APC – Perm – G – 03 – Low NO_x Draft – 092120
Low NO_x Technology Requirements for New and Modified Sources

DISCLAIMER: This document is guidance only and does not create legal rights or obligations. Agency decisions in any particular case will be made applying applicable laws and regulations to the specific facts.

EFFECTIVE DATE: **SEPTEMBER 21, 2020**

Signatures:

Division Director

Reviewer – Office of General Counsel

Reviewer - Division Deputy Director

Preparer - Environmental Consultant 4

PURPOSE

The purpose of this guidance is to specify when low NO_x burners are required for new and modified fuel burning air contaminant sources. This includes process and non-process fuel burning sources.

APC – Perm – G – 03 – Low NO_x Draft – 092120
Low NO_x Technology Requirements for New and Modified Sources

This guidance only applies to new and modified sources of nitrogen oxides. Owners of existing sources of nitrogen oxides that are not modifying those sources will not be required to retrofit such sources through this guidance unless such sources were constructed or modified without the appropriate air pollution control permit or permit modification.

Background

On June 7, 1974, the following provisions became part of the Tennessee Air Pollution Control Regulations:

> TAPCR 1200-03-07-.07(2) (process emission sources): Any person constructing or otherwise establishing an air contaminant source emitting gaseous air contaminants after April 3, 1972, or relocating an air contaminant source more than 1.0 km from the previous position after November 6, 1988, shall install and utilize equipment and technology which is deemed reasonable and proper by the Technical Secretary.
>
> TAPCR 1200-03-06-.03(2) (non-process emission sources): Any person constructing or otherwise establishing a non-portable air contaminant source emitting gaseous air contaminants after April 3, 1972, or relocating an air contaminant source more than 1.0 km from the previous position after November 6, 1988, shall install and utilize the best equipment and technology currently available for controlling such gaseous emissions.

These rules are part of Tennessee's federally approved State Implementation Plan. A State Implementation Plan (SIP) is a collection of regulations and documents used by a state, territory, or local air district to reduce air pollution in areas that do not meet National Ambient Air Quality Standards, or NAAQS. SIPs must also include provisions for ongoing maintenance of the NAAQS once attainment has been achieved.

Effective June 15, 2004, six areas in Tennessee were either designated non-attainment or deferred non-attainment for the 1997 ozone National Ambient Air Quality Standard (NAAQS) (three areas qualified for Early Action Compacts, which means they committed to take certain actions to improve air quality before they were required to do so). Ozone is a colorless, odorless gas that forms in the atmosphere in the presence of nitrogen oxides (NO_x) and volatile organic compounds (VOCs). In most of the southeastern United States, including Tennessee, it has been determined through extensive scientific research that NO_x emissions are the primary factor in ozone formation. NO_x emissions are also precursors to the formation of fine particulate matter ($PM_{2.5}$), and Tennessee had two areas designated non-attainment for $PM_{2.5}$ for the 1997 $PM_{2.5}$ NAAQS.

APC – Perm – G – 03 – Low NO_x Draft – 092120

Low NO_x Technology Requirements for New and Modified Sources

On July 20, 2005, the then Technical Secretary of the Tennessee Air Pollution Control Board, Barry Stephens, P.E., made a determination, via memorandum to staff, that low NO_x burner technology represented reasonable and proper control of NO_x emissions from new and modified process sources and best equipment and technology for emissions of NO_x from new and modified non-process sources as one measure to attain and maintain the ozone and $PM_{2.5}$ NAAQS pursuant to TAPCR 1200-03-07-.07(2) and 1200-03-06-.03(2). Although this determination is not specifically part of Tennessee's approved SIP, it is one measure that has likely contributed to Tennessee's continued attainment of the ozone and $PM_{2.5}$ NAAQS. The Division plans to continue to require low NO_x burners as outlined in this document to ensure continued attainment of the NAAQS.

Because ozone formation is attributable to both regional and local sources of NO_x emissions, this determination applies to new and modified fuel-burning sources and process sources with fuel-burning components in all counties of Tennessee directly regulated by the Division, regardless of attainment status. On a national scale, Tennessee is impacted by and contributes to air pollution that is transported from within and outside the state. This is the case for the other states in the southeast as well. Emissions from facilities in other states impact air quality in Tennessee, and emissions in attainment counties in Tennessee impact air quality throughout the state and in our neighboring states.

Low NO_x Requirements

Low NO_x burners for natural gas combustion are readily available for most applications, and in most cases are not cost prohibitive. Emission limits for fuel-burning sources using natural gas shall be established based on the low NO_x emission factors found in Table 1.4-1 of EPA's *Compilation of Air Pollutant Emissions Factors* (AP-42). For boilers with less than 100 MMBtu/hr heat input, this table provides a NO_x emission factor for low NO_x burners of 50 lb/10^6 scf of natural gas, 50% lower than NO_x emissions from uncontrolled boilers, and this degree of reduction will be required in most cases for natural gas combustion. The Division may make case-by-case determinations for the low NO_x requirement for natural gas combustion if evidence is provided by the applicant that the technology will adversely affect the process or is cost prohibitive. Such information may include calculations, manufacturer's statements, cost per ton of NOx reduction, the effect that the implementation of low NO_x requirements will have on the process, and any other information the applicant can provide to support their request. For combustion of fuel oils, the Division will make determinations of appropriate reductions as indicated in AP-42 Table 1.3-1 and on a case-by-case basis. For combustion of all other fuels, the Division will make case-by-case determinations of the appropriate technology for reduction of NO_x emissions based on the best available information.

Low NO_x burners will not be required for sources with potential NO_x emissions less than five tons per year (TPY). Sources may agree to limits that lower allowable NO_x emissions below five TPY to avoid the requirement for low NO_x burners, but they must agree to install low NO_x burners if they need to modify the permit such that their potential NO_x emissions are above five TPY. In such cases, retrofit or replacement costs shall not be factors in case-by-case determinations. For process emission sources with multiple units of processing equipment, applicants may request that the requirement for low-NO_x controls be based on potential emissions from each unit rather than the source in its entirety. The request must include appropriate justification for the exemption, including a flow diagram of the process with burner locations identified. Modifications to process emission sources that do not include updating or replacing the burners or otherwise increasing the potential emissions of NO_x from fuel combustion will not trigger the requirement for low-NO_x technology.

Information for Specific Source Types

Diesel engines at asphalt plants: Following implementation of the first low NO_x burner requirement, a determination was made for diesel engines at asphalt plants, an industry in which it is common to move equipment from location to location, that existing equipment moving into an area that is attainment for both ozone and $PM_{2.5}$ does not always have to install low NO_x burners. However, equipment moving into an ozone or $PM_{2.5}$ non-attainment area will be subject to this requirement. An existing source in a non-attainment area county that wishes to move within that non-attainment area, even if it is within the same county, will also be required to upgrade to low NO_x burners. If the move is less than 1 km from the current location, low NO_x burners will not be required unless the new location is in a non-attainment area and the old location was attainment.

For diesel engines subject to low NO_x requirements, including engines located at asphalt plants moving into a non-attainment area, the NO_x allowable emission rate will be set by 40 CFR §89.112 for Tier 2 or Tier 3 as applicable (Tier 1 will not be used). The "NMHC + NO_x" value, expressed on this table as g/kW-hr, will be used for the NO_x allowable limit (to be converted to pounds per mechanical horsepower output and / or pounds per hour).

Emergency engines/generators: The requirement for low-NOx technology will be presumed to be met by the applicable New Source Performance Standards (NSPS) and/or National Emission Standards for Hazardous Air Pollutants (NESHAP).

Large wall-fired boilers and small boilers: For those natural gas boilers which fit the description of the gas boilers in AP-42 Table 1.4-1 "Emission Factors for NO_x and CO from Natural Gas Combustion" for large wall-fired boilers and small boilers, the allowable emissions limit for NO_x will be set at the limit specified in this table for "Controlled Low NO_x Boilers." The "Flue gas recirculation" values will not

be required unless the application indicates that the source will be equipped with this type of control in addition to low NO_x burners.

Stationary gas and oil-fired turbines not subject to federal emission reduction requirements for NO_x: Allowable emission limits for NO_x will be established using the controlled NO_x emission factors found in AP-42 Table 3.1-1 and on a case-by-case basis.

Incinerators not subject to federal emission reduction requirements for NO_x: NOx emission reductions will be established on a case-by-case basis. These limitations will be established based on AP-42 Chapter 2, Solid Waste Disposal, or other available information resources (such as industry-specific emission factors developed by industry groups) as approved by the Technical Secretary of the Tennessee Air Pollution Control Board.

REVISION HISTORY TABLE

Revision Number	Date	Brief Summary of Change
0	--/--/--	