility subject to subsection (a) or (b), or to the owner and operator of a VOC air contamination source that has the potential to emit less than 1 TPY of VOC located at a major VOC emitting facility subject to subsection (a) or (b). The owner or operator shall identify and list these sources in the written notification required under § 129.115(a).

No changes are made to subsection (c) from proposed to this final-form rulemaking.

Subsection (d) establishes that, except as specified in subsection (e), this section and §§ 129.112—129.115 do not apply to the owner and operator of a facility that is not a major NO<sub>x</sub> emitting facility or a major VOC emitting facility on or before December 31, 2022.

Subsection (d) is amended from proposed to this final-form rulemaking to add the words “except as specified in subsection (e)” and to amend the date of applicability from the date of publication of this final-form rulemaking to the date certain of December 31, 2022.

The amendment of subsection (d) from proposed to this final-form rulemaking with the compliance date certain of December 31, 2022, in place of the proposed compliance date, which was the date of publication of this final-form rulemaking, is made to address the required implementation deadline of January 1, 2023, in the EPA 2015 ozone implementation rule, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. See 40 CFR 51.1312(a)(3)(i); see also 40 CFR 51.1316(b)(3)(1).

Subsection (e) is added to this final-form rulemaking to establish that if the owner and operator of a facility that complied with subsection (d), that is, the facility was not a major NO<sub>x</sub> emitting facility or a major VOC facility on or before December 31, 2022, then meets the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility after December 31, 2022, the affected owner or operator shall comply with subsection (b) once the facility meets the applicable major facility threshold. Likewise, if the owner or operator of a NO<sub>x</sub> emitting facility or a VOC emitting facility that becomes subject to subsection (b) as a result of meeting the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility on or before December 31, 2022, then falls below the applicable major facility emission threshold on or before December 31, 2022, and then resumes major facility status after December 31, 2022, that owner or operator shall comply with subsection (b) again once the facility meets the applicable major facility threshold and will be subject again to the applicable RACT requirements and RACT emission limitations of §§ 129.111—129.115.

*§ 129.112. Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule*

Subsection (a) establishes that the owner and operator of a source listed in one or more of subsections (b)—(k) located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall comply with the applicable presumptive RACT requirement or RACT emission limitation, or both, beginning with the specified compliance date in paragraph (1) or (2), unless an alternative compliance schedule is submitted and approved under subsections (n)—(p) or under § 129.114. Paragraph (1) specifies the compliance date of January 1, 2023, for a source subject to § 129.111(a). Paragraph (2) specifies the compliance date of January 1, 2023, or 1 year after the date the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b). The owner or operator shall meet the applicable standards or regulations within the time frame required by standards or regulations even if the permit is not revised to incorporate the standards or regulations within the required time frame.

No changes are made to subsection (a) from proposed to this final-form rulemaking.

Subsection (b) establishes that the owner and operator of a source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111

shall comply with the applicable presumptive RACT requirements in paragraph (1) and the recordkeeping and reporting requirements in paragraph (2).

Paragraph (1) specifies that the owner and operator of one or more of the combustion unit or process heater types listed in paragraph (1)(i) and (ii) shall comply with the applicable presumptive RACT requirements for that source, which include, among other things, inspection and adjustment requirements. Paragraph (1)(i) and (ii) are amended from proposed to this final-form rulemaking to add the words “or process heater” after the words “combustion unit.” These changes are made in response to comments received on the proposed rulemaking. No other changes are made to paragraph (1) from proposed to this final-form rulemaking.

Paragraph (2) specifies the applicable recordkeeping and reporting requirements. Paragraph (2) is amended from proposed to this final-form rulemaking to delete “§ 129.115(e), (f) or (g)” and add “§ 129.115(f) and (i)” to provide the correct cross reference. No other changes are made to paragraph (2) from proposed to this final-form rulemaking.

Paragraph (3) specifies that compliance with the applicable presumptive RACT requirements in paragraph (1) and recordkeeping and reporting requirements in paragraph (2) assures compliance with the provisions in §§ 129.93(b)(2)—(5) and 129.97(b)(1)—(3) (relating to presumptive RACT emissions limitations; and presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule). No changes are made to paragraph (3) from proposed to this final-form rulemaking.

Subsection (c) establishes that the owner and operator of a source listed in this subsection located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall comply with the applicable presumptive RACT requirement, which is the installation, maintenance and operation of the source in accordance with the manufacturer's specifications and with good operating practices.

Subsection (c)(8) is amended from proposed to this final-form rulemaking to delete the word “or” and add a comma after the words “thermal oxidizer” and add the words “or flare” after the words “catalytic oxidizer.” These changes are made in response to comments received on the proposed rulemaking. No other changes are made to subsection (c) from proposed to this final-form rulemaking.

Subsection (d) establishes that, except as specified in subsection (c), the owner and operator of a combustion unit, brick kiln, cement kiln, lime kiln, glass melting furnace or combustion source located at a major VOC emitting facility subject to § 129.111 shall comply with the specified presumptive RACT requirement, which is the installation, maintenance and operation of the source in accordance with the manufacturer's specifications and with good operating practices for the control of the VOC emissions from the combustion unit, brick kiln, cement kiln, lime kiln, glass melting furnace or combustion source. Subsection (d) is amended from proposed to this final-form rulemaking to add the words “glass melting furnace” after lime kiln, add the words “brick kiln, cement kiln, lime kiln, glass melting furnace” after combustion unit, and delete the word “other” in two places. These changes are made in response to comments received on the

proposed rulemaking. No other changes are made to subsection (d) from proposed to this final-form rulemaking.

Subsection (e) establishes that the owner and operator of a municipal solid waste landfill subject to § 129.111 shall comply with the applicable presumptive RACT requirements specified in paragraph (1) or (2).

Paragraph (1) is amended from proposed to this final-form rulemaking to delete the reference to 40 CFR Part 60, Subpart Cc (relating to emission guidelines and compliance times for municipal solid waste landfills) and add the reference to the Federal Plan for Municipal Solid Waste Landfills in 40 CFR Part 62, Subpart OOO (relating to Federal plan requirements for municipal solid waste landfills that commenced construction on or before July 17, 2014 and have not been modified or reconstructed since July 17, 2014). This change is made in response to comments received that the requirements of 40 CFR Part 60, Subpart Cc are superseded by the requirements of 40 CFR Part 62, Subpart OOO. The EPA issued the Federal Plan in 40 CFR Part 62, Subpart OOO, on May 21, 2021, with an effective date of June 21, 2021. See 86 FR 27756 (May 21, 2021).

Proposed paragraph (2), which referenced 40 CFR Part 60, Subpart WWW (relating to standards of performance for municipal solid waste landfills that commenced construction, reconstruction, or modification on or after May 30, 1991, but before July 18, 2014), is deleted in this final-form rulemaking because the requirements of 40 CFR Part 60, Subpart WWW are superseded by the requirements of 40 CFR Part 60, Subpart XXX (relating to standards of performance for municipal solid waste landfills that commenced construction, reconstruction, or modification after July 17, 2014).

The requirements of 40 CFR Part 60, Subpart XXX, were specified in proposed paragraph (3). Proposed paragraph (3) is renumbered to paragraph (2) in this final-form rulemaking.

Subsection (f) establishes that the owner and operator of a municipal waste combustor (MWC) subject to § 129.111 shall comply with the presumptive RACT emission limitation of 110 parts per million volume dry (ppmvd) NO<sub>x</sub> @ 7% oxygen. Proposed subsection (f) specified a presumptive RACT emission limitation of 150 ppmvd NO<sub>x</sub> @ 7% oxygen. Subsection (f) was amended from proposed to this final-form rulemaking to delete the emission limitation of 150 ppmvd NO<sub>x</sub> @ 7% oxygen and add the emission limitation of 110 ppmvd NO<sub>x</sub> @ 7% oxygen. This change is made in response to comments received on the proposed rulemaking and an analysis by the Department showing that the emission limitation of 110 ppmvd NO<sub>x</sub> @ 7% oxygen is achievable, cost-effective, and constitutes RACT for MWCs.

Subsection (g) establishes that, except as specified in subsection (c), the owner and operator of a NO<sub>x</sub> air contamination source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or a VOC air contamination source listed in this subsection that is located at a major VOC emitting facility subject to § 129.111 may not cause, allow or permit NO<sub>x</sub> or VOCs to be emitted from the air contamination source in excess of the applicable presumptive RACT emission limitation specified in paragraphs (1)–(4).

Paragraph (1) is amended from proposed to this final-form rulemaking. Paragraph (1)(vi), which applies to the owner or operator of a circulating fluidized bed combustion unit with a rated heat input equal to or greater than 250 million Btu/hour and firing waste coal products, is amended to add the words “RACT requirements and” after the word “presumptive.” Paragraph (1)(vi) is further amended to add clause (C), which specifies that the owner or operator shall control the NO<sub>x</sub> 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. Clause (C) replaces proposed paragraph (1)(viii), which is deleted in this final-form rulemaking. These changes are made in response to comments received on the proposed rulemaking.

No changes were made to paragraphs (1)(i)—(v) and (vii) from proposed to this final-form rulemaking.

Paragraph (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 based on the Department’s review of information provided by commentators during the public comment period as well as the Department’s review of available stack test emissions data. Proposed paragraph (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. Paragraph (2)(i) is amended in this final-form rulemaking to establish 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 less than 180 MW. Paragraph (2)(i)(A) is amended from proposed to this final-form rulemaking to delete the limitation of 42 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 120 ppmvd NO<sub>x</sub> @ 15% oxygen. Paragraph (2)(i)(C) is amended from proposed to this final-form rulemaking to delete the limitation of 96 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 150 ppmvd NO<sub>x</sub> @ 15% oxygen.

Paragraph (2)(ii) is amended from proposed to this final-form rulemaking to establish 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 and less than 180 MW. The applicable presumptive RACT emission limitations are established in paragraph (2)(ii)(A)—(D). Clause (A) establishes the limitation of 42 ppmvd NO<sub>x</sub> @ 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<sub>x</sub> @ 15% oxygen when firing fuel oil. Clause (D) establishes the limitation of 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

Proposed paragraph (2)(ii) is renumbered in this final-form rulemaking to paragraph (2)(iii). No other changes are made to renumbered paragraph (2)(iii) in this final-form rulemaking.

Proposed paragraph (2)(iii) is renumbered in this final-form rulemaking to paragraph (2)(iv). Renumbered paragraph (2)(iv) is further amended in this final-form rulemaking to establish 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. Subparagraph (iv)(A) is amended from proposed to this final-form rulemaking to delete the limitation of 85 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel and add the limitation of 120 ppmvd NO<sub>x</sub> @ 15% oxygen, based on the Department's review of information provided by commentators during the public comment period and the Department's review of available stack test emissions data.

Proposed paragraph (2)(iv) is renumbered in this final-form rulemaking to paragraph (2)(v). Renumbered paragraph (2)(v) is further amended in this final-form rulemaking to establish 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 3,000 bhp, and less than 60,000 bhp.

Proposed paragraph (3) established applicable presumptive RACT emission limitations for the owners or operators of four subcategories of stationary internal combustion engines in subparagraphs (i)—(iv). Subparagraph (iv)(A) is amended from proposed to this final-form rulemaking to establish the applicable presumptive RACT emission limitation for the owner or operator of a rich burn stationary internal combustion engine with a rating equal to or greater than 100 bhp is 2.0 gram NO<sub>x</sub>/brake horsepower-hour (bhp-hr) when firing natural gas or a noncommercial gaseous fuel, rather than the proposed limitation of 0.6 gram NO<sub>x</sub>/bhp-hr. This change is made in response to comments received on the proposed rulemaking.

No changes are made to paragraph (3)(i)—(iii) or to subparagraph (iv)(B) from proposed to this final-form rulemaking. No changes are made to paragraph (4) from proposed to this final-form rulemaking.

Subsection (h) establishes that the owner and operator of a Portland cement kiln subject to § 129.111 shall comply with the applicable presumptive RACT emission limitation in paragraphs (1)—(3).

Subsection (i) establishes that the owner and operator of a glass melting furnace subject to § 129.111 shall comply with the applicable presumptive RACT emission limitation in paragraphs (1)—(5).

Subsection (j) establishes that the owner and operator of a lime kiln subject to § 129.111 shall comply with the applicable presumptive RACT emission limitation of 4.6 pounds of NO<sub>x</sub> per ton of lime produced.

No changes are made to subsections (h)—(j) from proposed to this final-form rulemaking.

Subsection (k) establishes that the owner and operator of a direct-fired heater, furnace, oven or other combustion source with a rated heat input equal to or greater than 20 million Btu/hour

subject to § 129.111 shall comply with the applicable presumptive RACT emission limitation of 0.10 lb NO<sub>x</sub>/million Btu heat input. Subsection (k) is amended from proposed to this final-form rulemaking to add the category of other combustion source and to remove the proposed requirement that the limitation be complied with on a daily average basis or that compliance be determined through a stack test. These changes are made in response to comments received on the proposed rulemaking.

Subsection (l) provides that the requirements and emission limitations of this section supersede the requirements and emission limitations of a RACT permit issued to the owner or operator of an air contamination source subject to one or more of subsections (b)—(k) prior to *blank* (*Editor's Note: The blank refers to the effective date of this final-form rulemaking when published as a final-form rulemaking.*) under §§ 129.91—129.95 or under §§ 129.96—129.100 to control, reduce or minimize NO<sub>x</sub> emissions or VOC emissions, or both, from the air contamination source unless the RACT permit contains more stringent requirements or emission limitations, or both. No changes are made to subsection (l) from proposed to this final-form rulemaking.

Subsection (m) provides that the requirements and emission limitations of this section supersede the requirements and emission limitations of §§ 129.201—129.205, 129.301—129.310, 145.111—145.113 and 145.141—145.146 unless the requirements or emission limitations of §§ 129.201—129.205, 129.301—129.310, 145.111—145.113 or 145.141—145.146 are more stringent. Subsection (m) is amended from proposed to this final-form rulemaking to add §§ 129.301—129.310 (relating to control of NO<sub>x</sub> emissions from glass melting furnaces) to the group of regulations whose requirements and emission limitations would be superseded by the requirements and emission limitations of § 129.112 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent. This change is made in response to comments received on the proposed rulemaking.

Subsection (n) establishes that the owner or operator of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility subject to § 129.111 that includes an air contamination source subject to one or more of subsections (b)—(k) that cannot meet the applicable presumptive RACT requirement or RACT emission limitation without installation of an air cleaning device may submit a petition to the Department or appropriate approved local air pollution control agency, in writing or electronically, requesting an alternative compliance schedule in accordance with paragraphs (1) and (2). Subsection (n) is amended from proposed to this final-form rulemaking to add the word “electronically” after the words “in writing.”

Paragraph (1) is amended from proposed to this final-form rulemaking to delete the word “written.” The changes to subsection (n) and (n)(1) are made to provide flexibility to the subject owner or operator in how the petition may be submitted.

Paragraph (1)(i) is amended from proposed to this final-form rulemaking to establish that the petition shall be submitted to the Department or appropriate approved local air pollution control agency as soon as possible but not later than December 31, 2022, for a source subject to § 129.111(a). Proposed paragraph (1)(i) established the due date as 6 months after the date of publication of this final-form rulemaking.

Paragraph (1)(ii) is amended from proposed to this final-form rulemaking to establish that the petition shall be submitted to the Department or appropriate approved local air pollution control agency as soon as possible but not later than December 31, 2022, or not later than 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility, whichever is later, for a source subject to § 129.111(b). Proposed paragraph (1)(ii) established the due date as 6 months after the date of publication of this final-form rulemaking or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility, whichever is later.

The changes to the due dates specified in paragraph (1)(i) and (ii) are made to accommodate the length of time for this rulemaking to move through the regulatory development process and meet the implementation deadline of January 1, 2023, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. This final-form rulemaking is expected to be published as a final-form rulemaking in the Pennsylvania Bulletin prior to the end of 2022.

Proposed paragraph (2) established that the written petition must include the items specified in subparagraphs (i)—(v). Paragraph (2) is amended from proposed to this final-form rulemaking to delete the word “written.” The petition may be submitted in writing or electronically as specified in subsection (n). This change provides flexibility to the subject owner or operator in how the petition may be submitted. No changes are made to subparagraphs (i)—(v) from proposed to this final-form rulemaking.

Subsection (o) provides that the Department or appropriate approved local air pollution control agency will review the timely and complete written petition requesting an alternative compliance schedule submitted in accordance with subsection (n) and approve or deny the petition in writing.

Subsection (p) provides that approval or denial under subsection (o) of the timely and complete petition for an alternative compliance schedule submitted under subsection (n) will be effective on the date the letter of approval or denial of the petition is signed by the authorized representative of the Department or appropriate approved local air pollution control agency.

Subsection (q) provides that the Department will submit each petition for an alternative compliance schedule approved under subsection (o) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

No changes are made to subsections (o)—(q) from proposed to this final-form rulemaking.

#### *§ 129.113. Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements*

Subsection (a) provides that the owner or operator of a major NO<sub>x</sub> emitting facility subject to § 129.111 that includes at least one air contamination source subject to a NO<sub>x</sub> RACT emission

limitation in § 129.112 that cannot meet the applicable NO<sub>x</sub> RACT emission limitation may elect to meet the applicable NO<sub>x</sub> RACT emission limitation in § 129.112 by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis. System-wide emissions averaging must be among sources under common control of the same owner or operator within the same ozone nonattainment area in this Commonwealth. No change is made to subsection (a) from proposed to this final-form rulemaking.

Subsection (b) provides that the owner or operator of each facility that elects to comply with subsection (a) shall submit a NO<sub>x</sub> emissions averaging plan in writing or electronically to the Department or appropriate approved local air pollution control agency as part of an application for an operating permit modification or a plan approval, if otherwise required. Subsection (b) is amended from proposed to this final-form rulemaking to delete the word “written” before the phrase “NO<sub>x</sub> emissions averaging plan” and add the words “in writing or electronically” after the phrase “NO<sub>x</sub> emissions averaging plan.” These changes are made to provide flexibility to the subject owner or operator in how the NO<sub>x</sub> emissions averaging plan may be submitted.

The application incorporating the NO<sub>x</sub> emissions averaging plan requirements of this section shall be submitted by the applicable date specified in subsection (b)(1) or (2). Proposed paragraph (1) established the due date as the date 6 months after the date of publication of this final-form rulemaking for a source subject to § 129.111(a). Paragraph (1) is amended from proposed to this final-form rulemaking to establish the due date as December 31, 2022.

Proposed paragraph (2) established the due date as the date 6 months after the date of publication of this final-form rulemaking or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility, whichever is later, for a source subject to § 129.111(b). Paragraph (2) is amended from proposed to this final-form rulemaking to establish the due date as December 31, 2022, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility, whichever is later.

The changes to the due dates specified in paragraphs (1) and (2) are made to accommodate the length of time for this rulemaking to move through the regulatory development process and meet the implementation deadline of January 1, 2023, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. This final-form rulemaking is expected to be published as a final-form rulemaking in the Pennsylvania Bulletin prior to the end of 2022.

Subsection (c) provides that each NO<sub>x</sub> air contamination source included in the application for an operating permit modification or a plan approval, if otherwise required, for averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis submitted under subsection (b) must be an air contamination source subject to a NO<sub>x</sub> RACT emission limitation in § 129.112.

Subsection (d) provides that the application for the operating permit modification or the plan approval, if otherwise required, for averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis submitted under subsection (b) must demonstrate that the aggregate NO<sub>x</sub> emissions emitted by the air contamination sources included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan are not greater than the NO<sub>x</sub> emissions that would be emitted by the

group of included sources if each source complied with the applicable NO<sub>x</sub> RACT emission limitation in § 129.112 on a source-specific basis.

Subsection (e) provides that the application for the operating permit modification or a plan approval, if otherwise required, specified in subsections (b)—(d) may include facility-wide or system-wide NO<sub>x</sub> emissions averaging only for NO<sub>x</sub> emitting sources or NO<sub>x</sub> emitting facilities that are owned or operated by the applicant.

Subsection (f) provides that the application for the operating permit modification or a plan approval, if otherwise required, specified in subsections (b)—(e) must include the information identified in paragraphs (1)—(3). Paragraph (1) specifies that the application must identify each air contamination source included in the NO<sub>x</sub> emissions averaging plan. Paragraph (2) specifies that the application must list each air contamination source's applicable emission limitation in § 129.112. Paragraph (3) specifies that the application must include methods for demonstrating compliance and recordkeeping and reporting requirements in accordance with § 129.115 for each source included in the NO<sub>x</sub> emissions plan submitted under subsection (b).

Subsection (g) provides that an air contamination source or facility included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(f) may be included in only one facility-wide or system-wide NO<sub>x</sub> emissions averaging plan.

No changes are made to subsections (c)—(g) from proposed to this final-form rulemaking.

Subsection (h) provides in paragraph (1) that the Department or appropriate approved local air pollution control agency will review the timely and complete NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(g) and approve, deny or modify the NO<sub>x</sub> emissions averaging plan, in writing, as specified in paragraphs (2)—(3). The Department or appropriate approved local air pollution control agency will approve the NO<sub>x</sub> emissions averaging plan if the approving authority is satisfied that the NO<sub>x</sub> emissions averaging plan complies with the requirements of subsections (b)—(g) and that the proposed NO<sub>x</sub> emissions averaging plan is RACT for the air contamination sources. The approving authority will deny or modify the NO<sub>x</sub> emissions averaging plan if the proposal does not comply with the requirements of subsections (b)—(g). Paragraphs (1)—(3) are amended from proposed to this final-form rulemaking to delete the words “subsection (b)” and add the words “subsections (b)—(g)” for clarity and completeness.

Subsection (i) provides that the proposed NO<sub>x</sub> emissions averaging plan submitted under subsection (b) will be approved, denied or modified under subsection (h) by the Department or appropriate approved local air pollution control agency in accordance with 25 Pa. Code Chapter 127 prior to the owner or operator implementing the NO<sub>x</sub> emissions averaging plan. Subsection (i) was amended from proposed to this final-form rulemaking to delete the words “subsection (h) in writing through the issuance of a plan approval or operating permit modification” and add the words “25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources)” to provide clarity in how the proposed NO<sub>x</sub> emissions averaging plan will be approved, denied or modified.

Subsection (j) provides that the owner or operator of an air contamination source or facility included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(g) shall submit the reports and records specified in subsection (f)(3) to the Department or appropriate approved local air pollution control agency to demonstrate compliance with § 129.115.

Subsection (k) provides that the owner or operator of an air contamination source or facility included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(g) that achieves emission reductions in accordance with other emission limitations required under the APCA or the CAA, or regulations adopted under the APCA or the CAA, that are not NO<sub>x</sub> RACT emission limitations may not substitute those emission reductions for the emission reductions required by the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted to the Department or appropriate approved local air pollution control agency under subsection (b).

Subsection (l) provides that the owner or operator of an air contamination source subject to a NO<sub>x</sub> RACT emission limitation in § 129.112 that is not included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted under subsection (b) shall operate the source in compliance with the applicable NO<sub>x</sub> RACT emission limitation in § 129.112.

Subsection (m) provides that the owner and operator of the air contamination source included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted under subsection (b) shall be liable for a violation of an applicable NO<sub>x</sub> RACT emission limitation at each source included in the NO<sub>x</sub> emissions averaging plan regardless of each individual facility's NO<sub>x</sub> emission rate.

Subsection (n) provides that the Department will submit each NO<sub>x</sub> emissions averaging plan approved under subsection (i) to the Administrator of the EPA for approval as a revision to the SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

No changes are made to subsections (j)—(n) from proposed to this final-form rulemaking.

*§ 129.114. Alternative RACT proposal and petition for alternative compliance schedule*

Subsection (a) provides that the owner or operator of an air contamination source subject to § 129.112 located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 that cannot meet the applicable presumptive RACT requirement or RACT emission limitation of § 129.112 may propose an alternative RACT requirement or RACT emission limitation in accordance with subsection (d).

Subsection (b) provides that the owner or operator of a NO<sub>x</sub> air contamination source with a potential emission rate equal to or greater than 5.0 tons of NO<sub>x</sub> per year that is not subject to § 129.112 or §§ 129.201—129.205 located at a major NO<sub>x</sub> emitting facility subject to § 129.111

shall propose a NO<sub>x</sub> RACT requirement or RACT emission limitation in accordance with subsection (d).

Subsection (c) provides that the owner or operator of a VOC air contamination source with a potential emission rate equal to or greater than 2.7 tons of VOC per year that is not subject to § 129.112 located at a major VOC emitting facility subject to § 129.111 shall propose a VOC RACT requirement or VOC RACT emission limitation in accordance with subsection (d).

No changes are made to subsections (a)—(c) from proposed to this final-form rulemaking.

Subsection (d) provides that the owner or operator proposing an alternative RACT requirement or RACT emission limitation under subsection (a), (b) or (c) shall comply with the requirements in paragraphs (1)—(7). Proposed paragraph (1) established that the subject owner or operator shall submit a written RACT proposal in accordance with the procedures in § 129.92(a)(1)—(5), (7)—(10) and (b) (relating to RACT proposal requirements) to the Department or appropriate approved local air pollution control agency as soon as possible but not later than the date specified in subparagraphs (i) and (ii). Proposed subparagraph (i) specified the date 6 months after the date of publication of this final-form rulemaking, for a source subject to § 129.111(a). Proposed subparagraph (ii) specified the submittal is due not later than the date 6 months after the date of publication of this final-form rulemaking, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

Paragraph (1) is amended from proposed to this final-form rulemaking to establish that the RACT proposal shall be submitted in writing or electronically. This change provides flexibility to the subject owner or operator in submitting the RACT proposal.

Subparagraph (i) is amended from proposed to this final-form rulemaking to specify December 31, 2022, as the due date for a source subject to § 129.111(a)

Subparagraph (ii) is amended from proposed to this final-form rulemaking to specify the due date is either December 31, 2022, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

The changes to the due dates specified in subparagraphs (i) and (ii) are made to accommodate the length of time for this rulemaking to move through the regulatory development process and meet the implementation deadline of January 1, 2023, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. This final-form rulemaking is expected to be published as a final-form rulemaking in the Pennsylvania Bulletin prior to the end of 2022.

No changes are made to paragraphs (2)—(7) from proposed to this final-form rulemaking.

Subsection (e) provides that the Department or appropriate approved local air pollution control agency will review the timely and complete alternative RACT proposal submitted in accordance

with subsection (d) and approve, modify or deny in writing the application as specified in paragraphs (1)—(3).

No change is made to subsection (e) from proposed to this final-form rulemaking.

Subsection (f) provides that the proposed alternative RACT requirement or RACT emission limitation and the implementation schedule submitted under subsection (d) will be approved, denied or modified under subsection (e) by the Department or appropriate approved local air pollution control agency in accordance with 25 Pa. Code Chapter 127 prior to the owner or operator implementing the alternative RACT requirement or RACT emission limitation. Subsection (f) was amended from proposed to this final-form rulemaking to delete the words “subsection (e) in writing through the issuance of a plan approval or operating permit modification” and add the words “25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources)” to provide clarity in how the proposed alternative RACT requirement or RACT emission limitation and the implementation schedule will be approved, denied or modified.

Subsection (g) provides that the emission limit and requirements specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection (f) supersede the emission limit and requirements in the existing plan approval or operating permit issued to the owner or operator of the source prior to *blank* (*Editor’s Note: The blank refers to the effective date of this final-form rulemaking when published as a final-form rulemaking.*), on the date specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection (f), except to the extent the existing plan approval or operating permit contains more stringent requirements.

Subsection (h) provides that the Department will submit each alternative RACT requirement or RACT emission limitation approved under subsection (f) to the Administrator of the EPA for approval as a revision to the SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

No changes are made to subsections (g) and (h) from proposed to this final-form rulemaking.

Subsection (i) provides that an owner or operator subject to subsection (a), (b) or (c) and § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) that has not modified or changed a source that commenced operation on or before October 24, 2016, and has not installed and commenced operation of a new source after October 24, 2016, may, in place of the alternative RACT requirement or RACT emission limitation required under subsection (d), submit an analysis, certified by the responsible official, in writing or electronically to the Department or appropriate approved local air pollution control agency on or before December 31, 2022, that demonstrates that compliance with the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) assures compliance with the provisions in subsections (a)—(c) and (e)—(h), except for sources subject to § 129.112(c)(11) or (i)—(k). Proposed subsection (i) provided that compliance with the requirements in § 129.99(a)—(h)

assures compliance with the provisions in subsections (a)—(h), except for sources subject to § 129.112(b)(11), (h)(4) and (5) or (i)—(k). Subsection (i) was amended from proposed to this final-form rulemaking to add the words “subsections (a)—(c) and (e)—(h), except for sources subject to § 129.112(c)(11) or (i)—(k)” after the words “with the provisions in” and deleted the words “subsections (a)—(h), except for sources subject to § 129.112(b)(11), (h)(4) and (5) or (i)—(k).”

Subsection (i) is further amended from proposed to this final-form rulemaking to add paragraphs (1) and (2) to establish the procedures an owner or operator shall follow to submit the analysis required under subsection (i) if the owner or operator chooses to demonstrate compliance with subsections (a)—(c) and (e)—(h) in accordance with subsection (i). Paragraph (1) establishes cost-effectiveness thresholds of \$7,500 per ton of NO<sub>x</sub> emissions reduced and \$12,000 per ton of VOC emissions reduced as “screening level values” to determine the amount of analysis and due diligence that the owner or operator shall perform if there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis.

Final-form paragraph (1)(i) specifies that the owner or operator of a subject source or facility that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis and that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) had a cost effectiveness equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced shall include the information specified in paragraph (1)(i)(A)—(E) in the analysis. Clause (A) specifies a statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available. Clause (B) specifies a list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously identified and evaluated under § 129.92(b)(1)—(3) included in the written RACT proposal submitted under § 129.99(d) and approved by the Department or appropriate approved local air pollution control agency under § 129.99(e). Clause (C) specifies a summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under § 129.99(d) or as calculated consistent with the EPA Air Pollution Control Cost Manual, 6<sup>th</sup> Edition, EPA/452/B-02-001, January 2002, as amended. Clause (D) specifies a statement that an evaluation of each economic feasibility analysis summarized in clause (C) demonstrates that the cost effectiveness remains equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced. Clause (E) specifies that the owner or operator shall provide additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

Final-form paragraph (1)(ii) specifies that the owner or operator of a subject source or facility that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis and

that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) had a cost effectiveness less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced shall include the information specified in paragraph (1)(ii)(A)—(F) in the analysis. Clauses (A)—(C) are the same as clauses (A)—(C) under paragraph (1)(i). Clause (D) specifies a statement that an evaluation of each economic feasibility analysis summarized in clause (C) demonstrates that the cost effectiveness remains less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced. Clause (E) specifies that the owner or operator shall include a new economic feasibility analysis for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) in accordance with § 129.92(b)(4). Clause (F) specifies that the owner or operator shall provide additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

Final-form paragraph (2) establishes procedures in paragraph (2)(i)—(iii) that the owner or operator of a subject source or facility that evaluates and determines that there is a new or upgraded pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis shall follow. Subparagraph (i) requires that the owner or operator perform a technical feasibility analysis and an economic feasibility analysis in accordance with § 129.92(b). Subparagraph (ii) requires that the owner or operator submit the analyses performed under subparagraph (i) to the Department or appropriate approved local air pollution control agency for review. Subparagraph (iii) requires that the owner or operator provide additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

The changes in subsection (i) from proposed to this final-form rulemaking are made in response to concerns and comments submitted by the EPA on the proposed rulemaking. The EPA expressed concerns regarding the need for additional analysis to determine whether the case-by-case determinations made under §§ 129.96—129.100 (RACT II) for the 1997 and 2008 8-hour ozone NAAQS remain RACT for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III).

Subsection (j) is amended from proposed to this final-form rulemaking to provide in paragraphs (1)—(4) that the Department or appropriate approved local air pollution control agency will review the analyses submitted in accordance with subsection (i), solicit public comment on the analyses and the Department's supporting documentation, prepare a summary of the public comments received on the analyses and responses to the comments, and as appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127 for the analyses reviewed under paragraph (1).

Final-form subsection (k) provides that the Department will submit the analyses, supporting documentation and summary of public comments and responses described in subsection (j)(2) and (3) as well as the plan approvals and operation permit modifications issued under subsection (j)(4) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP.

Proposed subsection (j) is re-lettered in this final-form rulemaking as subsection (l) and provides that the owner and operator of a facility proposing to comply with the applicable RACT requirement or RACT emission limitation under subsection (a), (b) or (c) through the installation of an air cleaning device may submit a petition, in writing, requesting an alternative compliance schedule in accordance with paragraphs (1) and (2).

Final-form subsection (l) is further amended to add the words “or electronically” after “in writing.” This change provides flexibility to the subject owner or operator in how the petition may be submitted. Final-form subsection (l)(1) is amended to delete the word “written” to coordinate with the addition of “or electronically” in subsection (l). Final-form paragraph (1)(i) is amended from proposed to final to specify that the due date is December 31, 2022, for a source subject to § 129.111(a). Final-form paragraph (1)(ii) is amended from proposed to final to specify that the due date is December 31, 2022, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b). The amendment of final-form paragraphs (1)(i) and (ii) with the compliance date certain of December 31, 2022, in place of the proposed compliance date, which was the date of publication of this final-form rulemaking, is made to address the required deadline of January 1, 2023, in the EPA 2015 ozone implementation rule, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. See 40 CFR 51.1312(a)(3)(i); see also 40 CFR 51.1316(b)(3)(1). Final-form paragraph (2) is amended to delete the word “written” to coordinate with the addition of “or electronically” in subsection (l).

Proposed subsection (k) is re-lettered in this final-form rulemaking as subsection (m) and provides that the Department or appropriate approved local air pollution control agency will review the timely and complete written petition requesting an alternative compliance schedule submitted in accordance with proposed subsection (j) and approve or deny the petition in writing. Final-form subsection (m) is amended to delete the word “written” and to delete subsection “(j)” and add subsection “(l).”

Proposed subsection (l) is re-lettered in this final-form rulemaking as subsection (n) and provides that the emission limit and requirements specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under proposed subsection (k), now final-form subsection (m), which supersedes the emission limit and requirements in the existing plan approval or operating permit issued to the owner or operator of the source prior to *blank* (*Editor’s Note: The blank refers to the effective date of this final-form rulemaking when published as a final-form rulemaking.*), on the date specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under proposed subsection (k), except to the extent the existing plan approval or operating permit contains more stringent requirements. Final-form subsection (n) is amended to delete subsection “(k)” and add subsection “(m).”

Proposed subsection (m) is re-lettered in this final-form rulemaking as subsection (o) and provides that approval or denial under proposed subsection (k), now final-form subsection (m), of the timely and complete petition for an alternative compliance schedule submitted under proposed subsection (j), now final-form subsection (l), will be effective on the date the letter of

approval or denial of the petition is signed by the authorized representative of the Department or appropriate approved local air pollution control agency. Final-form subsection (o) is amended to delete subsection “(k)” and add subsection “(m)” and to delete subsection “(j)” and add subsection “(l).”

Proposed subsection (n) is re-lettered in this final-form rulemaking as subsection (p) and provides that the Department will submit each petition for an alternative compliance schedule approved under proposed subsection (k), now final-form subsection (m), to the Administrator of the EPA for approval as a revision to the Commonwealth’s SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal. Final-form subsection (p) is amended to delete subsection “(k)” and add subsection “(m).”

*§ 129.115. Written notification, compliance demonstration and recordkeeping and reporting requirements*

Subsection (a) provides that the owner and operator of an air contamination source subject to this section and § 129.111 shall submit a notification, in writing or electronically, to the appropriate Regional Manager or the appropriate approved local air pollution control agency that proposes how the owner and operator intend to comply with the requirements of this section and §§ 129.111—129.114. Proposed subsection (a) specified that the written notification shall be submitted to the appropriate Regional Manager by the date 6 months after the date of publication of this final-form rulemaking and include the information specified in proposed paragraphs (1)—(6). Subsection (a) is amended from proposed to this final-form rulemaking to delete the word “written” and add a comma and the words “in writing or electronically” after the word “notification.” This change provides flexibility to the subject owner or operator in how the notification may be submitted. Subsection (a) is further amended from proposed to this final-form rulemaking to delete the due date of 6 months after the date of publication of this final-form rulemaking and to add the words “or appropriate approved local air pollution control agency” after the words “Regional Manager.”

Proposed subsection (a) included paragraphs (1)—(6) that specified the information to be included in the written notification. Proposed paragraph (1) specified that the written notification shall include the air contamination sources identified in § 129.111(a) as either subject to a RACT requirement or RACT emission limitation in §§ 129.112—129.114 or exempted from §§ 129.112—129.114. Proposed subsection (a) is amended from proposed to this final-form rulemaking to add new paragraph (1) to establish the due dates for the notification and renumber proposed paragraphs (1)—(6) as final-form paragraphs (2)—(7). Final-form paragraph (1) specifies that the notification shall be submitted to the appropriate Regional Manager or appropriate approved local air pollution control agency as soon as possible but not later than December 31, 2022, for a source subject to § 129.111(a) and not later than December 31, 2022, or 6 months after the date the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

The due dates specified in final-form paragraph (1) are established to accommodate the length of time for this rulemaking to move through the regulatory development process and meet the

implementation deadline of January 1, 2023, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. This final-form rulemaking is expected to be published as a final-form rulemaking in the Pennsylvania Bulletin prior to the end of 2022.

Proposed subsection (a)(1) is renumbered as paragraph (2) in this final-form rulemaking. Paragraph (2) specifies that the notification shall identify the air contamination sources in § 129.111(a) as either subject to a RACT requirement or RACT emission limitation in §§ 129.112—129.114 or exempted from §§ 129.112—129.114.

Proposed subsection (a) is further amended from proposed to this final-form rulemaking to renumber proposed paragraph (2) as final-form paragraph (3) and proposed paragraph (3) as final-form paragraph (4). No other changes are made to final-form paragraphs (3) and (4) in this final-form rulemaking.

Proposed subsection (a)(4) is renumbered as paragraph (5) in this final-form rulemaking. Final-form paragraph (5) is further amended to delete the reference to paragraph (1) and add the reference to paragraph (2). Subparagraph (ii) is amended from proposed to this final-form rulemaking to delete the reference to paragraph (1)(i) and add the reference to paragraph (2)(i). Subparagraph (iv) is amended from proposed to this final-form rulemaking to delete the reference to paragraph (1)(ii) and add the reference to paragraph (2)(ii). These changes are made to correct the cross references.

Proposed subsection (a)(5) is renumbered as paragraph (6) in this final-form rulemaking. Final-form paragraph (6) is further amended to delete the reference to paragraph (2) and add the reference to paragraph (3). Subparagraph (ii) is amended from proposed to this final-form rulemaking to delete the reference to paragraph (2)(i) and add the reference to paragraph (3)(i). Subparagraph (iv) is amended from proposed to this final-form rulemaking to delete the reference to paragraph (2)(ii) and add the reference to paragraph (3)(ii). These changes are made to correct the cross references.

Proposed subsection (a)(6) is renumbered as paragraph (7) in this final-form rulemaking. Final-form paragraph (7) is further amended to delete the reference to paragraph (3) and add the reference to paragraph (4). This change is made to correct the cross reference.

Subsection (b) provides that, except as specified in subsection (d), the owner and operator of an air contamination source subject to a NO<sub>x</sub> RACT requirement or RACT emission limitation or VOC RACT requirement or RACT emission limitation, or both, listed in § 129.112 shall demonstrate compliance with the applicable RACT requirement or RACT emission limitation by performing the monitoring or testing procedures under paragraphs (1)—(6). Proposed subsection (b) included paragraphs (1)—(5).

Paragraph (1) is amended from proposed to this final-form rulemaking to delete the word “and” after § 129.112(f), add a comma, and add the words “and direct-fired heaters, furnaces, ovens or other combustion sources subject to § 129.112(k)” after § 129.112(g)(1). These changes are made in response to comments received on the proposed rulemaking.

Paragraph (3) is amended from proposed to this final-form rulemaking to delete the word “rolling.” This change is made in response to comments received on the proposed rulemaking.

Proposed paragraph (5) is renumbered as paragraph (6) in this final-form rulemaking. Final-form paragraph (5) specifies that for a direct-fired heater, furnace, oven or other combustion source subject to § 129.112(k) with a continuous emissions monitoring system (CEMS), monitoring and testing shall be performed in accordance with the requirements in 25 Pa. Code Chapter 139, Subchapter C (relating to requirements for source monitoring for stationary sources), using a daily average. This requirement is added in response to comments received on the proposed rulemaking.

Final-form paragraph (6) is amended to clarify that for an air contamination source without a CEMS, monitoring and testing shall be performed in accordance with an emissions source test approved by the Department or appropriate approved local air pollution control agency that meets the requirements of Chapter 139, Subchapter A. The source test shall be conducted to demonstrate initial compliance and subsequently on a schedule set forth in the applicable permit. Final-form paragraph (6) is amended to delete “a Department approved” and add “approved by the Department or appropriate approved local air pollution control agency.” These changes are made to for clarity.

No changes are made to paragraphs (2) and (4) from proposed to this final-form rulemaking.

Subsection (c) provides that the owner or operator of a combined cycle combustion turbine may comply with the requirements in § 129.112(g)(2)(iii) on a mass-equivalent basis. The actual emissions during the compliance period must be less than the allowable emissions during the compliance period. The allowable emissions are calculated by multiplying actual heat input in million Btu during the compliance period by the applicable factor listed in paragraphs (1)—(4).

Subsection (c) is amended from proposed to this final-form rulemaking to delete the word “combined-cycle” and add the words “combined cycle” before the word “combustion.” This amendment is made to delete the hyphen in combined cycle. Subsection (c) is further amended from proposed to this final-form rulemaking to correct the cross-reference from § 129.112(g)(2)(ii) to § 129.112(g)(2)(iii). Paragraphs (1)—(4) are amended from proposed to this final-form rulemaking to correct the specified cross references. The cross reference in paragraph (1) is amended from § 129.112(g)(2)(ii)(A) to § 129.112(g)(2)(iii)(A). The cross reference in paragraph (2) is amended from § 129.112(g)(2)(ii)(B) to § 129.112(g)(2)(iii)(B). The cross reference in paragraph (3) is amended from § 129.112(g)(2)(ii)(C) to § 129.112(g)(2)(iii)(C). The cross reference in paragraph (4) is amended from § 129.112(g)(2)(ii)(D) to § 129.112(g)(2)(iii)(D). These changes are made to coordinate with the changes in § 129.112(g)(2) from proposed to this final-form rulemaking.

Subsection (d) provides that, except as specified in §§ 129.112(n) and 129.114(l), the owner and operator of an air contamination source subject to subsection (b) shall demonstrate compliance with the applicable RACT requirement or RACT emission limitation in accordance with the procedures in subsection (a) not later than the applicable date in paragraphs (1) and (2).

Subsection (d) is amended from proposed to this final-form rulemaking to correct the cross reference from § 129.114(j) to § 129.114(l) to coordinate with the changes made in § 129.114 from proposed to this final-form rulemaking. Subsection (d) is further amended from proposed to this final-form rulemaking to correct the cross reference from subsection (a) to subsection (b).

Subsection (e) provides that an owner or operator of an air contamination source subject to this section and §§ 129.111—129.113 may request a waiver from the requirement to demonstrate compliance with the applicable emission limitation listed in § 129.112 if the requirements in paragraphs (1)—(4) are met. Paragraph (1) is amended from proposed to this final-form rulemaking to add the words “or electronically” after the words “in writing.” This change is made to provide flexibility to the subject owner or operator in how the request for a waiver may be submitted.

The waiver in paragraph (1) shall be submitted by the applicable date in subparagraph (i) or (ii). Proposed subparagraph (i) established the due date as the date 6 months after the date of publication of this final-form rulemaking for a source subject to § 129.111(a). Subparagraph (i) is amended from proposed to this final-form rulemaking to establish the due date as December 31, 2022, for a source subject to § 129.111(a). Proposed subparagraph (ii) established the due date as the date 6 months after the date of publication of this final-form rulemaking or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b). Subparagraph (ii) is amended from proposed to this final-form rulemaking to establish the due date as December 31, 2022, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

The changes to the due dates specified in subparagraph (i) and (ii) are made to accommodate the length of time for this rulemaking to move through the regulatory development process and meet the implementation deadline of January 1, 2023, for states to implement the RACT requirements and RACT emission limitations to address the 2015 8-hour ozone NAAQS. This final-form rulemaking is expected to be published as a final-form rulemaking in the Pennsylvania Bulletin prior to the end of 2022.

No changes are made to paragraphs (2)—(4) from proposed to this final-form rulemaking.

Subsection (f) provides that the owner and operator of an air contamination source subject to this section and §§ 129.111—129.114 shall keep records to demonstrate compliance with §§ 129.111—129.114 and submit reports to the Department in accordance with the applicable regulations in 25 Pa. Code, Part 1, Subpart C, Article III (relating to air resources) and as specified in the operating permit or plan approval for the air contamination source as set forth in paragraphs (1)—(3). Paragraph (3) is amended from proposed to this final-form rulemaking to delete the words “Subpart C, Article III (relating to air resources) regulations” and add the words “applicable regulation” before the words “or as otherwise specified.” This amendment is made in response to *Sierra Club v. EPA*, 972 F.3d 290 (3d Cir. 2020) to clarify that the owners and operators are required to comply with existing recordkeeping and reporting requirements, to which the owners and operators are already subject under existing Commonwealth law and as

specified in the applicable operating permit or plan approval for the air contamination source. These recordkeeping and reporting requirements were previously approved as revisions to the Commonwealth's SIP. No changes are made to paragraphs (1) and (2) from proposed to this final-form rulemaking.

Subsection (g) provides that, beginning with the compliance date specified in § 129.112(a), the owner or operator of an air contamination source claiming that the air contamination source is exempt from the applicable NO<sub>x</sub> emission rate threshold specified in § 129.114(b) and the requirements of § 129.112 based on the air contamination source's potential to emit shall maintain records that demonstrate to the Department or appropriate approved local air pollution control agency that the air contamination source is not subject to the specified emission rate threshold.

Subsection (h) provides that, beginning with the compliance date specified in § 129.112(a), the owner or operator of an air contamination source claiming that the air contamination source is exempt from the applicable VOC emission rate threshold specified in § 129.114(c) and the requirements of § 129.112 based on the air contamination source's potential to emit shall maintain records that demonstrate to the Department or appropriate approved local air pollution control agency that the air contamination source is not subject to the specified emission rate threshold.

No changes are made to subsections (g) and (h) from proposed to this final-form rulemaking.

Subsection (i) provides that the owner or operator of a combustion unit or process heater subject to § 129.112(b) shall record each adjustment conducted under the procedures in § 129.112(b). This record must contain, at a minimum, the information specified in paragraphs (1)—(6). Subsection (i) is amended from proposed to this final-form rulemaking to add the words “or process heater” after the word “unit.” This change is made for consistency with the corresponding amendments to § 129.112(b). No changes are made to paragraphs (1)—(6) from proposed to this final-form rulemaking.

Subsection (j) provides that the owner or operator of a Portland cement kiln subject to § 129.112(h) shall maintain a daily operating log for each Portland cement kiln. The record for each kiln must include the information specified in paragraphs (1)—(4).

Subsection (k) provides that the records shall be retained by the owner or operator for 5 years and made available to the Department or appropriate approved local air pollution control agency upon receipt of a written request from the Department or appropriate approved local air pollution control agency.

No changes are made to subsections (j) and (k) from proposed to this final-form rulemaking.

## *F. Summary of Comments and Responses on the Proposed Rulemaking*

### *General Comments*

The Board adopted the proposed rulemaking at its meeting on May 19, 2021. The proposed rulemaking was published at 51 Pa.B. 4333 (August 7, 2021). Three public hearings were held by the Department on September 7, 8 and 9, 2021, respectively. A 67-day public comment period closed on October 12, 2021.

Public comments were received from IRRC, the EPA and 25 commentators. Written comments were not received from the Senate or House Environmental Resources and Energy Committees. On November 12, 2021, IRRC submitted comments to the Board. The public comments received by the Board are summarized as follows and are addressed in a comment and response document which is available from the Department.

Public comments received from the EPA, businesses or regulated industries, industry trade associations, a neighboring state and nongovernmental organizations sought further clarification regarding certain provisions of the proposed rulemaking or for the Board to revise provisions of the proposed rulemaking. IRRC and the EPA sought clarification from the Department regarding what additional analysis the Department will require from the owners and operators of subject facilities that seek to rely on previously approved RACT II conditions to meet RACT III for the 2015 8-hour ozone standard and whether such information would be included as part of the regulatory record to ensure compliance with EPA SIP requirements.

In response to comments from IRRC and the EPA, the Board has amended § 129.114(i) from the proposed rulemaking to this final-form rulemaking to establish requirements for additional analysis to be included in the RACT III case-by-case evaluations. The Board believes that final-form § 129.114(i) provides the conditions to support those instances where the Department or appropriate approved local air pollution control agency may determine that the previously established RACT II controls and limits remain RACT for the 2015 8-hour ozone NAAQS. Final-form § 129.114(i) addresses the EPA's comment that the source shall not have had any significant changes to operations, emission levels, or other site or source specific factors analyzed during the original determination for that source's RACT II permits. Final-form § 129.114(i) establishes the conditions that an owner or operator subject to final-form § 129.114(a), (b) or (c) and to § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) shall not have modified or changed a source that commenced operation on or before October 24, 2016, and shall not have installed and commenced operation of a new source after October 24, 2016. The date of October 24, 2016, is the date specified in § 129.99(i)(1) by which written RACT proposals to address the 1997 and 2008 8-hour ozone NAAQS were due to the Department or the appropriate approved local air pollution control agency from the owner or operator of an air contamination source located at a major NO<sub>x</sub> emitting facility or a major VOC emitting facility subject to § 129.96(a) or (b) (relating to applicability).

An owner or operator that is subject to final-form § 129.114(a), (b) or (c) and to § 129.99 and meets the conditions stipulated in final-form § 129.114(i), may, in place of proposing an

alternative RACT requirement or RACT emission limitation under final-form § 129.114(d), submit an analysis, certified by the responsible official, in writing or electronically to the Department or appropriate approved local air pollution control agency on or before December 31, 2022, that demonstrates that compliance with the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) for the 1997 and 2008 8-hour ozone NAAQS remains RACT for purposes of the 2015 8-hour ozone NAAQS under final-form § 129.114(a)—(c) and (e)—(h), except for sources subject to final-form § 129.112(c)(11) or (i)—(k). The excepted sources specified in final-form § 129.112(c)(11) and (i)—(k) are electric arc furnaces, glass melting furnaces, lime kilns and direct-fired heaters, furnaces, ovens or other combustion sources. These source types did not have presumptive RACT requirements or RACT limitations established under §§ 129.96—129.100 (RACT II). The owners and operators of these source types must comply with the applicable presumptive RACT requirement or RACT limitation, or both, established in § 129.112(c)(11) and (i)—(k). If an owner or operator cannot comply with the applicable requirement or limitation established in § 129.112(c)(11) and (i)—(k), the owner or operator may apply for an alternative RACT requirement or RACT limitation under final-form § 129.114(d).

Final-form § 129.114(i)(1) and (2) address the EPA's comments about "non-controversial sources," that is, sources which were well below the dollar per ton of NO<sub>x</sub> or VOC threshold used for the case-by-case RACT II analysis of economic feasibility, as well as the EPA's comments regarding the need for additional case-specific analysis for certain sources or source categories. Final-form § 129.114(i)(1) and (2) establish the process and information needed for the owners and operators of both categories of sources to document for the record that for each source or generic source category, the relevant control technologies and their costs have not changed significantly enough to change the prior RACT II analysis. The Department established cost-effectiveness thresholds of \$7,500 per ton of NO<sub>x</sub> emissions reduced and \$12,000 per ton of VOC emissions reduced as "screening level values" for determining if the economic feasibility analyses previously submitted under § 129.99(e) for the 1997 and 2008 8-hour ozone NAAQS should be updated for the 2015 8-hour ozone NAAQS. The NO<sub>x</sub> screening level value of \$7,500 is twice the amount of the RACT III cost-effectiveness benchmark for presumptive NO<sub>x</sub> RACT (\$3,750). The RACT III cost-effectiveness benchmark for presumptive VOC RACT, \$7,500, is larger in absolute magnitude than the RACT III cost-effectiveness benchmark of \$3,750 for presumptive NO<sub>x</sub> RACT, therefore the Department set the VOC screening level value at approximately one and one-half times the amount of the VOC RACT III cost-effectiveness benchmark. These screening level values are large enough to ensure that a cost-prohibitive control technology evaluated under § 129.99 with a cost-effectiveness that is equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced is still cost-prohibitive for the purposes of final-form § 129.114 without the need for re-evaluation of economic feasibility. If the cost-prohibitive control technology evaluated under § 129.99 had a cost-effectiveness that is less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced, then the owner or operator shall re-evaluate the economic feasibility of the control technology to verify that it remains cost-prohibitive for purposes of the 2015 8-hour ozone NAAQS.

Final-form § 129.114(i)(2) provides that the owner or operator of a subject source or facility that evaluates and determines that there is a new or upgraded pollutant specific air cleaning device, air pollution control technology or technique available at the time of the submittal of the analysis to the Department or appropriate approved local air pollution control agency shall do the following: perform a technical feasibility analysis and an economic feasibility analysis in accordance with § 129.92(b); submit the analyses to the Department or appropriate approved local air pollution control agency for review; and provide additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

An owner or operator subject to final-form § 129.114(a), (b) or (c) and to § 129.99 that has modified or changed a source that commenced operation on or before October 24, 2016, or has installed and commenced operation of a new source after October 24, 2016, shall comply with the requirements of final-form § 129.114(d) and propose an alternative RACT requirement or RACT emission limitation. These owners and operators may not use the analysis option under final-form § 129.114(i). This includes the owner or operator of a major NO<sub>x</sub> emitting facility that is subject to final-form § 129.111 and was subject to §§ 129.96—129.100 (RACT II) and after October 24, 2016, installed a new source with a PTE of equal to or greater than 5 TPY of NO<sub>x</sub> that is not subject to § 129.112 or §§ 129.201—129.205 (relating to additional NO<sub>x</sub> requirements) as well as the owner or operator of a major VOC emitting facility that is subject to final-form § 129.111 and was subject to RACT II and after October 24, 2016, installed a new source with a PTE equal to or greater than 2.7 TPY of VOC that is not subject to final-form § 129.112 or has modified equipment (for example, boiler replacement). In this case, a case-by-case RACT analysis shall be performed on the new source or equipment.

In response to IRRC and EPA comments regarding procedures to comply with SIP requirements relating to public participation, the Board has amended final-form § 129.114(j) to provide that the Department or appropriate approved local air pollution control agency will review the analyses submitted under final-form § 129.114(i), solicit public comment on the analyses and supporting documentation, prepare a summary of the public comments and responses to the public comments, and, as appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources). The public comment steps for the analyses specified in final-form § 129.114(j)(2) and (3) are provided to satisfy the public participation requirements under section 110 of the CAA and 40 CFR 51.102 (relating to public hearings) for submitting materials to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP under final-form § 129.114(k). If a plan approval or operating permit modification is issued under final-form § 129.114(j)(4), the plan approval or operating permit modification will undergo public comment as part of the issuing process in conformance with 25 Pa. Code Chapter 127.

IRRC and the EPA similarly asked what procedures the Department will follow to satisfy SIP requirements relating to public participation for instances where an owner and operator's previous RACT II determination remains RACT for the 2015 8-hour ozone standard. Final-form § 129.114(k) provides that the Department will submit the analyses, supporting documentation and summary of public comments and responses described in final-form § 129.114(j)(2) and (3) as well as the plan approvals and operating permit modifications issued under final-form §

129.114(j)(4) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. These submissions will include all supporting information necessary for the record to demonstrate that the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate local air pollution control agency under § 129.99(e) (RACT II) assures compliance with the provisions in final-form § 129.114 (a)—(c) and (e)—(h) (RACT III), that there is no further reduction in the emission limitations or tightening of the restrictions that is technically or economically feasible, and that no change has occurred at the source that would call into question whether the emission limitations in the RACT II permit remain RACT for the 2015 8-hour ozone NAAQS. The supporting documentation will include the applicable RACT II determinations, which will be made available to the public during the public comment period described under final-form § 129.114(j) and incorporated as part of the SIP submittal to the EPA.

IRRC and several commentators also raised concerns with the timeframe provided for affected owners and operators to comply with the final-form rulemaking and inquired what authority the Department is relying on to extend the compliance date beyond January 1, 2023.

The Board understands the concerns of IRRC and the commentators relating to the timeframe for implementation of the final-form rulemaking. However, the implementation date of January 1, 2023, is required by the EPA's 2015 ozone standard implementation rule. See 83 FR 62998 (December 6, 2018); see also 40 CFR 51.1316(b)(3). In this final-form rulemaking, owners and operators are required to submit alternative compliance schedules, averaging plan proposals and case-by-case proposals for alternative RACT requirements and RACT emission limitations to the Department or appropriate approved local air pollution control agency before the implementation date of January 1, 2023. Sources otherwise subject to the presumptive RACT limit and other RACT requirements for certain source categories in this final-form rulemaking will have to plan to begin complying with RACT III on the implementation date. To this end, the Department will be conducting direct outreach to the regulated community well in advance of the January 1, 2023, implementation date due to the short turnaround time between the expected promulgation date of this final-form rulemaking and the implementation date.

While the implementation date of January 1, 2023, is required by the EPA's 2015 8-hour ozone NAAQS implementation rule (40 CFR 51.1316(b)(3)), there are practical timing considerations for the owners and operators of sources that will need to install and operate control technologies in order to satisfy their applicable RACT III requirements. This includes submission of a plan approval from the owner or operator to the Department or appropriate approved local air pollution control agency, public participation and comment on the proposal as required by law, and ordering and installing the approved control technology as well as the installation of the new control technology or replacement of the existing control technology. Therefore, the requirements for alternative compliance schedules in this final-form rulemaking remain; owners and operators should plan to implement RACT as soon as possible when proposing an alternative compliance plan schedule subject to approval by the Department. Where an alternative compliance schedule, averaging plan proposal or case-by-case proposal is not submitted by the owner or operator to the Department or appropriate approved local air pollution control agency by December 31, 2022, or the owner or operator of the source is not otherwise complying with presumptive RACT III requirements and emissions limitations established for certain source categories on or after the implementation date, the Department will then consider

this to be a compliance matter subject to the Department's authority under the APCA (35 P.S. §§ 4001—4015), to issue notices of violation and conduct enforcement, as appropriate. This approach was previously approved for RACT II by the EPA on May 9, 2019 (84 FR 20274).

IRRC and other commentators had several inquiries regarding the Regulatory Analysis Form (RAF) for the proposed rulemaking. First, IRRC and some commentators contend that the RAF and the Technical Support Document (TSD) submitted with the proposed rulemaking underestimate the number of facilities that will have to install additional RACT controls and fail to account for the cost of new equipment that will be required to meet the new limits imposed by the proposed rulemaking. IRRC requested that the Board provide additional documentation and reasoning to justify the \$25 million number or revise this estimate accordingly and include these cost estimates in Section F of the Preamble to this final-form rulemaking. IRRC and a commentator suggested that the Department's estimated costs incurred by the affected owners and operators to comply with the proposed rulemaking presented in Question #19 of the RAF are underestimated as the alternative compliance options will entail legal and consulting services, which would exceed the estimated cost of \$4,000—6,000 estimated by the Department. IRRC and some commentators also note that the Department did not account for its costs in having to process additional case-by-case proposals and petitions due to lower presumptive limits proposed for multiple source categories. IRRC also asked for the Department to update Question #23 of the RAF to accurately account for the actual cost estimates, which are properly calculated under Question #19 of the RAF.

In response to comments on the RAF from IRRC and others, the Department determined that the owners and operators of approximately 115 engines and turbines would be required to install add-on control technology to meet the presumptive NO<sub>x</sub> RACT III emission limitations. Since the publication of the proposed rulemaking, the Department has updated the estimates to reflect that implementation of the final-form control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors and reduce VOC emissions by as much as 825 TPY from engines and turbines. The value of \$25 million has been updated to approximately \$36.7 million per year and was derived from multiplying the estimated 9,800 TPY of NO<sub>x</sub> emission reductions by the NO<sub>x</sub> RACT cost-effectiveness threshold of \$3,750. The Department does not anticipate any additional costs to the regulated industry to meet the lower VOC standards contained in this final-form rulemaking. Optimization of existing VOC controls should be sufficient to meet the VOC standards in this final-form rulemaking.

No changes were made to Question #19 of the RAF in response to comments from IRRC and other commentators that the Department underestimated the costs of compliance. The Board finds that \$4,000 to \$6,000 is a reasonable estimation of costs that covers public hearings and notifications, including newspaper notices, required for the SIP submittal, as well as application fees. The estimated cost does not include any legal or consultation fees that a company may choose to incur. The cost range provided by the commentator of \$4.4 to \$8.8 million is based on the assumption that 250—500 facilities will require alternative compliance provisions. The Board finds this to be an overestimation as the owners and operators of less than 200 facilities submitted either averaging plans or case-by-case proposals under RACT II. The Department anticipates that the number of facilities for which an averaging plan or case-by-case proposal will be submitted under RACT III will be less than 200. Further, the Department notes that final-form § 129.114(i) provides owners and operators with the opportunity to submit an analysis, where

applicable, demonstrating that RACT II conditions remain RACT for the 2015 8-hour ozone standard. For the owners and operators of eligible subject sources, this administratively efficient and less resource intensive approach than conducting a full case-by-case analysis, will likely reduce consulting costs that an owner or operator may choose to incur.

In response to comments from IRRC and others commenting that the Department did not account for its own costs in having to process additional case-by-case proposals and petitions due to lower presumptive limits proposed for multiple source categories, the Board finds that the Department will not incur any significant additional costs from the implementation of this final-form rulemaking. In the RAF, the Department explains that existing Department staff will be working to review and process alternative compliance schedules, NO<sub>x</sub> averaging plans and case-by-case proposals as it did in RACT II; no additional staff will be hired as a result of implementation of this final-form rulemaking. The Board's final-form amendments to § 129.114(i) provide for an administratively efficient and less resource intensive process that it anticipates some affected owners and operators will use to demonstrate that RACT II conditions remain appropriate for RACT III. While this process in final-form § 129.114(i)—(k) is anticipated to save the regulated community costs, the Department will be handling the newspaper publications in these instances, and therefore, incur costs for the required publication of newspaper notices. Accordingly, the Board has revised the RAF based on the Department's estimate of these additional publication and advertising costs.

As previously explained in response to IRRC's request, the total cost to the regulated community in Questions #19 and #23 of the RAF have been revised accordingly to approximately \$36.7 million per year.

IRRC and a commentator commented that the presumptive limit for glass melting furnaces in § 129.112 will conflict with industry-specific regulations that glass melting furnaces are subject to under 25 Pa. Code §§ 129.301-129.310 and that the Department did not provide an explanation in the Preamble of the proposed rulemaking as to why these facilities are subject to RACT III when they were not previously subject to RACT II for the 2008 8-hour ozone standard. IRRC and the commentator requested that operational flexibility for start-up, shutdown and idling that exists for glass melting furnaces in the current regulations be added to this final-form rulemaking. IRRC and a commentator also noted that the proposed rulemaking was overdue and urged its final adoption as soon as possible. IRRC and other commentators commented that stricter emission limits be adopted for certain source categories such as steel producing facilities, coal-fired power plants and municipal waste combustors.

In response to comments from IRRC and another commentator regarding the conflict between this rulemaking and the existing requirements in §§ 129.301—129.310, the Department explains that each time the EPA revises a NAAQS under section 109 of the CAA, the Commonwealth is required to meet the applicable RACT obligations for covered sources under sections 182 and 184 of the CAA (42 U.S.C.A. §§ 7511a and 7511c). The Department has determined that certain provisions, including § 129.303(a) relating to emissions requirements during periods of start-up, shutdown, or idling, in the existing glass melting furnace regulations preclude §§ 129.301—129.310 from meeting the presumptive standards in § 129.112(i) for the 2015 8-hour ozone NAAQS because these provisions do not include enforceable emissions limits. See EPA's

Reinstatement of its 2015 SSM Policy, available at: [Emissions During Periods of Startup, Shutdown, & Malfunction \(SSM\) | US EPA](#) The EPA's SSM Policy precludes the type of flexibility sought by IRRC and the commentator. The EPA also expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for the 1997 and 2008 8-hour ozone NAAQS; §§ 129.301—129.310 were not approved as RACT in the Commonwealth's SIP by the EPA for the 1997 and 2008 8-hour ozone NAAQS. See 76 FR 52283 (August 22, 2011). In response to these comments, the Board has amended final-form § 129.112(m) to reflect that the requirements and emission limitations for glass melting furnaces in § 126.112(i) would supersede existing requirements under §§ 129.301—129.310 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent.

Owners and operators of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility as defined in § 121.1 are subject to RACT III as described in final-form § 129.111. If an owner or operator of a glass melting furnace source cannot meet the presumptive RACT limit in final-form § 129.112(i), then the owner or operator may opt to submit a case-by-case proposal under final-form § 129.114. Certification of final-form § 129.112(i) as RACT for glass melting furnaces for the 2015 8-hour ozone NAAQS will be presumed to certify RACT for glass melting furnaces for the 1997 and 2008 8-hour ozone NAAQS. If an owner or operator cannot meet a presumptive RACT emission limit established under § 129.112(i), the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

In response to comments from IRRC and another commentator that the RACT III rulemaking is overdue and needs to be adopted as soon as possible, the Board acknowledges the comments. The Department has worked diligently to finalize this comprehensive rulemaking as quickly as possible. Litigation over certain aspects of the EPA's approval of certain provisions of the RACT II final-form rulemaking (84 FR 20274; May 9, 2019) in *Sierra Club v. EPA*, 972 F.3d 290 (3d Cir. 2020) has, in part, delayed the RACT III rulemaking.

In response to comments from IRRC and another commentator regarding the stringency of emissions limitations for coal-fired power plants, the Board explains that a coal-fired combustion unit with a rated heat input greater than 250 million Btu/hour, including an EGU with SCR, has no presumptive NO<sub>x</sub> RACT requirement or RACT emissions limitation specified in § 129.112. Therefore, § 129.114(a) is not applicable. Owners and operators of these large coal-fired combustion units are required to propose a NO<sub>x</sub> RACT requirement or RACT emission limitation under § 129.114(b).

The owners and operators of large coal-fired combustion units that are EGUs equipped with SCR were required to submit an alternative NO<sub>x</sub> RACT proposal to satisfy the requirement of § 129.99. See *Sierra Club v. EPA*, 972 F.3d 290 (3d Cir. 2020). Therefore, these owners and operators may submit an analysis under final-form § 129.114(i) to demonstrate that their limitations issued under §§ 129.96—129.100 (RACT II) remain RACT for §§ 129.111—129.115. These analyses received under § 129.114(i) along with supporting documentation will be subject to public comment to meet the Commonwealth's SIP public participation obligations under section 110 of the CAA and 40 CFR 51.102.

*§ 129.111. Applicability.*

IRRC and a commentator commented that the use of “that were in existence on or before August 3, 2018,” in proposed subsection (a) is vague and sought clarity. In response to these comments, the Board has amended this final-form rulemaking to provide further clarity. In final-form § 129.111(a) and (b), the words “commenced operation” have replaced “in existence.” While “commenced operation” is not defined in § 121.1, the words “commenced operation” are used in the definition of the term “new source” and also widely used in plan approvals issued by the Department’s Air Quality Program.

The Board finds that the Department does not intend for the RACT III provisions to be continually reapplied to new sources at major facilities. The intent of the applicability date in § 129.111(a) and (b) is that RACT should be determined once for each existing major facility or source in accordance with the requirements for the applicable 8-hour ozone NAAQS as the major facility or source exists on the applicability date. The applicability date in § 129.111(a) and (b), namely, August 3, 2018, is the effective date of the designations of the nonattainment areas in this Commonwealth for the 2015 8-hour ozone NAAQS. See 83 FR 25776, 25828 (June 4, 2018).

In response to the EPA’s suggestion that the scope of applicability of § 129.111(a) be narrowed to exclude new sources at existing major facilities, the Board has amended the language of § 129.111(a)(1) and (2) to clarify that the requirements apply to the owner and operator of major sources and facilities subject to § 129.111(a) that commenced operation on or before August 3, 2018. Installation and operation of a new source after August 3, 2018, at a major facility covered by § 129.111(a) is excluded from being identified and listed in accordance with § 129.111(a)(1) and (2) in the notification required under § 129.115(a). A new source installed after August 3, 2018, or the new major facility that commences operation after August 3, 2018, would instead be subject, at a minimum, to a best available technology (BAT) determination which can be no less stringent than RACT established for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III).

The EPA asked the Department to clarify if new facilities that came into existence after July 20, 2012, are not subject to RACT, or alternatively, whether those new facilities would be subject to a newer RACT standard. In response to the EPA’s questions regarding the applicability of RACT to the owners and operators of new [major] facilities that came into existence after July 20, 2012, the applicability date of §§ 129.96—129.100 (RACT II), the Department provides that the owner and operator of a major facility or source that commenced operation after July 20, 2012, but on or before August 3, 2018, would not have been subject to, or evaluated for, RACT for the 1997 and 2008 8-hour ozone NAAQS under §§ 129.96—129.100 (RACT II); rather, the owner and operator of the major facility or source would have been subject, at a minimum, to a BAT determination which could be no less stringent than the RACT II requirements for the 1997 and 2008 8-hour ozone NAAQS. The owner or operator of a major facility or source that commenced operation after July 20, 2012, and is in operation on or before August 3, 2018, would be subject to § 129.111(a) and would be evaluated for and issued an operating permit with the applicable RACT III requirements or emissions limitations, or both, for the 2015 8-hour ozone NAAQS for the major facility or source as it existed on or before August 3, 2018. If the owner or operator of this major facility then installs a new source after August 3,

2018, it is not the Department's intent to require an updated RACT III analysis for the 2015 8-hour ozone NAAQS for the facility, as explained above regarding the scope of applicability of § 129.111(a); rather, the new source would be subject to a BAT determination which can be no less stringent than RACT established for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III).

In response to the EPA's suggestion that the language in § 129.111(b) be clarified, the Board provides that the owner or operator of a non-major facility that commenced operation after July 20, 2012, and is in operation on or before August 3, 2018, would not have been subject to RACT II under §§ 129.96—129.100 nor would they be subject to § 129.111(a), since the facility is not a major facility. If the owner and operator of a non-major facility that commenced operation on or before August 3, 2018, then installs and commences operation of a new source after August 3, 2018, or makes a modification or change in operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, to the extent that the source or facility now meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, this owner and operator is subject to the requirements of § 129.111(b). The owner or operator will be evaluated by the Department for applicable RACT III requirements for the 2015 8-hour ozone NAAQS and be issued an operating permit with the applicable RACT III requirements. Once this source or facility meets major status and has been evaluated for applicable RACT III requirements under §§ 129.111—129.115, installation of a subsequent new source or a subsequent modification or change in operation of an existing source after the date of issuance of the permit would be subject to a BAT analysis which could be no less stringent than the RACT III requirements.

As specified under final-form § 129.111(d), the owner and operator of a facility that commenced operation on or before August 3, 2018, that is not a major NO<sub>x</sub> emitting facility or a major VOC emitting facility on or before December 31, 2022, would not be subject to §§ 129.111—129.115, except as specified in final-form § 129.111(e). Final-form § 129.111(e) specifies that if the owner and operator of a facility that complied with § 129.111(d) becomes major after December 31, 2022, the owner and operator of the now-major facility shall comply with § 129.111(b). This requirement precludes the situation in which an owner or operator of a major facility or source that is subject to § 129.111(a), or an owner or operator of a facility or source that is subject to § 129.111(b) that becomes major after August 3, 2018, then falls below the applicable major facility threshold on or before December 31, 2022, from being exempt from §§ 129.111—129.115 if the source or facility becomes major again after December 31, 2022.

The owner and operator of a source or facility that commences operation after August 3, 2018, would not be subject to §§ 129.111—129.115. These owners and operators would be evaluated according to applicable programs such as BAT or new source review. These owners and operators may become subject to future RACT requirements or RACT emission limitations, or both, that are implemented to address a future ground-level ozone NAAQS or revision to an existing ground-level ozone NAAQS. These owners and operators would be evaluated for RACT applicability at that time.

IRRC and a commentator asked the Board to explain in the preamble of this final-form rulemaking how the exemptions in subsection (c) will be implemented for facilities that have the potential to emit less than a certain amount of NO<sub>x</sub> or VOCs. In response to these comments, the

Board explains that the source exemptions listed in § 129.111(c) are based on potential emissions or potential to emit (PTE). A source that qualifies for an exemption under § 129.111(c) either does not have the physical capability to emit 1 TPY or more of NO<sub>x</sub> or VOCs or has a legal restriction that prohibits it from emitting 1 TPY or more of NO<sub>x</sub> or VOCs. A change that would allow the source to emit 1 TPY or more of NO<sub>x</sub> or VOCs would be a modification subject to BAT requirements. A modification that occurs after December 31, 2022, would not be subject to the RACT requirements and RACT emissions limitations of §§ 129.112—129.115 except as specified in § 129.111(e). The Board notes, however, that this modification may become subject to future RACT requirements or RACT emissions limitations, or both, that are implemented to address a future ground-level ozone NAAQS or revision to an existing ground-level ozone NAAQS. These owners and operators would be evaluated for RACT applicability at that time.

A commentator asked the Board to revise the definitions of “major NO<sub>x</sub> emitting facility” and “major VOC emitting facility” to exclude the 25 TPY thresholds for Bucks, Chester, Delaware, Montgomery and Philadelphia Counties consistent with RACT II. In response to the commentator’s request, the Department has explained that it intends for the major facility applicability thresholds established for Bucks, Chester, Delaware, Montgomery and Philadelphia Counties under RACT II to also apply for RACT III. Therefore, the Board has revised the definitions of major NO<sub>x</sub> emitting facility and major VOC emitting facility in this final-form rulemaking to clarify that the applicability thresholds for Bucks, Chester, Delaware, Montgomery or Philadelphia County for purposes of §§ 129.96—129.100 and 129.111—129.115 are 100 TPY for NO<sub>x</sub> emissions and 50 TPY for VOC emissions.

A commentator asked why sources subject to § 129.74 were not excluded from the proposed rulemaking as they were in RACT II. In response, the Board has revised § 129.111(a) and (b) in this final-form rulemaking to include § 129.74 in the list of excepted sections. Section 129.74 implements RACT requirements and RACT emission limitations consistent with the EPA’s applicable Control Techniques Guidelines (CTG) (EPA 453/R-08-004, 2008/09 Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials) and sources subject to § 129.74 are exempted from the major source RACT requirements in §§ 129.96—129.100 and §§ 129.111—129.115.

*§ 129.112. Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule.*

*Subsection (b)*

A commentator commented that proposed § 129.112 did not address the presumptive requirements for process heaters between 20—50 million Btu/hour and asked if it is the Department’s intention that these units be subject to case-by-case RACT under RACT III, similar to RACT II.

The Board has amended final-form § 129.112(b)(1)(i) and (ii) to add “or process heater.”

*Subsection (c)*

IRRC and a commentator suggested that “flare” be added to the list of equipment that must be installed, operated and maintained in accordance with manufacturer’s specifications and with good operating practices under § 129.112(c)(8) if the revision would improve clarity.

The Board has amended proposed § 129.112(c)(8) in this final-form rulemaking to add the word “flare.”

Some commentators commented that the Board has only adopted “good operating practices” for electric arc furnaces (EAF) and suggested that the Department and the Board should revise the TSD to include an analysis of RACT requirements for electric arc furnaces. Another commentator commented that steel producing facilities might improve their air emissions performance through more stringent RACT standards and suggested that the Department consider a meaningful work practices plan to control coke oven emissions from leaking doors, lids, offtake piping and charging of coke oven batteries as well as a leak detection and repair program for VOCs.

In response to comments regarding RACT III requirements for steel producing facilities, the Department explained that it evaluated several EAFs as part of case-by-case determinations for RACT II. The Department determined that no NO<sub>x</sub> or VOC emissions control for EAF is technically feasible. This is because EAF do not use combustion and are batch processes. Since there is no combustion, methods used to alter NO<sub>x</sub> and VOC emissions cannot be employed as they would for a combustion source. Therefore, the Board has determined that a numerical RACT emissions limitation for either NO<sub>x</sub> or VOC emissions from an EAF is not appropriate. The Board finds that the applicable presumptive RACT requirement of “good operating practices” is consistent with previous RACT determinations and is appropriate for EAF in this Commonwealth. Additional information can be found in Section IV(L) of the Department’s TSD for this final-form rulemaking.

Due to the nature and complexity of certain sources, such as steel mills and coke ovens, it is not appropriate to establish presumptive RACT requirements or RACT emissions limitations. See 44 FR 53761, 53762-53763 (September 17, 1979); see also 57 FR 18070, 18073--18074 (April 28, 1992). Owners and operators of sources with no presumptive RACT requirements or RACT emissions limitations are required to submit a case-by-case proposal for an alternative RACT requirement or RACT emissions limitation (alternative RACT proposal). If the facility is in Allegheny County, the alternative RACT proposal is submitted to and reviewed by the Allegheny County Health Department (ACHD).

Case-by-case proposals for alternative RACT requirements or RACT emissions limitations submitted to ACHD must be submitted by the Department to the EPA as a SIP revision. These proposals must meet the same requirements and undergo the same SIP review process as alternative RACT proposals submitted to the Department. Additionally, the Department provides support to ACHD during the review of alternative RACT proposals.

*Subsection (e)—Municipal Solid Waste Landfills*

A commentator requested that proposed § 129.112(e) be amended to reflect recent changes in applicable Federal regulations published in the *Federal Register* on May 21, 2021, effective June 21, 2021, pertaining to the adoption of the Federal Plan for municipal solid waste landfills that commenced construction on or before July 17, 2014, and landfills that are constructed, reconstructed or modified on or after July 18, 2014.

The Board believes that the commentator is referring to the EPA final rule published at 86 FR 27756 on May 21, 2021. The Board has revised final-form section 129.112(e) to incorporate the updated Federal regulations at 40 CFR Part 62, Subpart OOO (relating to Federal plan requirements for municipal solid waste landfills that commenced construction on or before July 17, 2014 and have not been modified or reconstructed since July 17, 2014). The Board notes that § 129.113(e)(2) requires a municipal solid waste landfill constructed, reconstructed or modified on or after July 18, 2014, to comply with the New Source Performance Standards in 40 CFR Part 60, Subpart XXX (relating to standards of performance for municipal solid waste landfills that commenced construction, reconstruction, or modification after July 17, 2014), which are adopted and incorporated by reference in § 122.3 (relating to adoption of standards).

*Subsection (f)—Municipal Waste Combustors*

The EPA commented that the prior NO<sub>x</sub> emission standard for municipal waste combustors in § 129.97 is proposed to be reduced from 180 ppmvd to 150 ppmvd. The Department's analysis determined that additional controls (for example, selective catalytic reduction/selective non-catalytic reduction (SCR/SNCR)) were technically or economically infeasible, or both. However, the EPA commented that the record does not explain what measures will be necessary for the sources to meet the new limits and does not demonstrate that 150 ppmvd is the lowest rate that is technically and economically feasible. Several of the sources appear to be capable of operating at lower emission rates. The EPA asked that the Department explain what analysis was performed to determine that 150 ppmvd is RACT for these units. Several commentators commented that the Department should set a lower limit for this source category.

The limit for MWCs in § 129.97 is 180 ppmvd. The Board has revised proposed § 129.112(f) from 150 ppmvd NO<sub>x</sub> @ 7% oxygen to a more stringent limit of 110 ppmvd NO<sub>x</sub> @ 7% oxygen in this final-form rulemaking based on the Department's review of information provided by commentators during the public comment period as well as the Department's review of available stack test emissions data. The supporting analysis is found in Section IV(E) of the Department's TSD for this final-form rulemaking.

Another commentator commented that the proposed rulemaking establishes no process for considering whether an individual source can achieve a stronger and more protective limit and weakens the standard by allowing the owner or operator of a municipal waste combustor to meet the presumptive limit through facility or system-wide averaging, which the commentator claimed poses a particular threat to environmental justice areas. The commentator requested the Board correct this.

In response to a commentator's request, the Board declines to make any revisions to this final-form rulemaking. The Department explained that it is appropriate to set presumptive RACT requirements and RACT emissions limitations for certain source categories, including MWCs, in this final-form rulemaking. A presumptive limit is set at a level that, when met, assures that the Commonwealth's RACT obligation under the CAA has been met. See *NRDC v. EPA*, 571 F.3d 1245, 1253-1255 (D.C. Cir. 2009). With respect to the ability for owners and operators to use systemwide NO<sub>x</sub> averaging, the Board finds that the Department has adequately explained the ability and limitations for owners and operators to use systemwide averaging in responses to Comments 99 and 100 of the comment and response document. NO<sub>x</sub> emissions averaging plans or alternative RACT proposals are submitted to the Department for review and approval, denial or modification in accordance with § 129.113(g) and (i). The NO<sub>x</sub> emissions averaging plan or alternative RACT proposal approval or modification and the Department's proposed actions are subject to public review and comment at the State level before being finalized by the Department. If approved and issued by the Department as an operating permit modification, the NO<sub>x</sub> emissions averaging plan or alternative RACT proposal must be submitted by the Department to the EPA as a revision to the Commonwealth's SIP. The local county agencies in Allegheny County and Philadelphia County follow a similar process.

Another commentator commented that SNCR control technology cannot be employed at some municipal waste combustor facilities due to the type of technology employed there and noted that the Department determined that retrofitting with SNCR is economically infeasible. In response, the Board notes that § 129.112(f) has been amended by the Board from the proposed 150 ppmvd NO<sub>x</sub> @ 7% oxygen to 110 ppmvd NO<sub>x</sub> @ 7% oxygen in this final-form rulemaking. The NO<sub>x</sub> emission rate of 110 ppmvd @ 7% oxygen on a 24-hour averaging period for large MWCs was recommended by the OTC SAS MWC workgroup in its June 2021 "Municipal Waste Combustor Workgroup Report" and is supported by the Department's cost-effectiveness analysis. If an owner or operator cannot meet the presumptive emission limit, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation under § 129.114.

*Subsection (g)(1)—Combustion Units or Process Heaters*

IRRC and other commentators asked the Board to explain in the Preamble of this final-form rulemaking the rationale for using an operating day to measure emission limits for coal-waste plants for an operating day under § 129.112(g)(1)(viii), instead of a 30-day rolling average.

In response, the Board finds that the proposed use of an operating day is appropriate. Based on continuous emissions monitoring data for the years 2018—2020, the Department determined that circulating fluidized bed boilers (CFBs) can meet the presumptive NO<sub>x</sub> RACT emissions limitation on a daily basis including periods of start-up, shutdown and low load operation. The owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation under final-form § 129.114 if they believe that the presumptive RACT limitation cannot be met at all times. Please see Section IV(F) of the Department's TSD for this final-form rulemaking.

A commentator commented that start-up and periods of low load operations should be exempted from the presumptive NO<sub>x</sub> RACT requirement for circulating fluidized bed boilers firing primarily coal refuse.

The Board finds that presumptive RACT requirements must be enforceable limits and apply at all times, including periods of start-up, shutdown and low load operation, which is consistent with the EPA's 2015 SSM Policy, available at: [Emissions During Periods of Startup, Shutdown, & Malfunction \(SSM\) | US EPA](#)

Commentators commented that the presumptive NO<sub>x</sub> RACT emissions limit for circulating fluidized bed boilers primarily firing anthracite waste such as culm should be the same rate as those primarily firing bituminous waste such as gob.

The Board agrees with the commentators. The RACT emission limitation for a CFB combustion unit with a rated heat input equal to or greater than 250 million Btu/hour firing waste products of coal mining, physical coal cleaning and coal preparation operations that contain coal, matrix material, clay and other organic and inorganic material is 0.16 lb. NO<sub>x</sub>/million Btu heat input when firing primarily bituminous waste such as gob and 0.16 lb. NO<sub>x</sub>/million Btu heat input when firing primarily anthracite waste such as culm.

Another commentator commented that the proposed rulemaking should be amended to include a lowered presumptive NO<sub>x</sub> emissions limit for coal-fired EGUs without the problematic inlet-temperature loophole from RACT II; and that the Commonwealth's "case-by-case approach" for coal plant NO<sub>x</sub> RACT determinations, involving a "top-down analysis," is inappropriate for several reasons. The commentator recommended that the Commonwealth set a new NO<sub>x</sub> RACT standard for its coal-fired power plants that incorporates a 0.07 lb NO<sub>x</sub>/million Btu emission limit, avoids control inlet temperature-based exemptions, and includes a short term, 24-hour emission limit at least as low as 0.125 lb NO<sub>x</sub>/million Btu.

The commentator's suggestion that the Board establish a presumptive RACT limit for coal-fired electric generating units is outside the scope of this rulemaking. Nothing in the CAA or regulations thereunder mandates that the Commonwealth establish a presumptive RACT limit for coal-fired power plants as suggested by the commentator. The CAA provides States with "broad authority to determine the methods and particular control strategies they will use to achieve the [CAA] statutory requirements." See *BCCA Appeal Group v. EPA*, 355 F.3d 817, 822 (5th Cir. 2003). The determination of RACT and the corresponding emission rate ensuring the proper application and operation of RACT may vary from source to source due to source configuration, retrofit feasibility, operating procedures, raw materials, and other technical or economic characteristics of a source or group of sources. 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](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19761209_strelow_ract.pdf); see also *Nat'l Steel Corp., Great Lakes Steel Div. v. Gorsuch*, 700 F.2d 314, 322–323 (6th Cir. 1983).

For some categories of sources, the EPA has promulgated CTGs and alternative control techniques documents (ACTs) to assist states in determining what control techniques meet the RACT requirement; states may opt to require alternative controls rather than following the CTGs. See *NRDC v. EPA*, 571 F.3d 1245, 1253-1254 (D.C. Cir 2009). The ACTs issued under section 183 of the CAA (42 U.S.C.A. § 7511b), such as the EPA's 1994 Alternative Control Techniques Document for Utility Boilers, do not establish presumptive levels of control. *Id.* Moreover, simply because other states have chosen to establish presumptive RACT limits for their coal-fired EGUs does not mean that the Commonwealth is required to do so or that the limits selected are appropriate. See Memorandum from William T. Harnett, Director, Air Quality Policy Division, USEPA, to Regional Air Division Directors, "RACT Qs & As – Reasonably Available Control Technology (RACT): Questions and Answers" (May 18, 2006), at 1 and 3, available at: [https://www.epa.gov/sites/production/files/201608/documents/ract\\_and\\_nsps\\_1dec1988.pdf](https://www.epa.gov/sites/production/files/201608/documents/ract_and_nsps_1dec1988.pdf) (A State may elect to select to establish "beyond-RACT controls" for policy reasons).

Although the Department is under no obligation to establish presumptive RACT requirements and RACT emissions limitations for a specific source category, the Department may do so when the Department determines that a source category contains emission units that are similar enough in nature that the emission units in the source category can be regulated by a consistent emissions limitation or requirement. However, based on the varying sizes, various operating scenarios and conditions, and other varying factors for coal-fired EGUs in this Commonwealth, the Department determined that it is appropriate for owners and operators of large coal-fired combustion units to obtain case-specific RACT determinations. Through these case-by-case submittals, the Department will be reviewing advances in technology. See *NRDC v. EPA*, 71 F.3d 1245 (D.C. Cir 2009). This position is supported by the EPA at 44 FR 53761, 53762-53763 (September 17, 1979), regarding State Implementation Plans, General Preamble for Proposed Rulemaking on Approval of Plan Revisions for Nonattainment Areas-Supplement (on Control Techniques Guidelines) and at 57 FR 18070, 18073-18074 (April 28, 1992), regarding State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Supplemental. See also 57 FR 55620 (November 25, 1992), regarding State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, at page 55624, paragraph 3.4, "VOC and NO<sub>x</sub> Emissions."

The Department previously submitted case-by-case submittals under §§ 129.91—129.95 (RACT I) to the EPA to meet the Commonwealth's RACT obligations under the CAA for the 1979 and 1993 1-hour ozone NAAQS. The Department is currently conducting case-by-case determinations under §§ 129.96—129.100 (RACT II) for existing coal-fired combustion units with SCR systems as a result of the United States Court of Appeals for the Third Circuit's decision in *Sierra Club v. EPA*, 972 F.3d 290 (3d Cir 2020). ("Sierra Club"). In *Sierra Club*, the Third Circuit noted that older coal plants may elect to submit source-specific RACT proposals under § 129.99. *Id.* at 296.

The Department determined that the best method to comply with the Third Circuit's decision in *Sierra Club* is through requiring the owner or operator of each coal-fired combustion unit affected by the Court's decision to submit case-by-case RACT determinations in accordance

with the procedures in § 129.92(a)(1)—(5) and (b), which includes a top-down analysis due to variability in operation and control device configuration. 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.

*Subsection (g)(2)—Combustion Turbines*

IRRC and a commentator asked the Board to explain in the preamble to this final-form rulemaking the rationale for establishing 85 ppmvd NO<sub>x</sub> as a presumptive RACT emission limitation under proposed § 129.112(g)(2)(iii)(A) and whether existing technology allows for that level of compliance.

In response to IRRC and the commentator's comment, the Board has amended the source categories for turbines by separating and adding an additional group for turbines in the 1,000 bhp—4,100 bhp size range in this final-form rulemaking. The emission limit of concern is now in final-form § 129.112(g)(2)(iv)(A). The Department explained that in its review of the comments on the proposed rulemaking, it analyzed additional information provided by a turbine manufacturer as well as additional stack test data, and determined that existing technology does not allow for installation of additional control technology and, therefore, does not provide for the level of control proposed by the Board. The Board has revised the presumptive standard in the final-form rulemaking to 120 ppmvd NO<sub>x</sub> @ 15% oxygen.

A commentator requested modifying the bhp size range for simple cycle or regenerative cycle combustion turbines in § 129.112(g)(2)(iii) and (iv) from 3,000 bhp to 4,100 bhp to alleviate alternative RACT submittals for the Centaur® 40 4000 rating, which does not have a DLNC technology option and, therefore, is unable to meet the proposed 42 ppmvd NO<sub>x</sub> level.

The Department reviewed the information provided by the commentator regarding the available turbines located in this Commonwealth. The information demonstrated that turbines with a rating less than 4,100 bhp cannot consistently meet the proposed 42 ppmvd NO<sub>x</sub> standard. Therefore, the Board has revised proposed § 129.112(g)(2)(iii) in this final-form rulemaking to revise the size ranges for simple cycle or regenerative cycle combustion turbines. The size threshold of 3,000 bhp in proposed § 129.112(g)(2)(iii) for simple cycle or regenerative cycle combustion turbines has been amended in this final-form rulemaking to 4,100 bhp. Further, the Board notes that proposed § 129.112(g)(2)(iii) is renumbered as final-form § 129.112(g)(2)(iv).

The Board has renumbered proposed § 129.112(g)(2)(iv) in this final-form rulemaking to § 129.112(g)(2)(v). Renumbered § 129.112(g)(2)(v) is further amended in this final-form rulemaking to establish the applicable presumptive RACT emissions 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 3,000 bhp) and less than 60,000 bhp. No changes are made to the applicable presumptive RACT emission limitations from proposed § 129.112(g)(2)(iv)(A)—(D) to final-form § 129.112(g)(2)(v)(A)—(D).

A commentator suggested splitting the source category for § 129.112(g)(2)(i) to add a source category for combined cycle and combined heat and power turbines for equal to and greater than 1,000 bhp to less than 4,100 bhp and modify the current source category to range from greater than 4,100 bhp to less than or equal to 180 megawatts (MW).

Proposed § 129.112(g)(2)(i) established the applicable presumptive RACT emissions 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 180 MW. The Board has amended § 129.112(g)(2)(i) in this final-form rulemaking to establish the applicable presumptive RACT emissions 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 less than 180 MW). Section 129.112(g)(2)(i)(A) is amended from proposed to this final-form rulemaking to delete the proposed limitation of 42 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 120 ppmvd NO<sub>x</sub> @ 15% oxygen. Section 129.112(g)(2)(i)(C) is amended from proposed to this final-form rulemaking to delete the limitation of 96 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 150 ppmvd NO<sub>x</sub> @ 15% oxygen. These limits are consistent with the presumptive NO<sub>x</sub> RACT emission limitations for the simple cycle or regenerative cycle combustion turbines in final-form § 129.112(g)(2)(iv).

The commentator also requested the NO<sub>x</sub> emissions level for the newly created category match the level requested for simple cycle turbines in § 129.112(g)(2)(iii) at 150 ppmvd NO<sub>x</sub>.

Proposed § 129.112(g)(2)(iii)(A) is amended in this final-form rulemaking to revise the applicable presumptive RACT emission limitation for simple cycle or regenerative cycle combustion turbines when firing natural gas or a noncommercial gaseous fuel. Based on the Department's review of the information provided by the commentator as well as the Department's review of available stack test emissions data, the Board has revised the presumptive NO<sub>x</sub> RACT emissions limitation of 85 ppmvd @ 15% oxygen to 120 ppmvd @ 15% oxygen. Please also see Section IV(G) of the Department's TSD for this final-form rulemaking.

Further, the Board has renumbered proposed § 129.112(g)(2)(iii)(A) in this final-form rulemaking as § 129.112(g)(2)(iv)(A).

#### *Subsection (g)(3)—Stationary Internal Combustion Engines*

IRRC and some commentators commented that the proposed rulemaking included a typographical error where it states a lower NO<sub>x</sub> limit for rich burn engines of 0.6 gram/bhp-hr (for all engine sizes); the TSD indicates 2.0 gram/bhp-hr for all units regardless of horsepower.

The Board has revised the final-form rulemaking to correct this typographical error. The proposed limit of 0.6 gram NO<sub>x</sub>/bhp-hr in § 129.112(g)(3)(iv)(A) has been revised to a limit of 2.0 gram NO<sub>x</sub>/bhp-hr.

*Subsection (g)(4)—Combustion Unit or Process Heater Firing Multiple Fuels*

IRRC and a commentator questioned how the owner or operator of a unit firing multiple fuels can comply with the requirements of § 129.112(g)(4) if beneficially reused process gases are used as fuels. IRRC asked the Board to explain in the preamble to this final-form rulemaking how this provision will be implemented.

In response to IRRC and the commentator's comment, the Department did not have sufficient data for other fuels to determine a presumptive NO<sub>x</sub> RACT emission limitation for this source category. Therefore, the owner or operator of a source firing a fuel not covered under the presumptive RACT emission limitations is required to submit a case-by-case proposal for an alternative RACT emissions limitation in accordance with final-form § 129.114(b) or § 129.114(c). The owner or operator may propose a method of compliance similar to the calculation in final-form § 129.112(g)(4)(i) as part of the case-by-case RACT proposal.

*Subsection (e)—Glass Melting Furnaces*

A commentator stated that RACT III would indirectly revoke important components of the existing glass melting furnace regulations regarding allowable emissions during start-up, shutdown and idling, and the provisions for alternative limits, claiming that the provisions of this final-form rulemaking would effectively impose a zero emissions limit for NO<sub>x</sub> during these periods. The commentator commented that the proposed RACT III rulemaking should not override and essentially rescind other currently applicable regulations without recognition and notice of the effect of the proposed rulemaking and without any explanation by the Board as to the rationale and basis for doing so.

Each time the EPA revises a NAAQS under section 109 of the CAA, the Commonwealth is required to meet the applicable RACT requirements for covered sources under sections 182 and 184 of the CAA (42 U.S.C.A. §§ 7511a and 7511c). These duties are charged to the Department and the Board, respectively, under the APCA. See for example, 35 P.S. §§ 4004, 4004.2 and 4005. The Department determined that certain provisions, including § 129.303(a), in the existing glass melting furnace regulations preclude §§ 129.301—129.310 from meeting the presumptive standards in § 129.112(i) for the 2015 8-hour ozone NAAQS. The EPA also expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for the 1997 and 2008 8-hour ozone NAAQS; §§ 129.301—129.310 were not approved as RACT in the Commonwealth's SIP by the EPA for the 1997 and 2008 8-hour ozone NAAQS. See 76 FR 52283 (August 22, 2011). Under the final-form rulemaking, the owner or operator of a glass melting furnace source that cannot meet the presumptive limit in § 129.112(i) may opt to submit a case-by-case proposal under § 129.114. Certification of § 129.112(i) as RACT for glass melting furnaces for the 2015 8-hour ozone NAAQS will be presumed to certify RACT for glass melting furnaces for the 1997 and 2008 8-hour ozone NAAQS.

RACT requirements and RACT emissions limitations are applicable at all times, including start-up, shutdown and idling. The presumptive NO<sub>x</sub> RACT limits for glass melting furnaces are in units of pounds of NO<sub>x</sub> per ton of glass pulled. The Board disagrees with the commentator that the presumptive NO<sub>x</sub> RACT emissions limitation effectively imposes a zero emissions limit for

NO<sub>x</sub> during start-up, shutdown and idling. During times when glass is not being pulled, the emissions in terms of pounds of NO<sub>x</sub> per ton of glass pulled is undefined, not zero. The RACT limit is therefore only practically applicable at times when glass is being pulled. If an owner or operator cannot meet a presumptive RACT emission limit, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

RACT emission limitations must be enforceable to be approvable by the EPA as a SIP revision. Exemptions from emission limitations during periods of start-up, shutdown and malfunction (SSM) existed in a number of other States' regulations, some of which exemptions were adopted and approved into those States' SIPs by the EPA many years ago. Court decisions have previously held that under the CAA, such exemptions are not allowed in SIPs. See, for example, *Sierra Club et al. v. Jackson*, No. 3:10-cv-04060-CRB (N.D. Cal.). In response to these court decisions, on June 12, 2015, the EPA published a final rule to restate and update the EPA's SSM Policy applicable to SIPs and to ensure States have plans in place that are fully consistent with the CAA and court decisions concerning emissions during periods of SSM operations. See 80 FR 33840 (June 12, 2015) (2015 SSM final action). The 2015 SSM final action embodies the EPA's updated SSM Policy as it applies to SIP provisions. The SSM Policy provides guidance to states for compliance with CAA requirements for SIP provisions applicable to excess emissions during SSM events. On October 9, 2020, the EPA issued a memorandum of guidance providing that exemption provisions for SSM may be permissible in SIPs under certain circumstances. On September 30, 2021, the EPA issued a memorandum withdrawing the previous October 9, 2020, guidance and reinstated the agency's prior policy in the 2015 SSM final action that SSM exemptions in SIPs are inconsistent with the CAA.

A commentator also commented that the TSD provided by the Department inaccurately relied on the EPA's Cost Control Manual to estimate the cost of NO<sub>x</sub> controls for glass melting furnaces and that the RACT III proposal is essentially silent on the rationale behind the imposition of presumptive RACT for glass melting furnaces.

In response, the Board finds based on explanation from the Department that the EPA Control Cost Manual is an accepted source for the determination of economic feasibility for NO<sub>x</sub> control technologies. These determinations of economic feasibility are not dependent on the source type. In this case, presumptive RACT is established as a NO<sub>x</sub> emissions limitation and does not mandate an emissions control strategy. For example, oxy-firing can be used to meet presumptive NO<sub>x</sub> RACT emissions limitations without the necessity to install particulate emission control technology.

The Department evaluated cost information provided by the commentator, which in part, also relied on the EPA Control Cost Manual. The Department also reviewed the analysis for various emission control scenarios submitted by the commentator for the regional haze four-factor analysis, which is a separate requirement under section 169A of the CAA (42 U.S.C.A. § 7491) and implementing regulations. The Department determined that based on the information provided, the control devices included in the analysis are cost-effective as RACT for the control of NO<sub>x</sub> emissions from glass melting furnaces. If an owner or operator cannot meet the presumptive RACT emission limit, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation under final-form § 129.114.

*Subsection (j)—Lime Kilns*

A commentator requested that the Board revise the proposed rulemaking to once again include the specific lb NO<sub>x</sub>/hr 30-operating day rolling average numerical limits associated with Graymont's Kiln 6, Kiln 7 and Kiln 8. The commentator noted that substantial system changes would have to occur to incorporate live production data into the well-established CEMS data management system with no environmental benefit.

The Board declines to revise this final-form rulemaking as requested by the commentator and disagrees that substantial changes would be needed to demonstrate compliance with the proposed standard. The amount of lime produced is a known quantity and can be added to the CEMS data management system. According to the Department, the calculation of a lb NO<sub>x</sub> per ton of lime produced value is not unnecessarily burdensome.

*Subsection (k)—Direct-Fired Heaters, Furnaces and Ovens*

A commentator inquired why the new definition "combustion source" was not used in proposed § 129.112(k). The Board agrees with the commentator that the term "combustion source" can be included in § 129.112(k). The term "combustion source" specifically includes sources that produce heat or energy by direct heat transfer. Direct-fired heaters, furnaces and ovens produce heat or energy by direct heat transfer and are combustion sources. In contrast, a "combustion unit" is defined as a stationary equipment used to burn fuel primarily for the purpose of producing power or heat by indirect heat transfer. The Board has amended final-form § 129.112(k) to include the words "or other combustion source" after the words "direct-fired heater, furnace, oven."

IRRC and a commentator commented that the proposed rulemaking applies the same NO<sub>x</sub> limit for a direct-fired heater, furnace or oven as the limit for indirect-fired furnaces established under RACT II. The commentator asked for clarification on the basis for this decision. IRRC asked the Board to include the rationale for this standard in the supporting documents and preamble submitted with this final-form rulemaking. The commentator requested that the Department provide additional information to support the proposed presumptive RACT requirement for direct-fired units and suggested that the Department should not require sources to redo case-by-case RACT determinations that were evaluated and approved in RACT II.

In response to the comment, the Board notes that presumptive RACT emissions limitations were not established in RACT II for direct-fired units. Under RACT II, owners and operators of direct-fired units were required to submit a case-by-case proposal for an alternative RACT emission limitation under § 129.99. The addition of presumptive NO<sub>x</sub> RACT limitations for direct-fired units in the RACT III rulemaking gives owners and operators more flexibility to comply with RACT requirements and RACT emission limitations. If an owner or operator cannot meet the applicable presumptive RACT emissions limitation under RACT III, the owner or operator may submit a case-by-case proposal under § 129.114(d) for an alternative RACT emission limitation.

The owner or operator may also be able to submit an analysis under § 129.114(i) to the Department or appropriate approved local air pollution control agency to demonstrate that the RACT emission limitation approved under § 129.99(e) (RACT II) remains RACT for RACT III. The process provided under § 129.114(i) for eligible facilities is less resource intensive than preparing a case-by-case proposal under § 129.114(d) for an alternative RACT emission limitation.

*§ 129.113. Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements.*

IRRC and a commentator asked the Board to explain in the preamble of this final-form rulemaking why the ability of an owner or operator to file for an averaging plan under § 129.113 is contingent on one unit not being able to meet the NO<sub>x</sub> RACT limit. The commentator noted that facility-wide and system-wide averaging plans should be able to be submitted at the discretion of the owner or operator to provide greater flexibility and still be protective of public health, safety and the environment. IRRC also asked the Board to explain in the preamble of this final-form rulemaking why the ability of an owner or operator to use system-wide averaging is limited to sources located in the same ozone nonattainment area.

The Board disagrees with the commentator that the owner and operator of an affected source may choose the emissions averaging compliance option without requiring the owner or operator to first demonstrate that the applicable presumptive RACT emissions limitation established for a certain source category cannot be met by the individual affected units. The averaging plan is provided as an alternative compliance option to meeting applicable source-specific presumptive RACT NO<sub>x</sub> emissions limitations if one or more of the individual affected units cannot meet the applicable presumptive RACT NO<sub>x</sub> emissions limitation. If all affected units can individually meet the applicable presumptive RACT NO<sub>x</sub> emissions limitations, then no averaging plan is warranted.

System-wide averaging is required to be among sources under common control of the same owner or operator within the same ozone nonattainment area in order to conform to the CAA and the D.C. Circuit Court of Appeals ruling in *NRDC v. EPA*, 571 F.3d 1245 (D.C. Cir. 2009). See 83 FR 62998, 63007 (December 6, 2018); see also *South Coast Air Quality Management Dist. v. EPA*, 882 F.3d. 1138, 1154 (D.C. Cir. 2018). All areas located in unclassifiable/attainment areas in an OTR state are considered to be the same ozone nonattainment area. Allowing system-wide averaging to include units from different ozone nonattainment areas would have the potential to increase or keep emissions higher in separate maintenance areas for the ozone NAAQS. This would conflict with the anti-backsliding provisions of the CAA. Furthermore, compliance with the applicable presumptive RACT NO<sub>x</sub> emissions limitations is the most cost-effective compliance method available to the owner and operator of an affected source. Submission of an averaging plan entails costs for developing the plan and submitting it to the Department.

The EPA commented that proposed § 129.113(n) would add new language that specifies that averaging plans will be submitted to the EPA for approval. The EPA commented that proposed § 129.113(n) appears to be new language added by the Commonwealth to alert source owners and operators using an averaging plan that the averaging plan will be submitted to the EPA for approval. The EPA asked how the Department will determine whether the emissions from the

two sources in the averaging plan are less than if both sources complied with presumptive RACT as would be required under proposed § 129.113(d) and also asked whether the demonstration of compliance with this method would be part of a permit and enforceable.

While the EPA references in its comment two sources included in the averaging plan, the Board notes that the averaging plan could include more than two sources.

The final-form rulemaking requires that the aggregate NO<sub>x</sub> emissions emitted by the air contamination sources included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan be less than or equal to the amount of NO<sub>x</sub> emissions that would be emitted by the group of included sources if each source complied with the applicable NO<sub>x</sub> RACT emissions limitation in § 129.112 on a source-specific basis. This demonstration is done on a mass basis consistent with the appropriate averaging period for each presumptive NO<sub>x</sub> emissions limitation. The exact calculations may vary somewhat among the averaging plans, so the final-form rulemaking does not specify the precise details in order to preserve flexibility in differing circumstances. Each averaging plan will be reviewed by the Department on a case-by-case basis. The provisions of each averaging plan, including terms and conditions regarding compliance, will be included in a plan approval or operating permit. Those terms and conditions will be submitted to the EPA as a SIP revision.

*§ 129.114. Alternative RACT proposal and petition for alternative compliance schedule.*

The EPA commented that proposed § 129.114(a) seems to not allow coal-fired electric generating units (EGU) to request case-by-case determinations under RACT III because there is no presumptive RACT for this source category in proposed § 129.112. The EPA commented that the Department should clearly notify the public when publicly noticing proposed case-by-case RACT II permits for coal-fired EGUs with SCRs that it intends to use the same limits to satisfy RACT for the 2015 ozone NAAQS and that the RACT II comment period will be the last opportunity to comment on whether the RACT II limits also meet the RACT III requirements.

In response, the Board notes that a coal-fired combustion unit with a rated heat input greater than 250 million Btu/hour, including an EGU with SCR, has no presumptive NO<sub>x</sub> RACT requirement or emission limitation specified in § 129.112. Therefore, § 129.114(a) is not applicable. Owners and operators of these large coal-fired combustion units are required to propose a NO<sub>x</sub> RACT requirement or RACT emissions limitation under § 129.114(b).

The owners and operators of large coal-fired combustion units that are EGUs equipped with SCR were required to submit an alternative NO<sub>x</sub> RACT proposal to satisfy the requirement of § 129.99. Therefore, these owners and operators will also submit an analysis under § 129.114(i) to demonstrate that their limitations issued under §§ 129.96—129.100 (RACT II) remain RACT for §§ 129.111—129.115. These analyses received under § 129.114(i) will be subject to public comment to meet the SIP public participation requirements under section 110 of the CAA and 40 CFR 51.102.

Another commentator commented that any technically feasible reductions would be nominal with high cost-effectiveness values and, as a result, the Department would create a need to process a significant number of alternative RACT petitions and will require significant resources.

The Board notes that presumptive RACT requirements and emission limitations were determined based on the technical and economic feasibility of emission control measures. The Department has developed an accompanying TSD for the source categories included in this final-form rulemaking. The Department expects that many owners and operators will benefit by complying with the presumptive RACT requirements and RACT emission limitations. If an owner or operator cannot meet a presumptive RACT requirement or RACT emissions limitation, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation under § 129.114.

A commentator commented that cost-effectiveness values (dollar per ton of pollutant removed) arrived at in the Department's TSD evaluation for presumptive RACT are reasonable and should be used as a standard for case-by-case evaluations of alternative limitations.

The Board concludes it is not appropriate to use the cost-effectiveness dollars as the standard for case-by-case evaluations of alternative limits as recommended by the commentator. The Department explains that compliance costs may vary for each source or facility depending on the source size, type, operational limitations and which control option is selected by the owner and operator of the affected source or facility, the cost-effectiveness benchmarks used in the analysis of presumptive RACT requirements and RACT emissions limitations are not to be taken as absolute cost-effectiveness threshold limits to be applied to case-by-case analyses. The Department believes that it is not appropriate to apply the same cost-effectiveness benchmarks used to determine the presumptive RACT requirements and RACT emissions limitations across all sources undergoing a case-by-case analysis due to these varying factors.

*§ 129.115. Written notification, compliance demonstration and recordkeeping and reporting requirements.*

IRRC and other commentators commented that proposed § 129.115(b)(4) requires owners and operators of combustion units and process heaters to demonstrate compliance on a daily averaging period, which is a significant tightening of the presumptive limits for combustion units and process heaters when compared to the 30-operating day averaging period under § 129.97(g)(1) (RACT II). IRRC noted that commentators commented that presumptive limits cannot be met using a daily average under certain operating conditions, such as the startup of a unit. A commentator requested that the Commonwealth implement more stringent standards and require CEMS on existing emission sources.

The Department evaluated available and relevant continuous emissions monitoring data and determined that certain source categories using a CEMS, including combustion units and process heaters, are capable of meeting the presumptive NO<sub>x</sub> RACT emissions limitations on a daily averaging basis. If an owner or operator of a subject source with a CEMS cannot meet the applicable presumptive RACT emissions limitation using a daily averaging basis, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emissions limitation.

Further, the Department notes that the regulations in §§ 129.96—129.100 (RACT II) established RACT requirements and RACT emission limitations to meet the Commonwealth's RACT obligations under the CAA for the 1997 and 2008 8-hour ozone NAAQS. The 1997 8-hour ozone standard was set at 0.08 ppm and the 2008 8-hour ozone standard was set at 0.075 ppm. The regulations in §§ 129.111—129.115 are designed to achieve and maintain the more stringent 2015 8-hour ozone standard of 0.070 ppm. To meet the Commonwealth's RACT obligations under the CAA for the 2015 8-hour ozone NAAQS, the Department determined that certain source categories should demonstrate compliance with the applicable RACT emissions limitations using a daily averaging period.

RACT implementation regulations and guidance issued by the EPA dictate that the standards and other requirements implemented be both technically and economically feasible. The Department believes that the monitoring, recordkeeping and reporting requirements included in this final-form rulemaking are sufficient to show compliance with the RACT III emissions standards and other requirements. The Board has amended § 129.115(f) from proposed rulemaking to this final-form rulemaking to further clarify that the existing monitoring and recordkeeping and reporting provisions of 25 Pa. Code Chapter 127 apply as well as those provisions as specified in the applicable plan approval or operating permit for the source or facility.

The Department explains that the preliminary analysis of the 2021 ambient air ozone season monitoring data shows that all ozone samplers in this Commonwealth are monitoring attainment of the 2015 8-hour ozone NAAQS except the Bristol sampler in Bucks County and the Philadelphia Air Management Services Northeast Airport sampler in Philadelphia County; all ozone samplers in this Commonwealth are projected to monitor attainment of the 2008 and 1997 8-hour ozone NAAQS. Implementing the daily averaging period is therefore appropriate to assist the Commonwealth in achieving and maintaining the 2015 8-hour ozone NAAQS.

The EPA commented that the RACT III proposed regulations have added language requiring the submission of information by every source subject to RACT that appears to address some of the missing information that caused difficulties for both the Department and the EPA in evaluating RACT II permits. For example, proposed § 129.115, entitled "Written notification, compliance demonstration and recordkeeping and reporting requirements," requires that every source subject to RACT notify the state within 6 months of how it is going to comply with the RACT III requirements, and requires these sources to identify those air contamination sources that are [proposed § 129.115(a)(1)(i)] and those air contamination sources that are not [proposed § 129.115(a)(1)(ii)] subject to §§ 129.112—129.114. Proposed § 129.115(a)(4) also requires information on source description and how the owner or operator shall comply with RACT III or the reason a source is exemption from RACT III requirements.

In response to the EPA's comment, the Board notes that the purpose of this notification provision in § 129.115(a) is for the Department to determine which facilities and sources are subject to RACT III requirements, which sources are exempt from RACT III requirements and if the owners and operators are complying with presumptive or case-by-case requirements. This notification is not meant to be a full RACT analysis.

Before an owner or operator of a facility can begin to construct, modify or operate a source, emissions unit or equipment emitting air contaminants in this Commonwealth, the owner or operator is required to obtain prior written approval from the Department's Air Quality Program as specified in 25 Pa. Code § 127.11 (relating to plan approval requirements). Thus, the Department is already aware of new and modified sources that have occurred since the implementation of RACT II due to this requirement for the owner and operator of the facility to obtain prior written approval from the Air Quality Program. Therefore, it is not necessary that the owner or operator submit this specific information as part of the written notification required by § 129.115(a).

#### *G. Benefits, Costs and Compliance*

##### *Benefits*

The Department estimates that implementation of the final-form control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors and VOC emissions by as much as 825 TPY from engines and turbines. These reductions in NO<sub>x</sub> and VOC emissions will benefit the health and welfare of the approximately 12.8 million residents and numerous animals, crops, vegetation and natural areas of this Commonwealth by reducing the amount of ground-level ozone air pollution. Reduced ambient concentrations of ground-level ozone reduce the incidences of hospital admissions for respiratory ailments, including asthma, and improve the quality of life for citizens overall. While children, the elderly and those with respiratory problems are most at risk, even healthy individuals may experience increased respiratory ailments and other symptoms when they are exposed to high levels of ambient ground-level ozone while engaged in activities that involve physical exertion.

Implementation of and compliance with the presumptive RACT limitations, RACT control measures and RACT requirements in this final-form rulemaking will allow this Commonwealth to make substantial progress in achieving and maintaining the 1997, 2008 and 2015 8-hour ozone NAAQS Statewide by reducing the levels of NO<sub>x</sub> and VOC ozone precursor emissions that contribute to potential nonattainment of the 2015 8-hour ozone NAAQS. As a result, the final-form RACT control measures are reasonably necessary to attain and maintain the health-based and welfare-based 8-hour ozone NAAQS in this Commonwealth and to satisfy related CAA requirements.

The EPA estimated that the monetized health benefits of attaining the 2008 8-hour ozone NAAQS of 0.075 ppm range from \$8.3 billion to \$18 billion on a National basis by 2020. See Regulatory Impact Analysis; Final National Ambient Air Quality Standard for Ozone (EPA, July 2011). Prorating that benefit to this Commonwealth, based on population, results in a public health benefit of \$337 million to \$732 million. Similarly, the EPA estimated that the monetized health benefits of attaining the 2015 8-hour ozone NAAQS of 0.070 ppm range from \$1.5 billion to \$4.5 billion on a National basis by 2025. See Regulatory Impact Analysis of the Final Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone (EPA-452/R-15-007, September 2015). Prorating that benefit to this Commonwealth, based on population, results in a public health benefit of \$63 million to \$189 million. The Department is not stating that these estimated monetized health benefits would all be the result of implementing the final-

form RACT control measures, but the EPA estimates are indicative of the benefits to Commonwealth residents of attaining and maintaining the 1997, 2008 and 2015 8-hour ozone NAAQS through the implementation of control measures to reduce ozone precursor emissions in the aggregate from different source categories.

This final-form rulemaking may create economic opportunities for NO<sub>x</sub> and VOC emission control technology innovators, manufacturers and distributors through an increased demand for new or improved air pollution control equipment. In addition, the owners and operators of regulated facilities may be required to install and operate an emissions monitoring system or equipment necessary for an emissions monitoring method to comply with this final-form rulemaking, thereby creating an economic opportunity for the emissions monitoring industry.

#### *Compliance costs*

Compliance costs will vary for each facility depending on which compliance option is chosen by the owners and operators of a facility. This final-form rulemaking includes two alternative compliance options: a provision allowing the owner and operator of an affected facility that cannot meet the applicable NO<sub>x</sub> RACT or VOC RACT emission limitation to elect to meet the applicable NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation in § 129.112 by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis as specified in final-form § 129.113; and a provision allowing the affected owner and operator to submit a case-specific RACT proposal for an alternative RACT requirement or RACT emission limitation to the Department for approval as specified in final-form § 129.114.

Under final-form § 129.113, the owner or operator of an affected major NO<sub>x</sub> emitting facility that includes an air contamination source subject to a NO<sub>x</sub> RACT requirement or emission limitation in § 129.112 that cannot meet the applicable presumptive NO<sub>x</sub> RACT requirement or NO<sub>x</sub> RACT emission limitation may elect to meet the requirement or emission limitation by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis. System-wide emissions averaging must be among sources under common control of the same owner or operator in this Commonwealth and within the same nonattainment area.

Under final-form § 129.114, the owner or operator of an air contamination source that cannot meet the applicable presumptive RACT requirement or RACT emission limitation of § 129.112 may submit an alternative NO<sub>x</sub> RACT requirement, NO<sub>x</sub> RACT emission limitation, VOC RACT requirement or VOC RACT emission limitation to the Department or approved local air pollution control agency for review.

Further, the Department notes that final-form § 129.114(i) provides owners and operators with the opportunity to submit an analysis, where applicable, demonstrating that RACT II conditions remain RACT for the 2015 8-hour ozone standard. This is an administratively efficient and less resource intensive approach than conducting a full case-by-case analysis for an alternative RACT proposal. For the owners and operators of eligible subject sources, this approach will likely reduce the consulting costs that an owner or operator may choose to incur. Additionally, there is no fee due to the Department to submit an analysis under final-form § 129.114(i).

Under these alternative compliance provisions, the owner or operator is required to demonstrate to the Department's or approved local air pollution control agency's satisfaction that it is economically or technically infeasible to meet the applicable final-form NO<sub>x</sub> RACT or VOC RACT emission limitation. The flexibility provided by these alternative compliance provisions may minimize compliance costs to the owner or operator of an affected facility.

The RACT emission limitations and RACT requirements established in this final-form rulemaking do not require the owner or operator of an affected facility to submit an application for amendments to an existing operating permit. These requirements will be incorporated when the permit is renewed if less than 3 years remain in the permit term, as specified under § 127.463(c) (relating to operating permit revisions to incorporate applicable standards). If 3 years or more remain in the permit term, the requirements will be incorporated as applicable requirements in the permit within 18 months of the date of promulgation of this final-form rulemaking, as required under § 127.463(b). Most importantly, § 127.463(e) specifies that “[r]egardless of whether a revision is required under this section, the permittee shall meet the applicable standards or regulations promulgated under the Clean Air Act within the time frame required by standards or regulations.” Consequently, upon promulgation as a final-form regulation, §§ 129.111—129.115 will apply to affected owners and operators irrespective of a modification to the operating permit. Therefore, the owner or operator shall comply with the applicable standards or regulations within the time frame specified by the final-form regulation even if the permit is not revised to incorporate the standard or regulation within the specified compliance time frame.

#### *Compliance assistance plan*

The Department will continue to educate and assist the public and the regulated community in understanding the requirements and how to comply with them after promulgation of this final-form rulemaking. The Department will also continue to work with the Department's provider of the Small Business Stationary Source Technical and Environmental Compliance Assistance services. These services are currently provided by the Environmental Management Assistance Program (EMAP) of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, section 507 of the CAA (42 U.S.C.A. § 7661f) and as authorized by the Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209).

In addition to providing one-on-one consulting assistance and onsite assessments, EMAP also operates a toll-free phone line to field questions from small businesses, as well as businesses wishing to start up in, or relocate to, this Commonwealth. EMAP operates and maintains a resource-rich environmental assistance web site and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

Due to the implementation date of January 1, 2023 required by the EPA's 2015 ozone standard implementation rule (see 83 FR 62998 (December 6, 2018); see also 40 CFR 51.1316(b)(3)), the Department will be conducting direct outreach to the regulated community well in advance of the

January 1, 2023, implementation date due to the short turnaround time between the expected promulgation date of this final-form rulemaking and the implementation date.

#### *Paperwork requirements*

The recordkeeping and reporting requirements for owners and operators of applicable sources under this final-form rulemaking are minimal because the records required align with the records already required to be kept for emission inventory purposes and for other Federal and State requirements. To minimize the burden of these requirements, the Department allows electronic submission of most planning, reporting and recordkeeping forms required by this final-form rulemaking.

#### *H. Pollution Prevention*

The Pollution Prevention Act of 1990 (42 U.S.C.A. §§ 13101—13109) established a National policy that promotes pollution prevention as the preferred means for achieving state environmental protection goals. The Department encourages pollution prevention, which is the reduction or elimination of pollution at its source, through the installation and operation of add-on air pollution controls, the substitution of environmentally friendly materials, more efficient use of raw materials and the incorporation of energy efficiency strategies. Pollution prevention practices can provide greater environmental protection with greater efficiency because they can result in significant cost savings to facilities that permanently achieve or move beyond compliance. Implementation of the final-form RACT requirements will allow the Department and approved local air pollution control agencies to maintain or further reduce the amounts of NO<sub>x</sub> and VOC emissions from the regulated sources in this Commonwealth, sustain the gains made in healthful air quality by reducing the ambient concentrations of ground-level ozone air pollution formed from the emissions of NO<sub>x</sub> and VOC and ensure continued protection of the environment and the public health and welfare of the citizens of this Commonwealth.

#### *I. Sunset Review*

This Board is not establishing a sunset date for this final-form rulemaking because it is needed for the Department to carry out its statutory authority. If published as a final-form rulemaking in the *Pennsylvania Bulletin*, the Department will closely monitor its effectiveness and recommend updates to the Board as necessary.

#### *J. Regulatory Review*

Under section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on July 14, 2021, the Department submitted a copy of the notice of proposed rulemaking, published at 51 Pa.B. 4333, to IRRC and the Chairpersons of the House and Senate Environmental Resources and Energy Committees.

Under section 5(c) of the Regulatory Review Act, IRRC and the House and Senate Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing this final-form rulemaking, the

Department has considered all comments from IRRC, the House and Senate Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P.S. § 745.5a(j.2)), on DATE, 2022, this final-form rulemaking was deemed approved by the House and Senate Committees. Under section 5.1(c) of the Regulatory Review Act, IRRC met on DATE, 2022, and approved this final-form rulemaking.

*K. Findings of the Board*

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P.L. 769, No. 240) (45 P.S. §§ 1201 and 1202), known as the Commonwealth Documents Law, and regulations promulgated thereunder at 1 Pa. Code §§ 7.1 and 7.2 (relating to notice of proposed rulemaking required; and adoption of regulations).

(2) At least a 60-day public comment period was provided as required by law and all comments were considered.

(3) This final-form rulemaking does not enlarge the purpose of the proposed rulemaking published at 51 Pa.B. 4333.

(4) These regulations are reasonably necessary and appropriate for administration and enforcement of the authorizing acts identified in section C of this order.

(5) These regulations are reasonably necessary to attain and maintain the ozone NAAQS and to satisfy related CAA requirements.

*L. Order of the Board*

The Board, acting under the authorizing statutes, orders that:

(a) The regulations of the Department, 25 Pa. Code Chapters 121 and 129, are amended by amending § 121.1 and adding §§ 129.111—129.115 to read as set forth in Annex A, with ellipses referring to the existing text of the regulations.

(b) The Chairperson of the Board shall submit this final-form regulation to the Office of General Counsel and the Office of Attorney General for review and approval as to legality and form, as required by law.

(c) The Chairperson of the Board shall submit this final-form regulation to IRRC and the House and Senate Committees as required by the Regulatory Review Act (71 P.S. §§ 745.1—745.14).

(d) The Chairperson of the Board shall certify this final-form regulation and deposit it with the Legislative Reference Bureau as required by law.

(e) This final-form regulation will be submitted to the EPA as a revision to the Commonwealth's SIP.

(f) This final-form regulation shall take effect immediately upon publication in the *Pennsylvania Bulletin*.

RAMEZ ZIADEH, P.E.,  
*Acting Chairperson*



**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL  
PROTECTION

**Bureau of Air Quality**

**Additional RACT Requirements for  
Major Sources of NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS**

25 Pa. Code Chapters 121 and 129

51 Pa.B. 4333 (August 7, 2021)

Environmental Quality Board Regulation #7-561  
(Independent Regulatory Review Commission #3310)

**Comment and Response Document**

## **Additional RACT Requirements for Major Sources of NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS**

On August 7, 2021, the Environmental Quality Board (Board or EQB) published a *Pennsylvania Bulletin* notice of public hearing and comment period on a proposed rulemaking to amend Chapters 121 and 129 (relating to general provisions; and standards for sources). See 51 Pa.B. 4333 (August 7, 2021). The Board proposed to amend Chapter 129 by adopting additional presumptive reasonably available control technology (RACT) requirements and RACT emission limitations for certain major stationary sources of oxides of nitrogen (NO<sub>x</sub>) and volatile organic compound (VOC) emissions that commenced operation on or before August 3, 2018, to address the 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS). There are ten existing source categories that would be affected by this proposed rulemaking: combustion units; municipal solid waste landfills; municipal waste combustors (MWCs); process heaters; turbines; stationary internal combustion engines; cement kilns; glass melting furnaces; lime kilns; and direct-fired heaters, furnaces or ovens; as well as other existing source categories that are not regulated elsewhere under Chapter 129. The Board also proposed to amend § 121.1 (relating to definitions) by adding the terms "combustion source" and "natural gas compression and transmission facility fugitive VOC air contamination source" to support the proposed amendments to Chapter 129. The proposed RACT requirements would apply to all sources in this Commonwealth that emit or have a potential to emit (PTE) 100 tons per year (TPY) or more of NO<sub>x</sub> or 50 TPY of VOCs.

This proposed rulemaking was adopted by the Board at its meeting on May 19, 2021. The Board held three public hearings for the purpose of accepting comments on this proposed rulemaking. The hearings were held at 1 p.m. on September 7, September 8 and September 9, 2021. The 67-day public comment period closed on October 12, 2021.

This document summarizes the testimony received at the public hearings and the written comments received during the public comment period. In addition, the comments received from the Independent Regulatory Review Commission (IRRC) and the United States Environmental Protection Agency (EPA) are summarized and responses provided. The Board received comments from 25 individuals and organizations, including letters with multiple attachments. A list of the Commentators, including name and affiliation (if any), can be found in Appendix A.

### **Copies of Comments**

Copies of all comments received by the Board during the public comment period can be viewed on eComment located on the Department's website at <https://www.ahs.dep.pa.gov/eComment/>. Copies of all comments received are also posted on the website of the Independent Regulatory Review Commission (IRRC) at <http://www.irrc.state.pa.us>. Search by Regulation # 7-561 or IRRC # 3310.

### Abbreviations and Acronyms

ACHD	Allegheny County Health Department
APCA	Pennsylvania Air Pollution Control Act (35 P.S. §§ 4001—4015)
BACT	Best Available Control Technology
bhp	Brake horsepower
CAA	Federal Clean Air Act (42 U.S.C.A. §§ 7401—7671q)
CEMS	Continuous Emissions Monitoring System
CSMM	Continuous Source Monitoring Manual
DEP	Pennsylvania Department of Environmental Protection
DLNC	Dry Low NO <sub>x</sub> Combustion
EGU	Electric Generating Unit
EQB	Environmental Quality Board
EPA	United States Environmental Protection Agency
IRRC	Independent Regulatory Review Commission
LDAR	Leak Detection and Repair
MSW	Municipal Solid Waste
MW	Megawatts
MWC	Municipal Waste Combustor
NAAQS	National Ambient Air Quality Standard
NO <sub>x</sub>	Oxides of Nitrogen
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
ppm	Parts per Million
ppmv	Parts per Million Volume
ppmvd	Parts per Million Volume Dry
PTE	Potential to Emit
RACT	Reasonably Available Control Technology
RACT I	25 Pa. Code §§ 129.91—129.95
RACT II	25 Pa. Code §§ 129.96—129.100
RAF	Regulatory Analysis Form
SAS	Stationary and Area Sources Committee
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
TSD	Technical Support Document
VOC	Volatile Organic Compound

#### Comments of the Independent Regulatory Review Commission (IRRC)

IRRC notes that EPA Region III submitted comments on the proposed rulemaking. Since this rulemaking must ultimately be approved by the EPA before it can be incorporated as part of the Commonwealth's SIP, it is important that the Board work with the EPA to ensure that the issues raised by the EPA are adequately addressed in this final-form rulemaking. IRRC asks the Board to review the EPA's concerns and amend the rulemaking or provide further explanation on implementation procedures to ensure compliance with the EPA requirements.

**1. Reasonableness of requirements, implementation procedures and timetables for compliance by the public and private sectors; Possible conflict with or duplication of statutes or existing regulations.**

**Revision to the State Implementation Plan (SIP) and review and approval by the United States Environmental Protection Agency (EPA)**

**1. Comment:** IRRC notes that the EPA stresses two things: that for RACT II case-by-case sources, additional analysis under RACT III is still required, even if no significant changes in control technologies have occurred since RACT II; and that the additional analysis for RACT III must be part of the regulatory record. IRRC asks the Board to review the EPA's concerns and amend the rulemaking or provide further explanation on implementation procedures to ensure compliance with the EPA requirements.

**Response:** The Department appreciates IRRC's concerns regarding the EPA's comments on the need for additional analysis to determine whether the case-by-case determinations made under §§ 129.96—129.100 (RACT II) for the 1997 and 2008 8-hour ozone NAAQS remain RACT for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III). After further discussions with the EPA, the Department has amended § 129.114(i) from the proposed rulemaking to this final-form rulemaking to establish requirements consistent with the EPA's comments for additional analysis to be included in these RACT case-by-case evaluations. The Department believes that the amendments to § 129.114(i) provide the conditions to support those instances where the Department or appropriate approved local air pollution control agency may determine that the previously established RACT II controls and limits remain RACT for the 2015 8-hour ozone NAAQS.

Please see the response to Comment #41 regarding the details of the final-form amendments to § 129.114(i).

**2. Comment:** IRRC notes that the EPA poses questions related to what implementation procedures the Department will follow for public participation and comment on the case-by-case RACT determinations. IRRC asks the Board to review the EPA's concerns and amend the rulemaking or provide further explanation on implementation procedures to ensure compliance with the EPA requirements.

**Response:** The Department appreciates IRRC's concerns regarding what procedures the Department will follow for public participation and comment on the case-by-case RACT determinations. By way of clarification, the Department notes that the EPA asks what process the Department will provide to allow the public to comment upon whether the RACT II requirements and RACT II emission limitations remain RACT for the 2015 8-hour ozone NAAQS.

The Department has amended proposed § 129.114 to add final-form requirements to address the EPA's comments regarding the procedures the Department will follow for the case-by-case RACT determinations. The Department notes that in this final-form rulemaking, proposed § 129.114(j) is re-lettered as § 129.114(l), proposed § 129.114(k) is re-lettered as § 129.114(m),

proposed § 129.114(l) is re-lettered as § 129.114(n); proposed § 129.114(m) is re-lettered as § 129.114(o); and proposed § 129.114(n) is re-lettered as § 129.114(p).

The Department has amended final-form § 129.114(j) to provide that the Department or appropriate approved local air pollution control agency will review the analyses submitted under final-form § 129.114(i), solicit public comment on the analyses and the Department's supporting documentation, prepare a summary of the public comments and responses to the public comments, and, as appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources).

Final-form § 129.114(j) reads as follows:

- (j) The Department or appropriate approved local air pollution control agency will:
  - (1) Review the analyses submitted in accordance with subsection (i).
  - (2) Publish notice in the Pennsylvania Bulletin and newspapers of general circulation for a minimum 30-day public comment period and an opportunity for a public hearing for the analyses submitted under subsection (i) and supporting documentation.
  - (3) Prepare a summary of the public comments received on the analyses and responses to the comments.
  - (4) As appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources).

The public comment steps for the analyses specified in final-form § 129.114(j)(2) and (3) are provided to satisfy the public participation requirements under section 110 of the Clean Air Act (CAA) (42 U.S.C.A. § 7410) and 40 CFR 51.102 (relating to public hearings) for submitting materials to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP under final-form § 129.114(k). If a plan approval or operating permit modification is issued under final-form § 129.114(j)(4), the plan approval or operating permit modification will undergo public comment as part of the issuing process in conformance with 25 Pa. Code Chapter 127. Further, the Department assures IRRC that for analyses demonstrating that RACT II conditions still remain RACT for the 2015 8-hour ozone standard as well as for those case-by case RACT III permits that are new RACT determinations and do not retain prior RACT II conditions as RACT III conditions, the public participation comment process provided for review and comment on the case-by-case RACT III SIP revision submittals and supporting analyses and documentation satisfies the public participation requirements under section 110 of the CAA and 40 CFR 51.102.

Please see the response to Comment #43 for discussion of final-form § 129.114(k) regarding the Department's SIP submittal process for the analyses submitted under final-form § 129.114(i).

**3. Comment:** IRRC notes that the EPA expresses concerns regarding how these RACT II permits will be incorporated into the SIP for purposes of RACT III and implementation of the 2015 8-hour ozone NAAQS. IRRC asks the Board to review the EPA's concerns and amend the rulemaking or provide further explanation on implementation procedures to ensure compliance with the EPA requirements.

**Response:** The Department appreciates IRRC's concerns regarding the EPA's comments on how the previously approved RACT II permits will be incorporated into the SIP for purposes of RACT III and implementation of RACT for the 2015 8-hour ozone NAAQS.

Final-form § 129.114(k) provides that the Department will submit the analyses, supporting documentation and summary of public comments and responses described in final-form § 129.114(j)(2) and (3) as well as the plan approvals and operating permit modifications issued under final-form § 129.114(j)(4) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. These submissions will include all supporting information necessary for the record to demonstrate that the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate local air pollution control agency under § 129.99(e) (relating to alternative RACT proposal and petition for alternative compliance schedule) (RACT II) assures compliance with the provisions in final-form § 129.114(a)—(c) and (e)—(h) (RACT III), that there is no further reduction in the emission limitations or tightening of the restrictions that is technically or economically feasible, and that no change has occurred at the source that would call into question whether the emission limitations in the RACT II permit remain RACT for the 2015 8-hour ozone NAAQS. The supporting documentation will include the applicable RACT II determinations, which will be made available to the public during the public comment period described under final-form § 129.114(j) and incorporated as part of the SIP submittal to the EPA.

As noted in the response to Comment #2, the public comment steps for the analyses specified in final-form § 129.114(j)(2) and (3) are provided to satisfy the public participation requirements under section 110 of the CAA and 40 CFR 51.102 for submitting a revision to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP under final-form § 129.114(k). If a plan approval or operating permit modification is issued under final-form § 129.114(j)(4), the plan approval or operating permit modification will undergo public comment as part of the issuing process in conformance with 25 Pa. Code Chapter 127. Additionally, the Department assures IRRC that for those case-by case RACT III permits that are issued under final-form § 129.114(j)(4), the public participation comment process provided for review and comment on the case-by-case RACT III SIP revision submittals and supporting analyses and documentation will satisfy the public participation requirements under section 110 of the CAA and 40 CFR 51.102.

Please also see the response to Comment #4 for information about compliance dates; the response to Comment #7 for information about averaging plans; and the response to Comment #49 for information about the data required for calculating costs.

**4. Comment:** IRRC notes that the EPA states that any extension of the compliance date beyond the January 1, 2023, deadline is contrary to the EPA's implementing regulations and is not approvable for purposes of RACT. IRRC asks the Board to please identify the legal authority or

guidance which the Department is relying upon for extending the deadline for RACT compliance beyond January 1, 2023.

**Response:** The Department understands IRRC's concern and has amended this final-form rulemaking. The Department requires alternative compliance schedules, averaging plan proposals and case-by-case proposals for alternative RACT requirements and RACT emission limitations to be submitted to the Department or appropriate approved local air pollution control agency before the implementation date of January 1, 2023. Sources otherwise subject to the presumptive RACT limit and other RACT requirements for certain source categories in this final-form rulemaking will have to plan to begin complying with RACT III on the implementation date.

To this end, the Department will be conducting direct outreach to the regulated community well in advance of the January 1, 2023, implementation date due to the short turnaround time between the expected promulgation date of this final-form rulemaking and the implementation date. The Department and the EPA both recognize that while the implementation date of January 1, 2023, is required by the EPA's 2015 8-hour ozone NAAQS implementation rule (40 CFR 51.1316(b)(3)), there are practical timing considerations for the owners and operators of sources that will need to install and operate control technologies in order to satisfy their applicable RACT III requirements. This includes submission of a plan approval from the owner or operator to the Department or appropriate approved local air pollution control agency, public participation and comment on the proposal, and ordering and installing the approved control technology as well as the installation of the new control technology or replacement of the existing control technology.

Therefore, the requirements for alternative compliance schedules in this final-form rulemaking remain. Where an alternative compliance schedule, averaging plan proposal or case-by-case proposal is not submitted by the owner or operator to the Department or appropriate approved local air pollution control agency by December 31, 2022, or the subject owner or operator is not otherwise implementing presumptive RACT III requirements or RACT III emission limitations established for certain source categories on and after the implementation date, the Department will then consider this to be a compliance matter subject to the Department's authority under the Pennsylvania Air Pollution Control Act (APCA) (35 P.S. §§ 4001—4015), to issue notices of violation and conduct enforcement, as appropriate. This is the same as the Department's approach to implementing RACT II, which the EPA approved on May 9, 2019 (84 FR 20274).

**5. Comment:** IRRC notes that the EPA comments that proposed § 129.113(n) appears to be new language added by the Department to alert source owners and operators using an averaging plan that the averaging plan will be submitted to the EPA for approval. This language is probably intended to avoid the issue leading to the conditional approval for averaging plans in RACT II. The EPA asks how will the Department determine whether the emissions from the two sources in the averaging plan are less than the emissions that would be emitted if both sources complied with presumptive RACT? Proposed § 129.113(d) requires that the permit applicant must demonstrate how it will show that emissions from the averaging plan are less than emissions that would be emitted if the sources in the averaging plan complied with their presumptive RACT

limits. The EPA asks if the averaging plan will include terms requiring that this method of demonstrating compliance be part of a permit and enforceable.

**Response:** By way of clarification, while the EPA references in its comment two sources included in the averaging plan, the Department notes that the averaging plan could include more than two sources.

In response to IRRC regarding the EPA's question concerning the determination of whether the emissions from the sources included in the averaging plan are less than the emissions if the sources individually complied with their applicable presumptive RACT emission limitations, the Department requires that the aggregate NO<sub>x</sub> emissions emitted by the air contamination sources included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan be less than or equal to the amount of NO<sub>x</sub> emissions that would be emitted by the group of included sources if each source complied with the applicable NO<sub>x</sub> RACT emission limitation in § 129.112 on a source-specific basis. This demonstration is done on a mass basis consistent with the appropriate averaging period for each presumptive NO<sub>x</sub> emission limitation. The exact calculations may vary somewhat among the averaging plans, so the final-form rulemaking does not specify the precise details in order to preserve flexibility in differing circumstances.

In response to IRRC regarding the EPA's question if the averaging plan will be part of a permit and enforceable, the Department notes that each averaging plan will be reviewed by the Department on a case-by-case basis. The provisions of each averaging plan, including terms and conditions regarding compliance, will be included in a plan approval or operating permit issued by the Department. Those terms and conditions will be submitted to the EPA as a SIP revision. Averaging plans submitted to the appropriate approved local air pollution control agencies will also follow this procedure.

**Ability of the regulated community to comply with the rulemaking and the Commonwealth's obligation to implement its SIP in a timely fashion**

**6. Comment:** IRRC notes that a major concern raised by the regulated community relates to the timing of the finalization of the rulemaking, the effective date of the rulemaking and their ability to comply with the revisions that are being made. These commentators contend that the current schedule associated with this rulemaking will not allow sources sufficient time to assess the impact of the regulation on their operations.

**Response:** In response to IRRC's reiteration of the commentators' concerns, the Department notes that the implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998 (December 6, 2018); see also 40 CFR 51.1316(b)(3). In this final-form rulemaking, the Department requires alternative compliance schedules, averaging plan proposals and case-by-case proposals be submitted to the Department before the implementation date of January 1, 2023. The owners and operators of sources otherwise subject to the presumptive RACT emission limitation and other RACT requirements for certain source categories established in this final-form rulemaking will have to plan to begin complying with RACT III on the implementation date.

To this end and as discussed at the April 7, 2022, Air Quality Technical Advisory Committee meeting, the Department will be conducting direct outreach to the regulated community well in advance of the January 1, 2023, implementation date due to the short turnaround time between the promulgation of this final-form rulemaking and the implementation date. The Department and the EPA both recognize that while the implementation date of January 1, 2023, is required by the EPA's 2015 ozone NAAQS implementation rule, there are practical timing considerations for the owners and operators of sources that will need to install and operate control technologies in order to satisfy their applicable RACT III requirements. This includes submission of a plan approval from the owner or operator to the Department, public participation, ordering and installing the approved control technology as well as the installation of the new control technology or replacement of the existing control technology.

In those instances when an alternative compliance schedule, averaging plan proposal or case-by-case proposal is not submitted by the owner or operator to the Department by December 31, 2022, or the subject owner or operator is not otherwise implementing presumptive RACT III requirements or RACT III emission limitations established for certain source categories on and after the implementation date, the Department will then consider this to be a compliance matter subject to the Department's authority under the APCA to issue notices of violation and conduct enforcement, as appropriate. This approach is the same as the Department's approach to implementing RACT II, which the EPA approved on May 9, 2019 (84 FR 20274).

Please also see the responses to Comments #4, #43, #64, #120.

**7. Comment:** In addition to the concerns raised in Comment #6, IRRC further notes that some industry commentators, whose operations make it difficult to shut down to install control technologies, believe that they will have difficulty meeting the stricter requirements.

**Response:** By way of explanation, the Department notes that some commentators request that the final RACT III rulemaking contain language that affords the Department significant discretion with respect to alternative compliance schedules, in particular to industries whose operations make it difficult to shut down in order to install additional controls.

In response to IRRC, the Department acknowledges the commentators' concern, however, the implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998; see also 40 CFR 51.1316(b)(3).

Please also see the Department response to Comments #4 and #6 for more detail on how the Department will assist the affected industries with implementation of the requirements of this final-form rulemaking.

**8. Comment:** IRRC notes that while some of the commentators have offered alternative schedules for compliance, IRRC reiterates that in the summary of comments submitted by the EPA, any compliance date beyond January 1, 2023, would not be in compliance with the EPA regulations.

**Response:** Please see the responses to Comments #4, #6, and #65.

**9. Comment:** IRRC asks the Board to review the concerns of the regulated community related to timely compliance and the unique nature of their operations, in conjunction with the EPA requirements for the Commonwealth's SIP and, if possible, provide regulatory flexibility for these organizations. Regardless of any flexibility that may or may not be possible, IRRC urges the Board and the Department to continue to do the work they have been doing to educate the affected industries on what will be expected of them once this rulemaking is finalized.

**Response:** Please see the responses to Comments #4 and #6.

**2. Direct and indirect costs to the Commonwealth, its political subdivisions and to the private sector; The nature and estimated costs of legal, consulting or accounting services which the public or private sector may incur.**

**10. Comment:** First, IRRC notes that comments submitted by the regulated community suggest that the fiscal analysis in the Regulatory Analysis Form (RAF) underestimates the cost of compliance with the rulemaking. For example, it is noted that the RAF does not include an estimate for sources that will need to spend time and resources on legal and technical advisory services to comply with presumptive limits or a case-by-case demonstration.

**Response:** In response to IRRC, the Department believes that \$4,000 to \$6,000 is a reasonable estimate that covers the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal, as well as application fees. The estimated cost does not include any legal or consultation fees that a company may choose to incur. The cost range provided by the commentator of \$4.4 to \$8.8 million is based on the assumption that 250—500 facilities will require alternative compliance provisions. The Department believes this to be an overestimation as the owners and operators of fewer than 200 facilities submitted either averaging plans or case-by-case proposals under RACT II. The Department anticipates that the number of facilities for which an averaging plan or case-by-case proposal will be submitted under RACT III will likely be fewer than 200.

Regarding the nature and estimated costs of legal, consulting or accounting services which may be incurred by the public or private sector, the Department has addressed this issue in response to Question 19 of the RAF for the final-form rulemaking. Specifically, the Department explains that “[n]o new legal, accounting or consulting procedures are anticipated.” The Department anticipates that most, if not nearly all, owners and operators of sources that elect to submit a case-by-case RACT application will rely on the analysis they performed for RACT II (§§ 129.96—129.100). This means that the majority of the accounting, legal and consulting costs have already been incurred. Based on the estimated number of source owners and operators that will be relying on services and analysis already performed as part of RACT II, the Department believes the associated costs will be 80% to 90% less than those incurred in RACT II.

Further, the Department notes that final-form § 129.114(i) provides owners and operators with the opportunity to submit an analysis, where applicable, demonstrating that RACT II conditions remain RACT for the 2015 8-hour ozone standard. This is an administratively efficient and less resource intensive approach than conducting a full case-by-case analysis for an alternative RACT

proposal. For the owners and operators of eligible subject sources, this approach will likely reduce the consulting costs that an owner or operator would otherwise incur. Additionally, there is no fee due to the Department to submit an analysis under final-form § 129.114(i).

**11. Comment:** IRRC further notes that the commentators also contend that the RAF and the Technical Support Document (TSD) submitted with the rulemaking underestimate the number of facilities that will have to install additional RACT and fail to account for the cost of new equipment that will be required to meet the new limits imposed by the rulemaking. IRRC requests that the Board provide additional documentation and reasoning to justify the \$25 million number or revise this estimate accordingly and include these cost estimates in Section F of the preamble to the final-form rulemaking. The Board has only provided the estimated benefit dollars in the preamble and not the reasoning.

**Response:** In response to IRRC, the Department determined that the owners and operators of approximately 115 engines and turbines would likely be required to install add-on control technology to meet the presumptive NO<sub>x</sub> RACT III emission limitations. Since the publication of the proposed rulemaking, the Department has updated the estimates to reflect that implementation of the final-form control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors. The value of \$25,000,000 has been updated to approximately \$36.7 million per year and was derived from multiplying the estimated 9,800 TPY of NO<sub>x</sub> emission reductions by the \$3,750 per ton of NO<sub>x</sub> emissions reduced threshold.

Please also see the response to Comment #54.

**12. Comment:** IRRC notes that commentators state that lower presumptive emissions required by the rulemaking will necessitate case-by-case alternative RACT limits and compliance schedules that the Department will have to review and approve. However, the cost to the Department associated with the additional petitions has not been quantified in the RAF.

**Response:** The Department does not anticipate that it will incur significant additional costs from the implementation of this final-form rulemaking. Department staff will be working to review and process alternative compliance schedules, NO<sub>x</sub> averaging plans and case-by-case proposals as was done for RACT II. As described in the Department response to Comment #10, the Department has provided an administratively efficient and less resource intensive process under final-form § 129.114(i) that it anticipates will be used by some subject owners and operators to demonstrate that their RACT II conditions remain RACT for the 2015 ozone standard. While this process in final-form § 129.114(i)—(k) is anticipated to provide cost savings to the regulated community, the Department will be handling the publication of the newspaper notices for this process and, therefore, will incur costs for the publication of the required newspaper notices. Accordingly, the Department has revised the RAF to reflect an estimate of these costs to the Department.

**13. Comment:** IRRC notes that the RAF quantifies the expected reduction of NO<sub>x</sub> emissions at approximately 9,000 tons per year (TPY) from engines, turbines and municipal waste combustors (MWCs), but a quantification of the amount of expected VOC emission reductions

was not provided in the RAF. IRRC asks the Board to quantify the expected reduction of VOC emissions from this rulemaking. IRRC also asks the Board to quantify the costs of meeting the lower VOC standards.

**Response:** The Department estimates the expected amount of VOC emission reductions to be approximately 825 TPY. The Department does not anticipate any additional costs to the regulated industry to meet the lower VOC standards contained in this final-form rulemaking. Optimization of existing VOC controls should be sufficient to meet the VOC standards in this final-form rulemaking. Additionally, due to changes made from proposed to this final-form rulemaking, the Department estimates NO<sub>x</sub> emission reductions from engines, turbines and MWCs to be approximately 9,800 TPY. The RAF for this final-form rulemaking has been revised accordingly.

**14. Comment:** IRRC notes that Question #23 of the RAF states that the total estimated cost to the regulated community will be \$38,500,000 for the last half of fiscal year 2022-2023 and then \$77,000,000 per year thereafter. It is IRRC's understanding that these estimated costs were based on an earlier draft of this proposed rulemaking and the actual cost estimates are lower and properly calculated under Question #19 of the RAF. IRRC requests that Question #23 of the RAF be updated.

**Response:** IRRC's understanding is correct. The Department has estimated the total cost to the regulated community to be approximately \$36.7 million per year. The responses to Questions #19 and #23 in the RAF for this final-form rulemaking have been revised accordingly.

**3. Glass melting furnaces. – Possible conflict with or duplication of statutes or existing regulations; Need; Reasonableness; Fiscal impact; Implementation procedures.**

**15. Comment:** IRRC notes that a commentator who operates a flat glass plant has submitted comments stating that this rulemaking should not impose presumptive RACT limits on their operation because their business is currently subject to comprehensive, industry-specific regulations for glass melting furnaces found at §§ 129.301—129.310 (relating to control of NO<sub>x</sub> emissions from glass melting furnaces). This commentator contends that glass melting furnaces were not subject to RACT II and the Preamble to this rulemaking offers no explanation why limits are now being imposed.

**Response:** In response to IRRC, the Department explains that each time the EPA revises a NAAQS under section 109 of the CAA, the Commonwealth is required to meet the applicable RACT obligations for covered sources under sections 182 and 184 of the CAA (42 U.S.C.A. §§ 7511a and 7511c). The EPA's implementing rules for the 1997, 2008 and 2015 8-hour ozone NAAQS further provide that State SIPs implementing the 8-hour standard must assure that RACT is met for that 8-hour standard, either through a certification that previously required RACT controls implemented for a previous 8-hour standard represent RACT for the new 8-hour ozone standard or through a new RACT determination. See 70 FR 71612, 71652 (November 29, 2005), 80 FR 12264, 12280 (March 6, 2015) and 83 FR 62998, 63002 (December 6, 2018). The EPA has expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for

the 1997 and 2008 8-hour ozone NAAQS for purposes of the Commonwealth's RACT SIP Certification for the 1997 and 2008 8-hour ozone NAAQS.

Although the glass melting furnace industry is regulated under §§ 129.301—129.310, the EPA did not expressly approve these regulations as RACT for the glass melting furnaces for purposes of the 1997 and 2008 8-hour ozone NAAQS in its approval of the SIP revision at 76 FR 34021—34023 (August 22, 2011). The EPA does not consider these regulations RACT for glass melting furnaces due to the inclusion of start-up, shutdown and malfunction (SSM) exceptions, which are not allowable exceptions for the purposes of satisfying RACT under section 110(a)(2)(A) of the CAA (42 U.S.C.A. § 7410(a)(2)(A)). RACT requires that an emissions limitation or requirement applies continuously at all times the source is operating with no exceptions for noncomplying emissions.

Consequently, the Department determined that certain provisions, including § 129.303(a) in the existing glass melting furnace regulations, preclude §§ 129.301—129.310 from meeting the presumptive NO<sub>x</sub> RACT standards in § 129.112(i) for the 2015 8-hour ozone NAAQS. The NO<sub>x</sub> RACT emission limitations and requirements being implemented for the 2015 ozone NAAQS are at least as stringent as the NO<sub>x</sub> RACT emission limitations and requirements for the 1979, 1997 and 2008 ozone NAAQS. To the extent that a prior RACT emission limitation or requirement established for the 1979, 1997 or 2008 ozone NAAQS is more stringent, the owner and operator of the affected source shall comply with the more stringent emission limitation or requirement.

Under this final-form rulemaking, the owner or operator of a glass melting furnace source that cannot meet the presumptive NO<sub>x</sub> RACT limit in § 129.112(i) may opt to submit a case-by-case proposal under § 129.114 of what the owner or operator considers RACT for its source for the 2015 8-hour ozone NAAQS.

The EPA has also expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for the 1997 and 2008 8-hour ozone NAAQS for purposes of the Commonwealth's RACT SIP Certification for the 1997 and 2008 8-hour ozone NAAQS. The EPA RACT SIP certification requirements are implemented in 70 FR 71612, 80 FR 12264 and 83 FR 62998. Final-form § 129.112(m) has been amended to reflect that the requirements and emission limitations for glass melting furnaces in § 129.112(i) would supersede existing requirements under §§ 129.301—129.310 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent. If an owner or operator cannot meet a presumptive RACT emission limit established under § 129.112(i), the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation. To the extent that there is a conflict between § 129.112(i) and §§ 129.301—129.310, the owner or operator shall comply with the more stringent applicable standard to satisfy RACT for the 2015 8-hour ozone NAAQS.

Once the Commonwealth submits the final-form regulations to the EPA as a revision to the Commonwealth's SIP, and receives approval from the EPA that these final-form regulations are RACT for the 2015 8-hour ozone NAAQS, the Commonwealth will be able to complete its required RACT certification SIP submittals. Certification by the EPA of § 129.112(i) as RACT

for glass melting furnaces for the 2015 8-hour ozone NAAQS will be presumed to certify RACT for glass melting furnaces for the 1997 and 2008 8-hour ozone NAAQS.

The Department disagrees with the commentator's assertion that glass melting furnaces are the only source category subject to presumptive RACT III requirements that are also subject to other source category specific regulations. For example, Portland cement kilns, which are regulated under 25 Pa. Code §§ 145.141—145.146 (relating to emissions of NO<sub>x</sub> from cement manufacturing), have presumptive NO<sub>x</sub> RACT III requirements established in § 129.112(h).

Please also see the responses to Comments #91, #92 and #93.

**16. Comment:** IRRC notes that the same commentator referenced in comment #15 states that the regulatory requirements for their operation imposed under this rulemaking will conflict with the existing regulations. If their operation will be subject this rulemaking, they request that operational flexibility regarding start-up, shutdown and idling of their furnaces currently provided in existing regulations be added to this proposal.

**Response:** In response to IRRC, the Department determined that the existing glass melting furnace regulations at §§ 129.301—129.310 do not meet the presumptive RACT requirements contained in this final-form rulemaking. Sections 129.301—129.310 were approved by the EPA as a revision to the Commonwealth's SIP at 76 FR 34021-34023 (August 22, 2011), but the EPA did not approve the regulations as RACT in its approval of the SIP revision due to the inclusion of start-up, shutdown and malfunction (SSM) exceptions, which are not allowable exceptions for the purposes of satisfying RACT under section 110(a)(2)(A) of the CAA (42 U.S.C.A. § 7410(a)(2)(A)).

The EPA has also expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for the 1997 and 2008 8-hour ozone NAAQS. Final-form § 129.112(m) has been amended to reflect that the requirements and emission limitations for glass melting furnaces in § 129.112(i) would supersede existing requirements under §§ 129.301—129.310 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent. If an owner or operator cannot meet a presumptive RACT emission limit established under § 129.112(i), the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation. To the extent that there is a conflict between § 129.112(i) and §§ 129.301—129.310, the owner or operator shall comply with the more stringent applicable standard to satisfy RACT for the 2015 8-hour ozone NAAQS.

Certification by the EPA of § 129.112(i) as RACT for glass melting furnaces for the 2015 8-hour ozone NAAQS will be presumed to certify RACT for glass melting furnaces for the 1997 and 2008 8-hour ozone NAAQS.

Please also see the Department responses to Comments #91 and #93.

**17. Comment:** IRRC notes that this commentator also requests additional time for compliance with the rulemaking.

**Response:** By way of explanation, the Department notes that the commentator requests that the Department provide more appropriate time frames for installation of controls if glass melting furnaces are included in RACT III. Flat glass furnaces are designed to run continuously. Once the furnace cools, the refractory is damaged and the furnace needs to be rebuilt before it can be placed back in operation. The RACT III rulemaking presents a significant concern to the commentator because the installation of control technology to reduce NO<sub>x</sub> emissions will require any affected furnace to be shut down to install the controls. The commentator states that the proposed rulemaking includes submitting a petition and limit by the 3-year maximum time frame which makes the RACT III proposal unreasonable and unduly burdensome. The commentator requests a longer time frame to install the control.

In response to IRRC, the Department notes that the implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. Please see the response to Comment #6 for more detail on how the Department will assist the affected industries with implementation of the requirements of this final-form rulemaking.

**18. Comment:** IRRC notes that the commentator disagrees with the cost estimates provided for their operation in the TSD.

**Response:** In response to IRRC, the Department notes that the EPA Control Cost Manual is an accepted source for the determination of economic feasibility for NO<sub>x</sub> control technologies. These determinations of economic feasibility are not dependent on the source type. In this case, presumptive RACT is established as a NO<sub>x</sub> emission limitation and does not mandate an emission control strategy. For example, oxy-firing can be used to meet presumptive NO<sub>x</sub> RACT emission limitations without the necessity to install particulate emission control technology.

The Department evaluated cost information provided by the commentator, which also relied in part on the EPA Control Cost Manual. The Department also reviewed the analysis for various emission control scenarios submitted by the commentator for the regional haze four-factor analysis. The Department determined that based on the information provided, the control devices included in the analysis are cost-effective as RACT for the control of NO<sub>x</sub> emissions from glass melting furnaces. If an owner or operator cannot meet a presumptive RACT emission limit, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

Please also see the Department responses to Comments #15 and #16 for discussion about how the existing glass melting furnace regulations at §§ 129.301—129.310 do not meet presumptive RACT requirements for the 2015 8-hour ozone NAAQS.

**4. Protection of the public health, safety and welfare and the effect on this Commonwealth's natural resources.**

**19. Comment:** IRRC notes that comments from an environmental advocacy organization state that this rulemaking is overdue and urge its final adoption as soon as possible.

**Response:** In response to IRRC, the Department acknowledges the comment. The Department has worked diligently to finalize this comprehensive rulemaking as quickly as possible.

**20. Comment:** IRRC notes that the comments also suggest stricter emissions limits for certain types of sources, such as steel producing facilities.

**Response:** In response to IRRC, the Department has determined that due to the nature and complexity of certain sources, such as steel mills and coke ovens, it is not appropriate to establish presumptive RACT requirements or RACT emission limitations. See 44 FR 53761, 53762 and 53763 (September 17, 1979); see also 57 FR 18070, 18073 and 18074 (April 28, 1992). Owners and operators of sources with no presumptive RACT requirements or RACT emission limitations are required to submit a case-by-case proposal for an alternative RACT requirement or RACT emission limitation (alternative RACT proposal). If the facility is located in Allegheny County, the alternative RACT proposal is submitted to and reviewed by the Allegheny County Health Department (ACHD).

Please note that case-by-case proposals for alternative RACT requirements or RACT emission limitations submitted to ACHD must be submitted by the Department to the EPA as a SIP revision. These proposals must meet the same requirements and undergo the same SIP review process as alternative RACT proposals submitted to the Department. Additionally, the Department provides support to ACHD during the review of alternative RACT proposals.

**21. Comment:** IRRC notes that the comments also suggest stricter emissions limits for certain types of sources, such as coal-fired power plants.

**Response:** By way of explanation, the Department notes that the EPA commented that because there is no presumptive RACT for large coal-fired electric generating units (EGUs) with selective catalytic reduction (SCR) controls in § 129.112, § 129.114(a) would not seem to allow those sources to request a case-by-case RACT determination under the RACT III requirements. When informing the public about the proposed case-by-case RACT II permits for coal-fired EGUs with SCRs, the Department plans to be clear that it intends to use the same limits to satisfy RACT for the 2015 ozone NAAQS, and that the RACT II comment period will be the last opportunity to comment on whether the RACT II limits also meet the RACT III requirements.

In response to IRRC, the Department explains that a coal-fired combustion unit with a rated heat input greater than 250 million Btu/hour, including an EGU with SCR, has no presumptive NO<sub>x</sub> RACT requirement or emission limitation specified in § 129.112. Therefore, § 129.114(a) is not applicable. Owners and operators of these large coal-fired combustion units are required to propose a NO<sub>x</sub> RACT requirement or RACT emission limitation under § 129.114(b).

The owners and operators of large coal-fired combustion units that are EGUs equipped with SCR were required to submit an alternative NO<sub>x</sub> RACT proposal to satisfy the requirement of § 129.99. Therefore, these owners and operators may submit an analysis under § 129.114(i) to demonstrate that their limitations issued under §§ 129.96—129.100 (RACT II) remain RACT for §§ 129.111—129.115. Analyses submitted under § 129.114(i) will be subject to public comment

to meet the SIP public participation requirements under section 110 of the CAA and 40 CFR 51.102.

Because of operating parameter variability and other plant-specific characteristics of large coal-fired combustion units, the Department concludes that a case-by-case approach for NO<sub>x</sub> RACT is more appropriate than setting a presumptive NO<sub>x</sub> RACT emission limitation for all large coal-fired combustion units. Case-by-case RACT determinations include a top-down analysis. The Department will review the proposed case-by-case determinations and incorporate the final determinations and associated conditions into the facility's Title V operating permit upon consideration of public comments. The RACT determinations incorporated into the Title V operating permit will then be submitted to the EPA as part of the SIP revision. A coal-fired combustion unit with a rated heat input equal to or greater than 250 million Btu/hour that is not a circulating fluidized bed coal-fired combustion unit is currently required to submit an alternative RACT proposal under § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule).

**22. Comment:** IRRC notes that the comments also suggest stricter emissions limits for certain types of sources, such as municipal waste combustors. If any of the recommendations are adopted, the EQB should quantify the fiscal impact associated with the more stringent requirements and include that information in the RAF. If the recommendations are adopted, the EQB should educate affected sources about the changes as soon as possible to assist with compliance obligations.

**Response:** In response to IRRC, the Department explains that proposed § 129.112(f) has been amended in this final-form rulemaking from 150 ppmvd NO<sub>x</sub> @ 7% oxygen to 110 ppmvd NO<sub>x</sub> @ 7% oxygen. The supporting analysis for establishing this presumptive NO<sub>x</sub> RACT limitation can be found in Section IV(E) of the TSD for this final-form rulemaking. The fiscal impact is addressed in the response to Question 19 of the RAF. The Department has conducted direct outreach to owners and operators of municipal waste combustors to apprise them of this change.

**23. Comment:** IRRC notes that the comments also call for greater protection for an environmental justice community in Chester County.

**Response:** By way of clarification, the Department notes that a commentator requests that a limit be set for the Delaware Valley Resource Recovery Facility that requires the installation and effective operation of NO<sub>x</sub> controls at that facility, which currently has no pollution control technology for NO<sub>x</sub>. The commentator further requests that the limit should be based on the most effective control technology possible and, at minimum, Covanta should be required to conduct a study assessing the most effective NO<sub>x</sub> controls that can be installed on the plant.

In response to IRRC and the commentator, the Department notes that the Delaware Valley Resource Recovery Facility shall comply with the final-form presumptive RACT emission limitation for MWCs of 110 ppmvd NO<sub>x</sub> @ 7% oxygen. To meet a presumptive NO<sub>x</sub> RACT emission limit of 110 ppmvd NO<sub>x</sub> @ 7% oxygen, the installation and operation of add-on NO<sub>x</sub> emission control technology may be required.

Please also see the response to Comment #72.

**5. Section 129.111. Applicability. – Clarity; Implementation procedures.**

**24. Comment:** First, IRRC notes that under § 129.111(a), several commentators believe the phrase, “that were in existence on or before August 3, 2018,” as it relates to major emitting facilities, is vague. Would this standard apply to a facility that was built, but not yet operating as of that date? IRRC recommends this subsection be clarified in the final-form regulation.

**Response:** In response to IRRC, the Department appreciates the commentators’ concern and has amended this final-form rulemaking to provide clarity. The Department amends § 129.111(a) and (b) from the proposed to this final-form rulemaking to delete the words “in existence” and add the words “commenced operation.” While the Department does not define the term “commenced operation” in § 121.1, the words “commenced operation” are used in the definition of the term “new source” and also widely used in plan approvals issued by the Department’s Air Quality Program. The final-form language for § 129.111(a) and (a)(1)—(2) reads as follows (*italics emphasize certain changes from proposed to final-form language*):

§ 129.111. Applicability.

(a) Except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major NO<sub>x</sub> emitting facility *that commenced operation on or before August 3, 2018*, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major VOC emitting facility *that commenced operation on or before August 3, 2018*, for which a requirement or emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107. The owner or operator shall identify and list the sources and facilities *subject to this subsection* in the written notification required under § 129.115(a) (relating to written notification, compliance demonstration and recordkeeping and reporting requirements) *as follows*:

(1) The sources and facilities *that commenced operation on or before August 3, 2018*, for which a requirement or emission limitation has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

(2) The sources and facilities *that commenced operation on or before August 3, 2018*, and are subject to §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

The final-form language for § 129.111(b) and (b)(1)—(2) reads as follows (*italics emphasize certain changes from proposed to final-form language*):

(b) Except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a NO<sub>x</sub> emitting facility *that commenced operation on or before August 3, 2018*, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a VOC emitting facility *that commenced operation on or before August 3, 2018*, when the installation and operation of a new source *after August 3, 2018*, or a modification or change in operation *after August 3, 2018*, of a source *that commenced operation on or before August 3, 2018*, results in the source or facility meeting the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility and for which a requirement or an emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107. The owner or operator shall identify and list the sources and facilities *subject to this subsection* in the written notification required under § 129.115(a) *as follows*:

(1) The sources and facilities for which a requirement or emission limitation has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

(2) The sources and facilities subject to §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

The final-form language for § 129.111(d) reads as follows (*italics emphasize certain changes from proposed to final-form language*):

(d) *Except as specified in subsection (c)*, this section and §§ 129.112—129.115 do not apply to the owner and operator of a facility *that commenced operation on or before August 3, 2018*, that is not a major NO<sub>x</sub> emitting facility or a major VOC emitting facility on or before *December 31, 2022*.

The final-form language for § 129.111(e) reads as follows (*italics emphasize certain changes from proposed to final-form language*):

(e) *If the owner and operator of a facility that complied with subsection (d) meets the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility after December 31, 2022, the owner and operator shall comply with subsection (b)*.

Please see the response to Comment #45 for additional discussion of the applicability section.

**25. Comment:** Second, IRRC notes that § 129.111(c) provides exemptions for facilities that have the potential to emit less than a certain amount of NO<sub>x</sub> or VOCs. A commentator states that an owner or operator that originally determined that a source is exempt may later determine that the source is not exempt. For this reason, the commentator suggests that the final rulemaking

include provisions that provide compliance date obligations for these sources under this particular circumstance. IRRC asks the Board to explain in the Preamble to this final-form rulemaking how this provision will be implemented under the scenario described above, and if appropriate, amend the final rulemaking accordingly.

**Response:** In response to IRRC, the Department explains that the source exemptions listed in § 129.111(c) are based on potential emissions or potential to emit (PTE). A source that qualifies for an exemption under § 129.111(c) either does not have the physical capability to emit 1 TPY or more of VOCs or NO<sub>x</sub> or has a legal restriction that prohibits it from emitting 1 TPY or more of NO<sub>x</sub> or VOCs. A change that would allow the source to emit 1 TPY or more of VOCs or NO<sub>x</sub> would be a modification subject to BAT requirements. A modification that occurs after December 31, 2022, would not be subject to the RACT requirements and RACT emission limitations of §§ 129.112—129.115 except as specified in § 129.111(e).

The Department notes, however, that this modification may become subject to future RACT requirements or RACT emission limitations, or both, that are implemented to address a future ground-level ozone NAAQS or revision to an existing ground-level ozone NAAQS. These owners and operators would be evaluated for RACT applicability at that time.

Please see the responses to Comments #45 and #60 for additional discussion of the applicability section.

Please also see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.111. *Applicability*.

**6. Section 129.112. Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule. – Clarity; Reasonableness; Whether the regulation is supported by acceptable data.**

**26. Comment:** IRRC’s first concern is with § 129.112(c)(8). IRRC notes that a commentator has suggested that “flare” be added to the list of equipment that must be installed, operated and maintained in accordance with the manufacturer’s specifications and with good operating practices. The commentator asserts that this piece of equipment is subject to presumptive RACT. If the addition of “flare” to this subsection improves the clarity of this provision, IRRC suggests that it be added to the final-form rulemaking.

**Response:** In response to IRRC, the Department agrees with the commentator. Final-form § 129.112(c)(8) is amended to add the word “flare” as follows (*italics emphasize certain changes from proposed to final-form language*):

(c) The owner and operator of a source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall install, maintain and operate the source in accordance with the manufacturer’s specifications and with good operating practices:

(8) An incinerator, thermal oxidizer, catalytic oxidizer *or flare* used primarily for air pollution control.

**27. Comment:** IRRC's second concern under § 129.112 is with § 129.112(g)(2)(iii)(A). IRRC notes that the specified standard of 85 ppmvd NO<sub>x</sub> as a presumptive RACT emission limitation is questioned by a commentator that believes that existing technology does not allow for this level of compliance. The commentator believes this standard will result in numerous alternative RACT submittals. IRRC asks the Board to explain the rationale for this standard in the Preamble to this final-form rulemaking.

**Response:** In response to IRRC, the Department notes that proposed § 129.112(g)(2)(iii) is renumbered in this final-form rulemaking to § 129.112(g)(2)(iv). The emission limit of concern is now renumbered to § 129.112(g)(2)(iv)(A). During its review of the public comment, the Department analyzed additional information provided by a turbine manufacturer as well as additional stack test data. The Department determined that the commentator is correct that existing control technology on the subject turbines does not allow for installation of additional control technology and, therefore, the NO<sub>x</sub> emissions from the subject turbines cannot be controlled to the proposed limitation of 85 ppmvd NO<sub>x</sub> @ 15% oxygen. The presumptive standard in § 129.112(g)(2)(iv)(A) is amended in this final-form rulemaking to 120 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

**28. Comment:** IRRC's third concern under § 129.112 is with § 129.112(g)(1)(vi)(A) and (B). IRRC notes that commentators have stated that the standards established for bituminous waste, such as gob, and anthracite waste, such as culm, are appropriate when measured as a 30-day rolling average. However, measuring those standards against an operating day compared to a 30-day rolling average is inappropriate because of the way in which combustion units using gob and culm as a fuel source operate. IRRC asks the Board to explain in the Preamble to this final-form rulemaking the rationale for measuring emission limits for an operating day as required under § 129.112(g)(1)(viii), instead of a 30-day rolling average.

**Response:** In response to IRRC, the Department provides that presumptive RACT requirements apply at all times, including start-up, shutdown, and low load operation. Based on existing data, the Department determined that the majority of circulating fluidized bed (CFB) boilers firing waste coal are capable of meeting the proposed RACT III presumptive NO<sub>x</sub> emission limitation during periods of start-up, shutdown, and low load operation. If an owner or operator cannot meet the applicable presumptive RACT emission limitation, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation. Please see Section IV(F) of the TSD for this final-form rulemaking.

Please also see the response to Comment #93 regarding the EPA's SSM Policy.

Please also see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.112. *Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule, Subsection (g)(1)—Combustion Units or Process Heaters.*

**29. Comment:** Fourth, IRRC notes that a commentator has questioned how the owner or operator of a unit firing multiple fuels can comply with the requirements of § 129.112(g)(4) if beneficially reused process gases are used as fuels. IRRC asks the Board to explain in the Preamble to this final-form rulemaking how this provision will be implemented under this scenario.

**Response:** By way of clarification, the Department explains that the commentator states that for sources that are multi-fuel firing units that are not clearly addressed in § 129.112(g)(4) by not having a presumptive emission limit, the calculation in § 129.112(g)(4) should be able to be used. Example fuels are Blast Furnace Gas and Coke Oven Gas which are cleaned process byproduct fuels that are beneficially reused.

In response to IRRC, the Department did not have sufficient data to determine a presumptive NO<sub>x</sub> RACT emission limitation for the process byproduct fuels listed by the commentator. The owner or operator of a source firing a fuel not covered under the presumptive RACT emission limitations is required to submit a case-by-case proposal for an alternative RACT emission limitation in accordance with § 129.114(b) or § 129.114(c). The owner or operator may propose a method of compliance similar to the calculation in § 129.112(g)(4)(i) as part of the case-by-case RACT proposal.

Please see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.112. *Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule, Subsection (g)(4)—Combustion Unit or Process Heater Firing Multiple Fuels.*

**30. Comment:** IRRC notes that the commentator cited in Comment #29 also suggests that as an alternative to broadening § 129.112(g)(4) to include beneficially reused process gases, § 129.112(k) could be revised to incorporate a multi-fuel fired unit approach.

**Response:** In response to IRRC, as noted in the response to Comment #29, the Department did not have sufficient data to determine a presumptive NO<sub>x</sub> RACT emission limitation for the process byproduct fuels listed by the commentator. Section 129.112(k) establishes the presumptive RACT emission limitation of 0.10 lb NO<sub>x</sub>/million Btu heat input for the owner and operator of a direct-fired heater, furnace, oven or other combustion source with a rated heat input equal to or greater than 20 million Btu/hour subject to § 129.111. If an owner or operator of a subject source firing process byproduct fuels cannot meet the applicable limit in § 129.112(k), the owner or operator is required to submit a case-by-case proposal for an alternative RACT emission limitation in accordance with § 129.114(b) or § 129.114(c). The owner or operator may propose a method of compliance similar to the calculation in § 129.112(g)(4)(i) as part of the case-by-case RACT proposal submitted under § 129.114(b) or § 129.114(c).

**31. Comment:** Finally, under § 129.112(k), IRRC notes that a commentator states that the rulemaking applies the same NO<sub>x</sub> limit for a direct-fired heater, furnace, or oven as the limit for indirect-fired furnaces established under RACT II. The commentator asks for clarification on the basis for this decision. IRRC asks the Board to include the rationale for this standard in the supporting documents and Preamble submitted with the final-form rulemaking.

**Response:** In response to IRRC, the Department provides that presumptive RACT emission limitations were not established in RACT II for direct-fired units. Under RACT II, owners and operators of direct-fired units were required to submit a case-by-case proposal for an alternative RACT emission limitation. The addition of presumptive NO<sub>x</sub> RACT limitations for direct-fired units in the RACT III rulemaking gives owners and operators more flexibility to comply with RACT requirements and RACT emission limitations. If an owner or operator cannot meet the applicable presumptive RACT emission limitation under RACT III, the owner or operator may submit a case-by-case proposal under § 129.114(d) for an alternative RACT emission limitation.

The owner or operator may also be eligible to submit an analysis under § 129.114(i) to the Department or appropriate approved local air pollution control agency to demonstrate that the RACT emission limitation approved under § 129.99(e) (RACT II) remains RACT for RACT III. The process provided under § 129.114(i) is less resource intensive than preparing a case-by-case proposal under § 129.114(d) for an alternative RACT emission limitation.

Please see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.112. *Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule, Subsection (k)—Direct-Fired Heaters, Furnaces and Ovens.*

**7. Section 129.113. Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements. – Reasonableness; Need; Protection of the public health, safety and welfare and the effects on this Commonwealth's natural resources.**

**32. Comment:** IRRC notes that a commentator believes the ability of an owner or operator to file for an averaging plan under § 129.113 should not be contingent on one unit not being able to meet the NO<sub>x</sub> RACT limit. Facility-wide and system-wide averaging plans should be able to be submitted at the discretion of the owner or operator as part of an overall strategy to achieve and maintain the emissions specified in the regulation. IRRC suggests that if the commentator's remarks provide greater regulatory flexibility and still satisfy the EPA and SIP requirements, and are still protective of the health, safety and welfare and natural resources of the Commonwealth, then the final-form rulemaking should be amended accordingly. If the commentator's remarks are not feasible, IRRC asks the Board to explain why this is so in the Preamble to this final-form rulemaking.

**Response:** In response to IRRC, the Department disagrees with the commentator that the owner or operator of an affected source should be able to choose the emissions averaging compliance option if each source under the averaging plan can comply with the respective applicable presumptive RACT emission limitation. The averaging plan is provided as an alternative compliance option to meeting applicable source-specific presumptive RACT NO<sub>x</sub> emission limitations if one or more of the individual affected units cannot meet the applicable presumptive RACT NO<sub>x</sub> emission limitation. If all affected units can individually meet the applicable presumptive RACT NO<sub>x</sub> emission limitations, then no averaging plan is warranted. Further, compliance with the applicable presumptive RACT NO<sub>x</sub> emission limitations is the most cost-effective compliance method available to the owner and operator of an affected source.

Submission of an averaging plan entails costs for developing the plan and submitting it to the Department, thus being less cost-efficient than compliance with presumptive RACT limitations where such standards are achievable.

No change is made to the final-form rulemaking in response to this comment.

Please see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.113. *Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements*.

**33. Comment:** IRRC notes that the same commentator cited in Comment #31 also states that limiting the system-wide averaging to the same ozone attainment area imposes a restriction that is unnecessary and could force the early retirement of an affected unit. IRRC suggests that if the commentator's remarks provide greater regulatory flexibility and still satisfy the EPA and SIP requirements, and are still protective of the health, safety and welfare and natural resources of the Commonwealth, then the final-form rulemaking should be amended accordingly. If the suggestions of the commentator are not feasible, IRRC asks the Board to explain why that is so in the Preamble to this final-form rulemaking.

**Response:** In response to IRRC, the Department explains that system-wide averaging is required to be among sources under common control of the same owner or operator within the same ozone nonattainment area in order to conform to the CAA and the D.C. Circuit Court of Appeals ruling in *NRDC v. EPA*, 571 F.3d 1245 (D.C. Cir. 2009). See 83 FR 62998, 63007 (December 6, 2018); see also *South Coast Air Quality Management Dist. v. EPA*, 882 F.3d 1138, 1154 (D.C. Cir. 2018) ("*South Coast II*"). All areas located in unclassifiable/attainment areas in an OTR state are considered to be the same ozone nonattainment area. The unclassifiable/attainment areas of this Commonwealth are separate from the designated nonattainment areas. As an example, an owner or operator cannot average a source from outside the five Southeast Pennsylvania Counties with a source from inside the five Southeast Pennsylvania Counties. Allowing system-wide averaging to include units from different ozone nonattainment areas would have the potential to increase or keep emissions higher in separate maintenance areas for the ozone NAAQS.

No change is made to the final-form rulemaking in response to this comment.

Please see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.113. *Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements*.

**34. Comment:** IRRC notes that a commentator has asked for clarification on how the Department will administer the aggregation for a facility, subject to a concentration-based NO<sub>x</sub> limit under § 129.113(d), if that facility has two sources that are subject to the rulemaking. IRRC asks the Board to provide clarification on how this subsection will be administered in the Preamble to this final-form rulemaking.

**Response:** In response to IRRC, the Department explains that aggregate emissions are determined on a mass basis. The averaging plan provided under § 129.113(d) is required to show that mass NO<sub>x</sub> emissions emitted by the air contamination sources included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan are not greater than the mass NO<sub>x</sub> emissions that would be emitted by the group of included sources if each source complied with the applicable presumptive NO<sub>x</sub> RACT emission limitation in § 129.112 on a source-specific basis. Please note that all averaging plans must be submitted to and approved by the EPA as revisions to the Commonwealth's SIP.

Please see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.113. *Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements*.

**8. Section 129.115. Written notification, compliance demonstration and recordkeeping and reporting requirements. – Implementation procedures; Clarity.**

**35. Comment:** IRRC notes that § 129.115(b)(4) requires owners and operators of combustion units and process heaters to demonstrate compliance on a daily averaging period. Commentators state that existing requirements under § 129.97(g)(1) (RACT II) allow owners and operators of combustion units and process heaters to demonstrate compliance using a 30-operating day averaging period. These commentators believe that the daily averaging requirement of § 129.115(b)(4) is a significant tightening of the presumptive limits for combustion units and process heaters.

**Response:** The Department evaluated available and relevant continuous emissions monitoring data and determined that certain source categories using a CEMS, including combustion units and process heaters, are capable of meeting the presumptive NO<sub>x</sub> RACT emission limitations using a daily averaging basis. If an owner or operator of a subject source with a CEMS cannot meet the applicable presumptive RACT emission limitation using a daily averaging basis, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation.

Further, the Department notes that the regulations in §§ 129.96—129.100 (RACT II) established RACT requirements and emission limitations to meet the Commonwealth's RACT obligations under the CAA for the 1997 and 2008 8-hour ozone NAAQS. The 1997 8-hour ozone standard was set at 0.08 ppm and the 2008 8-hour ozone standard was set at 0.075 ppm. The regulations in §§ 129.111—129.115 are designed to achieve and maintain the more stringent 2015 8-hour ozone standard of 0.070 ppm. To meet the Commonwealth's RACT obligations under the CAA for the 2015 8-hour ozone NAAQS, the Department determined that certain source categories should demonstrate compliance with the applicable RACT emission limitations using a daily averaging period.

The Department notes that the preliminary analysis of the 2021 ambient air ozone season monitoring data shows that all ozone samplers in this Commonwealth are monitoring attainment of the 2015 8-hour ozone NAAQS except these two: the Bristol sampler in Bucks County and the Philadelphia Air Management Services Northeast Airport sampler in Philadelphia County; all

ozone samplers in this Commonwealth are projected to monitor attainment of the 2008 and 1997 8-hour ozone NAAQS. Implementing the daily averaging period is therefore appropriate to assist the Commonwealth in achieving and maintaining the 2015 8-hour ozone NAAQS.

Please also see the response to Comment #117 for additional information.

**36. Comment:** IRRC notes that commentators state that presumptive limits cannot be met using a daily average under certain operating conditions, such as the start-up of a unit.

**Response:** In response to IRRC, the Department states that presumptive RACT requirements and RACT emission limitations apply at all times, including start-up, shutdown, and low load operation. This is necessary under section 110(a)(2)(A) of the CAA (42 U.S.C.A. § 7410(a)(2)(A)). The Department evaluated available and relevant continuous emissions monitoring data reported to the Department for several different source types and determined that certain source categories using CEMS, including combustion sources, combustion units and process heaters, are capable of meeting the proposed RACT III presumptive NO<sub>x</sub> emission limitations on a daily averaging basis. If an owner or operator cannot meet the applicable presumptive RACT emission limitation, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation.

Please also see the response to Comment #93 regarding the EPA's SSM Policy.

**37. Comment:** IRRC notes that commentators request clarification on the term "daily average."

**Response:** The daily average procedures under RACT III for MWCs and for combustion units and process heaters equipped with a CEMS to monitor compliance will be implemented as follows:

The daily average for MWCs will continue to follow the daily average procedure as outlined in the Department's CSMM. The daily average for MWCs will be considered valid if it contains at least 18 valid hourly averages reported at any time during the calendar day. This is consistent with the procedure stipulated in the Quality Assurance Section of the CSMM and with what was stated by the commentator.

The daily average for combustion units or process heaters subject to RACT III will be implemented using a heat input weighted calculation similar to that of the 30-day rolling average emission rate under RACT II. The total pounds of pollutant emitted from the source for each operating hour during the calendar day will be summed. The total heat input to the source for each operating hour during the calendar day will be summed. The total pounds of pollutant emitted for the calendar day will be divided by the total heat input to the source during the calendar day. The daily average for the source must include all emissions that occur during the entire calendar day, including start-up, shutdown, low load operation or other circumstance.

Additionally, the Department has amended § 129.115(b)(3) and (4) from the proposed rulemaking to this final-form rulemaking to read as follows:

(3) For a municipal waste combustor with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, 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 Continuous Source Monitoring Manual.

(4) For a combustion unit or process heater subject to § 129.112(g)(1) with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, using a daily average.

(i) 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.

(ii) The daily average for the source shall include all emissions that occur during the entire calendar day.

Please also see the responses to Comments #28 regarding the use of operating day and #35 regarding the use of daily averaging for certain source categories in RACT III.

Please also see section F, *Summary of Comments and Responses on the Proposed Rulemaking*, of the preamble to this final-form rulemaking under the discussion of § 129.112. *Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule, Subsection (g)(1)—Combustion Units or Process Heaters and § 129.115. Written notification, compliance demonstration and recordkeeping and reporting requirement.*

**Miscellaneous clarity.**

**38. Comment:** IRRC notes that a commentator suggested that § 129.112(e)(1) and (2) be amended to reflect changes in applicable Federal regulations published in the *Federal Register*. IRRC asks the Board to review this potential amendment for inclusion in the final-form regulation.

**Response:** In response to IRRC, the Department agrees with the commentator. Section 129.112(e) has been revised in the final-form rulemaking to read as follows.

(e) The owner and operator of a municipal solid waste landfill subject to § 129.111 shall comply with the following applicable presumptive RACT requirements. The owner or operator of a:

(1) Municipal solid waste landfill constructed, reconstructed or modified on or before July 17, 2014, that has 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 (relating to Federal plan requirements for municipal solid waste landfills that commenced construction on or before July 17, 2014 and have not been modified or reconstructed since July 17, 2014).

(2) Municipal solid waste 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 that commenced construction, reconstruction, or modification after July 17, 2014), which are adopted and incorporated by reference in § 122.3 (relating to adoption of standards).

**39. Comment:** IRRC notes that commentators state that the standard of 0.6 gram NO<sub>x</sub>/bhp-hr in § 129.112(g)(3)(iv)(A) should be 2.0 gram NO<sub>x</sub>/bhp-hr. IRRC asks the Board to review this provision to ensure the correct standard is included in the final-form regulation.

**Response:** The Department appreciates IRRC's comment and has revised the final-form rulemaking to correct this typographical error. The proposed limit of 0.6 gram NO<sub>x</sub>/bhp-hr in § 129.112(g)(3)(iv)(A) has been revised to a limit of 2.0 gram NO<sub>x</sub>/bhp-hr.

**40. Comment:** IRRC notes that a commentator recommends that the newly defined term "combustion unit" be included under § 129.112(k) in the final-form regulation. IRRC asks the Board to review this potential amendment for inclusion in the final-form regulation.

**Response:** The Department appreciates IRRC's comment. The Department agrees with the commentator that the term "combustion source" can be included in § 129.112(k). The term "combustion source" specifically includes sources that produce heat or energy by direct heat transfer. Direct-fired heaters, furnaces and ovens produce heat or energy by direct heat transfer and are combustion sources. In contrast, a "combustion unit" is defined as a stationary equipment used to burn fuel primarily for the purpose of producing power or heat by indirect heat transfer. The Department has amended § 129.112(k) from the proposed to this final-form rulemaking to include the words "or other combustion source" after the words "direct-fired heater, furnace, oven" in this final-form rulemaking as follows (*italics emphasize certain changes from proposed to final-form language*):

(k) The owner and operator of a direct-fired heater, furnace, oven *or other combustion source* with a rated heat input equal to or greater than 20 million Btu/hour subject to § 129.111 shall comply with the presumptive RACT emission limitation of 0.10 lb NO<sub>x</sub>/million Btu heat input.

#### **Comments of the United States Environmental Protection Agency (EPA)**

**41. Comment:** The EPA commented that proposed § 129.114(i) appears to be the regulatory provision by which the Department will allow existing case-by-case RACT II permits to be approved, with a streamlined review process, as RACT for the 2015 ozone NAAQS, with exemptions for electric arc furnaces, Portland cement plants (specifically Nazareth), glass melting furnaces, lime kilns, and direct fired heaters. The EPA's concern is that this language suggests that for the RACT II case-by-case sources, no additional analysis would be performed or required to determine whether the RACT II permit requirements meet RACT for the 2015

ozone NAAQS. The EPA believes that additional analysis is required before the case-by-case RACT II permits can be considered to meet the 2015 ozone NAAQS.

The EPA acknowledges that, for many sources with case-by-case permits, it is possible that since the Department's last analysis for RACT II, no significant changes in technically and economically feasible control technologies have occurred. However, the EPA stresses that the Department's rulemaking record must contain a robust analysis supporting this approach to be defensible. A record containing a general survey and analysis of changes in the cost or effectiveness of existing NO<sub>x</sub> and VOC control technologies or the development of new technologies since the RACT II case-by-case determinations were issued, along with a new review of case-by-case RACT II determinations using those controls, should be undertaken to determine whether the RACT II controls and limits remain RACT for the 2015 ozone NAAQS for those categories of sources. This analysis must be in the record. The EPA also notes that this approach is best for "non-controversial sources," such as sources which were well below the dollar per ton of NO<sub>x</sub> or VOC threshold used for the case-by-case RACT II analysis of economic feasibility. The EPA expects that certain sources or source categories may require some additional, case-specific analysis. For both categories of sources, the record should document that for each source or generic source category, the relevant control technologies and their costs have not changed significantly enough to alter the prior RACT II analysis, nor has the source had any significant changes to operations, emission levels, or any other site or source specific factors analyzed during the original determination for that source's RACT II permits. Under these conditions, a good case can be made that the previously established RACT II controls and limits continue to be RACT for the 2015 ozone NAAQS.

**Response:** The Department appreciates the EPA's concerns regarding the need for additional analysis to determine whether the case-by-case determinations made under §§ 129.96—129.100 (RACT II) for the 1997 and 2008 8-hour ozone NAAQS remain RACT for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III). After further discussions with the EPA, the Department has amended § 129.114(i) from the proposed rulemaking to this final-form rulemaking to establish requirements consistent with the EPA's comments for additional analysis to be included in these RACT case-by-case evaluations. The Department believes that the amendments to § 129.114(i) provide the conditions to support those instances where the Department or appropriate approved local air pollution control agency may determine that the previously established RACT II controls and limits remain RACT for the 2015 8-hour ozone NAAQS.

Final-form § 129.114(i) addresses the EPA's comment that the source shall not have had any significant changes to operations, emission levels, or other site or source specific factors analyzed during the original determination for that source's RACT II permits. Final-form § 129.114(i) establishes the conditions that an owner or operator subject to § 129.114(a), (b) or (c) and to § 129.99 shall not have modified or changed a source that commenced operation on or before October 24, 2016, and shall not have installed and commenced operation of a new source after October 24, 2016. The date of October 24, 2016, is the date specified in § 129.99(i)(1) by which written RACT proposals to address the 1997 and 2008 8-hour ozone NAAQS were due to the Department or the appropriate approved local air pollution control agency from the owner

or operator of an air contamination source located at a major NO<sub>x</sub> emitting facility or a major VOC emitting facility subject to § 129.96(a) or (b) (relating to applicability).

An owner or operator that is subject to § 129.114(a), (b) or (c) and to § 129.99 and meets the conditions stipulated in § 129.114(i), may, in place of proposing an alternative RACT requirement or RACT emission limitation under § 129.114(d), submit an analysis, certified by the responsible official, in writing or electronically to the Department or appropriate approved local air pollution control agency on or before December 31, 2022, that demonstrates that compliance with the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(c) for the 1997 and 2008 8-hour ozone NAAQS remains RACT for purposes of the 2015 8-hour ozone NAAQS under § 129.114(a)—(c) and (e)—(h), except for sources subject to § 129.112(c)(11) or (i)—(k). The excepted sources specified in § 129.112(c)(11) and (i)—(k) are electric arc furnaces, glass melting furnaces, lime kilns and direct-fired heaters, furnaces, ovens or other combustion sources. These source types did not have presumptive RACT requirements or RACT limitations established under §§ 129.96—129.100 (RACT II). The owners and operators of these source types shall comply with the applicable presumptive RACT requirement or RACT limitation, or both, established in § 129.112(c)(11) and (i)—(k). If an owner or operator cannot comply with the applicable requirement or limitation established in § 129.112(c)(11) and (i)—(k), the owner or operator may apply for an alternative RACT requirement or RACT limitation under § 129.114(d).

An owner or operator subject to § 129.114(a), (b) or (c) and to § 129.99 that has modified or changed a source that commenced operation on or before October 24, 2016, or has installed and commenced operation of a new source after October 24, 2016, shall comply with the requirements of § 129.114(d) and propose an alternative RACT requirement or RACT emission limitation. These owners and operators may not use the analysis option under § 129.114(i).

This includes the owner or operator of a major NO<sub>x</sub> emitting facility that is subject to 129.111 and was subject to §§ 129.96—129.100 (RACT II) and after October 24, 2016, installed a new source with a PTE of equal to or greater than 5 TPY of NO<sub>x</sub> that is not subject to § 129.112 or §§ 129.201—129.205 (relating to additional NO<sub>x</sub> requirements) as well as the owner or operator of a major VOC emitting facility that is subject to § 129.111 and was subject to RACT II and after October 24, 2016, installed a new source with a PTE equal to or greater than 2.7 TPY of VOC that is not subject to § 129.112 or has modified equipment (e.g. boiler replacement). In this case, a case-by-case RACT analysis shall be performed on the new source or equipment.

Final-form § 129.114(i)(1) and (2) address the EPA's comments about "non-controversial sources," that is, sources which were well below the dollar per ton of NO<sub>x</sub> or VOC threshold used for the case-by-case RACT II analysis of economic feasibility, as well as the EPA's comments regarding the need for additional case-specific analysis for certain sources or source categories. Final-form § 129.114(i)(1) and (2) establish the process and information needed for the owners and operators of both categories of sources to document for the record that for each source or generic source category, the relevant control technologies and their costs have not changed significantly enough to change the prior RACT II analysis.

The Department established cost-effectiveness thresholds of \$7,500 per ton of NO<sub>x</sub> emissions reduced and \$12,000 per ton of VOC emissions reduced as “screening level values” for determining if the economic feasibility analyses previously submitted under § 129.99(e) for the 1997 and 2008 8-hour ozone NAAQS should be updated for the 2015 8-hour ozone NAAQS. The NO<sub>x</sub> screening level value of \$7,500 is twice the amount of the RACT III cost-effectiveness benchmark for presumptive NO<sub>x</sub> RACT (\$3,750). The RACT III cost-effectiveness benchmark for presumptive VOC RACT, \$7,500, is larger in absolute magnitude than the RACT III cost-effectiveness benchmark of \$3,750 for presumptive NO<sub>x</sub> RACT, therefore the Department set the VOC screening level value at approximately one and one-half times the amount of the VOC RACT III cost-effectiveness benchmark. These screening level values are large enough to ensure that a cost-prohibitive control technology evaluated under § 129.99 with a cost-effectiveness that is equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced is still cost-prohibitive for the purposes of final-form § 129.114 without the need for re-evaluation of economic feasibility. If the cost-prohibitive control technology evaluated under § 129.99 had a cost-effectiveness that is less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced, then the owner or operator shall re-evaluate the economic feasibility of the control technology to verify that it remains cost-prohibitive for purposes of the 2015 8-hour ozone NAAQS.

Final-form § 129.114(i)(1) provides that the owner or operator of a subject source or facility that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of the submittal of the analysis to the Department or appropriate approved local air pollution control agency shall include certain information in the analysis.

Under final-form § 129.114(i)(1)(i), if the owner or operator determines that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) had a cost effectiveness equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced, the owner or operator shall include the following information in the analysis:

(A) A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.

(B) A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously identified and evaluated under § 129.92(b)(1)—(3) included in the written RACT proposal submitted under § 129.99(d) and approved under § 129.99(e).

(C) A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under § 129.99(d) or as calculated consistent with the “EPA Air Pollution Control Cost Manual” (sixth edition), EPA/452/B-02-001, January 2002, as amended.

(D) A statement that an evaluation of each economic feasibility analysis summarized in clause (C) demonstrates that the cost effectiveness remains equal to or greater than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced.

(E) Additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

Under final-form § 129.114(i)(1)(ii), if the owner or operator determines that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) had a cost effectiveness less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced, the owner or operator shall include the following information in the analysis:

(A) A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.

(B) A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously identified and evaluated under § 129.92(b)(1)—(3) in the written RACT proposal submitted under § 129.99(d) and approved under § 129.99(e).

(C) A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under § 129.99(d) or as calculated consistent with the “EPA Air Pollution Control Cost Manual” (sixth edition), EPA/452/B-02-001, January 2002, as amended.

(D) A statement that an evaluation of each economic feasibility analysis summarized in clause (C) demonstrates that the cost effectiveness remains less than \$7,500 per ton of NO<sub>x</sub> emissions reduced or \$12,000 per ton of VOC emissions reduced.

(E) A new economic feasibility analysis for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) in accordance with § 129.92(b)(4).

(F) Additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

Final-form § 129.114(i)(2) provides that the owner or operator of a subject source or facility that evaluates and determines that there is a new or upgraded pollutant specific air cleaning device, air pollution control technology or technique available at the time of the submittal of the analysis to the Department or appropriate approved local air pollution control agency shall do the following: perform a technical feasibility analysis and an economic feasibility analysis in accordance with § 129.92(b); submit the analyses to the Department or appropriate approved

local air pollution control agency for review; and provide additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

The above information, analyses and supporting documentation received by the Department as well as review memoranda prepared by the Department will be submitted to the EPA as part of the record for the case-by-case RACT III SIP revision submittals.

**42. Comment:** The EPA asks what public participation process will the Department provide for the public to comment upon whether the RACT II limits remain RACT for the 2015 ozone NAAQS for sources with an existing case-by-case RACT II permit seeking to keep that RACT requirement or limitation for RACT III?

If the language in proposed § 129.114(i) means that a source which is in compliance with a case-by-case RACT II permit issued under § 129.99(a)—(h) is in compliance with the RACT III requirements, what supporting information will be in the record for the RACT III rulemaking showing that for all of these sources, there is no further reduction in the limits or tightening of the restrictions that is technically or economically feasible, or that some change has not happened at each of the sources that would call into question whether the limits in the RACT II permit still meet RACT for the 2015 ozone NAAQS?

Additionally, how will these RACT II permits be incorporated into the SIP for purposes of RACT III and implementation of the 2015 ozone NAAQS?

Also, will these case-by-case RACT II sources have to apply using the process in proposed § 129.114 for that determination?

If so, proposed § 129.114(f) suggests that the Department or the appropriate approved local air pollution control agency will be putting case-by-case RACT II permits that satisfy the 2015 ozone NAAQS RACT requirements out for public comment at the state/local level, then submitting those permits to the EPA for approval into the SIP. Please explain the process for public comment on the determination that the previously issued case-by case RACT II permits continue to satisfy RACT for the 2015 ozone NAAQS.

**Response:** The Department appreciates the EPA's concerns regarding: how an owner or operator with a RACT II case-by-case permit will apply for a determination that their RACT II permit conditions remain RACT for the 2015 ozone NAAQS; what supporting information will be in the record for the RACT III rulemaking to document that the conditions of the RACT II permit remain RACT for the 2015 ozone NAAQS; what public participation process the Department will provide for the public to comment upon whether the RACT II requirements and limitations remain RACT for the 2015 ozone NAAQS for sources with an existing case-by-case RACT II permit seeking to keep that RACT requirement or limitation for RACT III; and how these RACT II permits will be incorporated into the SIP for purposes of RACT III and implementation of the 2015 ozone NAAQS.

In response to the EPA's question regarding applying for a determination that RACT II conditions would satisfy RACT III requirements, the Department provides that an owner or operator that is subject to § 129.114(a), (b) or (c) and to § 129.99 and meets the conditions stipulated in § 129.114(i), may, in place of proposing an alternative RACT requirement or RACT emission limitation under § 129.114(d), submit an analysis, certified by the responsible official, in writing or electronically to the Department or appropriate approved local air pollution control agency on or before December 31, 2022, that demonstrates that compliance with the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution control agency under § 129.99(e) for the 1997 and 2008 8-hour ozone NAAQS (RACT II) remains RACT for purposes of the 2015 8-hour ozone NAAQS (RACT III) under § 129.114(a)—(c) and (e)—(h), except for sources subject to § 129.112(c)(11) or (i)—(k).

Please see the response to Comment #41 for additional detail about the process the owner or operator shall follow and what supporting information shall be submitted to the Department to demonstrate that compliance with their RACT II permit requirement or emission limitation remains RACT for purposes of the 2015 8-hour ozone NAAQS.

In regard to public participation processes, the Department has amended final-form § 129.114(j) to provide that the Department or appropriate approved local air pollution control agency will review the analyses submitted under final-form § 129.114(i), solicit public comment on the analyses and the Department's supporting documentation, prepare a summary of the public comments and responses to the public comments, and, as appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127. Final-form § 129.114(j) reads as follows:

- (j) The Department or appropriate approved local air pollution control agency will:
  - (1) Review the analyses submitted in accordance with subsection (i).
  - (2) Publish notice in the Pennsylvania Bulletin and newspapers of general circulation for a minimum 30-day public comment period and an opportunity for a public hearing for the analyses submitted under subsection (i) and supporting documentation.
  - (3) Prepare a summary of the public comments received on the analyses and responses to the comments.
  - (4) As appropriate, issue the necessary plan approvals and operating permit modifications in conformance with 25 Pa. Code Chapter 127 (relating to construction, modification, reactivation and operation of sources).

The public comment steps for the analyses specified in final-form § 129.114(j)(2) and (3) are provided to satisfy the requirements for submitting a revision to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP under final-form § 129.114(k). If a plan approval or operating permit modification is issued under final-form § 129.114(j)(4), the plan

approval or operating permit modification will undergo public comment as part of the issuing process in conformance with 25 Pa. Code Chapter 127.

The Department will assure that the case-by-case RACT III SIP revision submittals and supporting analyses and documentation satisfy public participation requirements under section 110 of the CAA and 40 CFR 51.102.

In regard to what supporting information shall be submitted for the record demonstrating that RACT II permits remain RACT for the 2015 ozone NAAQS, final-form § 129.114(k) provides that the Department will submit the analyses, supporting documentation and summary of public comments and responses described in subsection (j)(2) and (3) as well as the plan approvals and operating permit modifications issued under subsection (j)(4) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. These submissions will include all supporting information necessary for the record to demonstrate that the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate local air pollution control agency under § 129.99(e) assures compliance with the provisions in final-form § 129.114 (a)—(c) and (e)—(h), that there is no further reduction in the limits or tightening of the restrictions that is technically or economically feasible, and that no change has occurred at the source that would call into question whether the limits in the RACT II permit remain RACT for the 2015 ozone NAAQS. The supporting documentation will include applicable RACT II determinations, which will be made available to the public during the public comment period and incorporated as part of the subsequent SIP submittal to the EPA.

**43. Comment:** The EPA notes that there appears to be no language limiting alternative final compliance dates (for example, proposed §§ 129.112(n)(2)(v) and 129.114(j)(2)(v)), which might allow for the implementation of RACT controls later than permitted by 40 CFR 51.1312(a)(3)(i) (i.e. no later than January 1 of the 5th year after designation, which is January 1, 2023). Any extension of the compliance date beyond the January 1, 2023, deadline is contrary to the EPA's implementing regulations and is not approvable for purposes of RACT. Please identify the legal authority or guidance which DEP is relying upon for extending the deadline for RACT compliance beyond January 1, 2023. If the Department believes there are no changes that could be made within the statutory timeline that are economically and technically feasible, the record should support that no change is RACT for the particular source. Changes made at a later date would then be considered "SIP strengthening."

**Response:** The Department understands the EPA's concern. In this final-form rulemaking, the Department requires alternative compliance schedules, averaging plan proposals and case-by-case proposals to be submitted to the Department no later than December 31, 2022. Sources otherwise subject to the presumptive RACT limit and other RACT requirements for certain source categories in this final-form rulemaking will have to plan to begin complying with RACT III on the implementation date.

Please see the response to Comment #4 for further information regarding compliance schedules.

**44. Comment:** The EPA notes that proposed § 129.114(i) states that:

(i) Compliance with the requirements in § 129.99(a)—(h) (relating to alternative RACT proposal and petition for alternative compliance schedule) assures compliance with the provisions in subsections (a)—(h), except for sources subject to § 129.112(b)(11), (h)(4) and (h)(5) or (i)—(k).

The EPA could not find § 129.112(b)(11). There also does not seem to be a § 129.112(h)(4) or (5), as § 129.112(h) ends at subsection (h)(3).

**Response:** The EPA is correct. The Department has amended § 129.114(i) from proposed to this final-form rulemaking to delete the references to § 129.112(b)(11), (h)(4) and (h)(5). The correct reference of § 129.112(c)(11) has been added to § 129.114(i). The reference to [§ 129.112] (i)—(k) remains.

**45. Comment:** The EPA comments that the RACT III requirements apply to major facilities in existence before August 3, 2018, and facilities which become major after August 3, 2018, due to a modification or change in operation of an existing source. The EPA believes that this language seems to say that if a facility was major before August 3, 2018, and adds a new NO<sub>x</sub> or VOC emissions unit after that date, the source (new emissions unit) would be subject to RACT under the § 129.111(a) provision. However, the presumptive (§ 129.111(a)(1)) and alternative (§ 129.114(d)(1)) compliance dates for sources subject to RACT under § 129.111(a) are firm and may have already passed at the time of new construction. The implication of this regulatory text structure is that existing major sources must continually evaluate and immediately comply with RACT provisions for any new sources. The EPA's experience with the Department's implementation of RACT II indicates that PA probably does not intend for RACT to be continually reapplied to new sources at major facilities—otherwise the EPA would be seeing a growing number of case-by-case RACT II determinations for new projects occurring across PA. Based on the Department's answer to a question in its Responses to Frequently Asked Questions document for RACT II, it seems that the Department does not intend for RACT to be continually reapplied to sources.

Please clarify the Department's intent for these particular provisions. Specifically, in the response above, is the Department suggesting that new facilities that came into existence after July 20, 2012, are not subject to RACT at all? Or, would those new facilities be subject to a newer RACT standard? Depending on what the Department's intent is for RACT III applicability for this circumstance, some potential solutions would be:

- clarifying the language in § 129.111(b);
- narrowing the scope of § 129.111(a) applicability definition to exclude new sources at existing major facilities;
- defining a compliance date for new sources at existing major facilities in the presumptive and alternative RACT compliance date sections.

**Response:** The EPA is correct. The Department does not intend for the RACT III provisions to be continually reapplied to new sources at major facilities. The intent of the applicability date in § 129.111(a) and (b) is that RACT should be determined once for each existing major facility or

source in accordance with the requirements for the applicable 8-hour ozone NAAQS as the major facility or source exists on the applicability date. The applicability date in § 129.111(a) and (b), namely, August 3, 2018, is the effective date of the designations of the nonattainment areas in this Commonwealth for the 2015 8-hour ozone NAAQS. See 83 FR 25776, 25828 (June 4, 2018).

In response to the EPA's suggestion that the scope of applicability of § 129.111(a) be narrowed to exclude new sources at existing major facilities, the Department has amended the language of § 129.111(a)(1) and (2) to clarify that the requirements apply to the owner and operator of major sources and facilities subject to § 129.111(a) that commenced operation on or before August 3, 2018. Installation and operation of a new source after August 3, 2018, at a major facility covered by § 129.111(a) is excluded from being identified and listed in accordance with § 129.111(a)(1) and (2) in the notification required under § 129.115(a). The new source installed after August 3, 2018, or the new major facility that commences operation after August 3, 2018, would instead be subject, at a minimum, to a best available technology (BAT) determination which can be no less stringent than RACT established for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III). The final-form language for § 129.111(a) and (a)(1)—(2) reads as follows (*italics emphasize certain changes from proposed to final-form language*):

§ 129.111. Applicability.

(a) Except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major NO<sub>x</sub> emitting facility *that commenced operation on or before August 3, 2018*, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major VOC emitting facility that *commenced operation on or before August 3, 2018*, for which a requirement or emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107. The owner or operator shall identify and list the sources and facilities *subject to this subsection* in the written notification required under § 129.115(a) (relating to written notification, compliance demonstration and recordkeeping and reporting requirements) *as follows*:

(1) The sources and facilities *that commenced operation on or before August 3, 2018*, for which a requirement or emission limitation has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

(2) The sources and facilities *that commenced operation on or before August 3, 2018*, and are subject to §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.75, 129.77 and 129.101—129.107.

In response to the EPA's questions regarding the applicability of RACT to the owners and operators of new [major] facilities that came into existence after July 20, 2012, the applicability date of §§ 129.96—129.100 (RACT II), the Department provides that the owner and operator of

a major facility or source that commenced operation after July 20, 2012, but on or before August 3, 2018, would not have been subject to, or evaluated for, RACT for the 1997 and 2008 8-hour ozone NAAQS under §§ 129.96—129.100 (RACT II); rather, the owner and operator of the major facility or source would have been subject, at a minimum, to a BAT determination which could be no less stringent than the RACT II requirements for the 1997 and 2008 8-hour ozone NAAQS. The owner or operator of a major facility or source that commenced operation after July 20, 2012, and is in operation on or before August 3, 2018, would be subject to § 129.111(a) and would be evaluated for and issued an operating permit with the applicable RACT III requirements or emission limitations, or both, for the 2015 8-hour ozone NAAQS for the major facility or source as it existed on or before August 3, 2018. If the owner or operator of this major facility then installs a new source after August 3, 2018, it is not the Department's intent to require an updated RACT III analysis for the 2015 8-hour ozone NAAQS for the facility, as explained above regarding the scope of applicability of § 129.111(a); rather, the new source would be subject to a BAT determination which can be no less stringent than RACT established for the 2015 8-hour ozone NAAQS under §§ 129.111—129.115 (RACT III).

In response to the EPA's suggestion that the language in § 129.111(b) be clarified, the Department provides that the owner or operator of a non-major facility that commenced operation after July 20, 2012, and is in operation on or before August 3, 2018, would not have been subject to RACT II under §§ 129.96—129.100 nor would they be subject to § 129.111(a), since the facility is not a major facility.

If the owner and operator of a non-major facility that commenced operation on or before August 3, 2018, then installs and commences operation of a new source after August 3, 2018, or makes a modification or change in operation after August 3, 2018, of a source that commenced operation on or before August 3, 2018, to the extent that the source or facility now meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, this owner and operator is subject to the requirements of § 129.111(b). The owner or operator will be evaluated by the Department for applicable RACT III requirements for the 2015 8-hour ozone NAAQS and be issued an operating permit with the applicable RACT III requirements. Once this source or facility meets major status and has been evaluated for applicable RACT III requirements under §§ 129.111—129.115, installation of a subsequent new source or a subsequent modification or change in operation of an existing source after the date of issuance of the permit would be subject to a BAT analysis which could be no less stringent than the RACT III requirements.

As specified under final-form § 129.111(d), the owner and operator of a facility that commenced operation on or before August 3, 2018, that is not a major NO<sub>x</sub> emitting facility or a major VOC emitting facility on or before December 31, 2022, would not be subject to §§ 129.111—129.115, except as specified in final-form § 129.111(e). Final-form § 129.111(e) specifies that if the owner and operator of a facility that complied with § 129.111(d) becomes major after December 31, 2022, the owner and operator of the now-major facility shall comply with § 129.111(b). This requirement precludes the situation in which an owner or operator of a major facility or source that is subject to § 129.111(a), or an owner or operator of a facility or source that is subject to § 129.111(b) that becomes major after August 3, 2018, then falls below the applicable major facility threshold on or before December 31, 2022, from being exempt from §§ 129.111—129.115 if the source or facility becomes major again after December 31, 2022.

The owner and operator of a source or facility that commences operation after August 3, 2018, would not be subject to §§ 129.111—129.115. These owners and operators would be evaluated according to applicable programs such as BAT or new source review. These owners and operators may become subject to future RACT requirements or RACT emission limitations, or both, that are implemented to address a future ground-level ozone NAAQS or revision to an existing ground-level ozone NAAQS. These owners and operators would be evaluated for RACT applicability at that time.

Please also see the Department response to Comment #60 for additional information about § 129.111.

**46. Comment:** The EPA commented that proposed § 129.113(n) appears to be new language added by Pennsylvania to alert source owners and operators using an averaging plan that the averaging plan will be submitted to the EPA for approval. This language is probably intended to avoid the issue leading to the conditional approval for averaging plans in RACT II. How will DEP determine whether the emissions from the two sources in the averaging plan are less than the emissions that would be emitted if both sources complied with presumptive RACT? Proposed § 129.113(d) requires that the permit applicant must demonstrate how it will show that emissions from the averaging plan are less than emissions that would be emitted if the sources in the averaging plan complied with their presumptive RACT limits. Will the averaging plan include terms requiring that this method of demonstrating compliance be part of a permit and enforceable?

**Response:** The Department appreciates the EPA's concern. Please see the response to Comment #5 for information regarding provisions of averaging plans, which will be included as in a plan approval or operating permit.

**47. Comment:** The EPA notes that the RACT III proposed regulations have added language requiring the submission of information by every source subject to RACT that appears to address some of the missing information that caused difficulties for both the Department and the EPA in evaluating RACT II permits. For example, proposed § 129.115, entitled "Written notification, compliance demonstration and recordkeeping and reporting requirements," requires that every source subject to RACT notify the state within 6 months of how it is going to comply with the RACT III requirements, and requires these sources to identify those air contamination sources that are [proposed § 129.115(a)(1)(i)] and those air contamination sources that are not [proposed § 129.115(a)(1)(ii)] subject to §§ 129.112—129.114. Proposed § 129.115(a)(4) also requires information on source description and how the owner or operator shall comply with RACT III or the reason a source is exemption from RACT III requirements.

This is more information than the regulations required for RACT II and RACT I. However, given that RACT I and II did not require the same information, this difference would seem to put the Department and the approved local air pollution control agencies in the position of figuring out whether any new emission sources have been added to the facility since the RACT I and II process, or whether sources have changed in any meaningful ways, such as a fuel switch, new control device, etc. The EPA suggests that a provision should be added to this section requiring

the source to clearly identify any changes to emission sources which have occurred since RACT II, at the least, and the effect that the change has on emissions from the facility, if any. The provision should also require an analysis of the impact of any such changes on prior RACT requirements. Having the sources provide this information will hopefully simplify the Department's review of these notices. This is especially true for the sources that received a case-by-case RACT II permit, to simplify the Department's analysis of whether there have been any changes at the facility which might require a new analysis for RACT III.

**Response:** The purpose of this notification provision in § 129.115(a) is for the Department to determine which facilities and sources are subject to RACT III requirements, which sources are exempt from RACT III requirements, and if the owners and operators are complying with presumptive or case-by-case requirements. This notification is not meant to be a full RACT analysis.

Before an owner or operator of a facility can begin to construct, modify or operate a source, emissions unit or equipment emitting air contaminants in Pennsylvania, the owner or operator is required to obtain prior written approval from the Department's Air Quality Program as specified in 25 Pa. Code § 127.11 (relating to plan approval requirements). Thus, the Department is already aware of new and modified sources that have occurred since the implementation of RACT II due to this requirement for the owner and operator of the facility to obtain prior written approval from the Air Quality Program. Therefore, it is not necessary that the owner or operator submit this specific information as part of the written notification required by § 129.115(a).

**48. Comment:** The EPA asks what dollar per ton figure for VOC and NO<sub>x</sub> were used to determine economic feasibility. The EPA believes that the numbers appear to be \$3,750/ton for NO<sub>x</sub> and \$7,500/ton for VOC, but the explanation in the TSD on page 12 is confusing.

**Response:** The EPA is correct. The benchmarks used to determine economic feasibility for presumptive RACT in this round (§§ 129.111—129.115) are \$3,750 per ton of NO<sub>x</sub> emissions removed and \$7,500 per ton of VOC emissions removed. Please also see pages 12 and 13 of the TSD for this final-form rulemaking for updated language.

**49. Comment:** The EPA is asking for clarification on whether the Department used the most up-to-date chapters in the EPA Air Pollution Control Cost Manual when calculating costs. For example, the Department cites a 2002 edition in one place ([DEP] evaluated cost-effectiveness using the guidance provided in the EPA Air Pollution Control Cost Manual, EPA/452/B-02-001, 6th Edition, January 2002, as amended,) but on page 12 of the TSD, reference is made to the 7th edition of the Cost Manual.

**Response:** The EPA is currently updating the Air Pollution Control Cost Manual. The 7<sup>th</sup> edition contains certain source categories and controls. The Department used the most recent chapters available from either the 6<sup>th</sup> edition or 7<sup>th</sup> edition when calculating the control costs.

**50. Comment:** The EPA commented that the prior NO<sub>x</sub> emission standard for MWCs in § 129.97 is proposed to be reduced from 180 parts per million volume (ppmv) to 150 ppmvd. The Department's analysis determined that additional controls (e.g. selective catalytic

reduction/selective non-catalytic reduction (SCR/SNCR)) were technically or economically infeasible, or both. However, the record does not explain what measures will be necessary for the sources to meet the new limits and does not demonstrate that 150 ppmvd is the lowest rate that is technically and economically feasible. Several of the sources appear to be capable of operating at lower emission rates. Please explain what analysis was performed to determine that 150 ppmvd is RACT for these units.

**Response:** The Department notes that the current limit for MWCs in § 129.97 is 180 parts per million volume dry (ppmvd). Proposed § 129.112(f) has been revised from 150 ppmvd NO<sub>x</sub> @ 7% oxygen to a more stringent limit of 110 ppmvd NO<sub>x</sub> @ 7% oxygen in this final-form rulemaking. The supporting analysis, and measures that could be used for the owners and operators to meet the presumptive NO<sub>x</sub> RACT emission limitations, are found in Section IV(E) of the TSD for this final-form rulemaking. If an owner or operator cannot meet the presumptive emission limit, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation.

**51. Comment:** The EPA commented that because there is no presumptive RACT for large coal-fired electric generating units (EGUs) with SCR in § 129.112, § 129.114(a) would not seem to allow those sources to request a case-by-case RACT determination under the RACT III requirements. The Department should clearly notify the public when public noticing proposed case-by-case RACT II permits for coal-fired EGUs with SCRs that it intends to use the same limits to satisfy RACT for the 2015 ozone NAAQS, and that the RACT II comment period will be the last opportunity to comment on whether the RACT II limits also meet the RACT III requirements.

**Response:** The Department acknowledges EPA's concerns. Please see the response to Comment #21 from IRRC.

### **Comments from Industry and the Public**

**52. Comment:** A commentator stated that Pennsylvania is long overdue in submitting a proposed RACT III SIP revision. Such a revision was required to be submitted to the EPA by August 3, 2020—over 14 months ago—and yet Pennsylvania has not yet finalized a submission to the EPA. Accordingly, Pennsylvania must act quickly to finalize new presumptive emission limits.

**Response:** The Department acknowledges the comment. The Department has worked diligently to finalize this comprehensive rulemaking as quickly as possible.

**53. Comment:** Some commentators state that in the response to Question #19 of the RAF for the proposed rulemaking, the Department indicates that the potential estimated costs for alternative compliance provisions could be on the order of \$4,000 to \$6,000 per facility. One of the commentators believes that estimate is very low and says most plants, regardless of whether they need to implement alternative compliance provisions, are estimated to spend on the order of \$15k to \$20k for some sort of combination of internal and external consulting costs and plan approval fees. This commentator attached a calculation to its comment letter with a total cost range of \$4.4 to \$8.8 million.

**Response:** Please see the response to Comment #10.

**54. Comment:** Some commentators state that in the response to Question #19 of the proposed rulemaking RAF, the Department estimates that the cost of add-on controls to the regulatory community will be \$25 million but does not show how this number is derived. In the separate TSD there are several appendices which have various pollution control cost estimates, most on the order of \$2 million to \$4 million. That seems reasonable, but if one divides \$25 million by \$2 million and \$4 million, on this basis there would be a total of 6 to 13 facilities out of 500 potentially impacted who would need to install additional controls. While most sources should not need to install additional controls, it seems unlikely that the number would only be limited to 6 to 13 out of 500 (1.2% to 2.6%) facilities.

Another commentator states that the cost-benefit analyses of the proposed RACT III rulemaking RAF significantly understate expected compliance costs. This commentator requests that the RAF for the final-form rulemaking be updated to clarify the number of facilities the Department expects to need to install additional controls, as well as to clearly identify costs.

**Response:** The Department determined that the owners and operators of approximately 115 engines and turbines would be required to install add-on control technology to meet the presumptive NO<sub>x</sub> RACT III emission limitations. Since the publication of the proposed rulemaking, the Department has updated the estimates of anticipated NO<sub>x</sub> emission reductions that would be achieved through implementation of the final-form control measures. The Department anticipates that implementation of these control measures could reduce NO<sub>x</sub> emissions by as much as 9,800 TPY from engines, turbines and municipal waste combustors. The proposed value of \$25,000,000 has been updated to approximately \$36.7 million per year and was derived from multiplying the estimated 9,800 TPY of NO<sub>x</sub> emission reductions by the \$3,750 per ton of NO<sub>x</sub> emissions reduced threshold.

**55. Comment:** Another commentator states that lower presumptive emission limitations will result in a greater number of case-by-case alternative RACT proposals. The associated cost to the Department has not been quantified in the RAF.

**Response:** The Department does not anticipate that it will incur any significant additional costs from the implementation of this final-form rulemaking. Existing Department staff will be working to review and process alternative compliance schedules, NO<sub>x</sub> averaging plans and case-by-case proposals as was done for RACT II. As described in the Department response to Comment #10, the Department has provided an administratively efficient and less resource intensive process under final-form § 129.114(i) that it anticipates will be used by some eligible owners and operators to demonstrate that their RACT II conditions remain RACT for RACT III. While this process in final-form § 129.114(i)—(k) is anticipated to provide cost savings to the regulated community, the Department will be handling the newspaper publications for this process and, therefore, will incur costs for the publication of required newspaper notices. Accordingly, the Department has revised the RAF to reflect an estimate of these newspaper publishing costs to the Department.

**56. Comment:** A commentator requests that Pennsylvania implement more stringent standards and require continuous emissions monitoring systems (CEMS) on existing emission sources.

**Response:** RACT implementation regulations and guidance issued by the EPA dictate that the standards and other requirements implemented be both technically and economically feasible. The Department believes that the monitoring, recordkeeping and reporting requirements included in this final-form rulemaking are sufficient to show compliance with the emission standards and other requirements. The Department has amended § 129.115(f) from proposed rulemaking to this final-form rulemaking to further clarify that the monitoring and recordkeeping and reporting provisions of 25 Pa. Code Chapter 127 apply as well as those provisions specified in the applicable plan approval or operating permit for the source or facility.

**57. Comment:** A commentator notes that one unique cost threshold or benchmark for all sources is not suitable for many reasons. This commentator recommends the Department revise its proposed NO<sub>x</sub> limits using higher \$/ton benchmarks so that its RACT levels are comparable to those used in other states. The Department should also use the RACT tool and associated cost-effectiveness levels that the Ozone Transport Commission's (OTC) Stationary and Area Sources Committee (SAS) RACT workgroup is developing to establish presumptive and case-by-case RACT determinations. During RACT rulemaking development in 2008, the New Jersey Department of Environmental Protection (NJDEP) estimated an acceptable range of \$5,000 to up to \$57,500 per ton of NO<sub>x</sub> removed for a facility-specific NO<sub>x</sub> control plan or an alternative maximum allowable NO<sub>x</sub> emission rate. (See economic impact section of New Jersey proposed rulemaking available at <http://www.nj.gov/dep/rules/proposals/080408a.pdf>).

**Response:** The presumptive RACT requirements and RACT emission limitations used by the Department are comparable to presumptive RACT standards in neighboring states.

The commentator's assertion that the NJDEP used the range of \$5,000 to \$57,500 as the thresholds for determining the cost-effectiveness of a facility-specific NO<sub>x</sub> control plan or an alternative maximum allowable NO<sub>x</sub> emission rate is incorrect. Rather, these dollar values represent NJDEP's range of estimates for the cost to prepare and complete an application for a facility-specific case-by-case permit depending upon the technical "complexity of the application." (See page 74 of <https://www.nj.gov/dep/rules/proposals/080408a.pdf>)

Regarding cost-effectiveness thresholds used by other Ozone Transport Region (OTR) states, the New York State Department of Environmental Conservation (NYDEC) extrapolated their cost-effectiveness thresholds for 2020 from their cost-effectiveness thresholds for implementation of RACT requirements in 1994. In 1994, the NYDEC used \$5,000/ton VOC emissions reduced for severe ozone nonattainment areas, \$3,000/ton VOC emissions reduced for marginal ozone nonattainment areas and \$3,000/ton NO<sub>x</sub> emissions reduced statewide for RACT implementation. The NYDEC used these values to determine cost effectiveness thresholds for 2020. ([https://www.dec.ny.gov/docs/air\\_pdf/dar20.pdf](https://www.dec.ny.gov/docs/air_pdf/dar20.pdf)). However, the NYDEC did not provide any justification for selecting these thresholds in 1994. The Department used the same methodology but provided adequate justification in its proposed rulemaking TSD for its 1991 RACT I implementation benchmarks.

The Department has been unable to identify the cost-effectiveness benchmarks used by other neighboring state air pollution control agencies to establish cost-effective RACT emission limitations for implementation of control measures to meet the 2015 Ozone NAAQS in their state.

**58. Comment:** Members of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) agreed to include a strategy in their Regional Haze State Implementation Plans that ensures that EGUs equal to or larger than 25 megawatts (MW) are operating existing NO<sub>x</sub> controls effectively on a year-round basis. In case-by-case RACT approvals for coal boilers, the Department should require operation of NO<sub>x</sub> controls on a year-round basis. The Department should also require measures to improve efficiency of NO<sub>x</sub> controls, such as increasing reagent (ammonia or urea) flow rate and increasing frequency of catalyst replacement, if feasible.

**Response:** Comments regarding alternative RACT proposals may be made during the public comment period provided for each proposal. The proposed rulemaking did not include presumptive NO<sub>x</sub> requirements in § 129.112 for coal-fired combustion units with a heat input rating greater than 250 million Btu/hr, which is approximately equivalent to 25 MW for coal-fired EGUs. (Heat rate or efficiency of coal-fired EGUs is typically calculated as 10,000 Btu/kWh. This converts 250 million Btu/hr to 25 MW.) Therefore, this comment is outside the scope of the proposed rulemaking.

#### **Section 129.111 - Applicability**

**59. Comment:** The commentator asks if the Department will revise the definitions of “major NO<sub>x</sub> emitting facility” and “major VOC emitting facility” to exclude the 25 TPY thresholds for Bucks, Chester, Delaware, Montgomery, and Philadelphia counties like was done for RACT II. Otherwise, the commentator asks if it is the Department’s intention to bring facilities in these counties that may not have been subject to RACT II (i.e., because NO<sub>x</sub> PTE is < 100 TPY but > 25 TPY or VOC PTE is < 50 TPY but > 25 TPY) into the applicability for RACT III.

**Response:** The Department’s intent is that the major facility applicability thresholds established for Bucks, Chester, Delaware, Montgomery and Philadelphia Counties under RACT II also apply for RACT III. Therefore, the definitions of major NO<sub>x</sub> emitting facility and major VOC emitting facility are revised in this final-form rulemaking to clarify that the applicability thresholds for Bucks, Chester, Delaware, Montgomery or Philadelphia County for purposes of §§ 129.96—129.100 and 129.111—129.115 are 100 TPY for NO<sub>x</sub> emissions and 50 TPY for VOC emissions. The definitions of major NO<sub>x</sub> emitting facility and major VOC emitting facility are revised from proposed to this final-form rulemaking to read as follows:

*Major NO<sub>x</sub> emitting facility*—A facility which emits or has the potential to emit NO<sub>x</sub> from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than one of the following:

\* \* \*

(v) For purposes of §§ 129.91—129.95 (relating to stationary sources of NO<sub>x</sub> and VOCs), twenty-five TPY and is located in Bucks, Chester, Delaware, Montgomery or Philadelphia County.

(vi) For purposes of §§ 129.96—129.100 and §§ 129.111—129.115 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs; and additional RACT requirements for major sources of NO<sub>x</sub> and VOCs for the 2015 ozone NAAQS), one hundred TPY Statewide.

*Major VOC emitting facility*—A facility which emits or has the potential to emit VOCs from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than one of the following:

\* \* \*

(iv) For purposes of §§ 129.91—129.95, twenty-five TPY and is located in Bucks, Chester, Delaware, Montgomery or Philadelphia County.

(v) For purposes of §§ 129.96—129.100 and §§ 129.111—129.115, fifty TPY Statewide.

**60. Comment:** Some commentators request that the Department define and clarify “in existence” in the applicability section of RACT III. The use of a term that is not otherwise defined in the State or CAA regulations makes the RACT applicability date unclear for some air emissions units and adds unnecessary confusion to implementation of this regulatory provision. Under RACT II, the Department provided comment that “in existence” means installed. “Installed” is also not defined, so it is unclear if “installed” means “began operation” or “began installation.”

The commentators proposed the following language: *§ 129.111(a) ... that were in existence on or before August 3, 2018 (The term “in existence” for the purposes of applicability under § 129.111 is defined as when an emissions unit has completed construction/installation and commenced operation as a source of air emissions).*

**Response:** The Department appreciates the commentators’ concern and has amended this final-form rulemaking to provide clarity. Please find the amended language in the response to Comment #24. Please also see the response to Comment #45 for additional discussion of the applicability section.

**61. Comment:** A commentator is concerned about RACT III applicability which does not exclude sources subject to § 129.74 (relating to control of VOC emissions from fiberglass boat manufacturing materials), while RACT II did. Is it the Department’s intention through this exclusion that fiberglass boat manufacturing operations (for example, gel coat and resin material application operations) must be evaluated under RACT III, potentially on a case-by-case basis? What is the reason for removing this exemption from the RACT III rulemaking?

**Response:** The Department appreciates the comment. Subsections 129.111(a) and (b) have been revised from proposed to this final-form rulemaking to include § 129.74 in the list of excepted sections. Section 129.74 implements RACT requirements and RACT emission limitations consistent with the EPA’s applicable Control Techniques Guidelines (CTG) (EPA 453/R-08-004, 2008/09 Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials) and

sources subject to § 129.74 are exempted from the major source RACT requirements in §§ 129.96—129.100 and §§ 129.111—129.115.

Please see the response to Comment #60 for detail of the final-form regulatory language.

**62. Comment:** A commentator states that in § 129.111, the implication is that major NO<sub>x</sub> sources follow NO<sub>x</sub> requirements, and major VOC sources follow VOC requirements. However, in some sections the language may contradict this, such as in § 129.112(a) (page 4344 of the [proposed rulemaking] notice) and subpart (k) (page 4347 of the [proposed rulemaking] notice).

Thus, it could be inferred that if § 129.111 applies to an entity, they may have to meet this presumptive NO<sub>x</sub> RACT limit even if they were a minor source of NO<sub>x</sub> (assuming major for VOC). Or any other RACT limit, i.e., if you are in as a major source for NO<sub>x</sub> or VOC then presumptive RACT requirements for both NO<sub>x</sub> and VOC could apply.

The commentator requests that the Department provide additional clarification to ensure that the apparent overall intent of the regulations is clear, that major NO<sub>x</sub> sources follow NO<sub>x</sub> requirements, and major VOC sources follow VOC requirements.

**Response:** The Department appreciates the commentator's concern. The owner and operator of a source that is a major NO<sub>x</sub> emitting facility but not a major VOC emitting facility shall comply with the applicable NO<sub>x</sub> RACT requirements and NO<sub>x</sub> RACT emission limitations but is not subject to the VOC RACT requirements and VOC RACT emission limitations. The owner and operator of a source that is a major VOC emitting facility but not a major NO<sub>x</sub> emitting facility shall comply with the applicable VOC RACT requirements and VOC RACT emission limitations but is not subject to the NO<sub>x</sub> RACT requirements and NO<sub>x</sub> RACT emission limitations. The owner and operator of a source that is major for both NO<sub>x</sub> and VOC shall comply with both the applicable NO<sub>x</sub> and the applicable VOC RACT requirements and RACT emission limitations. The owner and operator of a source that commenced operation on or before August 3, 2018, and is not major for either NO<sub>x</sub> or VOC emissions on or before December 31, 2022, is not subject to §§ 129.111—129.115, except as specified in final-form § 129.111(d) and (e).

Please see the response to Comment #60 for the language of final-form § 129.111(d) and (e) and the response to Comment #5 for additional discussion of the applicability section.

**63. Comment:** A commentator states that § 129.111(c) includes a de minimis exemption for air contamination sources that have the potential to emit less than 1 TPY of NO<sub>x</sub> or VOCs. An owner or operator may initially determine that a source is exempt per the de minimis threshold based on the best available data or information at that time but may later determine based on newer or better data or information that the source is no longer exempt. In such a circumstance, the rulemaking should provide a specific compliance date by which the source is required to comply with presumptive RACT or submit an alternative RACT proposal.

**Response:** Please see the response to Comment #25. Please also see the responses to Comments #45 and #60 for additional discussion of the applicability section.

**Section 129.112 – Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule**

**64. Comment:** Some commentators request that the Department extend the compliance dates for facilities to comply with RACT III requirements to allow the appropriate time for facilities to evaluate the emissions from sources, to consider options for compliance, and if needed allow time for a facility to petition the agency for an alternative RACT proposal or petition for an alternative compliance schedule or both. While the proposed rulemaking does provide a mechanism for sources to apply for alternative RACT limits and alternative schedules, the commentator believes the “presumptive” schedule afforded to sources to otherwise comply with the RACT requirements, i.e., those sources required to comply by January 1, 2023, is unreasonable and many sources will be compelled to seek an alternative schedule. These requests will place an unreasonable burden on sources and regulatory agency resources. If the schedule is revised so that sources are afforded a more reasonable schedule to evaluate and comply (for example, 2 years instead of ~ 1 year), many sources would not be forced into seeking an alternate compliance schedule.

**Response:** The Department appreciates the commentators’ concerns and is committed to conducting outreach to affected owners and operators to assist in compliance. The implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998 (December 6, 2018); see also 40 CFR 51.1316(b)(3).

Please also see the response to Comment #43.

**65. Comment:** A commentator recommends that the Department consider a compliance schedule that considers the routine major maintenance schedule of affected units or extends the currently proposed compliance schedule from 1 year to 2 years. The schedule for compliance is too aggressive. The proposed rulemaking’s compliance schedule does not provide sufficient time to comply with the presumptive RACT requirements.

The commentator requests a compliance schedule tied to the timing of the next major overhaul of affected combustion turbines. Typical major overhaul cycles run every 3.5 to 4.5 years depending on the operating hours of the turbine. To accommodate the emissions standards proposed in this rulemaking, it is anticipated that in addition to a dry low NO<sub>x</sub> combustion (DLNC) retrofit at time of overhaul, upgrades to the package, control system, fuel system, and other ancillary systems will be necessary. At a minimum the commentator recommends the compliance date be set for 2 years after the effective date of the final rulemaking.

**Response:** The Department appreciates the commentators’ concerns and is committed to conducting outreach to affected owners and operators to assist in compliance. The implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS.

Please also see the Department response to Comment #43.

**66. Comment:** A commentator states that the new definition “combustion source” was not used in § 129.112(k), and asks, if it was intentional, why.

**Response:** Please see the response to Comment #40.

**67. Comment:** A commentator indicates that process heaters between 20-50 MMBtu/hr do not appear to be addressed by presumptive requirements and asks if it is the Department’s intention that these units be subject to case-by-case RACT under RACT III, similar to RACT II.

**Response:** The Department appreciates the comment. The Department has added “or process heater” to final-form § 129.112(b)(1)(i) and § 129.112(b)(1)(ii) as follows (*italics emphasize certain changes from proposed to final-form language*):

(b) The owner and operator of a source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall comply with the applicable presumptive RACT requirements in paragraph (1) and recordkeeping and reporting requirements in paragraph (2).

(1) The owner or operator of a:

(i) Combustion unit *or process heater* with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour shall conduct a biennial tune-up in accordance with the procedures in 40 CFR 63.11223 (relating to how do I demonstrate continuous compliance with the work practice and management practice standards?).

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(ii) Combustion unit *or process heater* with an oxygen trim system that maintains an optimum air-to-fuel ratio that would otherwise be subject to a biennial tune-up shall conduct a tune-up of the boiler one time in each 5-year calendar period in accordance with the following:

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**68. Comment:** A commentator notes that § 129.112(c)(8) includes presumptive RACT for “an incinerator, thermal oxidizer or catalytic oxidizer used primarily for air pollution control” that requires that the source must “install, maintain and operate the source in accordance with the manufacturer’s specifications and with good operating practices.” The list of sources in that section should include a “flare,” since a flare operates in a manner consistent with and for a similar purpose as an incinerator, thermal oxidizer or catalytic oxidizer. The Department has previously agreed that a flare is subject to that presumptive RACT requirement as stated in its RACT II Responses to Frequently Asked Questions, October 20, 2016, Question 10, therefore this requested edit would merely memorialize that clarification. The commentator requests that the Board add the word “flare” to § 129.112(c)(8).

**Response:** Please see the response to Comment #26 for changes to the final form language.

**69. Comment:** A commentator notes that the Board has only adopted “good operating practices” for electric arc furnaces like the facility operated by ATI Flat Rolled Products Holdings, LLC in Breckenridge, Allegheny County. The Department and the Board should revise the TSD to include an analysis of RACT requirements for electric arc furnaces.

**Response:** The Department evaluated several electric arc furnaces (EAF) as part of case-by-case determinations for RACT II. The Department determined that no NO<sub>x</sub> or VOC emission control for EAF is technically feasible. This is because EAF do not use combustion and are batch processes. Since there is no combustion, methods used to alter NO<sub>x</sub> and VOC emissions cannot be employed as they would for a combustion source. Therefore, a numerical RACT emission limitation for either NO<sub>x</sub> or VOC emissions from an EAF is not appropriate.

The Department believes that the applicable presumptive RACT requirement of “good operating practices” is consistent with previous RACT determinations and is appropriate for EAF in this Commonwealth. Additional information can be found in Section IV(L) of the TSD for this final-form rulemaking.

**70. Comment:** A commentator states that the proposed rulemaking does not include RACT III requirements for the three U.S. Steel facilities in the Mon Valley in Allegheny County. The commentator notes that the Board has not provided a reasonable explanation for its failure to address RACT requirements for facilities in Allegheny County. The commentator requests that the Department pay special attention to sources within Allegheny County whose air emissions performance might improve through more stringent RACT standards -- including the Clairton Coke Works, the Edgar Thomson Plant, and the Irvin Works.

The commentator suggests with respect to the Clairton Coke Works, the Department should consider a meaningful work practices plan for the control of coke oven emissions from leaking doors, lids, and offtake piping, and charging of coke oven batteries. As the product of combustion, NO<sub>x</sub> would be one of a number of harmful air pollutants emitted from this source. Additionally, the Department should consider a leak detection and repair program for VOCs.

**Response:** Please see the response to Comment #20.

#### **Municipal Solid Waste Landfill**

**71. Comment:** A commentator recommends that § 129.112(e) be amended to reflect recent changes in applicable Federal regulations published in the *Federal Register* on May 21, 2021, effective June 21, 2021. Specifically, those changes stem from the adoption of the Federal Plan for municipal solid waste (MSW) landfills that commenced construction on or before July 17, 2014, and landfills that are constructed, reconstructed or modified on or after July 18, 2014. The commentator suggested regulatory language in the comments letter.

**Response:** Please see the response to Comment #38.

## Municipal Waste Combustor

**72. Comment:** Some commentators suggest that the Department should set a lower presumptive RACT limit for MWCs. These commentators also suggest that the Department evaluate the OTC SAS recommendations while establishing presumptive NO<sub>x</sub> limits. RACT is supposed to be technology forcing and such sources are already equipped with both low NO<sub>x</sub> burners and selective non-catalytic reduction controls. The Department should also consider at least this level of NO<sub>x</sub> control to be presumptive RACT for incinerators.

**Response:** Proposed § 129.112(f) has been amended in this final-form rulemaking from 150 ppmvd NO<sub>x</sub> @ 7% oxygen to 110 ppmvd NO<sub>x</sub> @ 7% oxygen. The supporting analysis for establishing this presumptive NO<sub>x</sub> RACT limitation can be found in Section IV(E) of the TSD for this final-form rulemaking.

**73. Comment:** A commentator requests that a limit be set for the Delaware Valley Resource Recovery Facility that requires the installation and effective operation of NO<sub>x</sub> controls at that facility, which currently has no pollution control technology for NO<sub>x</sub>. The limit should be based on the most effective control technology possible and, at minimum, Covanta should be required to conduct a study assessing the most effective NO<sub>x</sub> controls that can be installed on the plant.

**Response:** Please see the responses to Comments #23 and #72.

**74. Comment:** A commentator notes that facility owners or operators of MWCs who claim that they are unable to meet the presumptive NO<sub>x</sub> RACT limit may submit facility-specific analyses requesting a weaker limit, but the proposed rulemaking establishes no process for considering whether an individual source can achieve a stronger and more protective limit. The proposed rulemaking also weakens the standard by allowing a source owner or operator to elect to meet the presumptive limit through facility or system-wide emissions averaging. This poses a problem especially in environmental justice areas. The Board should revise the proposed rulemaking to correct these flaws for MWCs.

**Response:** A presumptive limit is set at a level that, when met, assures that the Commonwealth's RACT obligation under the CAA has been met. The Department determined that it is appropriate to set presumptive RACT requirements and RACT emission limitations for certain source categories, including MWCs.

NO<sub>x</sub> emissions averaging plans or alternative RACT proposals are submitted to the Department for review and approval, denial or modification in accordance with § 129.113(g) and (i). The approval or modification of a NO<sub>x</sub> emissions averaging plan or alternative RACT proposal and the Department's proposed actions are subject to public review and comment at the State level before being finalized by the Department. If approved and issued by the Department as an operating permit modification, the NO<sub>x</sub> emissions averaging plan or alternative RACT proposal will be submitted by the Department to the EPA as a revision to the Commonwealth's SIP. The local county agencies in Allegheny County and Philadelphia County follow a similar process.

**75. Comment:** The commentator suggested that alternatively, the Department may propose case-by-case RACT determinations for MWC units and use the OTC SAS RACT tool and associated cost-effectiveness thresholds in place of presumptive requirements.

**Response:** The Department determined that it is appropriate to establish presumptive NO<sub>x</sub> RACT emission limitations for MWCs.

Please also see the Department response to Comment #73.

**76. Comment:** A commentator states that proposed § 129.112 contains a presumptive RACT limit of 150 ppmvd @ 7% oxygen for MWCs. This revised limit was based, in part, on emissions data summarized in the TSD presented during the May 19, 2021, meeting of the Environmental Quality Board. That document contains NO<sub>x</sub> emissions data (Appendix 6) for the commentator's MWC facilities in York County, Montgomery County, Delaware County (3 of 6 units), Lancaster County and Dauphin County for the years 2018 and 2019. Referencing this data set, the Department concluded that achieving a proposed NO<sub>x</sub> emissions limit of 150 ppmvd @ 7% oxygen was readily achievable for each of these facilities. With the exception of the facilities in Delaware and York Counties, the remaining MWCs employ SNCR technology for the control of NO<sub>x</sub> emissions, which is considered Best Available Control Technology (BACT) for the combustion technologies in use by these facilities. When optimized, SNCR is capable of achieving the proposed RACT NO<sub>x</sub> limit at these facilities. However, SNCR has not been demonstrated as being technically feasible for the mass burn rotary combustor technology employed at the Delaware and York County MWCs. In addition, for RACT purposes, the Department has concluded that a SNCR retrofit for certain existing MWCs is economically infeasible. Despite these limitations, the commentator has proposed to voluntarily field test SNCR technology on one unit at the Delaware County MWC through a Request for Determination submitted to the Department (which has been approved). The results of that field test are not expected to be available prior to the anticipated publication of the RACT III rulemaking as final. Therefore, SNCR technology cannot be relied on for NO<sub>x</sub> control at this time at these two facilities.

**Response:** Section 129.112(f) has been amended from the proposed 150 ppmvd NO<sub>x</sub> @ 7% oxygen to 110 ppmvd NO<sub>x</sub> @ 7% oxygen in this final-form rulemaking. The NO<sub>x</sub> emission rate of 110 ppmvd @ 7% oxygen on a 24-hour averaging period for large MWCs was recommended by the OTC SAS MWC workgroup in its June 2021 "Municipal Waste Combustor Workgroup Report," and the Department's analysis shows that this limit is feasible for RACT. If an owner or operator cannot meet the presumptive emission limit, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation.

Please also see the Department response to Comment #73.

**77. Comment:** The same commentator states that the TSD also evaluates Selective Catalytic Reduction (SCR) as a potential control technology for MWCs. The TSD concludes that SCR is technically infeasible for MWCs. The commentator concurs with the conclusion as no existing MWC has been retrofitted with SCR technology due to technical, logistical and economic limitations. The conclusion that SCR is not RACT for NO<sub>x</sub> control at existing MWCs is

supported by NO<sub>x</sub> RACT determinations for the 2015 Ozone NAAQS in both Virginia and Maryland.

**Response:** The Department acknowledges the comment and agrees with the commentator.

#### **Combustion Unit or Process Heater**

**78. Comment:** The commentator believes that implementing a presumptive RACT limit as lbs. NO<sub>x</sub>/hr. assures acceptable performance by limiting the lbs. NO<sub>x</sub>/hr. during all conditions, including during those special conditions which include start-up or shutdown periods.

**Response:** Standards or emission limitations based on heat input, expressed as lb/million Btu, as opposed to mass emission rate, expressed as lb NO<sub>x</sub>/hr, are appropriate. A standard based on heat input allows for consistent emission levels across varying sizes of combustion units. Additionally, emission limitations based on heat input encourage combustion unit operation at greater thermal efficiency and discourage extended periods of start-up and shut down operation.

**79. Comment:** The commentator believes that start-up and periods of low load operations should be exempted from the presumptive NO<sub>x</sub> RACT requirement for circulating fluidized bed (CFB) boilers firing primarily coal refuse.

**Response:** Presumptive RACT requirements apply at all times, including start-up, shutdown, and low load operation. Based on continuous emissions monitoring data for the years 2018—2020, CFBs can meet the presumptive NO<sub>x</sub> RACT emission limitation on a daily basis including periods of start-up, shutdown, and low load operation. The owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation if they believe that the presumptive RACT limitation cannot be met at all times.

Please also see the Department responses to Comments #91—93.

**80. Comment:** The commentators believe that the presumptive NO<sub>x</sub> RACT emissions limit for CFB boilers primarily firing anthracite waste such as culm should be the same rate as those primarily firing bituminous waste such as gob.

**Response:** The Department acknowledges the comment and agrees with the commentators. The RACT emission limitation for a CFB combustion unit with a rated heat input equal to or greater than 250 million Btu/hour firing waste products of coal mining, physical coal cleaning and coal preparation operations that contain coal, matrix material, clay and other organic and inorganic material is 0.16 lb NO<sub>x</sub>/million Btu heat input when firing primarily bituminous waste such as gob and 0.16 lb NO<sub>x</sub>/million Btu heat input when firing primarily anthracite waste such as culm.

**81. Comment:** The commentator stated that the proposed rulemaking should be amended to include a lowered presumptive NO<sub>x</sub> emissions limit for coal-fired EGUs without the problematic inlet-temperature loophole from RACT II. The commentator stated that Pennsylvania's "case-by-case approach" for coal plant NO<sub>x</sub> RACT determinations, involving a "top-down analysis," is inappropriate for several reasons.

The commentator stated that no evidence or material exists in the record to support a determination that not only are Pennsylvania's coal-fired power plants somehow different from the coal-fired power plants in other states (such as Delaware, Maryland, and New Jersey) that have developed presumptive NO<sub>x</sub> RACT emission limits, but that Pennsylvania's coal-fired power plants are likewise different from other source categories in Pennsylvania for which the proposed rulemaking does include presumptive RACT. Therefore, the Department's election to exclude coal-fired power plants from the RACT III proposed rulemaking is arbitrary and capricious.

The commentator recommends that Pennsylvania set a new NO<sub>x</sub> RACT standard for its coal-fired power plants that incorporates a 0.07 lbs/MMbtu emission limit, eschews control inlet temperature-based exemptions, and includes a short term, 24-hour emission limit at least as low as 0.125 lbs/MMbtu. This presumptive RACT regime would be consistent with NO<sub>x</sub> control levels achievable by Pennsylvania's coal-fired power plant fleet based on its operational history and would likewise be consistent with emission limits set in other OTC states.

In the RACT III rulemaking, the Department should incorporate emission limits that are required at all times coal-fired EGUs are operating. These limits would be in keeping with not only current understandings of available technology, but with the RACT determinations made in other OTR states. Multiple other states in the OTC impose short-term NO<sub>x</sub> emission limits on their coal-fired power plants; Pennsylvania should do the same as part of the RACT III proposed rulemaking. Accordingly, any RACT III rulemaking or determination concerning Pennsylvania's coal-fired power plants should incorporate a short-term emission NO<sub>x</sub> limit at least as protective as 0.125 lbs/MMbtu on a 24-hour average.

**Response:** The source category presumptive RACT limitation recommended by the commentator is outside the scope of this rulemaking. Nothing in the CAA or regulations thereunder mandates that the Commonwealth establish a presumptive RACT limit for coal-fired power plants as suggested by the commentator. The CAA provides States with "broad authority to determine the methods and particular control strategies they will use to achieve the [CAA] statutory requirements." See *BCCA Appeal Group v. EPA*, 355 F.3d 817, 822 (5th Cir. 2003). The determination of RACT and the corresponding emission rate ensuring the proper application and operation of RACT may vary from source to source due to source configuration, retrofit feasibility, operating procedures, raw materials, and other technical or economic characteristics of a source or group of sources. See 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](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19761209_strelow_ract.pdf); see also *Nat'l Steel Corp., Great Lakes Steel Div. v. Gorsuch*, 700 F.2d 314, 322-323 (6th Cir. 1983).

For some categories of sources, the EPA has promulgated CTGs and alternative control techniques documents (ACTs) to assist States in determining what control techniques meet the RACT requirement; States may opt to require alternative controls rather than following the CTGs. See *NRDC v. EPA*, 571 F.3d 1245, 1253-1254 (D.C. Cir 2009). The ACTs issued under

section 183 of the CAA (42 U.S.C.A. § 7511b), such as the EPA's 1994 Alternative Control Techniques Document for Utility Boilers, do not establish presumptive levels of control. *Id.* Moreover, simply because other states have chosen to establish presumptive RACT does not mean that Pennsylvania is required to do so. See Memorandum from William T. Harnett, Director, Air Quality Policy Division, USEPA, to Regional Air Division Directors, "RACT Qs & As – Reasonably Available Control Technology (RACT): Questions and Answers" (May 18, 2006), at 1 and 3, available at: [https://www.epa.gov/sites/production/files/201608/documents/ract\\_and\\_nsps\\_1dec1988.pdf](https://www.epa.gov/sites/production/files/201608/documents/ract_and_nsps_1dec1988.pdf) (A State may elect to select beyond-RACT controls for policy reasons to attain and maintain the NAAQS).

Although the Department is under no obligation to establish presumptive RACT requirements and RACT emission limitations for a specific source category, the Department may do so when the Department determines that a source category contains emission units that are similar enough in nature that the emission units in the source category can be regulated by a consistent emission limitation or requirement. However, based on the varying sizes, various operating scenarios and conditions, and other varying factors for coal-fired EGUs in Pennsylvania, the Department determined that it is appropriate for owners and operators of large coal-fired combustion units to obtain case-specific RACT determinations. Through these case-by-case submittals, the Department will be reviewing advances in technology. See *NRDC v. EPA*, 71 F.3d 1245 (D.C. Cir 2009). This position is supported by the EPA at 44 FR 53761, 53762-53763 (September 17, 1979), regarding State Implementation Plans, General Preamble for Proposed Rulemaking on Approval of Plan Revisions for Nonattainment Areas-Supplement (on Control Techniques Guidelines) and at 57 FR 18070, 18073-18074 (April 28, 1992), regarding State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Supplemental. See also 57 FR 55620 (Nov. 25, 1992) at page 55624, paragraph 3.4, "VOC and NO<sub>x</sub> Emissions."

The Department previously submitted case-by-case submittals under §§ 129.91—129.95 (RACT I) to the EPA to meet the Commonwealth's RACT obligations under the CAA for the 1979 and 1993 1-hour ozone NAAQS. The Department is currently conducting case-by-case determinations under §§ 129.96—129.100 (RACT II) for existing coal-fired combustion units with SCR systems due to the U.S. Third Circuit Court of Appeals decision in *Sierra Club v. EPA*, 972 F.3d 290 (3d Cir 2020). ("Sierra Club"). In *Sierra Club*, the Third Circuit noted that older coal plants may submit source-specific RACT limits under § 129.99. *Id.* at 296.

The Department determined that the best method to comply with the Court's decision is through requiring the owner or operator of each coal-fired combustion unit affected by the Court's decision to submit case-by-case RACT determinations in accordance with the procedures in § 129.92(a)(1)—(5) and (b), which includes a top-down analysis due to variability in operation and control device configuration. 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.

Because of operating parameter variability and other plant-specific characteristics of large coal-fired combustion units, the Department concludes that a case-by-case approach for NO<sub>x</sub> RACT is more appropriate than setting a presumptive NO<sub>x</sub> RACT emission limitation for all large coal-fired combustion units. Case-by-case RACT determinations include a top-down analysis. The Department will review the proposed case-by-case determinations and incorporate the final determinations and associated conditions into the facility's Title V operating permit upon consideration of public comments. The RACT determinations incorporated into the Title V operating permit will then be submitted to the EPA as part of the SIP revision. A coal-fired combustion unit with a rated heat input equal to or greater than 250 million Btu/hour that is not a circulating fluidized bed coal-fired combustion unit is currently required to submit an alternative RACT proposal under § 129.99.

### **Combustion Turbine**

**82. Comment:** A commentator suggests modifying the NO<sub>x</sub> emissions level for simple cycle or regenerative cycle combustion turbines in proposed § 129.112(g)(2)(iii) from 85 ppmvd to 150 ppmvd NO<sub>x</sub>.

The Department states, “most natural gas or noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with rated output equal to or greater than 1000 bhp and less than 3000 bhp are installed with DLNC [Dry Low NO<sub>x</sub> Combustion].” The commentator claims not to have a DLNC option for turbines in the 1000-4100 bhp range.

The Department also states that “...an analysis of test results of actual NO<sub>x</sub> emissions show as high as 84 ppmvd @ 15% oxygen.” And goes on to conclude, “Therefore, the Department is proposing 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 or greater than 1,000 bhp and less than 3,000 bhp, shall comply with the presumptive RACT emission limitation of 85 ppmvd NO<sub>x</sub> corrected at 15% oxygen. [§ 129.112(g)(2)(iii)(A)]”

While the Department dataset for the 1000-3000 bhp size range may show a high of 84 ppm, setting a presumptive RACT at 85 ppm is not recommended. The value is significantly lower than manufacturer warranty levels for the affected equipment and does not allow for any margin to account for the effect of fuel variation, seasonal variation, engine to engine variation, etc.

The typical emissions warranty of the commentator's turbines in this size range is either 100 or 150 ppm NO<sub>x</sub> depending on the model, rating, and date of manufacture. Warranty levels account for engine-to-engine variability, site conditions, fuel variability, operating margin, etc. The commentator's test cell data for turbines in this size range show a high value of 123 ppm NO<sub>x</sub>. Over 1100 units in this size range have been factory tested over the last ~20 years – 85 ppm NO<sub>x</sub> is not an appropriate level.

Setting a RACT at the level of 85 ppm NO<sub>x</sub> will result in numerous alternative RACT submittals since manufacturers will not warranty this emissions level. To avoid this lengthy administrative process, the commentator recommends the smallest RACT III category remain at 150 ppm NO<sub>x</sub>.

**Response:** Proposed § 129.112(g)(2)(iii)(A) is amended in this final-form rulemaking to revise the applicable presumptive RACT emission limitation for simple cycle or regenerative cycle combustion turbines when firing natural gas or a noncommercial gaseous fuel. Based on the Department's review of the information provided by the commentator as well as the Department's review of available stack test emissions data, the proposed presumptive NO<sub>x</sub> RACT emission limitation of 85 ppmvd @ 15% oxygen has been revised to 120 ppmvd @ 15% oxygen in this final-form rulemaking. Please also see Section IV(G) of the TSD for this final-form rulemaking.

Further, the Department notes that proposed § 129.112(g)(2)(iii)(A) is renumbered in this final-form rulemaking as § 129.112(g)(2)(iv)(A).

Please also see the Department response to Comment #27.

**83. Comment:** The commentator requests modifying the bhp size range for simple cycle or regenerative cycle combustion turbines in § 129.112(g)(2)(iii) and (iv) from 3,000 to 4,100 bhp. Incorporating this change will alleviate alternative RACT submittals for the Centaur® 40 4000 rating which does not have a DLNC technology option and therefore is unable to meet the 42 ppm NO<sub>x</sub> level. The other two ratings of the Centaur 40, the 4500 and 4700, have a DLNC option and can meet the proposed 42 ppm NO<sub>x</sub> level.

The commentator recently went through a similar rulemaking process/negotiation with New Mexico on their Ozone Rule for the Oil and Gas Sector, 20.2.50 NMAC, where the smallest category was set to ≥1000 to ≤4100 bhp at 150 ppm NO<sub>x</sub>. The commentator attached Table 3 of the New Mexico rule in the comment letter for reference (20.2.50.113).

While there may not be many Centaur 40 4000 combustion turbines left in Pennsylvania, changing the category size is important as the Department regulations are looked at as a model by other state agencies. Making the change will have minimal impact, if any, in Pennsylvania but will ensure the RACT conclusions match RACT technologies when other states follow the Department's lead.

**Response:** The Department reviewed the information provided by the commentator regarding the available turbines located in this Commonwealth. The information demonstrated that turbines with a rating less than 4,100 bhp cannot consistently meet the proposed 42 ppm NO<sub>x</sub> standard. Section 129.112(g)(2)(iii) is amended from proposed to this final-form rulemaking to revise the size ranges for simple cycle or regenerative cycle combustion turbines in response to the commentator's request. The size threshold of 3,000 bhp in proposed § 129.112(g)(2)(iii) for simple cycle or regenerative cycle combustion turbines has been amended in this final-form rulemaking to 4,100 bhp.

Further, the Department notes that proposed § 129.112(g)(2)(iii) is renumbered as final-form § 129.112(g)(2)(iv). As discussed in the response to Comment #82, the proposed presumptive NO<sub>x</sub> RACT emission limitation of 85 ppmvd @ 15% oxygen when firing natural gas or a

noncommercial gaseous fuel has been revised to 120 ppmvd @ 15% oxygen in final-form § 129.112(g)(2)(iv)(A).

The Department notes that proposed § 129.112(g)(2)(iv) is renumbered in this final-form rulemaking to § 129.112(g)(2)(v). Renumbered § 129.112(g)(2)(v) is further amended in this final-form rulemaking to establish 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 3,000 bhp) and less than 60,000 bhp. No changes are made to the applicable presumptive RACT emission limitations from proposed § 129.112(g)(2)(iv)(A)—(D) to final-form § 129.112(g)(2)(v)(A)—(D).

**84. Comment:** The commentator suggests splitting the source category for § 129.112(g)(2)(i). The commentator asks that the Department add a source category for combined cycle and CHP for  $\geq 1000$  to  $\leq 4100$  bhp and modify the current source category to range from  $>4100$  bhp to  $\leq 180$  MW. The commentator requests the NO<sub>x</sub> emissions level for the newly created category match those requested for simple cycle in § 129.112(g)(2)(iii) at 150 ppm NO<sub>x</sub>.

**Response:** 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 bhp and less than 180 MW. Section 129.112(g)(2)(i) is amended from proposed to this final-form rulemaking to establish 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 less than 180 MW). Section 129.112(g)(2)(i)(A) is amended from proposed to this final-form rulemaking to delete the proposed limitation of 42 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 120 ppmvd NO<sub>x</sub> @ 15% oxygen. Section 129.112(g)(2)(i)(C) is amended from proposed to this final-form rulemaking to delete the limitation of 96 ppmvd NO<sub>x</sub> @ 15% oxygen and add the limitation of 150 ppmvd NO<sub>x</sub> @ 15% oxygen. These limits are consistent with the presumptive NO<sub>x</sub> RACT emission limitations for the simple cycle or regenerative cycle combustion turbines in final-form § 129.112(g)(2)(iv).

Proposed § 129.112(g)(2)(ii) is amended in this final-form rulemaking to establish 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 and less than 180 MW. The applicable presumptive RACT emission limitations are established in final-form § 129.112(g)(2)(ii)(A)—(D). These limits are the same as the presumptive RACT emission limitations for the combined cycle or combined heat and power combustion turbines with a rated output equal to or greater than 1,000 bhp and less than 180 MW that were established in proposed § 129.112(g)(2)(i).

Please see the responses to Comments #82 and #83 for additional discussion of the changes to § 129.112(g)(2) from proposed to this final-form rulemaking.

**85. Comment:** Some commentators remarked upon various technical issues or errors, or both, with the assumptions contained in the TSD analysis related to the cost of SCR control on turbines.

**Response:** The Department evaluated the cost information provided by the commentator and reviewed the analysis provided in the TSD and appendices. The Department determined that the control devices included in the analysis are cost-effective for the control of NO<sub>x</sub> emissions for RACT. If an owner or operator cannot meet a presumptive RACT emission limitation, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

#### **Stationary Internal Combustion Engine**

**86. Comment:** The commentator asked if under the proposed RACT III rulemaking presumptive requirements, do “lean burn” engines firing liquid fuel include diesel-fired engines? Typically, the terms “lean burn” and “rich burn” are reserved for spark ignition (e.g., natural gas-fired) engines, but are not typically used to describe compression ignition (e.g., diesel-fired) engines.

**Response:** Yes, the category lean burn engines firing liquid fuel does include diesel-fired compression ignition engines for the purposes of the presumptive RACT VOC emission limitations in § 129.112(g)(3)(i)(B) and § 129.112(g)(3)(ii)(B).

**87. Comment:** Some commentators note that the proposed rulemaking includes a typographical error where it states a lower NO<sub>x</sub> limit for rich burn engines of 0.6 g/bhp-hr (for all engine sizes); the TSD indicates 2.0 g/bhp-hr for all units regardless of hp.

**Response:** The Department appreciates the comment and has corrected this typographical error. The limitation in § 129.112(g)(3)(iv)(A) has been revised from proposed 0.6 gram NO<sub>x</sub>/bhp-hr to 2.0 gram NO<sub>x</sub>/bhp-hr in this final-form rulemaking.

**88. Comment:** Some commentators remarked upon various technical issues or errors, or both, with the assumptions contained in the TSD analysis related to the cost of SCR control on engines.

**Response:** The Department evaluated the cost information provided by the commentators and reviewed the analysis provided in the TSD and appendices. The Department determined that the control devices included in the analysis are cost-effective for the control of NO<sub>x</sub> emissions for RACT. If an owner or operator cannot meet a presumptive RACT emission limitation, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

#### **Combustion Unit or Process Heater Firing Multiple Fuels**

**89. Comment:** A commentator states that for sources that are multi-fuel firing units that are not clearly addressed in § 129.112(g)(4) by not having a presumptive emission limit, the calculation in § 129.112(g)(4) should be able to be used. Example fuels are Blast Furnace Gas and Coke Oven Gas which are cleaned process byproduct fuels that are beneficially reused. It is not clear, from the regulation, on how such an evaluation would be completed for multi-fired units burning

these beneficially reused process gases. The commentator certainly agrees that a multi-fired unit should have the ability to demonstrate compliance with RACT III. Section 129.112(g)(4) should be broadened to include such beneficially reused process gases.

**Response:** Please see the response to Comment #29.

**90. Comment:** The commentator in Comment #89 suggested that as an alternative to broadening § 129.112(g)(4) to include beneficially reused process gases, § 129.112(k) could be revised to incorporate a multi-fuel fired unit approach.

**Response:** The owner or operator of a source firing a fuel not covered under the presumptive RACT emission limitations in § 129.112(g)(1)—(3) is required to submit a case-by-case proposal for an alternative RACT emission limitation in accordance with § 129.114(b) or § 129.114(c). The owner or operator may propose a method of compliance similar to the calculation in § 129.112(g)(4)(i) as part of the case-by-case RACT proposal submitted under § 129.114(b) or § 129.114(c).

### **Glass Melting Furnaces**

**91. Comment:** A commentator states that glass furnaces should not be included in the RACT III rulemaking since NO<sub>x</sub> emissions from glass furnaces are already comprehensively regulated under §§ 129.301—129.310 (relating to control of NO<sub>x</sub> emissions from glass melting furnaces). The existing glass melting furnace regulations establish a comprehensive scheme of NO<sub>x</sub> emissions limits, exemptions and alternative limits, start-up, shutdown and idling requirements, and compliance demonstration and recordkeeping requirements. Glass melting furnaces were not subject to RACT II. The glass industry appears to be the only industry sector that is already subject to industry-specific regulation.

**Response:** Each time the EPA revises a NAAQS under section 109 of the CAA, the Commonwealth is required to meet the applicable RACT requirements for covered sources under sections 182 and 184 of the CAA. These duties are charged to the Department and Environmental Quality Board, respectively, under the APCA. See for example, 35 P.S. §§ 4004, 4004.2 and 4005.

Although the glass melting furnace industry is regulated under §§ 129.301—129.310, the EPA did not expressly approve the regulations as RACT in its approval of the SIP revision at 76 FR 34021—34023 (August 22, 2011) due to the inclusion of start-up, shutdown and malfunction (SSM) exceptions, which are not allowable exceptions for the purposes of satisfying RACT under section 110(a)(2)(A) of the CAA (42 U.S.C.A. § 7410(a)(2)(A)). Consequently, the Department determined that certain provisions, including § 129.303(a) in the existing glass melting furnace regulations, preclude §§ 129.301—129.310 from meeting the presumptive standards in § 129.112(i) for the 2015 8-hour ozone NAAQS. Under this final-form rulemaking, the owner or operator of a glass melting furnace source that cannot meet the presumptive limit in § 129.112(i) may opt to submit a case-by-case proposal under § 129.114.

The EPA has also expressed concerns regarding the certification of §§ 129.301—129.310 as RACT for the 1997 and 2008 8-hour ozone NAAQS for purposes of the Commonwealth's RACT SIP Certification for the 1997 and 2008 8-hour ozone NAAQS. Final-form § 129.112(m) has been amended to reflect that the requirements and emission limitations for glass melting furnaces in § 129.112(i) would supersede existing requirements under §§ 129.301—129.310 unless the requirements or emission limitations of §§ 129.301—129.310 are more stringent. If an owner or operator cannot meet a presumptive RACT emission limit established under § 129.112(i), the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation. To the extent that there is a conflict between § 129.112(i) and §§ 129.301—129.310, the owner or operator shall comply with the more stringent applicable standard to satisfy RACT for the 2015 8-hour ozone NAAQS.

Certification by the EPA of § 129.112(i) as RACT for glass melting furnaces for the 2015 8-hour ozone NAAQS will be presumed to certify RACT for glass melting furnaces for the 1997 and 2008 8-hour ozone NAAQS.

The Department disagrees with the commentator's assertion that glass melting furnaces are the only source category subject to presumptive RACT requirements that are also subject to other source category specific regulations. For example, Portland cement kilns, which are regulated under 25 Pa. Code §§ 145.141—145.146 (relating to emissions of NO<sub>x</sub> from cement manufacturing), have presumptive NO<sub>x</sub> RACT requirements established in § 129.112(h).

Please also see the responses to Comments #16, #92 and #93.

**92. Comment:** A commentator states RACT III would indirectly revoke important components of the existing glass melting furnace regulations regarding allowable emissions during start-up, shutdown and idling, and the provisions for alternative limits.

The proposed RACT III rulemaking should not override and essentially rescind other currently applicable regulations without recognition and notice of the effect of the proposed rulemaking, and without any explanation by the Board as to the rationale and basis for doing so. A change to the regulation to impose a RACT program in place of existing specific industry-focused rules is arbitrary and capricious.

**Response:** Please see the responses to Comments #16, #91 and #93.

**93. Comment:** A commentator states that RACT III should preserve the start-up, shutdown, and idling provisions of the existing glass melting furnace regulations. The proposed RACT III rulemaking would apply the emission limits without exceptions for these periods in which it is difficult or impossible to meet the proposed limits. The control equipment cannot be operated during start-up, shutdown, and idling without damaging the equipment and it will be very difficult or impossible to meet the RACT III NO<sub>x</sub> limits during these times.

Additionally, the RACT III NO<sub>x</sub> limits for glass melting furnaces do not make sense for flat glass furnaces during start-up, shutdown and idling since no glass is produced when a flat glass furnace is starting up, shutting down, or idling. During these times, the concept of measuring NO<sub>x</sub> emissions in terms of glass produced is unworkable and effectively imposes a zero

emissions limit for NO<sub>x</sub> during start-up, shutdown and idling. For these reasons, glass melting furnaces are different than essentially every other industry.

Further, there is no analysis provided to evaluate what additional controls might be required to allow the achievement of the glass melting furnace emission limits without the ability to use the exemptions applicable to start-up, shutdown and idling provided in §§ 129.301—129.310. The failure to explain the reasoning of the proposal, and the lack of any consideration of technical and cost issues associated with this aspect of the RACT III rulemaking, is arbitrary and capricious.

**Response:** RACT requirements and RACT emission limitations are applicable at all times, including start-up, shutdown and idling. The presumptive NO<sub>x</sub> RACT limits for glass melting furnaces are in units of pounds of NO<sub>x</sub> per ton of glass pulled. The Department disagrees with the commentator that the presumptive NO<sub>x</sub> RACT emission limitation “effectively imposes a zero emissions limit for NO<sub>x</sub> during start-up, shutdown and idling.” During times when glass is not being pulled, the emissions in terms of pounds of NO<sub>x</sub> per ton of glass pulled is not zero. The applicable emission rate when compared to the NO<sub>x</sub> RACT emission limitation is undefined because the denominator is zero. An undefined emission rate is not above an emission standard and cannot be in violation of it. The RACT limit is therefore only practically applicable at times when glass is being pulled. This is similar to the approach taken for presumptive NO<sub>x</sub> RACT emission limitations for cement kilns, which are expressed in terms of pounds of NO<sub>x</sub> per ton of clinker produced. If an owner or operator cannot meet a presumptive RACT emission limit, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

The Department further notes that exemptions from emission limitations during periods of start-up, shutdown and malfunction (SSM) existed in a number of other States’ regulations, some of which exemptions were adopted and approved into those States’ SIPs by the EPA many years ago. Court decisions have previously held that under the CAA, such exemptions are not allowed in SIPs. Moreover, on May 22, 2015, the EPA Administrator Gina McCarthy signed a final action to ensure states have plans in place that are fully consistent with the Clean Air Act (CAA) and recent court decisions concerning SSM operations. See, for example, *Sierra Club et al. v. Jackson*, No. 3:10-cv-04060–CRB (N.D. Cal.) and *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008). In response to these court decisions, on June 12, 2015, the EPA published a final rule to restate and update the EPA’s SSM Policy applicable to SIPs and to ensure States have plans in place that are fully consistent with the CAA and court decisions concerning emissions during periods of SSM operations. See 80 FR 33840 (June 12, 2015) (2015 SSM final action). The 2015 SSM final action embodies the EPA’s updated SSM Policy as it applies to SIP provisions. The SSM Policy provides guidance to states for compliance with CAA requirements for SIP provisions applicable to excess emissions during SSM events. See “Emissions During Periods of Startup, Shutdown, & Malfunction (SSM)” at <https://www.epa.gov/air-quality-implementation-plans/emissions-during-periods-startup-shutdown-malfunction-ssm>.

On October 9, 2020, the EPA issued a memorandum of guidance providing that exemption provisions for SSM may be permissible in SIPs under certain circumstances. On September 30, 2021, the EPA issued a memorandum withdrawing the previous October 9, 2020, guidance and

reinstated the agency's prior policy in the 2015 SSM final action that SSM exemptions in SIPs are inconsistent with the CAA.

With regard to the commentator's contention that the final rulemaking is arbitrary and capricious, the Department performed a cost analysis for the installation and operation of SCR control technology on flat glass furnaces with an uncontrolled NO<sub>x</sub> emissions rate of 26.75 pounds of NO<sub>x</sub> per ton of glass pulled. The Department determined the cost-effectiveness to be less than \$500 per ton of NO<sub>x</sub> emissions reduced, which is well below the cost-effectiveness benchmark of \$3750 for RACT III. See Technical Support Document at 40-41. The installation of SCR controls is technically feasible as most of these sources are equipped with Oxy-firing and LNB or SCR control technology; the emissions limit in final-form § 129.112(i)(4) is identical to the emissions limit 25 Pa. Code § 129.304(a)(4). *Id.* Moreover, an owner or operator also has the choice to submit a case-by-case RACT proposal to the Department for review under final-form § 129.114(i).

Please also see the responses to Comments #16, #91 and #92.

**94. Comment:** A commentator states that technical guidance provided by the Department inaccurately estimates the cost of NO<sub>x</sub> controls for glass melting furnaces and the RACT III proposal is essentially silent on the rationale behind the imposition of presumptive RACT for glass melting furnaces. The commentator states that the Department relies on the EPA's Control Cost Manual for some of its economic feasibility arguments but fails to recognize the uncertainty is around ±30% and the SCR cost model is based on data from utility boilers, not glass melting furnaces. The commentator contends that Department errs in assuming that SCR, by itself, is the appropriate control technology. For SCR to function reliably on a flat glass furnace, the commentator states that it needs to be combined with a particulate control technology. The commentator provided a cost analysis in their comment letter.

**Response:** Please see the response to Comment #18. Please also see Section IV(J) and Appendices 32 and 33 of the TSD for this final-form rulemaking.

**95. Comment:** A commentator requests that the Department provide more appropriate time frames for installation of controls if glass melting furnaces are included in RACT III. Flat glass furnaces are designed to run continuously. Once the furnace cools, the refractory is damaged and the furnace needs to be rebuilt before it can be placed back in operation. The RACT III rulemaking presents a significant concern because the installation of control technology to reduce NO<sub>x</sub> emissions will require any affected furnace to be shut down to install the controls. The proposed rulemaking includes submitting a petition and limit by the 3-year maximum time frame which makes the RACT III proposal unreasonable and unduly burdensome. The commentator requests a longer time frame to install the control.

**Response:** The Department appreciates the commentators' concerns and is committed to conducting outreach to affected owners and operators to assist in compliance. The implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS.

Please also see the Department responses to Comments #4, #6, #43 and #91.

### **Lime Kilns**

**96. Comment:** The commentator states that their facility, which consists of three lime kilns, was subject to the RACT II provisions established in §§ 129.96—129.100. The commentator worked through an extensive technical review with the Department as part of the alternative RACT proposal process that ultimately culminated in the establishment of NO<sub>x</sub> emissions limits for two kilns.

In the current proposed rulemaking, the Department outlines a presumptive RACT limitation of 4.6 pounds of NO<sub>x</sub> per ton of lime produced on a 30-operating day rolling average for any lime kiln operating in the Commonwealth. As noted in the Bulletin, the prior draft version of the proposed rulemaking, which went through advisory committee meetings and Citizens Advisory Council (CAC) meetings, identified the following specific 30-operating day NO<sub>x</sub> limits for Graymont Pleasant Gap Plant under proposed § 129.112(j):

- 205 pounds per hour (lb/hr) for Kiln 6;
- 179 lb/hr for Kiln 7; and
- 7.9 lb/hr for Kiln 8.

The commentator confirms the agency assertion that the already-established emissions limitations for Kilns 6, 7 and 8 are effectively more restrictive than the current industry-wide rate in the proposed rulemaking. However, the commentator would have to perform substantial system changes to incorporate live production data into the well-established CEMS data management system. The system's underlying algorithms would need to be revised to account for the new limitation while retaining mechanisms for demonstrating compliance with the existing limits as well. These material modifications to the CEMS and its data management systems would not result in any environmental benefit.

The commentator requests that the Department update the proposed rulemaking to once again include the specific lb/hr 30-operating day rolling average numerical limits associated with Graymont's Kiln 6, Kiln 7 and Kiln 8. By doing so, the Department will 1) help alleviate unnecessary burden on Graymont that results in no environmental benefit, and 2) more directly, and consistently, enforce more stringent NO<sub>x</sub> emissions levels than the current proposal and in turn help achieve the goal of the regulation.

**Response:** The Department disagrees that substantial changes would be needed to demonstrate compliance with the proposed standard. The amount of lime produced is a known quantity and can be added to the CEMS data management system. The calculation of a lb NO<sub>x</sub> per ton of lime produced value is not unnecessarily burdensome.

### **Direct-Fired Heaters, Furnaces and Ovens**

**97. Comment:** A commentator states that in proposed § 129.112(k) for RACT III regulations, the Department proposed to apply the same NO<sub>x</sub> limit for a direct-fired heater, furnace, or oven

as the limit for indirect-fired furnaces established in RACT II. The basis of this determination is not clear from the rulemaking record and is inconsistent with prior determinations. There are significant technological differences between direct-fired heaters, furnaces, and ovens and indirect-fired units. During prior RACT rulemakings and evaluations, the technologies employed for indirect-fired units have been shown to not be technologically or economically feasible for direct-fired units. The commentator respectfully requests that the Department provide additional information to support the “presumptive RACT” requirement for direct-fired units. Most indirect-furnace technologies are not transferrable to direct-furnace units without major modifications, effects to product capacity and quality, increased fuel usage, and potential derating of a furnace. When finalizing the rulemaking, the Department should not require sources to redo case-by-case RACT determinations that were just evaluated and approved in RACT II.

**Response:** Please see the responses to Comments #31 and #41.

**98. Comment:** The same commentator additionally requests that the Department identify which fuel or fuels were assumed to be combusted in the direct-fired sources from which the presumptive RACT limit of 0.1 lb NO<sub>x</sub>/mmbtu was derived.

**Response:** The presumptive NO<sub>x</sub> RACT emission limitation established for this source category was based upon the use of natural gas as the fuel. The use of other fuels does not preclude an owner or operator from complying with the applicable presumptive NO<sub>x</sub> RACT emission limitation. If an owner or operator cannot meet the applicable presumptive RACT emission limitation, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

#### **Section 129.113 – Facility-wide or system-wide NO<sub>x</sub> emission averaging plan general requirements**

**99. Comment:** A commentator states that the ability for an owner or operator to file for an averaging plan should not be contingent upon one unit not being able to meet the NO<sub>x</sub> RACT limit. Facility-wide and system-wide averaging plans should be able to be submitted at the discretion of the owner or operator as part of an overall strategy to achieve and maintain the emissions specified by this RACT rulemaking.

**Response:** Please see the response to Comment #32.

**100. Comment:** A commentator believes that system-wide averaging does not need to be limited to units located in the same ozone nonattainment area. Affected units located in different nonattainment areas should be able to average their emissions so long as the unit(s) that is/are over-controlled is/are located in the area with a more stringent ozone nonattainment designation. That is exactly how emission reduction credits (ERCs) are regulated and are able to be used to allow the construction of modified or new emissions sources in actual nonattainment areas and the OTR.

**Response:** See response to Comment #33.

**101. Comment:** The commentator states that the proposed regulation appears to only allow averaging of emissions across all sources at a facility when the sources are subject to presumptive limits. Averaging across a facility should be allowed in all cases, including when an alternative RACT proposal is made and adopted for a source. The RACT rulemaking is limiting emissions for the purposes of impacting ozone formation significantly downwind of an area. If emissions are slightly higher from one source on a site, they should be able to be offset by lower emissions from other sources on the site. The net effect downwind from the facility will be the same as if all sources met their respective limits. This is especially important when compliance is measured on a daily basis, as emissions are typically variable over shorter time periods.

**Response:** The averaging provisions of § 129.113 only apply in the case where all units under the averaging plan are subject to presumptive RACT emission limitations. An owner or operator may propose an averaging plan as part of a case-by-case proposal under § 129.114 for an alternative RACT emission limitation for two or more units. An averaging plan under case-by-case would be evaluated as part of the case-by-case proposal under § 129.114 and may deviate from the averaging plan requirements of § 129.113.

**102. Comment:** A commentator states that proposed § 129.113(d) specifies that a source or sources may average NO<sub>x</sub> emissions by demonstrating that aggregate emissions emitted by the source(s) do not exceed the applicable NO<sub>x</sub> limit on a source specific basis. For RACT sources subject to a concentration-based NO<sub>x</sub> limit (i.e., parts per million), does the term 'aggregation' apply to that standard? For example, if a facility has two sources subject to a RACT NO<sub>x</sub> limit of 150 ppmvd as a daily average, would aggregation allow, for example, one unit to operate at 100 ppmvd and the second unit to operate at or below 200 ppmvd for the combined daily average of = 150 ppmvd?

**Response:** Please see the response to Comment #34.

#### **Section 129.114 – Alternate RACT proposal and petition for alternate compliance schedule**

**103. Comment:** The commentator requests an exemption for sources that have case-by-case RACT conditions and limits approved within 1 year of the effective date of the RACT II regulations, for sources that do not have proposed presumptive RACT III limits. Given the short period of time between approval of case-by-case limits under RACT II, the commentator believes there would be no benefit to make the same demonstration to comply with the RACT III regulations and making that demonstration would be unduly burdensome. The commentator suggests that the Department and the Board include an exemption for sources that have case-by-case RACT conditions and limits approved within 1 year of the effective date of the RACT II regulations. Alternatively, the Department and Board could include a provision that case-by-case RACT conditions and limits approved within 1 year of the effective date of the RACT II regulations are deemed to meet the requirements of the RACT III regulations for alternative RACT limits.

**Response:** Please see the responses to Comments #1 and #41.

By way of further response, the Commonwealth's RACT II Final Rulemaking (§§ 129.96—129.100) was effective on April 22, 2016; about 6 years have passed since that time. Because changes may have occurred regarding the technical and economic feasibility of RACT II emission limitations, controls or techniques and because RACT III is a separate CAA requirement, the owners and operators of facilities and sources seeking to submit a case-by-case RACT proposal for RACT III shall follow the process as set forth in § 129.114(d) or, if applicable, § 129.114(i).

**104. Comment:** The commentator pointed out a potential typo at § 129.114(i), which references to § 129.112(h)(4) and (h)(5). However, § 129.112(h)(4) and (h)(5) don't appear to exist. Can you clarify what this is intended to reference?

**Response:** The Department has amended § 129.114(i) from proposed to this final-form rulemaking to delete the references to § 129.112(b)(11), (h)(4) and (h)(5). The correct reference of § 129.112(c)(11) has been added to § 129.114(i). The reference to [§ 129.112] (i)—(k) remains.

**105. Comment:** The commentator requests clarification about the § 129.114(i) provision which specifies that a new case-by-case RACT analysis is not required to be submitted so long as nothing has changed. If a facility submitted a case-by-case analysis for RACT II and also is subject to case-by-case RACT III, what is the expectation for the submission? Is it simply an affirmative statement in the RACT III Notification that the company does not believe the conclusions would change and reference that analysis? Or, is it "refreshing" and re-submitting the analysis (with updated cost information, for example)? Another commentator requests that the Department confirm that where the proposed RACT III NO<sub>x</sub> or VOC limit is equivalent to the RACT II limit and an alternate RACT II limit was approved by the Department, the approved alternate RACT II limit would satisfy the RACT III limit or requirements, or both, as described in § 129.114(i). Another commentator requests that the Department accept the RACT II analyses for RACT III for sources where the presumptive limit either did not change or is still not presented in the proposed RACT III regulations, and where the control cost exceeds the RACT III levels as presented in the regulatory analysis document.

**Response:** Please see the responses to Comments #1 and #41 for additional information about the amendments to § 129.114(i).

**106. Comment:** Some commentators state that the schedule for compliance is too aggressive because the proposed rulemaking does not provide sufficient time to comply with presumptive RACT requirements. The commentator suggests the compliance date be set for 2 years after the effective date of the final rulemaking. The commentator suggests the petition deadline for an alternate compliance schedule with installation of an air cleaning device, and the petition deadline for an alternative compliance schedule when alternative RACT is requested, be set for 1 year after the effective date of the final rulemaking. The commentator requests that the compliance date for an alternate compliance schedule with no installation of an air cleaning device be set for 1 year after Department approval of the plan approval application.

**Response:** The Department appreciates the commentators' concerns and is committed to conducting outreach to affected owners and operators to assist in compliance. The implementation date of January 1, 2023 is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998.

Please also see the Department responses to Comments #4, #6 and #43.

**107. Comment:** Some commentators request that the final RACT III rulemaking contain language that affords the Department significant discretion with respect to alternative compliance schedules, in particular to industries whose operations make it difficult to shut down in order to install additional controls.

**Response:** The Department appreciates the commentators' concerns and is committed to conducting outreach to affected owners and operators to assist in compliance. The implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998.

Please also see the Department responses to Comments #4, #6 and #43.

**108. Comment:** A commentator states that many sources will require alternative RACT limits. Any technically feasible reductions would be nominal and with high-cost effectiveness values, which would require a significant number of case-by-case alternative RACT limits. This would be subject to the Department's review and approval. As a result, this would create a need to process a significant number of alternative RACT petitions and will require significant resources which the Department may not be contemplating.

**Response:** The presumptive RACT requirements and emission limitations were determined based on the technical and economic feasibility of emission control measures. The Department has developed an accompanying TSD for the source categories included in this final-form rulemaking. The Department expects that many owners and operators will benefit by complying with the presumptive RACT requirements and emission limitations. If an owner or operator cannot meet a presumptive RACT requirement or emission limitation, the owner or operator may submit a case-by-case proposal for an alternative RACT emission limitation.

**109. Comment:** The commentator believes that cost-effectiveness values (dollar per ton of pollutant removed) arrived at in the TSD's evaluation for presumptive RACT are reasonable and should be used as a standard for case-by-case evaluations of alternative limitations.

**Response:** The Department appreciates the commentator's support of the cost-effectiveness values provided in the TSD. However, because compliance costs may vary for each source or facility depending on the source size, type, operational limitations and which control option is selected by the owner and operator of the affected source or facility, the cost-effectiveness benchmarks used in the analysis of presumptive RACT requirements and RACT emission limitations are not to be taken as absolute cost-effectiveness threshold limits to be applied to case-by-case analyses. The Department believes that it is not appropriate to apply the same cost-effectiveness benchmarks used to determine the presumptive RACT requirements and RACT

emission limitations across all sources undergoing a case-by-case analysis due to these varying factors.

**110. Comment:** The commentator notes that the proposed RACT rulemaking limits would be applicable on and after January 1, 2023. The proposal allows 1 additional year; a 1-year grace period. The commentator suggests that this should not be permitted.

**Response:** The implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998.

Please also see the Department responses to Comments #4, #6 and #43.

**Section 129.115 – Written notification, compliance demonstration and recordkeeping and reporting requirements**

**111. Comment:** A commentator states that the purpose of § 129.115(a), which requires facilities to submit a very detailed written notification for sources subject to RACT as well as sources that are exempted, is unclear.

**Response:** The purpose of § 129.115(a) is to inform the Department about the facilities and sources that are subject to the RACT requirements and those that are exempt from the RACT requirements. This information is necessary to track compliance and provide data for internal and external information requests.

**112. Comment:** The commentator also states that requiring sources to advise the Department of a compliance methodology within 6 months of the effective date is not reasonable considering some sources will have to generate data, determine compliance, and review technologies.

**Response:** The Department acknowledges the commentator's concern, however, the implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998.

Please also see the Department responses to Comments #4, #6 and #43 regarding the implementation date of January 1, 2023.

**113. Comment:** Another commentator requests that the Board change the deadline to 1 year from the effective date of the rulemaking.

**Response:** The Department acknowledges the commentator's request, however, the implementation date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998.

Please also see the Department responses to Comments #4, #6 and #43 regarding the implementation date of January 1, 2023.

**114. Comment:** The commentator states that § 129.111(a) notes that the owner or operator shall identify and list the sources in paragraphs (1) and (2) in the written notification required under § 129.115(a), and requests that the Department revise the written notification to only include the facility's sources that are subject to the additional RACT (RACT III) requirements based on the proposed rulemaking, not sources subject to prior RACT limits or exemptions.

**Response:** The notification requirements are applicable to all major NO<sub>x</sub> and VOC emitting facilities. The provisions of §§ 129.115(a)(1) and 129.115(a)(2) apply to sources subject to and exempt from §§ 129.111—129.115. This includes sources subject to and exempt from other requirements, such as §§ 129.96—129.100.

**115. Comment:** The commentators state that when RACT limits are on a daily average basis, allowances or exemptions should be made for start-up and shutdown conditions, as well as partial day operations. Having only 24 hours of emissions in an average for compliance demonstration provides very little buffer for variable operations (30-day averages, as in the RACT II regulation, should be sufficient). Start-up and shutdown emissions are known to be higher than those during normal, baseline operations. Those emissions will skew the average rate higher, potentially above any limit, even when emissions are controlled during those events in accordance with good engineering practices and manufacturing specifications. It will be worse, if there are not a significant number of normal operating hours included in the daily average, like when operations start late in the day or end early in the day. Another commentator expressed similar concerns regarding a daily average for boilers used in an industrial setting.

**Response:** Please see the response to Comment #36.

Please also see the response to Comment #93 regarding the EPA's SSM Policy.

**116. Comment:** Some commentators express concerns about applying the NO<sub>x</sub> standard of 0.16 lb/MMBtu on a daily basis rather than on a 30-day rolling average basis for compliance with the presumptive RACT. The coal refuse to energy industry uses culm, gob or coal refuse as its fuel. This fuel source is unpredictable, with widely varying calorific content, ash content, moisture, and nitrogen, which could result in an average NO<sub>x</sub> rate over 0.16 lb/MMBtu on any given day. However, as demonstrated over the industry's historic operating averages, these plants continually average less than 0.16 lb/MMBtu over a 30-day rolling average period. As a result, we request that each coal refuse to energy facility continue to be permitted to demonstrate presumptive RACT on a 30-day rolling average basis. Otherwise, provisions need to be considered to eliminate the natural fluctuations of daily and instantaneous NO<sub>x</sub> values due to various plant conditions such as start-ups, shutdowns, transient upset conditions, and fuel fluctuations. Without either maintaining the 30-day rolling averaging period, providing exemptions for particular circumstances, or providing daily exceedance allowances, the majority of the waste coal to energy facilities would be forced to conduct resource intensive case-by-case RACT analyses as they would not be able to comply with the new daily average presumptive limit whereas historically they have been able to demonstrate consistently low NO<sub>x</sub> rates, below the presumptive limit, on a 30-day rolling average basis. This result would be contrary to the strong commitment from the Commonwealth in supporting the waste coal to energy industry.

**Response:** Please see the response to Comment #28 regarding when RACT requirements are applicable. Please also see the response to Comment #93 regarding the EPA's SSM Policy.

**117. Comment:** A commentator stated that the requirement that compliance must be demonstrated on a daily averaging period, as opposed to the current 30-operating day averaging period, is a very significant tightening of those presumptive limits which presents a significant compliance challenge for most of the affected units that supply steam in varying industrial settings.

**Response:** The Department evaluated available continuous emissions monitoring data and determined that certain source categories using CEMS, including combustion units and process heaters, are capable of meeting the proposed RACT III presumptive NO<sub>x</sub> emission limitations on a daily averaging basis. If an owner or operator of a subject source with a CEMS cannot meet the applicable presumptive RACT emission limitation using a daily averaging basis, the owner or operator has the option to submit a case-by-case proposal for an alternative RACT emission limitation.

**118. Comment:** The commentator in Comment #117 also notes that the State has achieved significant improvements in ambient air quality in recent years through the RACT II regulation which incorporated a 30-day averaging period.

**Response:** The Department agrees that the Commonwealth has continued to make progress in achieving and maintaining the ozone NAAQS. Please see the response to Comment #35 regarding progress in achieving ozone NAAQS.

**119. Comment:** Some commentators note that the term "daily average" is not defined in the proposed RACT III rulemaking. Based on the current CSMM Revision 8, the commentators request that the RACT III rulemaking define this averaging period to be calculated and validated as follows: 1) a daily block average (one calculated compliance average per day); 2) calculated as the arithmetic mean of the 1-hour averages in the daily period; and 3) considered valid if it contains at least 18 valid 1-hour averages during the daily period.

**Response:** Please see the response to Comment #37.

**120. Comment:** A commentator states that 1 year is not an adequate amount of time for completing implementation of the RACT requirement or emission limitation. Six months is an insufficient amount of time to manage all the necessary logistics, particularly given that Revision 3.3 of the Department's Source Testing Manual and certain Title V permits require compliance testing protocols to be submitted to the Department between 30 and 90 days prior to testing. The commentator suggests that the Board extend this time period to 2 years.

**Response:** The date of January 1, 2023, is fixed by the EPA implementation rule for the 2015 Ozone NAAQS. See 83 FR 62998; see also 40 CFR 51.1316(b)(3).

Please also see the Department responses to Comments #4, #6 and #43.

## Appendix A

### Commentator List

LAST NAME	FIRST NAME	AFFILIATION
Sumner	David	IRRC
Fernandez	Cristina	US EPA Region 3
Brill	Eli	Pennsylvania Waste Industry Association
Chinofsky	Christine	ALL4 LLC
Hacker	Amy	Vitro Flat Glass
Ackiewicz	John	Armstrong World Industries
Witherspoon	Leslie	Solar Turbines Incorporated
Wesloh	Steven M.	Frost Brown Todd LLC
Brisini	Vincent	Olympus Power LLC
Casilio	Tony	Domtar Paper Company - Johnsonburg
McCarthy	James	Innovative Environmental Solutions, Inc.
Steitz	Francis	New Jersey DEP
Walsh	Joseph	Covanta
Cline	Gary	Homer City Generating Station
Welty	Jim	Marcellus Shale Coalition
Pikul	Greg	Calpine Corporation
Weissinger	Thomas	Talen Energy
Kelso	Jason	Schuylkill Energy Resources
Brush	Alexander	Gilberton Power Company
Sunday	Kevin	PA Chamber of Business and Industry
Hardin	Christopher	United States Steel
Maitland	John	Graymont (PA) Inc.
Gibbons	Jaret	ARIPPA
Fabish	Zachary	Sierra Club
Ahlers	Christopher	Clean Air Council

### Commentators Requesting a Copy of the Final-Form Rulemaking

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Annex A  
TITLE 25. ENVIRONMENTAL PROTECTION  
PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Subpart C. PROTECTION OF NATURAL RESOURCES  
ARTICLE III. AIR RESOURCES

CHAPTER 121. GENERAL PROVISIONS

§ 121.1. Definitions.

The definitions in section 3 of the act (35 P.S. § 4003) apply to this article. In addition, the following words and terms, when used in this article, have the following meanings, unless the context clearly indicates otherwise:

\* \* \* \* \*

*Combustion efficiency*—A measure of the extent of a combustion reaction, abbreviated C. E. and computed as follows:

$$\text{C. E.} = \frac{[\text{CO}_2]}{[\text{CO}_2] + [\text{CO}]} \times 100\%$$

where: [CO<sub>2</sub>] = concentration of carbon dioxide and  
[CO] = concentration of carbon monoxide

**Combustion source—FOR PURPOSES OF §§ 129.111—129.115 (RELATING TO ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NO<sub>x</sub> AND VOCs FOR THE 2015 OZONE NAAQS):**

**(i) A stationary device that combusts solid, liquid or gaseous fuel used to produce heat or energy for industrial, commercial or institutional use by direct heat transfer.**

**(ii) The term does not include:**

**(A) Brick kilns.**

**(B) Cement kilns.**

**(C) Lime kilns.**

**(D) GLASS MELTING FURNACES.**

**(E) A SOURCE LISTED IN § 129.112(g)(2) OR (3) (RELATING TO PRESUMPTIVE RACT REQUIREMENTS, RACT EMISSION LIMITATIONS AND PETITION FOR ALTERNATIVE COMPLIANCE SCHEDULE).**

**(F) A SOURCE SUBJECT TO § 129.112(g)(4).**

*Combustion unit*—A stationary equipment used to burn fuel primarily for the purpose of producing power or heat by indirect heat transfer.

\* \* \* \* \*

*Major NO<sub>x</sub> emitting facility*—A facility which emits or has the potential to emit NO<sub>x</sub> from the processes located at the site or on contiguous properties under the common control of the same person at a rate greater than one of the following:

(i) Ten TPY in an ozone nonattainment area designated as extreme under section 182(c) and (f) of the Clean Air Act (42 U.S.C.A. § 7511a(e) and (f)).

(ii) Twenty-five TPY in an ozone nonattainment area designated as severe under section 182(d) and (f) of the Clean Air Act.

(iii) Fifty TPY in an area designated as serious under section 182(c) and (f) of the Clean Air Act.

(iv) One hundred TPY in an area included in an ozone transport region established under section 184 of the Clean Air Act (42 U.S.C.A. § 7511c).

(v) ~~Twenty-five~~ **FOR PURPOSES OF §§ 129.91—129.95 (RELATING TO STATIONARY SOURCES OF NO<sub>x</sub> AND VOCs), TWENTY-FIVE** TPY and is located in Bucks, Chester, Delaware, Montgomery or Philadelphia County. ~~This threshold does not apply to §§ 129.96—129.100 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs).~~

(vi) **FOR PURPOSES OF §§ 129.96—129.100 AND 129.111—129.115 (RELATING TO ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NO<sub>x</sub> AND VOCs; AND ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NO<sub>x</sub> AND VOCs FOR THE 2015 OZONE NAAQS), ONE HUNDRED** TPY STATEWIDE.

*Major VOC emitting facility*—A facility which emits or has the potential to emit VOCs from **THE** processes located at the site or on contiguous properties under the common control of the same person at a rate greater than one of the following:

(i) Ten TPY in an ozone nonattainment area designated as extreme under section 182(e) of the Clean Air Act.

(ii) Twenty-five TPY in an ozone nonattainment area designated as severe under section 182(d) of the Clean Air Act.

(iii) Fifty TPY in an area included in an ozone transport region established under section 184 of the Clean Air Act.

(iv) ~~Twenty-five~~ **FOR PURPOSES OF §§ 129.91—129.95, TWENTY-FIVE TPY** and is located in Bucks, Chester, Delaware, Montgomery or Philadelphia County. ~~This threshold does not apply to §§ 129.96—129.100.~~

(v) **FOR PURPOSES OF §§ 129.96—129.100 AND 129.111—129.115, FIFTY TPY STATEWIDE.**

\* \* \* \* \*

*Natural-finish hardwood plywood panel*—A panel on which the original grain pattern is enhanced by an essentially transparent finish frequently supplemented by filler and toner.

*Natural gas compression and transmission facility fugitive VOC air contamination source*—The group of fugitive-VOC-emitting components associated with an individual stationary source. Both of the following apply:

(i) The group of fugitive-VOC-emitting components is considered an individual VOC-emitting source.

(ii) Fugitive VOC emissions from the group of fugitive-VOC-emitting components are not aggregated with the VOC emissions from the associated individual stationary source.

*Necessary preconstruction approvals or permits*—Those permits or approvals required under the Clean Air Act or the act and regulations adopted under the acts, which are part of the applicable SIP.

\* \* \* \* \*

## CHAPTER 129. STANDARDS FOR SOURCES

### ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NO<sub>x</sub> AND VOCs FOR THE 2015 OZONE NAAQS

(*Editor's Note:* Sections 129.111—129.115 are proposed to be added and are printed in regular type to enhance readability.)

#### § 129.111. Applicability.

(a) Except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major NO<sub>x</sub> emitting facility **THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018**, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a major VOC emitting facility that ~~were in existence~~ **COMMENCED OPERATION** on or before August 3, 2018, for which a requirement or emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107. The owner or operator shall identify and list the **following** sources and facilities **SUBJECT TO THIS SUBSECTION** in the written notification required under §

129.115(a) (relating to written notification, compliance demonstration and recordkeeping and reporting requirements) **AS FOLLOWS:**

(1) The sources and facilities **THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018**, for which a requirement or emission limitation has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107.

(2) The sources and facilities **THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018, AND ARE** subject to §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107.

(b) Except as specified in subsection (c), the NO<sub>x</sub> requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a NO<sub>x</sub> emitting facility **THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018**, and the VOC requirements of this section and §§ 129.112—129.115 apply Statewide to the owner and operator of a VOC emitting facility **THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018**, when the installation **AND OPERATION** of a new source **AFTER AUGUST 3, 2018**, or a modification or change in operation **AFTER AUGUST 3, 2018**, of ~~an existing~~ **A source after THAT COMMENCED OPERATION ON OR BEFORE August 3, 2018**, results in the source or facility meeting the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility and for which a requirement or an emission limitation, or both, has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107. The owner or operator shall identify and list the ~~following~~ sources and facilities **SUBJECT TO THIS SUBSECTION** in the written notification required under § 129.115(a) **AS FOLLOWS:**

(1) The sources and facilities for which a requirement or emission limitation has not been established in §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107.

(2) The sources and facilities subject to §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, ~~129.71—129.73, 129.75~~ **129.71—129.75**, 129.77 and 129.101—129.107.

(c) Sections 129.112—129.114 do not apply to the owner and operator of a NO<sub>x</sub> air contamination source that has the potential to emit less than 1 TPY of NO<sub>x</sub> located at a major NO<sub>x</sub> emitting facility subject to subsection (a) or (b) or a VOC air contamination source that has the potential to emit less than 1 TPY of VOC located at a major VOC emitting facility subject to subsection (a) or (b). The owner or operator shall identify and list these sources in the written notification required under § 129.115(a).

(d) ~~This~~ EXCEPT AS SPECIFIED IN SUBSECTION (e), THIS section and §§ 129.112—129.115 do not apply to the owner and operator of a facility THAT COMMENCED OPERATION ON OR BEFORE AUGUST 3, 2018, that is not a major NO<sub>x</sub> emitting facility or a major VOC emitting facility on or before ~~blank~~ *(Editor's Note: The blank refers to the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)* DECEMBER 31, 2022.

(e) IF THE OWNER AND OPERATOR OF A FACILITY THAT COMPLIED WITH SUBSECTION (d) MEETS THE DEFINITION OF A MAJOR NO<sub>x</sub> EMITTING FACILITY OR A MAJOR VOC EMITTING FACILITY AFTER DECEMBER 31, 2022, THEN THE OWNER AND OPERATOR SHALL COMPLY WITH SUBSECTION (b).

**§ 129.112. Presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule.**

(a) The owner and operator of a source listed in one or more of subsections (b)—(k) located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 (relating to applicability) shall comply with the applicable presumptive RACT requirement or RACT emission limitation, or both, beginning with the specified compliance date as follows, unless an alternative compliance schedule is submitted and approved under subsections (n)—(p) or § 129.114 (relating to alternative RACT proposal and petition for alternative compliance schedule):

(1) January 1, 2023, for a source subject to § 129.111(a).

(2) January 1, 2023, or 1 year after the date the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(b) The owner and operator of a source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall comply with the applicable presumptive RACT requirements in paragraph (1) and recordkeeping and reporting requirements in paragraph (2).

(1) The owner or operator of a:

(i) Combustion unit **OR PROCESS HEATER** with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour shall conduct a biennial tune-up in accordance with the procedures in 40 CFR 63.11223 (relating to how do I demonstrate continuous compliance with the work practice and management practice standards?).

(A) Each biennial tune-up shall occur not less than 3 months and not more than 24 months after the date of the previous tune-up.

(B) The biennial tune-up must include, at a minimum, the following:

(I) Inspection and cleaning or replacement of fuel-burning equipment, including the burners and components, as necessary, for proper operation as specified by the manufacturer.

(II) Inspection of the flame pattern and adjustment of the burner, as necessary, to optimize the flame pattern to minimize total emissions of NO<sub>x</sub> and, to the extent possible, emissions of CO.

(III) Inspection and adjustment, as necessary, of the air-to-fuel ratio control system to ensure proper calibration and operation as specified by the manufacturer.

(ii) Combustion unit **OR PROCESS HEATER** with an oxygen trim system that maintains an optimum air-to-fuel ratio that would otherwise be subject to a biennial tune-up shall conduct a tune-up of the boiler one time in each 5-year calendar period in accordance with the following:

(A) Each tune-up shall occur not less than 3 months and not more than 60 months after the date of the previous tune-up.

(B) The tune-up must include, at a minimum, the following:

(I) Inspection and cleaning or replacement of fuel-burning equipment, including the burners and components, as necessary, for proper operation as specified by the manufacturer.

(II) Inspection of the flame pattern and adjustment of the burner, as necessary, to optimize the flame pattern to minimize total emissions of NO<sub>x</sub> and, to the extent possible, emissions of CO.

(III) Inspection and adjustment, as necessary, of the air-to-fuel ratio control system to ensure proper calibration and operation as specified by the manufacturer.

(2) The applicable recordkeeping and reporting requirements of ~~§ 129.115(e), (f) or (g)~~ § 129.115(f) AND (i) (relating to written notification, compliance demonstration and recordkeeping and reporting requirements).

(3) Compliance with the applicable presumptive RACT requirements in paragraph (1) and recordkeeping and reporting requirements in paragraph (2) assures compliance with the provisions in §§ 129.93(b)(2), (3), (4) and (5) and 129.97(b)(1), (2) and (3) (relating to presumptive RACT emissions limitations; and presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule).

(c) The owner and operator of a source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 shall install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices:

(1) A NO<sub>x</sub> air contamination source that has the potential to emit less than 5 TPY of NO<sub>x</sub>.

- (2) A VOC air contamination source that has the potential to emit less than 2.7 TPY of VOC.
- (3) 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.
- (4) A boiler or other combustion source with an individual rated gross heat input less than 20 million Btu/ hour.
- (5) A combustion turbine with a rated output less than 1,000 bhp.
- (6) A lean burn stationary internal combustion engine rated at less than 500 bhp (gross).
- (7) A rich burn stationary internal combustion engine rated at less than 100 bhp (gross).
- (8) An incinerator, thermal oxidizer ~~or~~, catalytic oxidizer **OR FLARE** used primarily for air pollution control.
- (9) A fuel-burning unit with an annual capacity factor of less than 5%.
- (i) For a combustion unit, the annual capacity factor is the ratio of the unit's heat input (in million Btu or equivalent units of measure) to the unit's maximum rated hourly heat input rate (in million Btu/hour or equivalent units of measure) multiplied by 8,760 hours during a period of 12 consecutive calendar months.
- (ii) For an electric generating unit, the annual capacity factor is the ratio of the unit's actual electric output (expressed in MWe/hr) to the unit's nameplate capacity (or maximum observed hourly gross load (in MWe/hr) if greater than the nameplate capacity) multiplied by 8,760 hours during a period of 12 consecutive calendar months.
- (iii) For any other unit, the annual capacity factor is the ratio of the unit's actual operating level to the unit's potential operating level during a period of 12 consecutive calendar months.
- (10) An emergency standby engine operating less than 500 hours in a 12-month rolling period.
- (11) An electric arc furnace.
- (d) Except as specified in subsection (c), the owner and operator of a combustion unit, brick kiln, cement kiln, lime kiln, GLASS MELTING FURNACE or ~~other~~ combustion source located at a major VOC emitting facility subject to § 129.111 shall install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices for the control of the VOC emissions from the combustion unit, BRICK KILN, CEMENT KILN, LIME KILN, GLASS MELTING FURNACE or ~~other~~ combustion source.
- (e) The owner and operator of a municipal solid waste landfill subject to § 129.111 shall comply with the following applicable presumptive RACT requirements. The owner or operator of a:

~~(1) Municipal solid waste landfill constructed, reconstructed or modified on or before May 29, 1991, shall comply with the emission guidelines and compliance times in 40 CFR Part 60, Subpart Ce (relating to emission guidelines and compliance times for municipal solid waste landfills), which are adopted and incorporated by reference in § 122.3 (relating to adoption of standards), and the applicable Federal or state plans in 40 CFR Part 62 (relating to approval and promulgation of state plans for designated facilities and pollutants).~~ **MUNICIPAL SOLID WASTE LANDFILL CONSTRUCTED, RECONSTRUCTED OR MODIFIED ON OR BEFORE JULY 17, 2014, THAT HAS 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 (RELATING TO FEDERAL PLAN REQUIREMENTS FOR MUNICIPAL SOLID WASTE LANDFILLS THAT COMMENCED CONSTRUCTION ON OR BEFORE JULY 17, 2014 AND HAVE NOT BEEN MODIFIED OR RECONSTRUCTED SINCE JULY 17, 2014).**

~~—(2) Municipal solid waste landfill constructed, reconstructed or modified on or after May 30, 1991, but on or before July 17, 2014, shall comply with the New Source Performance Standards in 40 CFR Part 60, Subpart WWW (relating to standards of performance for municipal solid waste landfills that commenced construction, reconstruction, or modification on or after May 30, 1991, but before July 18, 2014), which are adopted and incorporated by reference in § 122.3.~~

~~—(3)~~ **(2) Municipal solid waste 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 that commenced construction, reconstruction, or modification after July 17, 2014), which are adopted and incorporated by reference in § 122.3 (RELATING TO ADOPTION OF STANDARDS).**

(f) The owner and operator of a municipal waste combustor subject to § 129.111 shall comply with the presumptive RACT emission limitation of ~~150~~ **110** ppmvd NO<sub>x</sub> @ 7% oxygen.

(g) Except as specified in subsection (c), the owner and operator of a NO<sub>x</sub> air contamination source listed in this subsection that is located at a major NO<sub>x</sub> emitting facility or a VOC air contamination source listed in this subsection that is located at a major VOC emitting facility subject to § 129.111 may not cause, allow or permit NO<sub>x</sub> or VOCs to be emitted from the air contamination source in excess of the applicable presumptive RACT emission limitation specified in the following paragraphs:

(1) The owner or operator of:

(i) 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 comply with 0.10 lb NO<sub>x</sub>/million Btu heat input.

(ii) A distillate oil-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall comply with 0.12 lb NO<sub>x</sub>/million Btu heat input.

(iii) 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 comply with 0.20 lb NO<sub>x</sub>/million Btu heat input.

(iv) A refinery gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour shall comply with 0.25 lb NO<sub>x</sub>/million Btu heat input.

(v) 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 comply with 0.45 lb NO<sub>x</sub>/million Btu heat input.

(vi) A circulating fluidized bed combustion unit firing waste products of coal mining, physical coal cleaning and coal preparation operations that contain coal, matrix material, clay and other organic and inorganic material with a rated heat input equal to or greater than 250 million Btu/hour shall comply with the following presumptive **RACT REQUIREMENTS AND RACT** emission limitations as applicable:

(A) 0.16 lb NO<sub>x</sub>/million Btu heat input when firing primarily bituminous waste such as gob.

(B) 0.16 lb NO<sub>x</sub>/million Btu heat input when firing primarily anthracite waste such as culm.

**(C) CONTROL THE NO<sub>x</sub> 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.**

(vii) 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 comply with 0.25 lb NO<sub>x</sub>/million Btu heat input.

~~—(viii) A circulating fluidized bed coal-fired combustion unit subject to subparagraph (vi) shall control the NO<sub>x</sub> emissions each operating day by operating the installed air pollution control technology and combustion controls at all times consistent with the technological limitations, manufacturer specifications, good engineering and maintenance practices and good air pollution control practices for controlling emissions.~~

(2) The owner or operator of a:

(i) Combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 1,000 bhp and less than ~~180 MW~~ 4,100 bhp shall comply with the following presumptive RACT emission limitations as applicable:

(A) ~~42~~ 120 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(B) 5 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(C) ~~96~~ 150 ppmvd NO<sub>x</sub> @ 15% oxygen when firing fuel oil.

(D) 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

**(ii) 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 COMPLY WITH THE FOLLOWING PRESUMPTIVE RACT EMISSION LIMITATIONS AS APPLICABLE:**

**(A) 42 ppmvd NO<sub>x</sub> @ 15% OXYGEN WHEN FIRING NATURAL GAS OR A NONCOMMERCIAL GASEOUS FUEL.**

**(B) 5 ppmvd VOC (as propane) @ 15% OXYGEN WHEN FIRING NATURAL GAS OR A NONCOMMERCIAL GASEOUS FUEL.**

**(C) 96 ppmvd NO<sub>x</sub> @ 15% OXYGEN WHEN FIRING FUEL OIL.**

**(D) 9 ppmvd VOC (as propane) @ 15% OXYGEN WHEN FIRING FUEL OIL.**

**(iii) Combined cycle or combined heat and power combustion turbine with a rated output equal to or greater than 180 MW shall comply with the following presumptive RACT emission limitations as applicable:**

(A) 4 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(B) 2 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(C) 8 ppmvd NO<sub>x</sub> @ 15% oxygen when firing fuel oil.

(D) 2 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

**(iii) (iv) Simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than ~~3,000~~ 4,100 bhp shall comply with the following presumptive RACT emission limitations as applicable:**

(A) ~~85~~ 120 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(B) 9 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(C) 150 ppmvd NO<sub>x</sub> @ 15% oxygen when firing fuel oil.

(D) 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

~~(iv)~~ (v) Simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than ~~3,000~~ 4,100 bhp and less than 60,000 bhp shall comply with the following presumptive RACT emission limitations as applicable:

(A) 42 ppmvd NO<sub>x</sub> @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(B) 9 ppmvd VOC (as propane) @ 15% oxygen when firing natural gas or a noncommercial gaseous fuel.

(C) 96 ppmvd NO<sub>x</sub> @ 15% oxygen when firing fuel oil.

(D) 9 ppmvd VOC (as propane) @ 15% oxygen when firing fuel oil.

(3) The owner or operator of a:

(i) 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 following presumptive RACT emission limitations as applicable:

(A) 3.0 grams NO<sub>x</sub>/bhp-hr when firing natural gas or a noncommercial gaseous fuel.

(B) 0.5 gram VOC/bhp-hr excluding formaldehyde when firing natural gas or a noncommercial gaseous fuel, liquid fuel or dual-fuel.

(ii) Lean burn stationary internal combustion engine with a rating equal to or greater than 3,500 bhp shall comply with the following presumptive RACT emission limitations as applicable:

(A) 0.6 gram NO<sub>x</sub>/bhp-hr when firing natural gas or a noncommercial gaseous fuel.

(B) 0.5 gram VOC/bhp-hr excluding formaldehyde when firing natural gas or a noncommercial gaseous fuel, liquid fuel or dual-fuel.

(iii) Stationary internal combustion engine with a rating equal to or greater than 500 bhp shall comply with 1.6 grams NO<sub>x</sub>/bhp-hr when firing liquid fuel or dual-fuel.

(iv) Rich burn stationary internal combustion engine with a rating equal to or greater than 100 bhp shall comply with the following presumptive RACT emission limitations as applicable:

(A) ~~0.6~~ 2.0 gram NO<sub>x</sub>/bhp-hr when firing natural gas or a noncommercial gaseous fuel.

(B) 0.5 gram VOC/bhp-hr when firing natural gas or a noncommercial gaseous fuel.

(4) Except as specified in subparagraph (ii), the owner or operator of a unit firing multiple fuels shall comply with:

(i) The applicable RACT multiple fuel emission limit determined on a total heat input fuel weighted basis in accordance with the following:

(A) Using the following equation:

$$E_{HI\text{weighted}} = \frac{\sum_{i=1}^n E_i HI_i}{\sum_{i=1}^n HI_i}$$

Where:

$E_{HI\text{weighted}}$  = The heat input fuel weighted multiple fuel emission rate or emission limitation for the compliance period, expressed in units of measure consistent with the units of measure for the emission limitation.

$E_i$  = The emission rate or emission limit for fuel  $i$  during the compliance period, expressed in units of measure consistent with the units of measure for the emission limitation.

$HI_i$  = The total heat input for fuel  $i$  during the compliance period.

$n$  = The number of different fuels used during the compliance period.

(B) Excluding a fuel representing less than 2% of the unit's annual fuel consumption on a heat input basis when determining the applicable RACT multiple fuel emission limit calculated in accordance with clause (A).

(ii) The determination in subparagraph (i) does not apply to a stationary internal combustion engine that is subject to the RACT emission limits in paragraph (3).

(h) The owner and operator of a Portland cement kiln subject to § 129.111 shall comply with the following presumptive RACT emission limitations as applicable:

(1) 3.88 pounds of NO<sub>x</sub> per ton of clinker produced for a long wet-process cement kiln as defined in § 145.142 (relating to definitions).

(2) 3.0 pounds of NO<sub>x</sub> per ton of clinker produced for a long dry-process cement kiln as defined in § 145.142.

(3) 2.30 pounds of NO<sub>x</sub> per ton of clinker produced for:

(i) A preheater cement kiln as defined in § 145.142.

(ii) A precalciner cement kiln as defined in § 145.142.

(i) The owner and operator of a glass melting furnace subject to § 129.111 shall comply with the following presumptive RACT emission limitations as applicable:

(1) 4.0 pounds of NO<sub>x</sub> per ton of glass pulled for container glass furnaces.

(2) 7.0 pounds of NO<sub>x</sub> per ton of glass pulled for pressed or blown glass furnaces.

(3) 4.0 pounds of NO<sub>x</sub> per ton of glass pulled for fiberglass furnaces.

(4) 7.0 pounds of NO<sub>x</sub> per ton of glass pulled for flat glass furnaces.

(5) 6.0 pounds of NO<sub>x</sub> per ton of glass pulled for all other glass melting furnaces.

(j) The owner and operator of a lime kiln subject to § 129.111 shall comply with the presumptive RACT emission limitation of 4.6 pounds of NO<sub>x</sub> per ton of lime produced.

(k) The owner and operator of a direct-fired heater, furnace ~~or~~, oven **OR OTHER COMBUSTION SOURCE** with a rated heat input equal to or greater than 20 million Btu/hour subject to § 129.111 shall comply with the presumptive RACT emission limitation of 0.10 lb NO<sub>x</sub>/million Btu heat input ~~on a daily average basis or as determined through a stack test.~~

(l) The requirements and emission limitations of this section supersede the requirements and emission limitations of a RACT permit issued to the owner or operator of an air contamination source subject to one or more of subsections (b)—(k) prior to *blank* (*Editor's Note: The blank refers to the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.*), under §§ 129.91—129.95 (relating to stationary sources of NO<sub>x</sub> and VOCs) or under §§ 129.96—129.100 (relating to additional RACT requirements for major sources of NO<sub>x</sub> and VOCs) to control, reduce or minimize NO<sub>x</sub> emissions or VOC emissions, or both, from the air contamination source unless the permit contains more stringent requirements or emission limitations, or both.

(m) The requirements and emission limitations of this section supersede the requirements and emission limitations of §§ 129.201—129.205, **129.301—129.310**, 145.111—145.113 and 145.141—145.146 (~~relating to additional NO<sub>x</sub> requirements; emissions of NO<sub>x</sub> from stationary internal combustion engines; and emissions of NO<sub>x</sub> from cement manufacturing~~) unless the requirements or emission limitations of §§ 129.201—129.205, §§ **129.301—129.310**, §§ 145.111—145.113 or §§ 145.141—145.146 are more stringent.

(n) The owner or operator of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility subject to § 129.111 that includes an air contamination source subject to one or more of

subsections (b)—(k) that cannot meet the applicable presumptive RACT requirement or RACT emission limitation without installation of an air cleaning device may submit a petition, in writing **OR ELECTRONICALLY**, requesting an alternative compliance schedule in accordance with the following:

(1) The **written** petition shall be submitted to the Department or appropriate approved local air pollution control agency as soon as possible but not later than:

(i) ~~**blank** (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, for a source subject to § 129.111(a).

(ii) ~~**blank** (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or a major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(2) The **written** petition must include:

(i) A description, including make, model and location, of each affected source subject to a RACT requirement or a RACT emission limitation in one or more of subsections (b)—(k).

(ii) A description of the proposed air cleaning device to be installed.

(iii) A schedule containing proposed interim dates for completing each phase of the required work to install the air cleaning device described in subparagraph (ii).

(iv) A proposed interim emission limitation that will be imposed on the affected source until compliance is achieved with the applicable RACT requirement or RACT emission limitation.

(v) A proposed final compliance date that is as soon as possible but not later than 3 years after the written approval of the petition by the Department or the appropriate approved local air pollution control agency. The approved petition shall be incorporated in an applicable operating permit or plan approval.

(o) The Department or appropriate approved local air pollution control agency will review the timely and complete written petition requesting an alternative compliance schedule submitted in accordance with subsection (n) and approve or deny the petition in writing.

(p) Approval or denial under subsection (o) of the timely and complete petition for an alternative compliance schedule submitted under subsection (n) will be effective on the date the letter of approval or denial of the petition is signed by the authorized representative of the Department or appropriate approved local air pollution control agency.

(q) The Department will submit each petition for an alternative compliance schedule approved under subsection (o) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

**§ 129.113. Facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements.**

(a) The owner or operator of a major NO<sub>x</sub> emitting facility subject to § 129.111 (relating to applicability) that includes at least one air contamination source subject to a NO<sub>x</sub> RACT emission limitation in § 129.112 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule) that cannot meet the applicable NO<sub>x</sub> RACT emission limitation may elect to meet the applicable NO<sub>x</sub> RACT emission limitation in § 129.112 by averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis. System-wide emissions averaging must be among sources under common control of the same owner or operator within the same ozone nonattainment area in this Commonwealth.

(b) The owner or operator of each facility that elects to comply with subsection (a) shall submit a ~~written~~ NO<sub>x</sub> emissions averaging plan **IN WRITING OR ELECTRONICALLY** to the Department or appropriate approved local air pollution control agency as part of an application for an operating permit modification or a plan approval, if otherwise required. The application incorporating the requirements of this section shall be submitted by the applicable date as follows:

(1) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, for a source subject to § 129.111(a).

(2) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility, whichever is later, for a source subject to § 129.111(b).

(c) Each NO<sub>x</sub> air contamination source included in the application for an operating permit modification or a plan approval, if otherwise required, for averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis submitted under subsection (b) must be an air contamination source subject to a NO<sub>x</sub> RACT emission limitation in § 129.112.

(d) The application for the operating permit modification or the plan approval, if otherwise required, for averaging NO<sub>x</sub> emissions on either a facility-wide or system-wide basis submitted under subsection (b) must demonstrate that the aggregate NO<sub>x</sub> emissions emitted by the air contamination sources included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan are not greater than the NO<sub>x</sub> emissions that would be emitted by the group of included sources if each source complied with the applicable NO<sub>x</sub> RACT emission limitation in § 129.112 on a source-specific basis.

(e) The application for the operating permit modification or a plan approval, if otherwise required, specified in subsections (b)—(d) may include facility-wide or system-wide NO<sub>x</sub> emissions averaging only for NO<sub>x</sub> emitting sources or NO<sub>x</sub> emitting facilities that are owned or operated by the applicant.

(f) The application for the operating permit modification or a plan approval, if otherwise required, specified in subsections (b)—(e) must include the following information:

(1) Identification of each air contamination source included in the NO<sub>x</sub> emissions averaging plan.

(2) Each air contamination source's applicable emission limitation in § 129.112.

(3) Methods for demonstrating compliance and recordkeeping and reporting requirements in accordance with § 129.115 (relating to written notification, compliance demonstration and recordkeeping and reporting requirements) for each source included in the NO<sub>x</sub> emissions averaging plan submitted under subsection (b).

(g) An air contamination source or facility included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(f) may be included in only one facility-wide or system-wide NO<sub>x</sub> emissions averaging plan.

(h) The Department or appropriate approved local air pollution control agency will:

(1) Review the timely and complete NO<sub>x</sub> emissions averaging plan submitted in accordance with ~~subsection (b)~~ **SUBSECTIONS (b)—(g)**.

(2) Approve the NO<sub>x</sub> emissions averaging plan submitted under subsection (b), in writing, if the Department or appropriate approved local air pollution control agency is satisfied that the NO<sub>x</sub> emissions averaging plan complies with the requirements of ~~subsection (b)~~ **SUBSECTIONS (b)—(g)** and that the proposed NO<sub>x</sub> emissions averaging plan is RACT for the air contamination sources.

(3) Deny or modify the NO<sub>x</sub> emissions averaging plan submitted under subsection (b), in writing, if the proposal does not comply with the requirements of ~~subsection (b)~~ **SUBSECTIONS (b)—(g)**.

(i) The proposed NO<sub>x</sub> emissions averaging plan submitted under subsection (b) will be approved, denied or modified **UNDER SUBSECTION (h)** by the Department or appropriate approved local air pollution control agency in accordance with ~~subsection (h) in writing through the issuance of a plan approval or operating permit modification~~ **25 Pa. CODE CHAPTER 127 (RELATING TO CONSTRUCTION, MODIFICATION, REACTIVATION AND OPERATION OF SOURCES)** prior to the owner or operator implementing the NO<sub>x</sub> emissions averaging plan.

(j) The owner or operator of an air contamination source or facility included in the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(g) shall submit the reports and records specified in subsection (f)(3) to the Department or appropriate approved local air pollution control agency to demonstrate compliance with § 129.115.

(k) The owner or operator of an air contamination source or facility included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted in accordance with subsections (b)—(g) that achieves emission reductions in accordance with other emission limitations required under the act or the Clean Air Act, or regulations adopted under the act or the Clean Air Act, that are not NO<sub>x</sub> RACT emission limitations may not substitute those emission reductions for the emission reductions required by the facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted to the Department or appropriate approved local air pollution control agency under subsection (b).

(l) The owner or operator of an air contamination source subject to a NO<sub>x</sub> RACT emission limitation in § 129.112 that is not included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted under subsection (b) shall operate the source in compliance with the applicable NO<sub>x</sub> RACT emission limitation in § 129.112.

(m) The owner and operator of the air contamination sources included in a facility-wide or system-wide NO<sub>x</sub> emissions averaging plan submitted under subsection (b) shall be liable for a violation of an applicable NO<sub>x</sub> RACT emission limitation at each source included in the NO<sub>x</sub> emissions averaging plan regardless of each individual facility's NO<sub>x</sub> emission rate.

(n) The Department will submit each NO<sub>x</sub> emissions averaging plan approved under subsection (i) to the Administrator of the EPA for approval as a revision to the SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

**§ 129.114. Alternative RACT proposal and petition for alternative compliance schedule.**

(a) The owner or operator of an air contamination source subject to § 129.112 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule) located at a major NO<sub>x</sub> emitting facility or major VOC emitting facility subject to § 129.111 (relating to applicability) that cannot meet the applicable presumptive RACT requirement or RACT emission limitation of § 129.112 may propose an alternative RACT requirement or RACT emission limitation in accordance with subsection (d).

(b) The owner or operator of a NO<sub>x</sub> air contamination source with a potential emission rate equal to or greater than 5.0 tons of NO<sub>x</sub> per year that is not subject to § 129.112 or §§ 129.201—129.205 (relating to additional NO<sub>x</sub> requirements) located at a major NO<sub>x</sub> emitting facility subject to § 129.111 shall propose a NO<sub>x</sub> RACT requirement or RACT emission limitation in accordance with subsection (d).

(c) The owner or operator of a VOC air contamination source with a potential emission rate equal to or greater than 2.7 tons of VOC per year that is not subject to § 129.112 located at a major VOC emitting facility subject to § 129.111 shall propose a VOC RACT requirement or RACT emission limitation in accordance with subsection (d).

(d) The owner or operator proposing an alternative RACT requirement or RACT emission limitation under subsection (a), (b) or (c) shall:

(1) Submit a ~~written~~ RACT proposal **IN WRITING OR ELECTRONICALLY** in accordance with the procedures in § 129.92(a)(1)—(5), (7)—(10) and (b) (relating to RACT proposal requirements) to the Department or appropriate approved local air pollution control agency as soon as possible but not later than:

(i) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, for a source subject to § 129.111(a).

(ii) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ **DECEMBER 31, 2022**, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(2) Be in receipt of an approval issued by the Department or appropriate approved local air pollution control agency in writing through a plan approval or operating permit modification for a RACT proposal submitted under paragraph (1)(ii) prior to the installation, modification or change in the operation of the existing air contamination source that will result in the source or facility meeting the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility.

(3) Include in the RACT proposal the proposed alternative NO<sub>x</sub> RACT requirement or RACT emission limitation or VOC RACT requirement or RACT emission limitation developed in accordance with the procedures in § 129.92(a)(1)—(5) and (b).

(4) Include in the RACT proposal a schedule for completing implementation of the RACT requirement or RACT emission limitation as soon as possible but not later than:

(i) ~~blank (Editor's Note: The blank refers to the date 1 year after the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)~~, for a source subject to § 129.111(a).

(ii) ~~blank (Editor's Note: The blank refers to the date 1 year after the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)~~, or 1 year after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(5) Include interim dates in the schedule required under paragraph (4) for the:

(i) Issuance of purchase orders.

(ii) Start and completion of process, technology and control technology changes.

(iii) Completion of compliance testing.

(6) Include in the RACT proposal methods for demonstrating compliance and recordkeeping and reporting requirements in accordance with § 129.115 (relating to written notification, compliance demonstration and recordkeeping and reporting requirements) for each air contamination source included in the RACT proposal.

(7) Demonstrate to the satisfaction of the Department or the appropriate approved local air pollution control agency that the proposed requirement or RACT emission limitation is RACT for the air contamination source.

(e) The Department or appropriate approved local air pollution control agency will:

(1) Review the timely and complete alternative RACT proposal submitted in accordance with subsection (d).

(2) Approve the alternative RACT proposal submitted under subsection (d), in writing, if the Department or appropriate approved local air pollution control agency is satisfied that the alternative RACT proposal complies with the requirements of subsection (d) and that the proposed alternative requirement or RACT emission limitation is RACT for the air contamination source.

(3) Deny or modify the alternative RACT proposal submitted under subsection (d), in writing, if the proposal does not comply with the requirements of subsection (d).

(f) The proposed alternative RACT requirement or RACT emission limitation and the implementation schedule submitted under subsection (d) will be approved, denied or modified **UNDER SUBSECTION (e)** by the Department or appropriate approved local air pollution control agency in accordance with ~~subsection (e) in writing through the issuance of a plan approval or operating permit modification~~ **25 Pa. CODE CHAPTER 127 (RELATING TO CONSTRUCTION, MODIFICATION, REACTIVATION AND OPERATION OF SOURCES)** prior to the owner or operator implementing the alternative RACT requirement or RACT emission limitation.

(g) The emission limit and requirements specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection (f) supersede the emission limit and requirements in the existing plan approval or operating permit issued to the owner or operator of the source prior to *blank* (*Editor's Note: The blank refers to the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.*), on the date specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection (f),

except to the extent the existing plan approval or operating permit contains more stringent requirements.

(h) The Department will submit each alternative RACT requirement or RACT emission limitation approved under subsection (f) to the Administrator of the EPA for approval as a revision to the SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

~~(i) Compliance with the requirements in § 129.99(a) — (h)~~ **AN OWNER OR OPERATOR SUBJECT TO SUBSECTION (a), (b) OR (c) AND § 129.99 THAT HAS NOT MODIFIED OR CHANGED A SOURCE THAT COMMENCED OPERATION ON OR BEFORE OCTOBER 24, 2016, AND HAS NOT INSTALLED AND COMMENCED OPERATION OF A NEW SOURCE AFTER OCTOBER 24, 2016, MAY, IN PLACE OF THE ALTERNATIVE RACT REQUIREMENT OR RACT EMISSION LIMITATION REQUIRED UNDER SUBSECTION (d), SUBMIT AN ANALYSIS, CERTIFIED BY THE RESPONSIBLE OFFICIAL, IN WRITING OR ELECTRONICALLY TO THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY ON OR BEFORE DECEMBER 31, 2022, THAT DEMONSTRATES THAT COMPLIANCE WITH THE ALTERNATIVE RACT REQUIREMENT OR RACT EMISSION LIMITATION APPROVED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY UNDER § 129.99(e) (relating to alternative RACT proposal and petition for alternative compliance schedule) assures compliance with the provisions in subsections ~~(a) — (h)~~ (a) — (c) AND (e) — (h), except for sources subject to ~~§ 129.112(b)(11), (h)(4) and (h)(5)~~ § 129.112(c)(11) or (i) — (k).**

**(1) THE OWNER OR OPERATOR OF A SUBJECT SOURCE OR FACILITY THAT EVALUATES AND DETERMINES THAT THERE IS NO NEW POLLUTANT SPECIFIC AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AVAILABLE AT THE TIME OF SUBMITTAL OF THE ANALYSIS AND THAT EACH TECHNICALLY FEASIBLE AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE EVALUATED FOR THE ALTERNATIVE RACT REQUIREMENT OR RACT EMISSION LIMITATION APPROVED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY UNDER § 129.99(e) HAD A COST EFFECTIVENESS:**

**(i) EQUAL TO OR GREATER THAN \$7,500 PER TON OF NO<sub>x</sub> EMISSIONS REDUCED OR \$12,000 PER TON OF VOC EMISSIONS REDUCED SHALL INCLUDE THE FOLLOWING INFORMATION IN THE ANALYSIS:**

**(A) A STATEMENT THAT EXPLAINS HOW THE OWNER OR OPERATOR DETERMINED THAT THERE IS NO NEW POLLUTANT SPECIFIC AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AVAILABLE.**

**(B) A LIST OF THE TECHNICALLY FEASIBLE AIR CLEANING DEVICES, AIR POLLUTION CONTROL TECHNOLOGIES OR TECHNIQUES PREVIOUSLY IDENTIFIED AND EVALUATED UNDER § 129.92(b)(1)—(3) INCLUDED IN THE WRITTEN RACT PROPOSAL SUBMITTED UNDER § 129.99(d) AND APPROVED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY UNDER § 129.99(e).**

**(C) A SUMMARY OF THE ECONOMIC FEASIBILITY ANALYSIS PERFORMED FOR EACH TECHNICALLY FEASIBLE AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE LISTED IN CLAUSE (B) AND THE COST EFFECTIVENESS OF EACH TECHNICALLY FEASIBLE AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AS SUBMITTED PREVIOUSLY UNDER § 129.99(d) OR AS CALCULATED CONSISTENT WITH THE “EPA AIR POLLUTION CONTROL COST MANUAL” (SIXTH EDITION), EPA/452/B-02-001, JANUARY 2002, AS AMENDED.**

**(D) A STATEMENT THAT AN EVALUATION OF EACH ECONOMIC FEASIBILITY ANALYSIS SUMMARIZED IN CLAUSE (C) DEMONSTRATES THAT THE COST EFFECTIVENESS REMAINS EQUAL TO OR GREATER THAN \$7,500 PER TON OF NO<sub>x</sub> EMISSIONS REDUCED OR \$12,000 PER TON OF VOC EMISSIONS REDUCED.**

**(E) ADDITIONAL INFORMATION REQUESTED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY THAT MAY BE NECESSARY FOR THE EVALUATION OF THE ANALYSIS.**

**(ii) LESS THAN \$7,500 PER TON OF NO<sub>x</sub> EMISSIONS REDUCED OR \$12,000 PER TON OF VOC EMISSIONS REDUCED SHALL INCLUDE THE FOLLOWING INFORMATION IN THE ANALYSIS:**

**(A) A STATEMENT THAT EXPLAINS HOW THE OWNER OR OPERATOR DETERMINED THAT THERE IS NO NEW POLLUTANT SPECIFIC AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AVAILABLE.**

**(B) A LIST OF THE TECHNICALLY FEASIBLE AIR CLEANING DEVICES, AIR POLLUTION CONTROL TECHNOLOGIES OR TECHNIQUES PREVIOUSLY IDENTIFIED AND EVALUATED UNDER § 129.92(b)(1)—(3) IN THE WRITTEN RACT PROPOSAL SUBMITTED UNDER § 129.99(d) AND APPROVED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY UNDER § 129.99(e).**

**(C) A SUMMARY OF THE ECONOMIC FEASIBILITY ANALYSIS PERFORMED FOR EACH TECHNICALLY FEASIBLE AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE LISTED IN CLAUSE (B) AND THE COST EFFECTIVENESS OF EACH TECHNICALLY FEASIBLE AIR CLEANING**

**DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AS SUBMITTED PREVIOUSLY UNDER § 129.99(d) OR AS CALCULATED CONSISTENT WITH THE “EPA AIR POLLUTION CONTROL COST MANUAL” (SIXTH EDITION), EPA/452/B-02-001, JANUARY 2002, AS AMENDED.**

**(D) A STATEMENT THAT AN EVALUATION OF EACH ECONOMIC FEASIBILITY ANALYSIS SUMMARIZED IN CLAUSE (C) DEMONSTRATES THAT THE COST EFFECTIVENESS REMAINS LESS THAN \$7,500 PER TON OF NO<sub>x</sub> EMISSIONS REDUCED OR \$12,000 PER TON OF VOC EMISSIONS REDUCED.**

**(E) A NEW ECONOMIC FEASIBILITY ANALYSIS FOR EACH TECHNICALLY FEASIBLE AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE LISTED IN CLAUSE (B) IN ACCORDANCE WITH § 129.92(b)(4).**

**(F) ADDITIONAL INFORMATION REQUESTED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY THAT MAY BE NECESSARY FOR THE EVALUATION OF THE ANALYSIS.**

**(2) THE OWNER OR OPERATOR OF A SUBJECT SOURCE OR FACILITY THAT EVALUATES AND DETERMINES THAT THERE IS A NEW OR UPGRADED POLLUTANT SPECIFIC AIR CLEANING DEVICE, AIR POLLUTION CONTROL TECHNOLOGY OR TECHNIQUE AVAILABLE AT THE TIME OF SUBMITTAL OF THE ANALYSIS SHALL:**

**(i) PERFORM A TECHNICAL FEASIBILITY ANALYSIS AND AN ECONOMIC FEASIBILITY ANALYSIS IN ACCORDANCE WITH § 129.92(b).**

**(ii) SUBMIT THE ANALYSES PERFORMED UNDER SUBPARAGRAPH (i) TO THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY FOR REVIEW.**

**(iii) PROVIDE ADDITIONAL INFORMATION REQUESTED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY THAT MAY BE NECESSARY FOR THE EVALUATION OF THE ANALYSIS.**

**(j) THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY WILL:**

**(1) REVIEW THE ANALYSES SUBMITTED IN ACCORDANCE WITH SUBSECTION (i).**

**(2) PUBLISH NOTICE IN THE PENNSYLVANIA BULLETIN AND NEWSPAPERS OF GENERAL CIRCULATION FOR A MINIMUM 30-DAY PUBLIC COMMENT PERIOD AND AN OPPORTUNITY FOR A PUBLIC HEARING FOR THE ANALYSES SUBMITTED UNDER SUBSECTION (i) AND SUPPORTING DOCUMENTATION.**

**(3) PREPARE A SUMMARY OF THE PUBLIC COMMENTS RECEIVED ON THE ANALYSES AND RESPONSES TO THE COMMENTS.**

**(4) AS APPROPRIATE, ISSUE THE NECESSARY PLAN APPROVALS AND OPERATING PERMIT MODIFICATIONS IN CONFORMANCE WITH 25 Pa. CODE CHAPTER 127 FOR THE ANALYSES REVIEWED UNDER PARAGRAPH (1).**

**(k) THE DEPARTMENT WILL SUBMIT THE FOLLOWING INFORMATION TO THE ADMINISTRATOR OF THE EPA FOR APPROVAL AS A REVISION TO THE COMMONWEALTH'S SIP.**

**(1) THE ANALYSES, SUPPORTING DOCUMENTATION AND SUMMARY OF PUBLIC COMMENTS AND RESPONSES DESCRIBED IN SUBSECTION (j)(2) and (3).**

**(2) THE PLAN APPROVALS AND OPERATING PERMIT MODIFICATIONS ISSUED UNDER SUBSECTION (j)(4).**

**(l) The owner and operator of a facility proposing to comply with the applicable RACT requirement or RACT emission limitation under subsection (a), (b) or (c) through the installation of an air cleaning device may submit a petition, in writing **OR ELECTRONICALLY**, requesting an alternative compliance schedule in accordance with the following:**

**(1) The ~~written~~ petition requesting an alternative compliance schedule shall be submitted to the Department or appropriate approved local air pollution control agency as soon as possible but not later than:**

**(i) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ DECEMBER 31, 2022, for a source subject to § 129.111(a).**

**(ii) ~~blank (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final form rulemaking.)~~ DECEMBER 31, 2022, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).**

**(2) The ~~written~~ petition must include:**

**(i) A description, including make, model and location, of each air contamination source subject to a RACT requirement or RACT emission limitation in one or more of subsections (a)—(c).**

**(ii) A description of the proposed air cleaning device to be installed.**

(iii) A schedule containing proposed interim dates for completing each phase of the required work to install the air cleaning device described in subparagraph (ii).

(iv) A proposed interim emission limitation that will be imposed on the affected air contamination source until compliance is achieved with the applicable RACT requirement or RACT emission limitation.

(v) A proposed final compliance date that is as soon as possible but not later than 3 years after the approval of the petition by the Department or the appropriate approved local air pollution control agency. If the petition is for the replacement of an existing source, the final compliance date will be determined on a case-by-case basis. The approved petition shall be incorporated in an applicable operating permit or plan approval.

~~(k)~~ (m) The Department or appropriate approved local air pollution control agency will review the timely and complete ~~written~~ petition requesting an alternative compliance schedule submitted in accordance with subsection ~~(j)~~ (l) and approve or deny the petition in writing.

~~(h)~~ (n) The emission limit and requirements specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection ~~(k)~~ (m) supersede the emission limit and requirements in the existing plan approval or operating permit issued to the owner or operator of the source prior to *blank* (*Editor's Note: The blank refers to the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.*), on the date specified in the plan approval or operating permit issued by the Department or appropriate approved local air pollution control agency under subsection ~~(k)~~ (m), except to the extent the existing plan approval or operating permit contains more stringent requirements.

~~(m)~~ (o) Approval or denial under subsection ~~(k)~~ (m) of the timely and complete petition for an alternative compliance schedule submitted under subsection ~~(j)~~ (l) will be effective on the date the letter of approval or denial of the petition is signed by the authorized representative of the Department or appropriate approved local air pollution control agency.

~~(n)~~ (p) The Department will submit each petition for an alternative compliance schedule approved under subsection ~~(k)~~ (m) to the Administrator of the EPA for approval as a revision to the Commonwealth's SIP. The owner and operator of the facility shall bear the costs of public hearings and notifications, including newspaper notices, required for the SIP submittal.

#### **§ 129.115. Written notification, compliance demonstration and recordkeeping and reporting requirements.**

(a) The owner and operator of an air contamination source subject to this section and § 129.111 (relating to applicability) shall submit a ~~written~~ notification, **IN WRITING OR ELECTRONICALLY**, to the appropriate Regional Manager ~~by *blank* (*Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.*)~~ **OR THE APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** that proposes how the

owner and operator intend to comply with the requirements of this section and §§ 129.111—129.114.

**(1) THE NOTIFICATION SHALL BE SUBMITTED TO THE APPROPRIATE REGIONAL MANAGER OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY AS SOON AS POSSIBLE BUT NOT LATER THAN:**

**(i) DECEMBER 31, 2022, FOR A SOURCE SUBJECT TO § 129.111(a).**

**(ii) DECEMBER 31, 2022, OR 6 MONTHS AFTER THE DATE THAT THE SOURCE MEETS THE DEFINITION OF A MAJOR NO<sub>x</sub> EMITTING FACILITY OR MAJOR VOC EMITTING FACILITY, WHICHEVER IS LATER, FOR A SOURCE SUBJECT TO § 129.111(b).**

**(2) This written notification shall include the following information IDENTIFY THE AIR CONTAMINATION SOURCES IN § 129.111(a) AS ONE OF THE FOLLOWING:**

~~(1) The air contamination sources identified in § 129.111(a) as one of the following:~~

(i) Subject to a RACT requirement or RACT emission limitation in §§ 129.112—129.114.

(ii) Exempted from §§ 129.112—129.114.

~~(2)~~**(3) The air contamination sources identified in § 129.111(b) as one of the following:**

(i) Subject to a RACT requirement or RACT emission limitation in §§ 129.112—129.114.

(ii) Exempted from §§ 129.112—129.114.

~~(3)~~**(4) The air contamination sources identified in § 129.111(c) that have a potential to emit less than 1 TPY of NO<sub>x</sub> located at a major NO<sub>x</sub> emitting facility subject to § 129.111(a) or (b) or a VOC air contamination source that has the potential to emit less than 1 TPY of VOC located at a major VOC emitting facility subject to § 129.111(a) or (b).**

~~(4)~~**(5) The following information for each air contamination source listed in paragraph ~~(4)~~ (2):**

(i) A description, including make, model and location, of each source.

(ii) The applicable RACT requirement or RACT emission limitation, or both, in §§ 129.112—129.114 for each source listed in accordance with paragraph ~~(4)~~**(2)(i).**

(iii) How the owner or operator shall comply with subparagraph (ii) for each source listed in subparagraph (i).

(iv) The reason why the source is exempt from the RACT requirements and RACT emission limitations in §§ 129.112—129.114 for each source listed in accordance with paragraph ~~(1)(ii)~~ **(2)(ii)**.

~~(5)(6)~~ **(6)** The following information for each air contamination source listed in paragraph ~~(2)~~ **(3)**:

(i) A description, including make, model and location, of each source.

(ii) The applicable RACT requirement or RACT emission limitation, or both, in §§ 129.112—129.114 for each source listed in paragraph ~~(2)(i)~~ **(3)(i)**.

(iii) How the owner or operator shall comply with subparagraph (ii) for each source listed in subparagraph (i).

(iv) The reason why the source is exempt from the RACT requirements and RACT emission limitations in §§ 129.112—129.114 for each source listed in accordance with paragraph ~~(2)(ii)~~ **(3)(ii)**.

~~(6)(7)~~ **(7)** The following information for each air contamination source listed in paragraph ~~(3)~~ **(4)**:

(i) A description, including make, model and location, of each source.

(ii) Information sufficient to demonstrate that the source has a potential to emit less than 1 TPY of NO<sub>x</sub> or 1 TPY of VOC, as applicable.

(b) Except as specified in subsection (d), the owner and operator of an air contamination source subject to a NO<sub>x</sub> RACT requirement or RACT emission limitation or VOC RACT requirement or RACT emission limitation, or both, listed in § 129.112 (relating to presumptive RACT requirements, RACT emission limitations and petition for alternative compliance schedule) shall demonstrate compliance with the applicable RACT requirement or RACT emission limitation by performing the following monitoring or testing procedures:

(1) For an air contamination source with a CEMS, monitoring and testing in accordance with the requirements of Chapter 139, Subchapter C (relating to requirements for source monitoring for stationary sources) using a 30-operating day rolling average, except for municipal waste combustors subject to § 129.112(f) ~~and~~, 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)**.

(i) A 30-operating day rolling average emission rate for each applicable RACT emission limitation shall be calculated for an affected air contamination source for each consecutive operating day.

(ii) Each 30-operating day rolling average emission rate for an affected air contamination source must include the emissions that occur during the entire operating day, including emissions from start-ups, shutdowns and malfunctions.

(2) For a Portland cement kiln with a CEMS, monitoring of clinker production rates in accordance with 40 CFR 63.1350(d) (relating to monitoring requirements).

(3) For a municipal waste combustor with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, using a daily ~~rolling~~ 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 CONTINUOUS SOURCE MONITORING MANUAL.**

(4) For a combustion unit or process heater subject to § 129.112(g)(1) with a CEMS, monitoring and testing in accordance with the requirements in Chapter 139, Subchapter C, using a daily average.

**(i) 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.**

**(ii) THE DAILY AVERAGE FOR THE SOURCE SHALL INCLUDE ALL EMISSIONS THAT OCCUR DURING THE ENTIRE DAY.**

**(5) 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.**

(6) For an air contamination source without a CEMS, monitoring and testing in accordance with ~~a Department-approved~~ AN emissions source test **APPROVED BY THE DEPARTMENT OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** 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.

(c) The owner or operator of a ~~combined-cycle~~ **COMBINED CYCLE** combustion turbine may comply with the requirements in ~~§ 129.112(g)(2)(ii)~~ § 129.112(g)(2)(iii) on a mass-equivalent basis. The actual emissions during the compliance period must be less than the allowable emissions during the compliance period. The allowable emissions are calculated by multiplying actual heat input in million Btu during the compliance period by the following:

(1) 0.015 lb NO<sub>x</sub>/million Btu for sources subject to ~~§ 129.112(g)(2)(ii)(A)~~ § 129.112(g)(2)(iii)(A).

(2) 0.031 lb NO<sub>x</sub>/million Btu for sources subject to ~~§ 129.112(g)(2)(ii)(B)~~ § 129.112(g)(2)(iii)(B).

(3) 0.014 lb VOC/million Btu for sources subject to ~~§ 129.112(g)(2)(ii)(C)~~ § 129.112(g)(2)(iii)(C).

(4) 0.030 lb VOC/million Btu for sources subject to ~~§ 129.112(g)(2)(ii)(D)~~ § 129.112(g)(2)(iii)(D).

(d) Except as specified in § 129.112(n) and ~~§ 129.114(j)~~ § 129.114(l) (relating to alternative RACT proposal and petition for alternative compliance schedule), the owner and operator of an air contamination source subject to subsection ~~(a)~~ (b) shall demonstrate compliance with the applicable RACT requirement or RACT emission limitation in accordance with the procedures in subsection (a) not later than:

(1) January 1, 2023, for a source subject to § 129.111(a) (relating to applicability).

(2) January 1, 2023, or 1 year after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(e) An owner or operator of an air contamination source subject to this section and §§ 129.111, 129.112 and 129.113 (relating to facility-wide or system-wide NO<sub>x</sub> emissions averaging plan general requirements) may request a waiver from the requirement to demonstrate compliance with the applicable emission limitation listed in § 129.112 if the following requirements are met:

(1) The request for a waiver is submitted, in writing **OR ELECTRONICALLY**, to the Department **OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** not later than:

(i) ~~*blank* (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)~~ **DECEMBER 31, 2022**, for a source subject to § 129.111(a).

(ii) ~~*blank* (Editor's Note: The blank refers to the date 6 months after the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)~~ **DECEMBER 31, 2022**, or 6 months after the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(2) The request for a waiver demonstrates that a Department-approved emissions source test was performed in accordance with the requirements of Chapter 139, Subchapter A on or after:

(i) ~~*blank* (Editor's Note: The blank refers to the date 1 year before the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)~~, for a source subject to § 129.111(a).

(ii) *blank* (*Editor's Note: The blank refers to the date 1 year before the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.*), or within 12 months prior to the date that the source meets the definition of a major NO<sub>x</sub> emitting facility or major VOC emitting facility, whichever is later, for a source subject to § 129.111(b).

(3) The request for a waiver demonstrates to the satisfaction of the Department **OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** that the test results show that the source's rate of emissions is in compliance with the source's applicable NO<sub>x</sub> emission limitation or VOC emission limitation.

(4) The Department **OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** approves, in writing, the request for a waiver.

(f) The owner and operator of an air contamination source subject to this section and §§ 129.111—129.114 shall keep records to demonstrate compliance with §§ 129.111—129.114 and submit ~~reporting~~ **REPORTS** to the Department ~~in the following manner~~ **OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY IN ACCORDANCE WITH THE APPLICABLE REGULATIONS IN 25 Pa. CODE, PART I, SUBPART C, ARTICLE III (RELATING TO AIR RESOURCES) AND AS SPECIFIED IN THE OPERATING PERMIT OR PLAN APPROVAL FOR THE AIR CONTAMINATION SOURCE AS FOLLOWS:**

(1) The records shall include sufficient data and calculations to demonstrate that the requirements of §§ 129.111—129.114 are met.

(2) Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

(3) The records necessary to determine compliance shall be reported to the Department **OR APPROPRIATE APPROVED LOCAL AIR POLLUTION CONTROL AGENCY** on a schedule specified in the ~~Subpart C, Article III (relating to air resources) regulations~~ **APPLICABLE REGULATION** or as otherwise specified in the operating permit or plan approval for the air contamination source.

(g) Beginning with the compliance date specified in § 129.112(a), the owner or operator of an air contamination source claiming that the air contamination source is exempt from the applicable NO<sub>x</sub> emission rate threshold specified in § 129.114(b) and the requirements of § 129.112 based on the air contamination source's potential to emit shall maintain records that demonstrate to the Department or appropriate approved local air pollution control agency that the air contamination source is not subject to the specified emission rate threshold.

(h) Beginning with the compliance date specified in § 129.112(a), the owner or operator of an air contamination source claiming that the air contamination source is exempt from the applicable VOC emission rate threshold specified in § 129.114(c) and the requirements of § 129.112 based on the air contamination source's potential to emit shall maintain records that

demonstrate to the Department or appropriate approved local air pollution control agency that the air contamination source is not subject to the specified emission rate threshold.

(i) The owner or operator of a combustion unit **OR PROCESS HEATER** subject to § 129.112(b) shall record each adjustment conducted under the procedures in § 129.112(b). This record must contain, at a minimum:

- (1) The date of the tuning procedure.
- (2) The name of the service company and the technician performing the procedure.
- (3) The final operating rate or load.
- (4) The final NO<sub>x</sub> and CO emission rates.
- (5) The final excess oxygen rate.
- (6) Other information required by the applicable operating permit.

(j) The owner or operator of a Portland cement kiln subject to § 129.112(h) shall maintain a daily operating log for each Portland cement kiln. The record for each kiln must include:

- (1) The total hours of operation.
- (2) The type and quantity of fuel used.
- (3) The quantity of clinker produced.
- (4) The date, time and duration of a start-up, shutdown or malfunction of a Portland cement kiln or emissions monitoring system.

(k) The records shall be retained by the owner or operator for 5 years and made available to the Department or appropriate approved local air pollution control agency upon receipt of a written request from the Department or appropriate approved local air pollution control agency.



August 10, 2022

David Sumner  
Executive Director  
Independent Regulatory Review Commission  
333 Market Street, 14th Floor  
Harrisburg, PA 17120

Re: Final Rulemaking: Additional RACT Requirements for Major Sources of NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS (RACT III) (#7-561 / IRRC #3310)

Dear Mr. Sumner:

Pursuant to Section 5.1(a) of the Regulatory Review Act (RRA), please find enclosed the Additional RACT Requirements for Major Sources of NO<sub>x</sub> and VOCs for the 2015 Ozone NAAQS (RACT III) (#7-561) final-form rulemaking for review by the Independent Regulatory Review Commission (IRRC). The Environmental Quality Board (Board) adopted this rulemaking on August 9, 2022.

The Board adopted the proposed rulemaking at its meeting on May 19, 2021. On August 7, 2021 the proposed rulemaking was published in the *Pennsylvania Bulletin* at 51 Pa.B. 4333 for a 66-day public comment period. Three public hearings were held on September 7, 8 and 9, 2021. The public comment period closed on October 12, 2021. The Department received comments from 24 commenters including the U.S. Environmental Protection Agency. The Board provided the Environmental Resources and Energy Committees and IRRC with copies of all comments received in compliance with Section 5(c) of the RRA.

The Department will provide assistance as necessary to facilitate IRRC's review of the enclosed rulemaking under Section 5.1(e) of the Regulatory Review Act.

Please contact me by e-mail at [laurgriffi@pa.gov](mailto:laurgriffi@pa.gov) or by telephone at 717.772.3277 if you have any questions or need additional information.

Sincerely,

Laura Griffin  
Regulatory Coordinator

Enclosures



**TRANSMITTAL SHEET FOR REGULATIONS SUBJECT TO THE  
REGULATORY REVIEW ACT**

**I.D. NUMBER:** 7-561

**SUBJECT:** Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS

**AGENCY:** DEPARTMENT OF ENVIRONMENTAL PROTECTION  
ENVIRONMENTAL QUALITY BOARD

**TYPE OF REGULATION**

**RECEIVED**

- Proposed Regulation
- X Final Regulation
- Final Regulation with Notice of Proposed Rulemaking Omitted
- 120-day Emergency Certification of the Attorney General
- 120-day Emergency Certification of the Governor
- Delivery of Tolled Regulation
  - a. With Revisions
  - b. Without Revisions

AUG 10 2022

Independent Regulatory  
Review Commission

**FILING OF REGULATION**

<u>DATE</u>	<u>SIGNATURE</u>	<u>DESIGNATION</u>
		<i>HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES &amp; ENERGY</i>
8/10/22		MAJORITY CHAIR <u>Representative Daryl Metcalfe</u>
8/10/22		MINORITY CHAIR <u>Representative Greg Vitali</u>
		<i>SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES &amp; ENERGY</i>
8/10/22	electronic submittal	MAJORITY CHAIR <u>Senator Gene Yaw</u>
8/10/22	electronic submittal	MINORITY CHAIR <u>Senator Carolyn Comitta</u>
_____	_____	<i>INDEPENDENT REGULATORY REVIEW COMMISSION</i>
_____	_____	<i>ATTORNEY GENERAL (for Final Omitted only)</i>
_____	_____	<i>LEGISLATIVE REFERENCE BUREAU (for Proposed only)</i>

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**Madison Brame**

---

**From:** Eyster, Emily  
**Sent:** Wednesday, August 10, 2022 10:48 AM  
**To:** Griffin, Laura; Troutman, Nick  
**Cc:** Chalfant, Brian; Reiley, Robert A.; Nezat, Taylor; Rodriguez, Amanda; Hartman, Michael  
**Subject:** Re: Delivery of Final Rulemaking - RACT III for Major Sources (7-561)

Received. Thanks!

Emily Eyster  
Legislative Director, Office of Senator Carolyn T. Comitta  
Executive Director, Senate Environmental Resources and Energy Committee  
Cell: (717) 756-4702  
Phone: (717) 787-5709  
[www.pasenate.com](http://www.pasenate.com)

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AUG 10 2022

**Independent Regulatory  
Review Commission**

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**From:** Griffin, Laura <laurgriffi@pa.gov>  
**Sent:** Wednesday, August 10, 2022 10:32 AM  
**To:** Troutman, Nick <ntroutman@pasen.gov>; Eyster, Emily <Emily.Eyster@pasenate.com>  
**Cc:** Chalfant, Brian <bchalfant@pa.gov>; Reiley, Robert A. <rreiley@pa.gov>; Nezat, Taylor <tnezat@pa.gov>; Rodriguez, Amanda <amarodrigu@pa.gov>; Hartman, Michael <michael.hartman@pasenate.com>  
**Subject:** Delivery of Final Rulemaking - RACT III for Major Sources (7-561)

■ EXTERNAL EMAIL ■

---

Good morning,

Pursuant to Section 5.1(a) of the Regulatory Review Act, please find attached the Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS final rulemaking (#7-561) for review by the Senate Environmental Resources and Energy Committee. Due to the file size of the documents, the rulemaking documents are attached in a compressed folder and the cover letters for Senators Yaw and Comitta are attached separately.

Also attached is the transmittal sheet showing delivery to the House Environmental Resources and Energy Committee this morning.

Please confirm receipt of this rulemaking by replying to all recipients.

Thank you,  
Laura

**Laura Griffin** | Regulatory Coordinator  
*she/her/hers*

Department of Environmental Protection | Policy Office  
Rachel Carson State Office Building  
400 Market Street | Harrisburg, PA  
Phone: 717.772.3277 | Fax: 717.783.8926  
Email: [laurgriffi@pa.gov](mailto:laurgriffi@pa.gov)

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DEPARTMENT OF ENVIRONMENTAL PROTECTION  
HARRISBURG, PA 17103

## Madison Brame

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**From:** Troutman, Nick  
**Sent:** Wednesday, August 10, 2022 11:00 AM  
**To:** Griffin, Laura; Eyster, Emily  
**Cc:** Chalfant, Brian; Reiley, Robert A.; Nezat, Taylor; Rodriguez, Amanda; Hartman, Michael  
**Subject:** RE: Delivery of Final Rulemaking - RACT III for Major Sources (7-561)

Received. Thanks Laura

-Nick

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**AUG 10 2022**

**Independent Regulatory  
Review Commission**

---

**From:** Griffin, Laura <laurgriffi@pa.gov>  
**Sent:** Wednesday, August 10, 2022 10:32 AM  
**To:** Troutman, Nick <ntroutman@pasen.gov>; Eyster, Emily <Emily.Eyster@pasenate.com>  
**Cc:** Chalfant, Brian <bchalfant@pa.gov>; Reiley, Robert A. <rreiley@pa.gov>; Nezat, Taylor <tnezat@pa.gov>; Rodriguez, Amanda <amarodrigu@pa.gov>; michael.hartman@pasenate.com  
**Subject:** Delivery of Final Rulemaking - RACT III for Major Sources (7-561)  
**Importance:** High

Ⓞ CAUTION : External Email Ⓞ

Good morning,

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Thank you,  
Laura

**Laura Griffin** | Regulatory Coordinator  
*she/her/hers*

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