Pre-Hearing Draft

Clean Air Act Section 110(l) Noninterference Demonstration to Remove 19 Counties from North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program

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Preface: This document contains the Clean Air Act Section 110(l) technical demonstration for the North Carolina Division of Air Quality's request to revise its Inspection and Maintenance State Implementation Plan to eliminate all 19 remaining counties from North Carolina's motor vehicle emissions inspection and maintenance program in accordance with Section 12.7 (Reduce Emissions Inspection Requirements) of Session Law (S.L.) 2023-134 (House Bill 259) enacted by the 2023 session of the North Carolina General Assembly.

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LIST OF ACRONYMS

Acronym	Definition
AADVMT	Annual Average Daily VMT
AEO	Annual Energy Outlook
ALVW	Adjusted Loaded Vehicle Weight
API	Application Programming Interface
AQS	Air Quality System
C1	Class I
C2	Class II
C3	Class III
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAMPD	Clean Air Markets Program Data
CDOT	Charlotte Department of Transportation
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CMV	Commercial Marine Vessels
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CSA	Clean Smokestacks Act
CSAPR	Cross State Air Pollution Rule
DAQ	North Carolina Division of Air Quality
DEQ	North Carolina Department of Environmental Quality
DMV	North Carolina Division of Motor Vehicles
DV	Design Value
EE	Exceptional Events
EGU(s)	Electricity Generating Unit(s)
EIA	U.S. Energy Information Administration
EMC	North Carolina Environmental Management Commission
EMP	Emissions Modeling Platform
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FIPS	Federal Information Processing Standard
FP	Fireplace
FR	Federal Register
GHG	Greenhouse Gas
GSMNP	Great Smoky Mountains National Park
GVWR	Gross Vehicle Weight Rating
HDV	Heavy-Duty Vehicles
HPMS	Highway Performance Management System
I&M	Inspection and Maintenance
ID	Identification
kg/day	kilogram per day

Acronym	Definition
LDGV	Light-Duty Gasoline Vehicle
LMP	Limited Maintenance Plan
LPG	Liquified Petroleum Gas
LVW	Loaded Vehicle Weight
MOVES	Motor Vehicle Emission Simulator
MPH	miles per hour
MRM	Metrolina Regional Model
MRS	MOVES RunSpec
MW	megawatts
MY	Model Year
NAAQS	National Ambient Air Quality Standard
NCAC	North Carolina Administrative Code
NCGS	North Carolina General Statute
NCore	National Core [monitoring station]
NEI	National Emissions Inventory
NHTSA	National Highway Traffic Safety Administration
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OBD	On-board Diagnostics
OSBM	North Carolina Office of State Budget and Management
OSD	Ozone Season Day
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch
RVP	Reid Vapor Pressure
S.L.	Session Law
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TDM	Travel Demand Model
ULSD	Ultra-Low Sulfur Diesel
VHT	Vehicle Hours Traveled
VIN	Vehicle Identification Number
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
vPIC	Product Information Catalog Vehicle Listing
$\mu g/m^3$	micrograms per cubic meter

1.0 OVERVIEW

The 2023 session of the North Carolina General Assembly enacted Session Law (S.L.) 2023-134 (House Bill 259) (2023-2024 Appropriations Bill) effective October 3, 2023. Section 12.7 of S.L. 2023-134 revised the inspection and maintenance (I&M) program as follows:

County Coverage: Section 12.7.(b) of the Act amended North Carolina General Statute (NCGS) §143-215.107A(c) to remove 18 of the 19 counties currently included in North Carolina's vehicle emissions I&M program. The 18 counties removed from the program include Alamance, Buncombe, Cabarrus, Cumberland, Davidson, Durham, Forsyth, Franklin, Gaston, Guilford, Iredell, Johnston, Lincoln, New Hanover, Randolph, Rowan, Union, and Wake.

Mecklenburg County is the only county retained in the program.

Vehicle Model Year (MY) Coverage: Section 12.7.(a) of S.L. 2023-134 revised NCGS §20-183.2(b) to change the vehicle MY coverage for vehicles registered in Mecklenburg County as follows:

- From: It is (i) a vehicle with a MY within 20 years of the current year and older than the three most recent MYs or (ii) a vehicle with a MY within 20 years of the current year and has 70,000 miles or more on its odometer.
- To: It is a vehicle with a MY within 20 years of the current year and earlier than the 2017 MY.

Implementation Schedule: Section 12.7.(c) of the Act requires the Department of Environmental Quality (DEQ) to prepare and submit to the United States (U.S.) Environmental Protection Agency (EPA) for approval by the agency a proposed North Carolina State Implementation Plan (SIP) amendment based on the change to the motor vehicle emissions testing program provided in Section 12.7 of the Act. This proposed SIP amendment must be submitted to EPA by October 3, 2024.

Section 12.7.(d) of the Act requires that Section 12.7.(a) and (b) of the Act become effective on the first day of a month that is 60 days after the Secretary of the Department of Environmental Quality certifies to the Revisor of Statutes that the United States Environmental Protection Agency has approved an amendment to the North Carolina State Implementation Plan submitted as required by Section 12.7.(c) and applies to motor vehicles inspected, or due to be inspected, on or after that date. The Secretary shall provide this notice of approval along with the effective date of this section on its website and by written or electronic notice to emissions inspection

mechanic license holders, emissions inspection station licensees, and self-inspector licensees in the county where motor vehicle emissions inspection requirements are removed by this section. The remainder of this section is effective when it becomes law.

After consultation with EPA, for the purpose of the SIP revision, the Division of Air Quality (DAQ) is also proposing to remove Mecklenburg County from the I&M program. This decision is based on the following:

1. Declining Emissions Reductions:

As presented in this proposed SIP revision, removing the I&M program in Mecklenburg County from the SIP is not expected to interfere with the ongoing attainment and maintenance of any of the National Ambient Air Quality Standards (NAAQS). Outside of the SIP, the program will continue to be implemented until the State Legislature removes the I&M program from Mecklenburg County or there are no more vehicles subject to the program. For example, the emission reduction benefit associated with the revised MY vehicle coverage per Section 12.7.(a) of the Act will gradually decline to zero.[1,2] Table 1 shows the results of Motor Vehicle Emission Simulator (MOVES4.0.1) modeling of the number of vehicles subject to the current I&M program and the revised MY vehicle coverage. These results show that for 2025, the number of vehicles subject to I&M program would decrease by 48% under the revised MY vehicle coverage. By 2035, less than 5% of the vehicles would be subject to the I&M program.

Table 1. Changes to I&M Vehicle Coverage for Mecklenburg County

	2025	2035
No. Vehicles Subject I&M Inspection - Current Program	545,807	518,034
No. Vehicles Subject I&M Inspection - Revised Program	281,656	21,869
No. Vehicles Removed from I&M Program	264,151	496,165
Percentage of Vehicles Removed from I&M Program	48.4%	95.8%

2. Technical Analysis Challenges:

For the 2008 ozone standard, the boundary for the 7-county maintenance area includes all of Mecklenburg County and the urban portion (i.e., townships) of the 6 counties that border Mecklenburg County. The I&M program applies countywide rather than to the urban portion of the border counties included in the maintenance area, which provides a buffer extending beyond

[1] Under Section 12.7.(a) of the Act, vehicles subject to the I&M program in Mecklenburg County are those "...with a MY within 20 years of the current year and earlier than the 2017 MY." For example, if the current vehicle MY is 2025, nine MYs of vehicles are not subject to the program (i.e., MY 2025 - MY 2016 = 9 MYs). Thus, the program would sunset in 11 years (MY 2025 + 11 MYs = MY 2036).

[2] The 20-year maintenance plan for the Charlotte area for the 2008 8-hour ozone standard ends August 27, 2035. The limited maintenance plan for the Charlotte area for the 1997 8-hour ozone standard ends January 2, 2034.

the boundary of the maintenance area. By removing the I&M program from the 6 counties that border Mecklenburg County, the buffer is eliminated for Mecklenburg County and the technical analysis would need to account for emissions increases in Mecklenburg County associated with vehicles in border counties that travel into Mecklenburg County each day. Information is not available within the time frame for completing this analysis to estimate emissions increases for Mecklenburg County associated with removing the I&M program for the 6 other counties included in the maintenance area.

3. Program Implementation Challenges:

Keeping the I&M program in the SIP for Mecklenburg County would require modeling the impact of the change to the vehicle MY coverage per Section 12.7.(a) of the Act, revising Rule 15A NCAC Subchapter 02D, Section .1000, *Motor Vehicle Emission Control Standards* (a year-long process), and revising the I&M SIP. Should the State Legislature remove Mecklenburg County from the program at a future date, the lengthy process for preparing the Clean Air Act (CAA) Section 110(l) demonstration and revising the Charlotte area maintenance plan would need to be repeated. For these reasons, removing Mecklenburg County's I&M program in the SIP supports efficient utilization of North Carolina staff time and resources.

Figure 1 shows the 19 counties with an I&M program, the 2021-2023 ozone design value (DV) data for counties that have monitors, and counties that are covered by a maintenance plan for ozone. The figure also shows the boundaries for the Charlotte area that is covered by a maintenance plan for the 1997 or 2008 8-hour ozone standards.[3]

Under the CAA, EPA has established NAAQS for the following criteria pollutants: ozone, carbon monoxide (CO), lead, nitrogen dioxide (NO_2), fine and coarse particulate matter ($PM_{2.5}$ or PM_{10}), and sulfur dioxide (SO_2). The EPA is required to review, and revise, if necessary, the NAAQS every five years. Areas that violate a NAAQS are designated as "nonattainment" by EPA. Areas designated as "moderate nonattainment" or higher for ozone and CO are required to implement a vehicle I&M program (i.e., an emissions inspection program) in accordance with the CAA, Sections 187(a)(4) and 182(b)(4), respectively. The requirements of an I&M program were established in the Code of Federal Regulations (CFR) under Title 40 CFR Part 51.

[3] The Charlotte maintenance area for the 2008 8-hour standard includes all of Mecklenburg County and portions of Cabarrus, Gaston, Iredell, Lincoln, Rowan and Union Counties. For the 1997 8-hour standard, the Charlotte maintenance area includes all of Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan and Union Counties and a portion of Iredell County. The portion of Cabarrus, Gaston, Lincoln, Rowan and Union Counties that was designated attainment with the 2008 ozone standard must continue to comply with the foundation control measures included in the maintenance plan for the 1997 ozone standard even though EPA revoked the 1997 standard effective one year after completing designations for the 2008 standard.

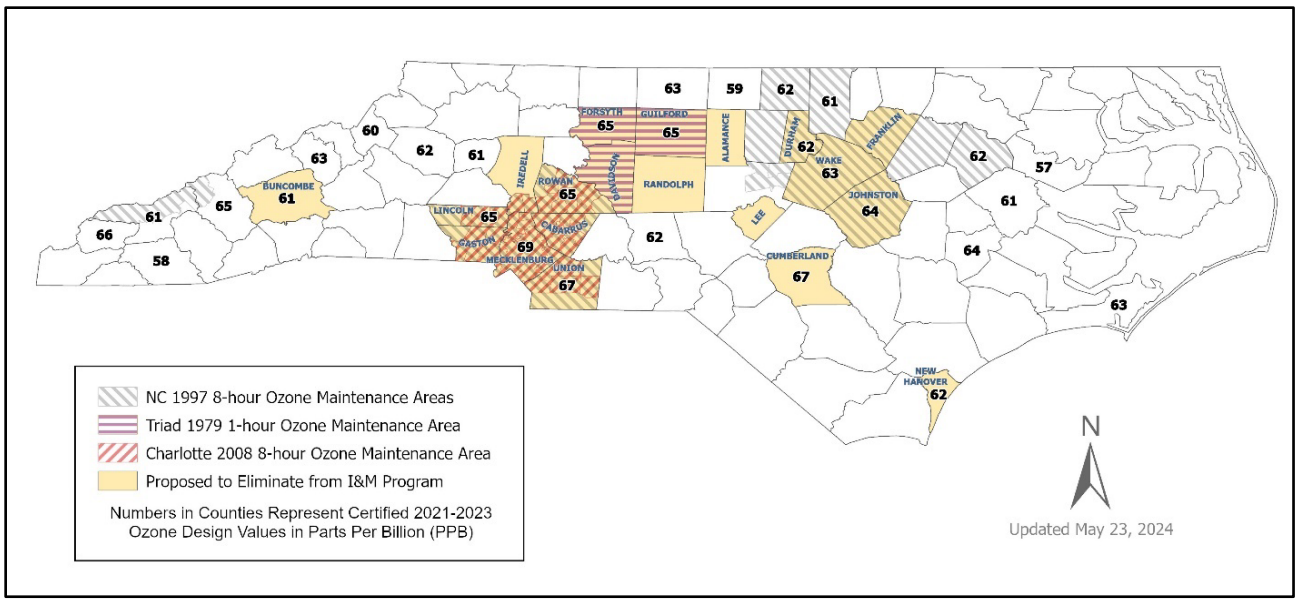

Figure 1. Counties Proposed to be Removed from North Carolina's I&M Program

In accordance with Section 110(l) of the CAA, the DAQ is submitting this noninterference demonstration on behalf of the DEQ to request EPA's approval to remove the remaining 19 counties covered by North Carolina's I&M SIP.

Section 110(l) states:

> *"Each revision to an implementation plan submitted by a State under this chapter shall be adopted by such State after reasonable notice and public hearing. The Administrator shall not approve a revision of a plan if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress (as defined in section 171 of this title), or any other applicable requirement of this Act."*

This noninterference demonstration provides a comprehensive review of the current ambient air quality monitoring and emissions data available for the removal of the 19 counties covered by the I&M program. Section 2 of this noninterference demonstration provides background information on North Carolina's I&M program. Section 3 presents the DAQ's request for EPA's approval to remove the 19 counites from the I&M program. Section 4 presents the noninterference demonstration by summarizing the current ambient air quality monitoring and emissions data available for the 19 counties to show why removing each county from the program will not interfere with maintaining compliance with the NAAQS in these or adjacent counties. Based on the technical analysis presented in this noninterference demonstration, Section 5 presents the DAQ's conclusions supporting the removal of the 19 counties from North Carolina's I&M SIP.

2.0 VEHICLE I&M PROGRAM BACKGROUND

The Environmental Management Commission (EMC) has the authority to *"adopt motor vehicle emissions standards; to adopt, when necessary and practicable, a motor vehicle emissions inspection and maintenance program to improve ambient air quality;"* pursuant to NCGS §143-215.107(a)(6), *Air quality standards and classification*s. The EMC has adopted rules for a basic I&M program pursuant to Title 15A North Carolina Administrative Code (NCAC) Subchapter 02D, Section .1000, *Motor Vehicle Emissions Control Standards,* that are federally enforceable by EPA pursuant to Title 40 Code of Federal Regulations (CFR) Part 51. The I&M program is implemented by the Commissioner of the North Carolina Division of Motor Vehicles (DMV) through the use of licensed safety/emission inspection stations, NCGS Article 3 – Motor Vehicle Act of 1937 §20-128.2(a), *Motor vehicle emission standards.*

The DMV's License and Theft Bureau has operational responsibility for the I&M program and has created rules for implementing and monitoring the program under 19A NCAC 03D .0500, *General Information Regarding Safety Inspection of Motor Vehicles*. The DEQ provides technical support to DMV's implementation of North Carolina's I&M program. In addition, the DEQ develops specifications for the program and certifies the emissions testing equipment used in the program. The DEQ also prepares revisions to the SIP based on changes made by the North Carolina General Assembly and the EMC. In the past, implementation of this program has been an integral part of North Carolina's SIP(s) to support attainment and maintenance of the NAAQS for ozone and CO.

The North Carolina vehicle I&M program started in 1982 with Mecklenburg County being required to have an I&M program to address violations of the CO NAAQS. In 1984, Wake County was added to the program for CO NAAQS violations. With the passage of the CAA Amendments of 1990, Cabarrus, Davidson, Durham, Forsyth, Gaston, Granville, Guilford, and Union Counties were added to the I&M program to address violations of the ozone and/or CO standards as described in 40 CFR 51.350(a). The I&M program was also implemented in Orange County although it was not designated as nonattainment for the ozone or CO NAAQS. Under the 1997 8-hour ozone standard, the Charlotte/Gastonia/Rock Hill area was designated as a moderate nonattainment area, which required Iredell, Lincoln, and Rowan Counties to be included in the I&M program.

Senate Bill 953 (S.L. 1999-328, Section 3.1(d)) required an additional 36 counties to have the vehicle emissions program to improve air quality in North Carolina. Counties were added to the program based on population, vehicle miles traveled, and the likely contribution by motor

vehicles to high ozone levels in these counties and adjacent counties. This expanded the program to a total of 48 counties.

In 1999, the North Carolina General Assembly passed legislation to require an On-Board Diagnostic II (OBD) I&M program in not only the counties required to have an I&M program under 40 CFR 51.350(a), but also in other counties in the State that may need the additional emission reductions to achieve the 1997 8-hour ozone standard. The NCGS §143-215.107A(c), *Motor vehicle emissions testing and maintenance program,* specifies the counties that are required to have OBD I&M. The State regulations at 15A NCAC Subchapter 02D, Section .1000, *Motor Vehicle Emission Control Standards,* references the NCGS.

The I&M program for the initial nine counties subject to the program was based on a "tailpipe" test. Starting in October 2002, the original nine counties converted from tailpipe testing to the new OBD emissions testing for all MY 1996 and newer light-duty gasoline vehicles and continued tailpipe testing of MY 1995 and older vehicles. The program was expanded from nine counties starting July 1, 2003, to a total of 48 counties on January 1, 2006. At the time of full implementation of the OBD program, inspection stations were performing the OBD emissions test on MY 1996 and newer vehicles, and tailpipe testing for MY 1995 and older vehicles was discontinued.

In 2002, North Carolina inspection stations performed over 2.5 million vehicle emission inspections. As the new I&M counties were added, the number of inspections was expected to rise to a high of about 3.5 million inspections but then dip to a lower figure when all tailpipe testing ended on December 31, 2005. The actual number of OBD inspections has varied from 3.6 to about 5.4 million since 2006, due to a program change to align registration and inspection dates in 2008 and higher than expected fleet turnover and population growth. In 2019, 3.86 million emissions inspections were performed.

On November 1, 2008, the State ended the use of paper inspection stickers and began the process of aligning vehicle inspection expiration and registration renewal dates by using electronic inspection authorizations. Session Law 2011-95 enacted by the North Carolina General Assembly exempted plug-in electric vehicles from the I&M requirement.

In 2012, the North Carolina General Assembly enacted S.L. 2012-199 which required DEQ and DMV to change the I&M program to exempt the vehicles of the three newest MYs that have less than 70,000 miles, and to secure EPA approval. The DEQ prepared and submitted to EPA an

amendment to the North Carolina I&M SIP to incorporate these changes to the I&M program. The EPA approved the amendment on February 5, 2015.[4]

The 2017 session of the North Carolina General Assembly enacted S.L. 2017-10, Senate Bill 131. Section 3.5.(a) of the Act amended NCGS §143-215.107A(c) to remove 26 of 48 counties from North Carolina's I&M program. For the 22 counties remaining in the program, Section 3.5.(b) of the Act also amended NCGS §20-183.2(b) by changing the vehicle MY coverage to: (i) a vehicle with a MY within 20 years of the current year and older than the three most recent MYs; or (ii) a vehicle with a MY within 20 years of the current year and has 70,000 miles or more on its odometer.

On November 17, 2017, the DAQ submitted to EPA an amendment to the North Carolina I&M SIP to remove the 26 counties specified in Section 3.5.(a) of S.L. 2017-10 from North Carolina's I&M program. This submittal included proposed revisions to North Carolina's (1) I&M SIP and (2) a CAA Section 110(l) noninterference demonstration supporting the proposed revisions to the I&M program. The EPA subsequently approved the amendment on September 11, 2018.[5] The counties were subsequently removed from the program effective December 1, 2018.

On July 25, 2018, the DAQ submitted to EPA an amendment to the North Carolina I&M SIP to adjust the vehicle MY coverage for the 22 counties remaining in the I&M program per Section 3.5.(b) of S.L. 2017-10. This submittal included proposed revisions to North Carolina's (1) motor vehicle I&M air quality rules in 15A NCAC Subchapter 02D, Section .1000, *Motor Vehicle Emission Control Standards*, (2) I&M SIP, (3) Maintenance Plan for the Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area for changing the vehicle MY coverage for 22 counties subject to North Carolina's I&M program; and (4) a CAA Section 110(l) noninterference demonstration supporting the proposed revisions to the I&M program. The EPA subsequently approved the amendment on August 28, 2019.[6] The revised vehicle MY coverage for the 22 counties was effective December 1, 2019. Note that submittal of the amendment to the I&M SIP to revise the vehicle MY coverage for the 22 counties remaining in the I&M program was placed on a different schedule than that for removing the 26 counties from the program to complete the process for revising rule 15A NCAC Subchapter 02D, Section .1000.

[4] 80 FR 6455-6458 (Vol. 80, No. 24)
[5] 83 FR 48383-48384 (Vol. 83, No. 186). The final rule was published in the *Federal Register* and was effective on September 25, 2018.
[6] 84 FR 47889-47893 (Vol. 84, No. 176). The final rule was published in the *Federal Register* on September 11, 2019 and was effective on October 11, 2019.

On December 14, 2020, the DAQ submitted to EPA an amendment to the North Carolina I&M SIP to remove Lee, Onslow, and Rockingham Counties as specified in S.L. 2020-5 from North Carolina's I&M program. This submittal included proposed revisions to North Carolina's (1) I&M SIP and (2) a CAA Section 110(l) noninterference demonstration supporting the proposed revisions to the I&M program. The EPA subsequently approved the amendment on August 1, 2022.[7] The counties were subsequently removed from the program effective November 1, 2022.

3.0 REQUEST FOR EPA'S APPROVAL OF REVISIONS TO NORTH CAROLINA'S I&M SIP TO REMOVE 19 COUNTIES FROM THE PROGRAM

The purpose of this noninterference demonstration is to request EPA's approval for North Carolina to:

- Revise the North Carolina I&M SIP at 40 CFR 52.1770 to:
  - Remove the following counties from North Carolina's I&M program as specified in Section 12.7.(b) of S.L. 2023-134: Alamance, Buncombe, Cabarrus, Cumberland, Davidson, Durham, Forsyth, Franklin, Gaston, Guilford, Iredell, Johnston, Lincoln, New Hanover, Randolph, Rowan, Union, and Wake. The DAQ is also requesting EPA's approval for North Carolina to revise its I&M SIP to remove Mecklenburg County.
  - Remove the following rules codified under 15A NCAC 02D, Section .1000, Motor Vehicle Emissions Control Standards (.1001 Purpose, .1002 Applicability, .1003 Definitions, .1005 On-Board Diagnostic Standards, and .1006 Sale and Service of Analyzers). Note that the DAQ would propose to repeal these rules after receiving EPA approval of this proposed CAA Section 110(l) noninterference demonstration.
- Remove the I&M program from the following maintenance plans:
  - Raleigh-Durham-Chapel Hill Area Limited Maintenance Plans for the 1997 8-Hour Ozone NAAQS;
  - Charlotte-Gastonia-Rock Hill Area Limited Maintenance Plan for the 1997 8-Hour Ozone NAAQS; and
  - Charlotte-Gastonia-Salisbury, North Carolina Maintenance Plan for the 2008 8-Hour Ozone Marginal Attainment Maintenance Area.

[7] 87 FR 49524-49526 (Vol. 87, No. 154). The final rule was published in the Federal Register on August 11, 2022, and was effective on September 12, 2022.

The EPA's approval of this request would provide significant economic relief to North Carolina vehicle owners exempted from annual emissions inspections in the remaining 19 counties and eliminate the need for an I&M SIP for North Carolina.

The following sections provide a summary of the air quality standards and implementation requirements with which this CAA Section 110(l) noninterference demonstration must comply for EPA to approve the revisions requested.

3.1 Current National Ambient Air Quality Standards (NAAQS) and Designation Status

Table 2 shows the most current air quality standards for the six criteria air pollutants and North Carolina's designation status with respect to each standard. North Carolina adopts the NAAQS into its air quality rules as authorized under Article 21B of Chapter 143-215.107 of the NCGS.

Table 2. Current National Ambient Air Quality Standards and Designation Status

Pollutant	Year Adopted by EPA	Primary / Secondary NAAQS	Averaging Time	Level[1]	Designation Status
Ozone	2008	Primary and secondary	8-hour	75 ppb	Attainment Statewide
Ozone	2015	Primary and secondary	8-hour	70 ppb	Attainment Statewide
CO	2011	Primary	1-hour 8-hour	35 ppm 9 ppm	Attainment Statewide
Lead	2008	Primary and secondary	Rolling 3-month average	0.15 µg/m^3	Attainment Statewide
NO_2	2010	Primary	1-hour	100 ppb	Attainment Statewide
		Primary and secondary	Annual	53 ppb	Attainment Statewide
$PM_{2.5}$	2012	Primary	Annual	12 µg/m^3	Attainment Statewide
		Secondary		15 µg/m^3	
		Primary and secondary	24-hour	35 µg/m^3	Attainment Statewide
$PM_{2.5}$	2024	Primary	Annual	9 µg/m^3	Final designations to be completed by EPA by February 6, 2026
PM_{10}	2012	Primary and secondary	24-hour	150 µg/m^3	Attainment Statewide
SO_2	2010	Primary	1-hour	75 ppb	Attainment/Unclassifiable[2]
		Secondary	3-hour	0.5 ppm	Attainment Statewide

[1] ppm = parts per million, ppb = parts per billion, µg/m^3 = micrograms per cubic meter.

[2] On Dec. 21, 2017, EPA designated the vast majority of North Carolina as "attainment/unclassifiable" (83 FR 1098, January 9, 2018) as a part of its Round 3 designation action under the Data Requirements Rule. Subsequently, North Carolina conducted source-oriented monitoring for one facility each in Limestone Township in Buncombe, Beaverdam Township in Haywood, and Cunningham Township in Person County for calendar years 2017 – 2019 to develop design values to support EPA's final Round 4 designations for the state. On December 21, 2020, EPA issued final "attainment/ unclassifiable" designations for these three remaining townships.

The pollutants that need to be reviewed are NO_2, CO, nitrogen oxides (NOx), and volatile organic compounds (VOCs). Nitrogen oxides refer to nitric oxide (NO) and NO_2. Since NOx includes NO_2, NO_2 does not need to be reviewed separately. Pollution control systems for light-duty gasoline vehicles subject to the I&M program are not designed to reduce emissions of $PM_{2.5}$, SO_2, or lead; therefore, removing counties from the program is not expected to have any impact on ambient concentrations of these pollutants.

North Carolina's I&M program has been approved into the SIP to attain and maintain the ozone and CO NAAQS. In order to remove a county from the I&M program, North Carolina must submit to EPA for approval a demonstration that any emissions increases associated with removing such county would not hinder any area from attaining and/or maintaining compliance with all the NAAQS. For counties that are in attainment with all the NAAQS, the noninterference demonstration would rely on ambient air quality monitoring data and emissions data to show that changing the program for the counties will not interfere with continued attainment of the NAAQS. For any area that is designated as not attaining the NAAQS, the SIP would have to be revised to include compensating or equivalent emissions reductions to offset increased emissions due to the I&M program change for the nonattainment area. However, since North Carolina is attaining the NAAQS for all criteria air pollutants, this requirement does not apply.

3.2 Ozone Sensitivity in North Carolina

It is important to note that North Carolina is considered "NOx limited" with respect to ozone formation. A study published in the *Journal of Environmental Management* concluded that the sensitivity of ozone to anthropogenic VOC emissions in the Southeastern United States is 2-3 orders of magnitude smaller than the sensitivity of ozone to NOx emissions, primarily due to the abundance of biogenic VOC emissions in this region.[8] The study also evaluates the change in ozone concentrations resulting from decreases in anthropogenic VOC emissions and indicates that the change in ozone concentrations resulting from a 30% decrease in anthropogenic VOC emissions is virtually zero in most cases. The study concludes that controlling anthropogenic VOC emissions in the Southeast is far less effective than controlling NOx emissions for purposes of reducing ozone levels. In North Carolina, approximately 80% of statewide VOC emissions come from biogenic or natural sources, which cannot be controlled.[9] Based on over 20 years of

[8] Odman, M Talat et al., *Quantifying the sources of ozone, fine particulate matter, and regional haze in the Southeastern United States,* 90 Journal of Environmental Management 3155-3168 (2009).
[9] Based on EPA's 2018v2 emissions modeling platform, biogenic VOC emissions were 80% of total statewide VOC emissions in 2018. Reference: "https://gaftp.epa.gov/Air/emismod/2018/v2/reports/2018gg_county_monthly_report_03aug2022_v0.csv" downloaded April 18, 2024, from EPA's FTP server at: https://gaftp.epa.gov/Air/emismod/2018/v2/reports/.

experience and scientific research, North Carolina's approach to controlling anthropogenic NOx instead of anthropogenic VOC emissions has proven to be the most cost-effective method for reducing ozone even in the most highly urbanized areas of the State.

4.0 NONINTERFERENCE DEMONSTRATION FOR ELIMINATING 19 COUNTIES FROM THE I&M PROGRAM

In the following sections, the DAQ presents the ambient monitoring and emissions data necessary to show that removing the remaining 19 counties from North Carolina's I&M program will not interfere with continued maintenance with all the NAAQS. Section 4.1 presents the noninterference demonstration for the ozone NAAQS. Section 4.2 presents the noninterference demonstration for the NO_2, CO, $PM_{2.5}$, SO_2, and lead NAAQS.

4.1 Noninterference with Ozone NAAQS

For each of the 19 counties, the study approach for ozone involved an analysis of daily NOx, VOC, and CO emissions changes associated with the program and the available ambient air quality monitoring data for ozone. The emissions data were used in conjunction with ambient monitoring data to evaluate whether removing the 19 counties from the I&M program would possibly interfere with continued maintenance with the NAAQS.

4.1.1 Compliance with the Current (2015) 8-Hour Ozone NAAQS

Attainment of the ozone NAAQS is demonstrated by monitoring ambient air ozone concentrations in areas required to be monitored by EPA (typically in and near large metropolitan areas). A monitoring location is considered in attainment if its DV is less than 71 parts per billion (ppb).[10] On November 16, 2017, EPA designated the entire State of North Carolina "attainment/unclassifiable" for the 2015 8-hour ozone NAAQS (based on certified monitoring data for 2014-2016).[11] North Carolina has continued to maintain compliance with the 2015 ozone standard based on certified monitoring data through October 31, 2023.

For each of the 19 counties, Table 3 shows the attainment status with respect to the current and previous ozone NAAQS, DVs calculated using certified monitoring data for 2021-2023 for the 2015 primary 8-hour ozone NAAQS, total number of vehicle inspections conducted in 2023, and

[10] An ozone design value is the average of the 4th highest ozone measurements for each year of a three consecutive year period.
[11] *Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)*, Final Rule, 82 FR 54232, November 16, 2017. This final rule was effective on January 16, 2018.

the total number of vehicles subject to the program as a percentage of all registered vehicles. None of the 19 counties have had a violation of the current 2015 8-hour ozone NAAQS. For the counties that do not have an ambient ozone monitor (i.e., Cabarrus, Gaston, Iredell, Franklin, Davidson, Alamance, and Randolph), EPA has determined that there is sufficient evidence to demonstrate compliance with the ozone NAAQS. As shown in Figure 1, these counties are next to counties with ozone measurement data below the current 2015 70 ppb ozone NAAQS. This is in sharp contrast to the ambient air quality data when the vehicle I&M program was expanded to 48 counties pursuant to S.L. 1999-328. At that time, two-thirds of the state's ozone monitors were violating the federal ozone standard.

Table 3. Counties to Remove from North Carolina's I&M Program

County	Ozone NAAQS	Previous Designation Status	2015 Ozone NAAQS Design Value, ppb (2021-2023)*	Total No. Vehicle I&M Inspections in 2023	Total I&M Vehicles (Model Years 2004-2023) as a Percentage of All Registered Vehicles
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS					
Cabarrus[1]	1997 8-hour	Maintenance		135,728	71%
	2008 8-hour	Maintenance			
Gaston[1]	1979 1-hour	Maintenance		130,392	70%
	1997 8-hour				
	2008 8-hour	Maintenance			
Iredell[1,2]	1997 8-hour	Maintenance		106,284	67%
	2008 8-hour	Maintenance			
Lincoln[1]	1997 8-hour	Maintenance	65	50,309	66%
	2008 8-hour	Maintenance			
Mecklenburg[3]	1979 1-hour	Maintenance	69	616,956	72%
	1997 8-hour				
	2008 8-hour	Maintenance			
Rowan[1]	1997 8-hour	Maintenance	65	77,814	66%
	2008 8-hour	Maintenance			
Union[1]	1997 8-hour	Maintenance	67	136,370	70%
	2008 8-hour	Maintenance			
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)					
Durham[3]	1979 1-hour	Maintenance	62	162,179	75%
	1997 8-hour				
Franklin	1997 8-hour	Maintenance		37,963	69%
Johnston	1997 8-hour	Maintenance	64	128,423	71%
Wake[3]	1979 1-hour	Maintenance	63	691,162	73%
	1997 8-hour				

County	Ozone NAAQS	Previous Designation Status	2015 Ozone NAAQS Design Value, ppb (2021-2023)*	Total No. Vehicle I&M Inspections in 2023	Total I&M Vehicles (Model Years 2004-2023) as a Percentage of All Registered Vehicles
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)[4]					
Davidson[5]	1979 1-hour	Maintenance		98,273	62%
Forsyth[3]	1979 1-hour	Maintenance	65	216,048	73%
Guilford[5]	1979 1-hour	Maintenance	65	300,138	73%
Other Counties (Not Subject to an Ozone Maintenance Plan)					
Alamance	-	-		98,630	70%
Buncombe	-	-	61	146,489	69%
Cumberland	-	-	67	149,533	73%
New Hanover	-	-	62	143,945	73%
Randolph	-	-		81,580	66%

* Ozone design values calculated based on the methodology in 40 CFR Part 50.19, Appendix U for the 2015 primary 8-hour ozone NAAQS. Design values downloaded from EPA's Air Quality System (AQS) May 17, 2024.

[1] Although only part of this county is subject to a maintenance plan for the 2008 8-hour ozone NAAQS, the whole county is subject to the I&M program.

[2] Although only part of this county is subject to a maintenance plan for the 1997 8-hour ozone NAAQS, the whole county is subject to the I&M program.

[3] County is now designated as attainment for CO.

[4] The Triad area maintenance plan ended after the area demonstrated continued attainment of the 1997 8-hour ozone NAAQS through the maintenance year 2018. The area is now classified attainment with the 1997 8-hour ozone NAAQS.

[5] County is subject to a maintenance plan for the 1997 primary annual $PM_{2.5}$ NAAQS of 15.0 $\mu g/m^3$. The maintenance plan ends December 19, 2031 (20 years after being redesignated from nonattainment to attainment/maintenance on December 19, 2011).[12]

4.1.2 Emissions Inventory

The EPA requires that the year of the inventory for this noninterference demonstration be prepared for a year that is plus or minus one year of the year in which the SIP revision is implemented by North Carolina after EPA approval. The DAQ selected 2025 for the inventory year to provide flexibility in case the SIP revision cannot be implemented until 2026.

For each of the 19 counties, total county-level ozone season day (OSD) NOx, VOC, and CO emissions were estimated for mobile (onroad and nonroad) and stationary (point and nonpoint) emissions sources. Emissions were estimated for all sectors to understand each sector's contribution to total emissions as well as the relative increase in total county-level emissions associated with removing each county from the I&M program. The DAQ utilized currently

[12] U.S. EPA, Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes; North Carolina: Redesignation of the Hickory- Morganton-Lenoir 1997 Annual Fine Particulate Matter Nonattainment Area to Attainment, Final rule, 76 FR 71452, November 18, 2011.

available EPA datasets from national modeling efforts and the state's best understanding of 2025 emissions levels to examine emission trends and their impact on ozone formation.

Table 4, Table 5, and Table 6 show anthropogenic OSD NOx, VOC, and CO emissions, respectively, for all sectors for 2025. As expected, the results show that removing each county from the I&M program increases emissions only for onroad vehicles. As shown in Table 4, MOVES4.0.1 emissions modeling results for 2025 show only slight increases in anthropogenic NOx emissions for each county, ranging from a 0.02 tons/day increase in total NOx emissions (1.1%) for Franklin County to a 0.31 tons/day increase in total NOx emissions (1.1%) for Mecklenburg County. The NOx emissions are estimated to increase by 1.0% (1.66 tons/day) of total manmade emissions (160.59 tons/day) for all 19 counties combined and 0.32% of total statewide manmade emissions (513 tons/day).[13] The largest increase in NOx emissions occur in Mecklenburg and Wake Counties because these counties have the largest number of light-duty vehicles that are subject to the I&M program in the state.

As shown in Table 5, MOVES4.0.1 emissions modeling results also show only slight increases in anthropogenic VOC emissions for each county, ranging from a 0.03 tons/day increase in total VOC emissions (0.4%) for Franklin County to a 0.48 tons/day increase in total VOC emissions (1.1%) for Wake County. The VOC emissions are estimated to increase by 0.8% (2.61 tons/day) of total manmade emissions (310.36 tons/day) for all 19 counties combined and 0.04% of total statewide manmade emissions (5,843 tons/day). When biogenic VOC emissions from natural sources (average of 265.07 tons/day in July 2018 as estimated in the 2018v2 modeling platform) are added to the man-made emissions (310.36 tons/day), the actual VOC emissions increase is only about 0.45% (2.61/575.43 tons/day x 100).[14]

As shown in Table 6, in 2025, MOVES4.0.1 emissions modeling results also show increases in anthropogenic CO emissions for each county ranging from a 1.25 tons/day increase in total CO emissions (3.1%) for Franklin County to a 26.12 tons/day increase in total CO emissions (6.2%) for Mecklenburg County. The CO emissions are estimated to increase by 6.4% (128.67 tons/day) of total manmade emissions (2,020.74 tons/day) for all 19 counties combined and 2.87% of total statewide manmade emissions (4,480 tons/day).

[13] Total statewide emissions were calculated from EPA's 2018v2 Emissions Modeling Platform that includes projection year emissions for 2032 (see files named "2018gg_county_monthly_report_03aug2022_v0.csv.zip" and "2032gg2_county_monthly_report_23oct2023_v1.csv.zip" on EPA's website at: https://gaftp.epa.gov/Air/emismod/2018/v2/reports/). The platform provides monthly emissions for anthropogenic NOx, VOC, and CO and biogenic emissions for VOC; therefore, July day emissions for 2025 were interpolated and divided by 31 days to estimate daily anthropogenic and biogenic emissions.

Table 4. Total County-Level Anthropogenic NOx Emissions for 2025 for 19 Counties (tons/day)

County	Onroad			Nonroad		Point		Nonpoint (Area)		Totals			
	I&M	No I&M	Emissions Increase	I&M	No I&M	I&M	No I&M	I&M	No I&M	I&M	No I&M	Emissions Increase	Percent Increase
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS													
Cabarrus	3.09	3.15	0.06	1.19	1.19	1.64	1.64	0.24	0.24	6.16	6.22	0.06	1.0%
Gaston	3.56	3.62	0.06	1.13	1.13	0.60	0.60	0.32	0.32	5.62	5.68	0.06	1.1%
Iredell	3.98	4.04	0.06	0.97	0.97	2.06	2.06	0.29	0.29	7.30	7.36	0.06	0.8%
Lincoln	1.60	1.63	0.03	0.37	0.37	0.79	0.79	0.11	0.11	2.87	2.90	0.03	1.0%
Mecklenburg	13.44	13.75	0.31	6.49	6.49	7.70	7.70	1.51	1.51	29.14	29.45	0.31	1.1%
Rowan	2.92	2.96	0.04	1.28	1.28	3.43	3.43	0.22	0.22	7.85	7.89	0.04	0.5%
Union	3.03	3.09	0.06	1.82	1.82	0.73	0.73	0.31	0.31	5.90	5.96	0.06	1.0%
Subtotals	31.62	32.25	0.63	13.26	13.26	16.96	16.96	3.00	3.00	64.84	65.46	0.62	1.0%
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)													
Durham	3.92	4.01	0.09	1.70	1.70	1.20	1.20	0.51	0.51	7.33	7.42	0.09	1.2%
Franklin	0.98	1.00	0.02	0.27	0.27	0.57	0.57	0.08	0.08	1.89	1.91	0.02	1.1%
Johnston	4.07	4.14	0.07	1.47	1.47	0.67	0.67	0.24	0.24	6.45	6.52	0.07	1.1%
Wake	11.01	11.29	0.28	4.80	4.80	3.29	3.29	1.21	1.21	20.31	20.59	0.28	1.4%
Subtotals	19.98	20.43	0.45	8.24	8.24	5.73	5.73	2.04	2.04	35.67	36.12	0.45	1.3%
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)													
Davidson	2.85	2.90	0.05	1.55	1.55	2.56	2.56	0.24	0.24	7.20	7.25	0.05	0.7%
Forsyth	5.19	5.30	0.11	1.50	1.50	1.77	1.77	0.52	0.52	8.98	9.09	0.11	1.2%
Guilford	6.87	7.01	0.14	3.95	3.95	1.96	1.96	0.86	0.86	13.64	13.78	0.14	1.0%
Subtotals	14.91	15.21	0.30	7.00	7.00	6.29	6.29	1.61	1.61	29.81	30.11	0.30	1.0%
Other Counties (Not Subject to an Ozone Maintenance Plan)													
Alamance	2.57	2.62	0.04	0.95	0.95	0.48	0.48	0.25	0.25	4.25	4.30	0.05	1.2%
Buncombe	3.83	3.90	0.07	1.31	1.31	0.72	0.72	0.45	0.45	6.31	6.38	0.07	1.1%
Cumberland	3.81	3.88	0.07	1.58	1.58	3.36	3.36	0.29	0.29	9.03	9.10	0.07	0.8%
New Hanover	1.84	1.89	0.05	2.13	2.13	1.96	1.96	0.28	0.28	6.20	6.25	0.05	0.8%
Randolph	2.88	2.92	0.04	0.78	0.78	0.26	0.26	0.24	0.24	4.16	4.20	0.04	0.9%
Subtotals	14.93	15.21	0.28	6.74	6.74	6.77	6.77	1.51	1.51	29.96	30.24	0.28	0.9%
Totals	**81.44**	**83.09**	**1.66**	**35.24**	**35.24**	**35.75**	**35.75**	**8.16**	**8.16**	**160.59**	**162.25**	**1.66**	**1.0%**

Table 5. Total County-Level Anthropogenic VOC Emissions for 2025 for 19 Counties (tons/day)

County	Onroad			Nonroad		Point		Nonpoint (Area)		Totals			
	I&M	No I&M	Emissions Increase	I&M	No I&M	I&M	No I&M	I&M	No I&M	I&M	No I&M	Emissions Increase	Percent Increase
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS													
Cabarrus	2.34	2.43	0.10	1.19	1.19	1.17	1.17	4.84	4.84	9.55	9.64	0.09	0.09%
Gaston	2.55	2.65	0.09	1.13	1.13	1.51	1.51	5.52	5.52	10.72	10.82	0.10	0.9%
Iredell	2.70	2.79	0.09	0.84	0.84	1.54	1.54	4.94	4.94	10.03	10.12	0.09	0.9%
Lincoln	1.26	1.30	0.04	0.46	0.46	2.69	2.69	2.15	2.15	6.56	6.60	0.04	0.6%
Mecklenburg	9.09	9.55	0.46	10.56	10.56	3.07	3.07	28.43	28.43	51.14	51.60	0.46	0.9%
Rowan	2.21	2.28	0.07	0.80	0.80	5.46	5.46	4.06	4.06	12.52	12.59	0.07	0.6%
Union	2.45	2.55	0.11	2.12	2.12	2.19	2.19	6.91	6.91	13.68	13.78	0.10	0.7%
Subtotals	22.60	23.56	0.96	17.11	17.11	17.63	17.63	56.85	56.85	114.19	115.14	0.95	0.8%
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)													
Durham	2.83	2.96	0.13	1.82	1.82	0.64	0.64	6.83	6.83	12.12	12.25	0.13	1.1%
Franklin	0.83	0.86	0.03	0.36	0.36	5.36	5.36	1.71	1.71	8.26	8.29	0.03	0.4%
Johnston	2.59	2.70	0.11	1.06	1.06	2.24	2.24	6.38	6.38	12.28	12.39	0.11	0.9%
Wake	8.77	9.24	0.48	7.99	7.99	2.63	2.63	24.47	24.47	43.86	44.33	0.47	1.1%
Subtotals	15.03	15.77	0.75	11.23	11.23	10.88	10.88	39.38	39.38	76.51	77.25	0.74	1.0%
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)													
Davidson	2.31	2.39	0.08	0.89	0.89	2.09	2.09	3.48	3.48	8.77	8.85	0.08	0.9%
Forsyth	4.00	4.16	0.16	2.05	2.05	3.63	3.63	7.22	7.22	16.91	17.07	0.16	0.9%
Guilford	5.02	5.24	0.21	4.54	4.54	8.66	8.66	11.42	11.42	29.64	29.86	0.22	0.7%
Subtotals	11.33	11.78	0.45	7.48	7.48	14.38	14.38	22.12	22.12	55.31	55.77	0.46	0.8%
Other Counties (Not Subject to an Ozone Maintenance Plan)													
Alamance	1.99	2.06	0.07	1.50	1.50	2.11	2.11	4.54	4.54	10.13	10.20	0.07	0.7%
Buncombe	2.83	2.94	0.11	1.86	1.86	2.87	2.87	6.39	6.39	13.95	14.06	0.11	0.8%
Cumberland	2.74	2.86	0.12	1.83	1.83	6.60	6.60	7.13	7.13	18.30	18.42	0.12	0.7%
New Hanover	1.79	1.88	0.09	1.97	1.97	2.53	2.53	4.82	4.82	11.11	11.20	0.09	0.8%
Randolph	2.06	2.13	0.06	0.90	0.90	2.54	2.54	5.36	5.36	10.87	10.94	0.07	0.6%
Subtotals	11.42	11.87	0.46	8.05	8.05	16.64	16.64	28.25	28.25	64.35	64.81	0.46	0.7%
Totals	**60.37**	**62.99**	**2.61**	**43.87**	**43.87**	**59.53**	**59.53**	**146.61**	**146.61**	**310.36**	**312.97**	**2.61**	**0.8%**

Table 6. Total County-Level Anthropogenic CO Emissions for 2025 for 19 Counties (tons/day)

County	Onroad			Nonroad		Point		Nonpoint (Area)		Totals			
	I&M	No I&M	Emissions Increase	I&M	No I&M	I&M	No I&M	I&M	No I&M	I&M	No I&M	Emissions Increase	Percent Increase
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS													
Cabarrus	39.38	44.07	4.69	22.33	22.33	1.45	1.45	2.52	2.52	65.69	70.38	4.69	7.1%
Gaston	43.02	47.78	4.76	20.87	20.87	1.14	1.14	2.70	2.70	67.72	72.48	4.76	7.0%
Iredell	43.99	48.64	4.65	14.07	14.07	2.23	2.23	2.51	2.51	62.79	67.44	4.65	7.4%
Lincoln	18.32	20.15	1.83	7.60	7.60	2.10	2.10	1.27	1.27	29.29	31.12	1.83	6.2%
Mecklenburg	194.21	220.33	26.12	200.48	200.48	22.16	22.16	7.55	7.55	424.40	450.52	26.12	6.2%
Rowan	35.52	39.05	3.53	12.24	12.24	3.61	3.61	1.79	1.79	53.17	56.70	3.53	6.6%
Union	39.01	43.61	4.60	39.19	39.19	4.46	4.46	3.03	3.03	85.69	90.29	4.60	5.4%
Subtotals	413.45	463.63	50.18	316.79	316.79	37.15	37.15	21.36	21.36	788.75	838.93	50.18	6.4%
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)													
Durham	58.60	66.24	7.64	32.41	32.41	1.04	1.04	3.86	3.86	95.91	103.55	7.64	8.0%
Franklin	11.67	12.92	1.25	6.42	6.42	20.93	20.93	1.02	1.02	40.03	41.28	1.25	3.1%
Johnston	44.11	49.24	5.13	17.71	17.71	2.65	2.65	2.70	2.70	67.17	72.30	5.13	7.6%
Wake	164.05	186.03	21.98	149.29	149.29	7.89	7.89	8.03	8.03	329.26	351.24	21.98	6.7%
Subtotals	278.43	314.43	36.00	205.83	205.83	32.50	32.50	15.61	15.61	532.37	568.37	36.00	6.8%
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)													
Davidson	33.13	36.37	3.25	15.49	15.49	1.20	1.20	2.21	2.21	52.03	55.27	3.24	6.2%
Forsyth	69.28	77.28	8.00	40.82	40.82	2.26	2.26	3.07	3.07	115.44	123.44	8.00	6.9%
Guilford	89.99	100.83	10.85	90.05	90.05	3.09	3.09	5.21	5.21	188.35	199.19	10.84	5.8%
Subtotals	192.39	214.49	22.10	146.37	146.37	6.55	6.55	10.49	10.49	355.81	377.89	22.08	6.2%
Other Counties (Not Subject to an Ozone Maintenance Plan)													
Alamance	28.91	31.99	3.08	28.60	28.60	3.93	3.93	2.01	2.01	63.44	66.52	3.08	4.9%
Buncombe	42.99	47.66	4.66	26.69	26.69	1.48	1.48	4.37	4.37	75.52	80.19	4.67	6.2%
Cumberland	50.44	56.61	6.17	31.77	31.77	5.28	5.28	2.67	2.67	90.17	96.34	6.17	6.8%
New Hanover	29.98	33.80	3.82	32.98	32.98	1.45	1.45	2.33	2.33	66.74	70.56	3.82	5.7%
Randolph	28.45	31.12	2.67	17.22	17.22	0.48	0.48	1.78	1.78	47.93	50.60	2.67	5.6%
Subtotals	180.77	201.18	20.40	137.26	137.26	12.63	12.63	13.15	13.15	343.81	364.22	20.41	5.9%
Totals	**1065.04**	**1193.71**	**128.68**	**806.25**	**806.25**	**88.84**	**88.84**	**60.61**	**60.61**	**2020.74**	**2149.41**	**128.67**	**6.4%**

The DAQ does not believe that the small increases to total NOx, VOC, and CO OSD emissions will translate into measurable ground-level ozone concentrations changes in North Carolina or contribute to a violation of any of the NAAQS. Consequently, maintenance of all the NAAQS is expected to be preserved.

The remainder of this section provides a summary of the methodologies applied to develop the emission inventories for each sector for 2025.

Onroad Vehicles

The onroad mobile source inventory contains emissions from motor vehicles that are licensed to use public roads. Onroad vehicles include passenger cars, motorcycles, and various classes of trucks and buses categorized according to vehicle weight and drive-cycle characteristics.

County-level July weekday NOx, VOC, and CO emissions were modeled using MOVES4.0.1. For each of the 19 counties, modeling was performed to generate emissions data both with and without the program parameters in place for 2025 to quantify emissions increases expected if the county is not subject to the program. The following summarizes key aspects of the onroad modeling framework; a detailed explanation is provided in Appendix A.

Pollutants Modeled:

- NOx, VOC, CO

Temporal Basis:

- MOVES4.0.1 modeling runs were executed to model emissions for a typical ozone season workday (specifically a July weekday).

Temperature and Relative Humidity Year:

- The latest available (2023) average July 24-hour temperature and humidity profiles were modeled, based on data from the Automated Surface Observing Systems at the Asheville Airport, Charlotte / Douglas International Airport, Fayetteville Regional Airport, Piedmont Triad International Airport, Raleigh-Durham International Airport, and Wilmington International Airport.

Inventory Year:

- 2025 was modeled (with and without the I&M program) for this study.

- For modeling runs that quantified the emissions reductions of the I&M program, the following I&M parameters were incorporated in the MOVES4.0.1 model inputs, as per the latest approved North Carolina I&M SIP:
    - Compliance Rate: 96%
    - Waiver Rate: 5%
    - Inspection Frequency: Annual
    - Model years covered: 2006 – 2025
    - Exempted vehicles: 2023 – 2025 (latest 3 vehicle MYs)

Nonroad Equipment and Vehicles

The nonroad mobile source inventory contains emissions from mobile equipment and vehicles that are not licensed to use public roads. Nonroad mobile source equipment covers a diverse set of items including lawn mowers, chain saws, tractors, all-terrain vehicles, forklifts, and construction equipment. Nonroad vehicles include freight and passenger railroads and commercial marine vessels (CMV). Appendix B documents the data sources, methods, and results used to develop OSD NOx, VOC, and CO emission estimates for the nonroad mobile sources in 2025.

For nonroad equipment, OSD emissions of NOx, VOC, and CO emissions were estimated by running MOVES4.0.1 for year 2025. The EPA includes more than 80 different types of equipment in the MOVES4.0.1 Nonroad model that was used to estimate nonroad equipment emissions. To facilitate analysis and reporting, EPA groups the equipment types into the following categories:

Agricultural equipment	Lawn and garden equipment, commercial
Airport support equipment	Logging equipment
Commercial equipment	Oil field equipment
Construction and mining equipment	Pleasure craft
Industrial equipment	Railway maintenance equipment
Lawn and garden equipment, residential	Recreational equipment

The model estimates emissions for different engine types: 2-stroke and 4-stroke spark ignition engines, diesel engines, liquid propane gas, and compressed natural gas fueled engines. Model runs were performed for each county separately. The model runs were developed for a typical July weekday. Default data were used for the input files used in the MOVES4.0.1 Nonroad model. The MOVES RunSpec (MRS) file (wherein all the modeling variables are set) used in the MOVES4.0.1 Nonroad model was tailored to reflect North Carolina-specific information. For reporting purposes, the resulting emissions from the MOVES4.0.1 Nonroad model were totaled for each equipment category by county. The resulting emissions from the MOVES4.0.1 Nonroad model were totaled for each equipment category by county and reported in Appendix B.

For freight and passenger railroads and CMV, month of July 2025 emissions were developed from emissions data obtained from version 2 of the EPA's 2018 Emissions Modeling Platform (2018v2).[15] The 2018v2 platform underwent extensive reviews and, for this reason, are considered to be the most comprehensive and accurate future year emission inventories for the railroad and CMV sectors available at the time that the inventory for this noninterference

[15] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.

demonstration was prepared. The DAQ estimated July NOx, VOC, and CO 2025 emissions from the July 2018 and 2032 emissions in the 2018v2 modeling platform. The 2025 values were calculated as the mid-point between the 2018 and 2032 emissions. To develop average July day emissions, the DAQ divided the estimated 2025 July emissions by 31 days. The DAQ believes that dividing July emissions by 31 days provides a reasonable estimate of typical OSD CMV and railroad locomotive emissions.

Stationary Point Sources

The point source inventory consists of emissions from individual facilities (point sources), airports, rail yards, wildfires, prescribed fires and agricultural burning. Industrial or commercial facilities with equipment that emits air pollutants are generally classified as point sources by air quality regulatory programs and are typically required to have permits issued by the DAQ and the three local programs located in Buncombe, Forsyth, and Mecklenburg Counties. A subcategory of these permitted sources are combustion sources such as boilers and turbines that generate electricity for sale on the electric grid. Emissions for these electricity generating units (EGUs) are developed separately from the other point sources due to differences in how they operate compared to industrial and commercial sources. These two categories of point sources are referred to as "EGUs" and "non-EGU point."

Airports or rail yards are not required to have air quality permits for construction and operations (although they could have equipment such as a boiler or generator that requires a permit). They have fixed and known locations and their emissions quantities can be comparable to industrial sources, therefore, EPA includes these sources in the point source inventory even though they are traditionally considered nonroad mobile sources. In addition, EPA includes wildfires and prescribed fires in the point source inventory because the extent of the fire-event activity is defined by geographic coordinates and because EPA uses related satellite fire detection methods to estimate agricultural burning emissions, DAQ has included these emissions in this inventory as well.

For point source, the inventory approach was to use the most recent data available for representing 2025-year emissions. To identify EGU facilities, the DAQ reviewed EGU records in EPA's 2018v2 emissions modeling platform (EMP). For EGUs with a continuous emissions monitoring system (CEMS), the DAQ downloaded 2023 daily NOx emissions for the month of July from EPA's CAMPD, which is available via website,[16] and counted the number of days

[16] EPA Clean Air Markets Program Data, 2023 July Daily NOx Emissions for North Carolina https://campd.epa.gov/data/custom-data-download.

each unit operated in July 2023. The 2023 daily average NOx emissions were calculated for each EGU by dividing the total 2023 NOx emissions for the month of July by the number of days the unit operated in July of 2023. The DAQ set 2025 daily average NOx emissions equal to 2023 daily average NOx emissions. For VOC emissions, the 2025 daily average VOC emission were calculated for each EGU by first calculating the ratio of 2018 annual VOC to annual NOx from EPA's 2018v2 modeling platform, then multiplying these ratios by 2025 daily average NOx emissions. The DAQ believes this calculation is a reasonable estimate of typical OSD VOC emissions. For CO emissions, the 2025 daily average CO emission were calculated for each EGU by first calculating the ratio of 2018 annual CO to annual NOx from EPA's 2018v2 modeling platform, then multiplying these ratios by 2025 daily average NOx emissions. The DAQ believes this calculation is a reasonable estimate of typical OSD CO emissions.

For all EGUs without a CEMS, the DAQ compiled emissions for 2022, which is the latest year of available data. A different set of EGUs appear in the 2018v2 EMP's 2018 emissions file and 2032 emissions file. While the 2018 emissions represent actual historical data, the 2032 emissions reflect EGU sector projections from an EPA projection using the Integrated Planning Model. A comprehensive list of EGUs from both the 2018 and 2032 files was developed, and then compared to the EPA's 2022 North Carolina point source inventory to identify the list of EGUs known to be currently operating. The DAQ compiled annual NOx, VOC, and CO emissions from the 2022 North Carolina point source inventory for these EGUs, and these emissions were divided by 365 days to estimate typical ozone day emissions. This approach is consistent with that used in estimating non-CEMS EGU emissions in previous Section 110(l) noninterference demonstrations to remove counties from the I&M program that DAQ has prepared and subsequently been approved by EPA.

For all non-EGU point sources, the approach was to estimate 2025-year emissions by interpolating between 2018 and 2032 emissions included in EPA's 2018v2 EMP. Because of the difficulty with predicting wild, prescribed, and agriculture fire activity in the future, EPA held 2018 emissions constant to represent 2032 emissions in the 2018v2 EMP. Year 2025 July NOx, VOC, and CO emissions from EPA's EMP were divided by 31 days to estimate typical OSD emissions. The DAQ believes that dividing July emissions by the 31 days in the month provides a reasonable estimate of typical OSD emissions for these point sources. Appendix C describes the methods applied to estimate emissions for point source categories.

Stationary Nonpoint (Area) Sources

Area sources represent a collection of many small, stationary sources of air pollution emissions within a specified geographical area that individually emit less than the minimum emission levels prescribed for point sources. Because these sources are too small and/or too numerous to be surveyed and characterized individually, all area source activities are collectively estimated. The county is the geographic area for which emissions from area sources are compiled, primarily because counties are the smallest areas for which data used for estimating emissions is readily available. The following sections explain the methodology for developing typical OSD 2025 emissions for area sources.

The 2025 area source emissions inventory is based on interpolating between the 2018 historical and 2032 projected emissions in the EPA's 2018v2 EMP.[17] The 2018v2 EMP has undergone extensive reviews and, for this reason, is considered to be the most comprehensive and accurate emissions data available at the time that the inventory for this noninterference demonstration was prepared. The July NOx, VOC, and CO emissions from the 2016v1 EMP were divided by 31 days to estimate OSD emissions. The DAQ believes that average July day area source emissions provide a reasonable estimate of typical OSD area source emissions. Appendix D documents the methods and procedures applied to estimate emissions for the nonpoint (area) source categories.

4.1.3 North Carolina's Obligations under the NOx SIP Call Regarding the Proposed Changes to Remove 19 Counties from the State's Vehicle Emissions I&M Program

On August 7, 2002, North Carolina submitted NC-104 to the EPA as a component of its response to the NOx SIP call requirements. The rule revisions expanded the I&M program from 9 to 48 counties pursuant to North Carolina S.L. 1999-328, Section 3.1(d) and incorporated the on-board diagnostics (OBD) testing procedure. The addition of 39 counties to the I&M program pursuant to Section 3.1(d) of the S.L. was initially ratified to satisfy the 1997 8-hour ozone NAAQS (80 FR 6455). However, the expanded I&M program coverage area was included in the SIP submittal alongside the newly-adopted OBD testing procedures to support the establishment of credits for North Carolina's NOx budget and trading program. On October 30, 2002, the EPA approved the I&M rule revisions and North Carolina's use of the I&M credits for the NOx SIP call budget and trading program (67 FR 66056). The ozone season I&M NOx emissions credits were 914 tons in 2004; 2,078 tons in 2006; and 4,385 tons in 2007 and beyond.[18] These credits

[17] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.
[18] For 2004, the ozone season ran from June 1 through Sept. 30. For subsequent years, the ozone season ran from May 1 through Sept. 30.

were used at the beginning of the program until the affected stationary sources could install and operate controls needed to meet their emissions allowances.

On November 19, 2008, North Carolina submitted NC-137 to repeal several NOx SIP call provisions as a component of its response to the Clean Air Interstate Rule (CAIR). This action was conducted by the state since the EPA no longer operated a separate banking and trading program for NOx SIP call sources when the CAIR program started on January 1, 2009. On May 9, 2013, the EPA approved North Carolina's request to remove its NOx SIP banking and trading program rules from its SIP (78 FR 27065). Elements of the NOx SIP call that were not carried forward into the CAIR ozone season trading program, such as the I&M credits, remained in effect.

North Carolina's obligations under the NOx SIP call are not affected by any emissions increases associated with the proposed changes to the vehicle I&M program pursuant to S.L. 2020-5. The DAQ considered the combined impacts of removing the 19 counties from North Carolina's I&M program, as specified by the S.L. 2020-5. As a follow-up to its July 11, 2018, letter to the EPA, the DAQ concludes that the proposed changes to North Carolina's I&M program do not impact NC's obligations under the NOx SIP Call for the following reasons:[19]

- The NOx trading program that made use of the I&M allowances was repealed and replaced with the Clean Air Interstate Rule (CAIR). Therefore, the I&M credits were not used to meet North Carolina's previous obligations under CAIR or current obligations under Phase I or II of the Cross-State Air Pollution Rule (CSAPR).

- The EGU sector has achieved actual ozone season emissions reductions in 2007 and 2023 that more than offset the increase in ozone season NOx emissions associated with the proposed changes to the I&M program, which eliminates the need for the I&M credits to comply with North Carolina's obligations under the NOx SIP call.

- State legislation such as the Clean Smokestacks Act (CSA) and economic drivers such as natural gas prices and renewable energy investments have significantly reduced ozone season NOx emissions below the original NOx SIP call budgets for EGUs.[20] This point is illustrated

[19] July 11, 2018, letter from the DAQ to EPA titled, *"North Carolina's Obligations under the NOx SIP Call Regarding Proposed Changes to the State's Vehicle Emissions I&M Program."* The purpose of this letter was to support why the DAQ believes that the state's obligations under the NOx SIP call were not affected by any emissions increases associated with the proposed changes to the I&M program pursuant to S.L. 2017-10.

[20] In June 2002, the North Carolina General Assembly enacted the CSA, which required that coal-fired power plants in North Carolina reduce annual NOx emissions by 77% by 2009. These power plants were also required to reduce annual SO_2 emissions by 49% by 2009 and 73% by 2013. The utilities have reduced NOx emissions by 89% and SO_2 emissions by 97% relative to 1998 emissions levels. With the requirement to meet annual emissions caps and

in Table 7, which compares the EGU NOx SIP call budget to actual emissions in 2007, 2021, 2022, and 2023. Actual EGU emissions in 2007, 2021, 2022, and 2023 were 23%, 61%, 63%, and 62%, respectively, below the NOx SIP call budget.

Table 7. Comparison of Ozone Season (May 1 through Sept. 30) NOx SIP Call Budget to Actual Emissions for EGUs

EGUs	2007	2021	2022	2023
NOx SIP Call Budget (tons/ozone season)*	31,451	31,451	31,451	31,451
Actual Emissions (tons/ozone season)	24,177	12,291	11,525	11,957
Below Budget (tons/ozone season)	7,274	19,160	19,926	19,494
Below Budget (Percent)	23%	61%	63%	62%

* The EGU NOx SIP Call budget reported in this table is based on the budget reported in a similar table in previous Section 110(l) noninterference demonstrations to remove counties from the I&M program (or change the vehicle model year coverage of the I&M program). On May 1, 2022, North Carolina Rule 15A NCAC 02D .1425 (NOx SIP Call Budgets) became effective and in this rule the EGU NOx SIP call budget is 31,212 tons, or 239 tons lower than the budget reported in this table. The difference between the two budgets is associated with moving emissions for one facility from the EGU to the non-EGU category.

- Modeling results show that NOx emissions remain below the NOx SIP call budgets after emissions increases from this proposed I&M program revision and two prior revisions. The DAQ used the EPA MOVES4.0.1 model to estimate the increases in onroad mobile source NOx emissions resulting from changes to the I&M program. The removal of 26 counties from the program in 2018 resulted in an estimated increase of 611 tons of NOx over the ozone season.[21] The DAQ also estimated that the 2018 ozone season NOx emissions increases from the vehicle MY coverage SIP revision to be 311 tons in the 22 counties remaining in the I&M program.[22] The DAQ estimates that NOx emissions increases from removing the 19 counties pursuant to S.L. 2020-5 will be 240 tons over the 2025 ozone season. Together, total ozone season NOx emissions are estimated to increase by 1,190 tons. In 2023, EGU emissions were 11,957 tons (62%) below the NOx SIP call budget for EGUs. As shown in Table 8, the proposed changes to the I&M program would lower the EGU reduction by 6.45% (from 18,462 to 17,512 tons).

disallowing the purchase of NOx credits to meet the caps, the CSA reduced NOx emissions beyond the requirements of the NOx SIP call even though the CSA did not limit emissions only during the ozone season. The CSA emissions caps were submitted to EPA for adoption into the SIP in August 2009 and were subsequently approved in September 2011 (76 FR 59250-59252; Vol. 76, No. 186). These regulations are both state and federally enforceable.

[21] On November 17, 2017, (NC-204), the DAQ submitted a SIP revision to remove 26 counties from North Carolina's expanded I&M program, which was previously approved into the SIP for use as a component of the State's NOx Budget and Allowance Trading Program. The EPA published a Final Rule (83 FR 48383-48384; Vol. 83, No. 186) approving the SIP revision on September 25, 2018, with an effective date of September 25, 2018.

[22] On July 25, 2018, (NC-214), the DAQ submitted a SIP revision to revise the MY coverage for counties subject to North Carolina's expanded I&M program pursuant to 2017-10, Section 3.5.(b). The EPA published a Final Rule (84 FR 47889-47893; Vol. 84, No. 176) approving the SIP revision on September 11, 2019, with an effective date of October 11, 2019.

Table 8. Impact of NOx Emissions Increases due to Proposed Changes to the I&M Program on EGU Reductions and NOx SIP Call I&M Credits

Ozone Season NOx Emission Increases from I&M Program Revisions	
Removed 26 Counties from Program (2018 tons/ozone season)	611
Revised MY Coverage for 22 Counties (2018 tons/ozone season)	311
Removed 3 Counties (2022 tons/ozone season)	28
Removed 19 Counties (2025 tons/ozone season)	240
Total I&M Increase (tons/ozone season)	1,190
EGU Ozone Season NOx Emission Reductions	
Emissions Reduction in 2023 (from Table 7) (tons/ozone season)	19,494
Emissions Reduction in 2023 minus I&M Increase (tons/ozone season)	18,304

4.1.4 Demonstration of Noninterference with Limited Maintenance Plans (LMP) for the 1997 8-Hour Ozone NAAQS

The following identifies the counties proposed for removal from the I&M program that are included in the limited maintenance plans (LMPs) for the 1997 8-hour ozone NAAQS:

- Raleigh-Durham-Chapel Hill Ozone Maintenance Area Counties (Triangle Area):
  - Durham, Franklin, Johnston, and Wake.

- Charlotte-Gastonia-Rock Hill Maintenance Area (Charlotte Area):
  - Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, and Union.

The 1997 8-hour ozone NAAQS was set at 0.08 parts per million (ppm). An exceedance of the 1997 8-hour ozone NAAQS occurs when a monitor measures ozone at or above 0.085 ppm on average for an 8-hour period (0.084 ppm is considered to be in compliance with the 1997 ozone standard to three decimal places). A violation of this NAAQS occurs when the annual fourth highest daily maximum 8-hour ozone values, averaged over three consecutive years, is greater than or equal to 0.085 ppm. This three-year average is termed the "design value" (DV) for the monitor. For areas with more than one ozone monitor, the DV for the area is based on the monitor with the highest DV.

The DAQ prepared LMPs to fulfill the 2nd 10-year maintenance plan requirement for the Triangle and Charlotte Areas for the 1997 8-hour ozone NAAQS. The LMP for each area was developed to comply with the D.C. Circuit decision that vacated EPA's interpretation that the second maintenance plans were not required for "orphan maintenance areas" (i.e., areas that had

been redesignated to attainment for the 1997 ozone NAAQS (maintenance areas) and designated attainment for the 2008 8-hour ozone NAAQS).[23]

In accordance with EPA guidance, these maintenance areas qualified for a LMP because (1) current air quality levels for ambient monitoring sites in the area are below 85% (i.e., 71 ppb) of the standard, and (2) air quality levels had not been highly variable during preceding years.[24] The EPA guidance went on to state that the continued applicability of prevention of significant deterioration requirements, and control measures already contained in the SIP and federal measures, such as the Federal Motor Vehicle Control Program, should provide adequate assurance of maintenance for such areas. Therefore, it was unnecessary to include projection year emissions and develop motor vehicle emission budgets for the last year of the maintenance plan.[25] The LMPs for the Triangle and Charlotte areas end December 26, 2027, and January 2, 2034, respectively. The EPA approved the LMP for the Triangle area in May 2022 and the Charlotte area in February 2023.[26,27]

The following presents trends in ozone DVs for the past 10 DV periods for each LMP area and compares 2025 OSD emissions after removing the I&M program from the applicable counties to the base year emissions in the LMPs (2014 for the Triangle area and 2017 for the Charlotte area). These results show that both LMP areas are maintaining ozone levels that are 85% below the 1997 8-hour ozone NAAQS and emissions in 2025 are projected to be well below baseline emissions included in the LMPs for each area after removing counties from the I&M program.

4.1.4.1 LMP for the Triangle Area

In addition to the four counties proposed for removal from the I&M program (i.e., Durham, Franklin, Johnston, and Wake Counties), the LMP for the Triangle area includes the entire counties of Granville, Orange, and Person and a portion of Chatham County. In a previous action, EPA approved removal of Chatham, Granville, and Orange Counties from the I&M

[23] South Coast, 882 F.3d 1138 (D.C. Cir. 2018).
[24] "Resource Document for 1997 Ozone NAAQS Areas: Supporting Information for States Developing Maintenance Plans," U.S. EPA, November 20, 2018, available from https://www.epa.gov/sites/production/files/2018-11/documents/ozone_1997_naaqs_lmp_resource_document_nov_20_2018.pdf, accessed April 2020.
[25] For the Triangle Area, although not required, the DAQ included projection year emissions for 2028 in the LMP as weight-of-evidence to show that future year emissions would remain below 2014 base year emissions.
[26] EPA Final Rule: Air Plan Approval; NC; Great Smoky Mountains National Park, Raleigh-Durham-Chapel Hill and Rocky Mount Areas Limited Maintenance Plans for the 1997 8-Hour Ozone NAAQS, 87 FR 27521, Vol. 87, No. 89, May 9, 2022, effective date of June 8, 2022.
[27] EPA Final Rule: Air Plan Approval; North Carolina; Charlotte-Gastonia-Rock Hill Area Limited Maintenance Plan for the 1997 8-Hour Ozone NAAQS, 88 FR 2245-2247, Vol. 88, No. 9, Friday, January 13, 2023, effective date of February 13, 2023.

program which were officially removed from the program in December 2018.[28] Person County was never subject to the I&M program.

All the ozone monitors in the Triangle area attained the 1997 8-hour ozone NAAQS (84 ppb) beginning with the 2004-2006 DV period. In addition, all areas attained the 2008 8-hour ozone NAAQS (75 ppb) beginning with the 2011-2013 DV period, and all met the 2015 ozone NAAQS (70 ppb) beginning with the 2012-2014 DV period. Table 9 shows ozone DVs (based on certified monitoring data) for the past 10 years. These data show that the Triangle maintenance area monitors have consistently had ozone DVs below the 85% threshold of 71 ppb including after December 2018 when Chatham, Granville, and Orange Counties were removed from the I&M program. During 2020 ozone concentrations decreased somewhat due to the effects of the COVID19 pandemic when light-duty vehicle miles decreased significantly from people staying at home. Since 2020, vehicle activity has increased to pre-pandemic levels resulting in a slight increase in DVs for the 2021-2023 period, however, the DVs continue to remain well below the 85% threshold of 71 ppb.

Table 9. Triangle Area Historic Ozone Design Values for the 1997 8-Hour Ozone NAAQS (ppb)*

Air Quality System (AQS) Site ID	Local Site Name	County Name	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
37-063-0015	Durham Armory	Durham	66	61	62	61	62	61	59	58	58	62
37-077-0001	Butner	Granville	66	63	64	64	65	64	60	57	57	61
37-101-0002	West Johnston Co.	Johnston	67	63	65	63	63	61	59	60	61	64
37-145-0003	Bushy Fork	Person	66	61	63	61	62	62	59	59	57	62
37-183-0014	Millbrook School	Wake	65	63	65	66	66	64	60	60	60	63

* Ozone design values calculated based on the methodology in 40 CFR Part 50.10, Appendix I for the 1997 primary 8-hour ozone NAAQS. Design values downloaded from EPA's AQS May 17, 2024.

Based on the data presented in Table 4 and Table 5, removal of Durham, Franklin, Johnston, and Wake Counties from the I&M program in 2025 is estimated to increase NOx and VOC emissions by 0.45 tons/day (1.3%) and 0.74 tons/day (1.0%), respectively, of total anthropogenic emissions in the Triangle maintenance area. Table 10 shows the 2014 OSD base year inventory in the Triangle LMP, the 2025 OSD emissions accounting for the NOx and VOC emissions increase, and the percent change in emissions from 2014 to 2025. Overall, emissions for NOx and VOC

[28] EPA Final Rule: Air Plan Approval; North Carolina; Inspection and Maintenance Program, Final rule, 83 FR 48383, September 25, 2018, effective date of September 25, 2018.

are expected to decline by 64% and 12%, respectively. For the point and fire sectors, VOC emissions show an increase due to differences in Prescribed/Wildfire emissions. The amount of fire activity is highly variable across time, and EPA has incorporated major refinements to methods of estimating acres burned activity with each successive national emissions inventory.[29] Point source VOC emissions are expected to decline over this period.

Table 10. Triangle LMP Area Average Summer Day 2014 and 2025 Anthropogenic NOx and VOC Emissions by Sector (tons)

	2014[1]		2025		% Change	
Sector	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**
Nonpoint (Area)	6.103	51.294	2.344	46.164	-62%	-10%
Nonroad	14.970	15.782	9.711	13.306	-35%	-16%
Onroad[2]	64.856	32.603	25.496	19.325	-61%	-41%
Point + Fires[3]	40.471	7.529	7.420	15.271	-82%	103%
TOTAL	**126.400**	**107.207**	**44.971**	**94.066**	-64%	-12%

[1] The methods used to develop the 2014 base year emissions are documented in the final *Limited Maintenance Plan (LMP) for the Great Smoky Mountains National Park (GSMNP), Rocky Mount, & Triangle Maintenance Areas for the 1997 8-Hour Ozone National Ambient Air Quality Standard (NAAQS)*, submitted to EPA on September 22, 2020. The 2014 emissions are presented in Table 3.4 (Average Summer Day 2014 and 2028 Anthropogenic NOx and VOC Emissions by Maintenance Area and Sector (tons)) of this SIP submission to EPA. This document is available on DAQ's website at: https://edocs.deq.nc.gov/AirQuality/DocView.aspx?id=400637&dbid=0&repo=AirQuality&searchid=b8583803-1035-4bd0-97aa-1a5059090754.

[2] Onroad emissions modeled to include the I&M program in 2014 and exclude the I&M program in 2025.

[3] Although reported separately in the LMP, emissions for the Point and Fires categories are combined here for comparison to how the data for the categories were developed from EPA's 2018v2 modeling platform.

With a couple of exceptions (onroad and nonroad mobile sources as discussed separately below). the 2025 emissions inventory for the Triangle is based on interpolating between the 2018 historical and 2032 projected emissions in EPA's 2018v2 EMP.[30] Because the 2018v2 platform's emissions were used by EPA in support of modeling the impact of EPA's revised primary annual $PM_{2.5}$ NAAQS, these emissions had already undergone extensive quality assurance. This inventory is considered to be the most comprehensive and accurate emissions data available at the time that the inventory for this noninterference demonstration was prepared. The DAQ estimated July NOx and VOC 2025 emissions from the July 2018 and 2032 emissions in the 2018v2 modeling platform. The 2025 values were calculated as the mid-point between the 2018 and 2032 emissions values. To develop average July day emissions for most source

[29] Specifically, EPA's modeling platform Prescribed/Wildfire 2018 average July day VOC emissions for Franklin and Orange County are 4.624 and 2.763 tons, respectively (EPA's platform holds these estimates constant in 2032, so DAQ also used 2018 values to estimate 2025 emissions). The July 2014 Prescribed/Wildfire average summer day VOC emissions, also compiled by EPA, were 0.002 and 0.001 tons in Franklin and Orange County, respectively.

[30] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.

sectors, the DAQ divided estimated 2025 July emissions by 31 days. The DAQ believes that average July day emissions provide a reasonable estimate of typical OSD emissions.

The MOVES4.0.1 model was run to calculate average July day onroad emissions for 2025 without the I&M program for all counties. The MOVES4.0.1 model was also run to calculate average July day nonroad model emissions for 2025. Further details on the methodologies for developing 2025 emissions are provided in sector-specific Appendices.

The results of this analysis show that after removing the four counties from the I&M program, emissions in 2025 are projected to be well below the 2014 baseline emissions ensuring on-going attainment with the 1997 ozone NAAQS. In addition, the Triangle LMP area has been maintaining ozone levels that are well below 85% of the 1997 8-hour ozone NAAQS. Thus, the small increases in NOx and VOC emissions associated with removing the counties from the I&M program is not expected to translate into measurable ground-level ozone concentration changes and ozone levels are expected to remain well below the 1997 8-hour ozone NAAQS.

4.1.4.2 LMP for the Charlotte Area

As displayed by the non-hatched blue shaded areas in Figure 2, the 1997 8-hour ozone NAAQS orphan maintenance area encompasses the following Townships that were designated attainment for the 2008 ozone NAAQS:

- Cabarrus county – Gold Hill;
- Gaston county – Cherryville;
- Lincoln county – Howards Creek and North Brook;
- Rowan county – Cleveland, Morgan, Mount Ulla, and Scotch Irish; and
- Union county – Buford, Jackson, Lanes Creek, and New Salem.

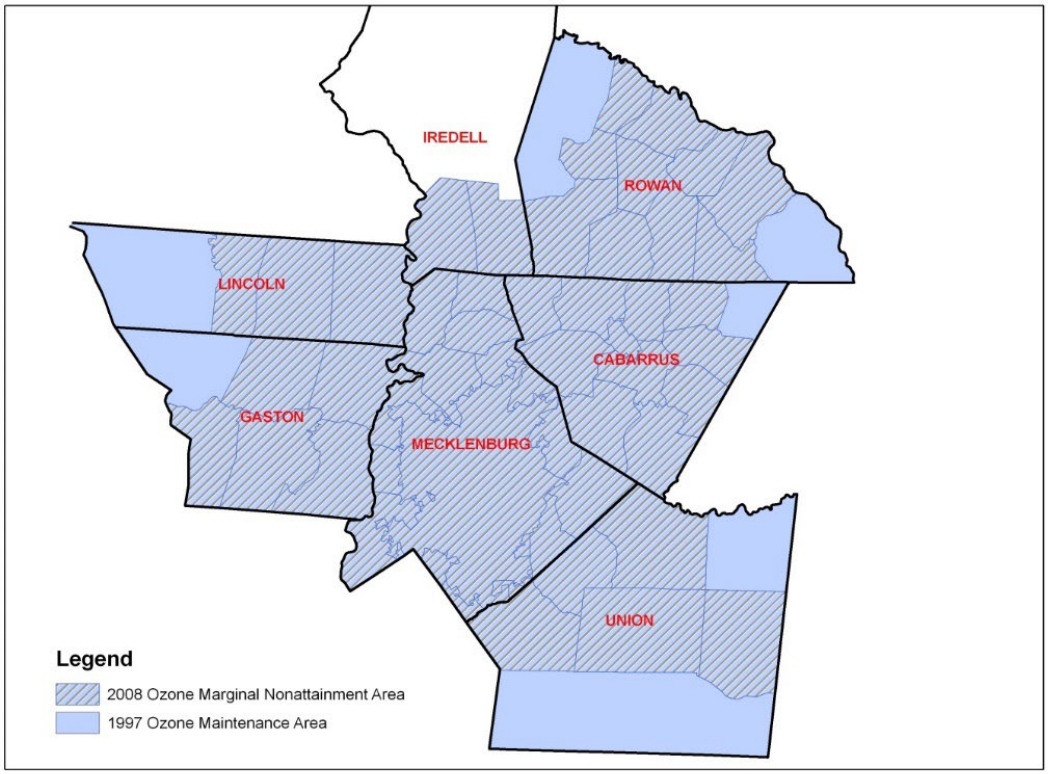

Figure 2. North Carolina Portion of 1997 and 2008 Ozone NAAQS Maintenance Areas

All regulatory ozone monitors in the Charlotte area attained the 1997 8-hour ozone NAAQS (84 ppb) beginning with the 2008-2010 DV period. In addition, all areas attained the 2008 8-hour ozone NAAQS (75 ppb) beginning with the 2012-2014 DV period, and all met the 2015 ozone NAAQS (70 ppb) beginning with the 2016-2018 DV period. Table 11 shows ozone DVs (based on certified monitoring data) for the past 10 DV periods. These data show that the Charlotte maintenance area monitors have consistently had ozone DVs below the 85% threshold of 71 ppb. As previously discussed for the Triangle area, DVs that include 2020 decreased somewhat due to the impacts of the COVID19 pandemic. Since 2020, vehicle activity and ozone DVs have increased to pre-pandemic levels for 2021-2023, however, the DVs continue to remain below the 85% threshold of 71 ppb.

Table 11. Charlotte Area Historic Ozone Design Values for the 1997 8-Hour Ozone NAAQS (ppb)*

AQS Site ID	Local Site Name	County Name	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
37-109-0004	Crouse	Lincoln	68	65	67	67	65	64	60	61	61	65
37-119-0041	Garinger	Mecklenburg	70	68	69	69	68	68	67	66	64	69
37-119-1009	County Line	Mecklenburg	73	67[a]								
37-119-0046	University Meadows	Mecklenburg			70[a]	70[a]	70	69	67	66	64	70
37-159-0021	Rockwell	Rowan	68	64	65	64	62	62	61	62	61	65
37-179-0003	Monroe Middle School	Union	68	65	68	67	68[b]	68[b]	63	62	61	67
45-091-0006[c]	York CMS	York, South Carolina	60	59	59							
45-091-0008	York Landfill	York, South Carolina				62	---[d]	---[d]	---[d]	---[d]	59	64
45-091-8801[e]	Catawba Longhouse	York, South Carolina					63	64	62	62	60	64

* Ozone design values calculated based on the methodology in 40 CFR Part 50.10, Appendix I for the 1997 primary 8-hour ozone NAAQS. Design values downloaded from EPA's AQS May 17, 2024 for North Carolina monitors and June 5 and 6, 2024 for South Carolina monitors.

[a] The County Line monitor (37-119-1009) was discontinued in 2015 and the University Meadows monitor was started in 2016 to replace the County Line monitor. EPA approved combining data for the two sites to calculate a design value; value reported is a combined design value.

[b] Monitor did not meet 3-year completeness requirement of 90%.

[c] The York CMS Monitoring Site was relocated to the York Landfill Monitoring Site in 2017. With EPA's approval, the data are now reported under AQS Site ID 45-091-0008.

[d] The EPA retroactively invalidated portions of the Department's ozone data collected in 2018 and 2019. The monitoring data collected during these years is not included within this document.

[e] The Catawba Indian Nation Monitoring Site is owned and operated by the Catawba Indian Nation (Tribal Code: 032). This monitoring site began operation in 2016 and did not have a valid design value until 2018.

Based on the data presented in Table 4 and Table 5, removal of the seven counties from the I&M program in 2025 is estimated to increase NOx and VOC emissions by 0.62 tons/day (1.0%) and 0.95 tons/day (0.8%), respectively, of total anthropogenic emissions in the Triangle maintenance area. Table 12 shows the 2017 OSD base year inventory in the Charlotte LMP, the 2025 OSD emissions developed for this noninterference demonstration, and the percent change in emissions from 2017 to 2025. Overall, emissions for NOx and VOC are expected to decline by 39% and 11%, respectively. Although point source VOC emissions are expected to decline over the period, the point and fire sectors show an estimated VOC emissions increase. As noted in Section 4.1.4.1 for the Triangle area, the increase is attributable to Prescribed/Wildfire emissions – emissions can be highly variable for these activities across time. Emission increases are also shown in Table 12 in the nonroad mobile sector. The EPA made major refinements to the post-2014 nonroad engine population growth data used in modeling nonroad emissions. These refinements occurred after the 2017 emissions data were developed that were used to support the Charlotte LMP. As nonroad equipment turns over to lower-emitting engines, nonroad modeling

projects emission decreases over time. Therefore, DAQ anticipates that 2025 nonroad mobile NOx and VOC emissions would be lower than 2017 nonroad mobile VOC emissions if the latest nonroad model was used to estimate emissions in each year.[31]

Table 12. Charlotte LMP Orphan Areas Average Summer Day 2017 and 2025 Anthropogenic NO_x and VOC Emissions by Sector (tons)

	2017[1]		2025		% Change	
Sector	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**
Nonpoint (Area)	0.267	2.266	0.099	1.986	-63%	-12%
Nonroad	0.436	0.451	0.480	0.502	10%	11%
Onroad[2]	2.184	1.376	1.171	0.922	-46%	-33%
Point + Fires[3]	0.100	1.181	0.084	1.288	-16%	9%
TOTAL	**2.987**	**5.274**	**1.835**	**4.697**	-39%	-11%

[1] The methods used to develop the 2017 base year emissions are documented in the final *Limited Maintenance Plan (LMP) for the Charlotte-Gastonia-Rock Hill Maintenance Area for the 1997 8-Hour Ozone National Ambient Air Quality Standard (NAAQS)*, submitted to EPA on December 9, 2021. The 2017 emissions are presented in Table 3.4 (Metrolina Orphan Areas Average Summer Day 2017 Anthropogenic NOx and VOC Emissions by Sector (tons)) of this SIP submission to EPA. This document is available on DAQ's website at: https://deq.nc.gov/media/26378/open.
[2] Onroad emissions modeled to include the I&M program in 2017 and exclude the I&M program in 2025.
[3] Although reported separately in the LMP, emissions for the Point and Fires categories are combined here for comparison to how the data for the categories were developed from EPA's 2018v2 modeling platform.

The DAQ applied the same approach to compiling 2025 emission estimates for the Charlotte LMP orphan area counties as the Triangle LMP area counties described above. For most source categories, 2025 July county emissions were developed as the mid-point between the July 2018 actual and 2032 projected emissions in EPA's 2018v2 modeling platform. To develop average July day emissions, the DAQ divided the estimated 2025 July emissions by 31 days. The DAQ believes that average July day emissions provide a reasonable estimate of typical OSD emissions.

The MOVES4.0.1 model was run to calculate average July day county-level 2025 onroad emissions without the I&M program for all counties. The MOVES4.0.1 model was also run to calculate average July day nonroad county-level emissions for 2025.

To estimate orphan area emissions in each county, the DAQ applied percentages by county/sector/pollutant calculated from the 2014 county and orphan area emissions for each

[31] The DAQ performed sample runs using the nonroad model incorporated into MOVES4.0.1 for Orange County. The MOVES4.0.1-based average July day emission estimates show decreases in both 2018 and 2025 emissions relative to 2014 emissions (NOx reductions ranging from 26% in 2018 to 51% in 2025, and VOC reductions ranging from 15% in 2018 to 20% in 2025).

orphan area as estimated in the Charlotte area LMP. Further details on the methodologies for developing 2025 emissions are provided in sector-specific Appendices.

The results of this analysis show that after removing the seven counties from the I&M program, emissions in 2025 are projected to be well below the 2014 baseline emissions ensuring on-going attainment with the 1997 ozone NAAQS. In addition, the Charlotte LMP area has been consistently maintaining ozone levels below the 1997 8-hour ozone NAAQS. Thus, the small increase in NOx and VOC emissions associated with removing the counties from the I&M program is not expected to translate into measurable ground-level ozone concentration changes and ozone levels are expected to remain well below the 1997 8-hour ozone NAAQS.

4.1.5 Demonstration of Noninterference with the Charlotte-Gastonia-Salisbury, North Carolina Maintenance Area for the 2008 8-Hour Ozone NAAQS

As displayed by the hatched blue shaded areas in Figure 2, the 2008 8-hour ozone NAAQS maintenance area encompasses the counties and townships shown in Table 13 that were designated attainment for the 2008 ozone NAAQS on July 28, 2015.[32]

Table 13. Counties and Townships within the Charlotte Maintenance Area

Cabarrus County Townships					
Central Cabarrus	Concord*	Georgeville	Harrisburg	Kannapolis	Midland
Mount Pleasant	Odell	Poplar Tent	New Gilead	Rimertown	
Gaston County Townships					
Dallas	Crowders Mountain	Gastonia	Riverbend	South Point	
Iredell County Townships					
Coddle Creek	Davidson				
Lincoln County Townships					
Catawba Springs	Lincolnton	Ironton			
Mecklenburg County – All Townships					
Rowan County Townships					
Atwell	China Grove	Franklin	Gold Hill*	Litaker	Locke
Providence	Salisbury	Steele	Unity		
Union County Townships					
Goose Creek	Marshville	Monroe	Sandy Ridge	Vance	

*Note: Concord Township in Cabarrus County and Gold Hill Township in Rowan County were inadvertently left out of North Carolina's recommendation and EPA's final designations. In a letter dated January 28, 2014, the DAQ requested EPA to add the missing townships in the state's 2008 marginal ozone nonattainment area definition.

[32] EPA Final Rule: Approval and Promulgation of Implementation Plans and Designation of Areas; North Carolina; Redesignation of the Charlotte-Rock Hill, 2008 8-Hour Ozone Nonattainment Area to Attainment, 80 FR 44873 (Vol. 80, No. 144), July 28, 2015.

Table 14 shows ozone DVs (based on certified monitoring data) for the past 12 DV time periods. All ozone monitors in the Charlotte area attained the 2008 8-hour ozone NAAQS (75 ppb) beginning with the 2012-2014 DV period, and all met the 2015 ozone NAAQS (70 ppb) beginning with the 2016-2018 DV period. These data show that the Charlotte maintenance area monitors have consistently had ozone DVs below 75 ppb over the past 10 DV periods. As previously discussed, DVs that include 2020 decreased somewhat due to the impacts of the COVID19 pandemic. Vehicle activity and ozone DVs have increased to pre-pandemic levels for the 2021-2023 DV period, however, the DVs continue to remain below 75 ppb.

Table 14. Charlotte Area Historic Ozone Design Values for the 2008 8-Hour Ozone NAAQS (ppb)*

AQS Site ID	Local Site Name	County Name	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
37-109-0004	Crouse	Lincoln	75	72	68	65	67	67	65	64	60	61	61	65
37-119-0041	Garinger	Mecklenburg	83	78	70	68	69	69	68	70	67	66	64	69
37-119-1009	County Line	Mecklenburg	83	78	73	67[a]								
37-119-0046	University Meadows	Mecklenburg					70[a]	70[a]	70	69	67	66	64	68
37-159-0021	Rockwell	Rowan	78	73	68	64	65	64	62	62	61	62	61	65
37-179-0003	Monroe Middle School	Union	73	70	68	65	68	67	68[b]	68[b]	63	62	61	67
45-091-0006[c]	York CMS	York, South Carolina	65	63	60	59	59							
45-091-0008	York Landfill	York, South Carolina						62	---[d]	---[d]	---[d]	---[d]	59	64
45-091-8801[e]	Catawba Longhouse	York, South Carolina							63	64	62	62	60	64

* Ozone design values calculated based on the methodology in 40 CFR Part 50.15, Appendix P for the 2008 primary 8-hour ozone NAAQS. Design values downloaded from EPA's AQS May 17, 2024, for North Carolina monitors and June 5 and 6, 2024 for South Carolina monitors.

[a] The County Line monitor (37-119-1009) was discontinued in 2015 and the University Meadows monitor was started in 2016 to replace the County Line monitor. EPA approved combining data for the two sites to calculate a design value; value reported is a combined design value.

[b] Monitor did not meet 3-year completeness requirement of 90% for 2016 and 2017.

[c] The York CMS Monitoring Site was relocated to the York Landfill Monitoring Site in 2017. With EPA's approval, the data are now reported under AQS Site ID 45-091-0008.

[d] The EPA retroactively invalidated portions of the Department's ozone data collected in 2018 and 2019. The monitoring data collected during these years is not included within this document.

[e] The Catawba Indian Nation Monitoring Site is owned and operated by the Catawba Indian Nation (Tribal Code: 032). This monitoring site began operation in 2016 and did not have a valid design value until 2018.

Table 15 shows the increase in NOx and VOC emissions in 2025 associated with removing the I&M program and compares total anthropogenic 2014 OSD base year emissions in the Charlotte maintenance plan for the first 10-year period (August 27, 2015 - August 27, 2025) to 2025

emissions (including and excluding the I&M program for light-duty vehicles) by county.[33] Overall, removal of the I&M program from the maintenance area would increase NOx and VOC emissions in 2025 by only 0.58 ton/day and 0.88 ton/day, respectively. With the I&M program maintained in 2025, the safety margin shows that 2025 emissions are 55% and 9% below the 2014 base year emissions for the maintenance area. Removing the counties from the I&M program in 2025 would result in decreasing the safety margin for the entire maintenance area by only 1% for both NOx and VOC emissions. Thus, removing the I&M program from the counties would not significantly change the safety margins. In addition, as discussed in Section 5.1, the emission reduction benefits of the I&M program are expected to decline through the last year of the maintenance plan (2035) as newer, cleaner vehicles replace older vehicles in the fleet and additional federal onroad vehicle rules are implemented. Therefore, the small increases in NOx and VOC emissions are not expected to cause any measurable increases in ozone levels in the maintenance area.

Table 15. Charlotte Maintenance Area for 2008 Ozone NAAQS – Average Summer Day Anthropogenic NO_x and VOC Emissions by Sector

	2014[1]		2025[2]				2025[2]				2025	
	Includes I&M for On-Road Light-Duty Vehicles (tons/day)		Includes I&M for On-Road Light-Duty Vehicles (tons/day)		Safety Margin (% below 2014 Emissions)		Excludes I&M for On-Road Light-Duty Vehicles (tons/day)		Safety Margin (% below 2014 Emissions)		Increase from Removing I&M Program (tons/day)	
Sector	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**
Cabarrus*	11.49	11.50	6.14	9.51	-47%	-17%	6.20	9.61	-46%	-16%	0.06	0.10
Gaston*	27.89	12.96	5.28	9.91	-81%	-24%	5.34	10.00	-81%	-23%	0.06	0.09
Iredell*	6.86	6.33	2.83	4.21	-59%	-33%	2.86	4.25	-58%	-33%	0.03	0.04
Lincoln*	4.36	6.55	2.57	5.81	-41%	-11%	2.59	5.84	-41%	-11%	0.02	0.03
Mecklenburg	56.71	50.10	29.14	51.14	-49%	2%	29.45	51.60	-48%	3%	0.31	0.46
Rowan*	11.74	12.59	7.46	10.66	-36%	-15%	7.51	10.72	-36%	-15%	0.05	0.06
Union*	11.13	13.09	5.27	12.20	-53%	-7%	5.32	12.30	-52%	-6%	0.05	0.10
TOTAL	**130.18**	**113.12**	**58.69**	**103.44**	**-55%**	**-9%**	**59.27**	**104.32**	**-54%**	**-8%**	**0.58**	**0.88**

[1] The methods used to develop the 2014 base year emissions are documented in the Supplement III to the Revised Maintenance Plan for The Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area, December 19, 2022.

[2] Emissions in 2025 for all sectors calculated for the Charlotte maintenance area for the 2008 ozone NAAQS. MOVES4.0.1 was used to calculate on-road and nonroad emissions. Light-duty vehicles were modeled with and without the I&M program.

[33] Note that the emissions reflect activity that occurs in the portion of each of the six counties included in the maintenance area plus all of Mecklenburg County. Therefore, for the six partial counties, the increase in emissions attributable to the maintenance area is lower than the increases for the entire county to which the I&M program applies as presented in Table 4 and Table 5.

The maintenance plan for the Charlotte area for the 2008 ozone NAAQS includes motor vehicle emissions budgets (MVEBs) for 2026 for each of three transportation planning organization budget areas. The EPA's MOVES3.0 model was run to establish the budgets that are included in the maintenance plan approved by EPA (80 FR 44873, July 28, 2015). Subsequently, EPA has released updates to the MOVES model. The DAQ conducted modeling using EPA's most recent version of the model (i.e., MOVES4.0.1, January 2024) and the most recent VMT and vehicle source type population data to evaluate compliance with the MVEBs with and without I&M implemented in the maintenance area and these results are presented in Table 16 and Table 17.

Table 16 shows that 2026 NOx and VOC emissions estimates, modeled with the current I&M program in effect, for the three budget areas within the maintenance area (Cabarrus-Rowan Metropolitan Planning Organization, Charlotte Regional Transportation Planning Organization, and Gaston-Cleveland-Lincoln Metropolitan Planning Organization). Budget area emissions are compared to their respective NOx and VOC MVEBs. Similarly, Table 17 shows the emissions estimates without an I&M program in effect. In all cases, the 2026 emissions estimates are well under the MVEBs. For transportation conformity determination analysis years beyond 2026, continued NOx and VOC emissions reductions from vehicle fleet turnover, implementation of new federal emission and engine standards, and transition to electric vehicles are anticipated to further reduce the potential for exceeding any of the 2026 MVEBs.[34]

Table 16. Charlotte-Gastonia-Salisbury Maintenance Area - 2026 Emissions with I&M - Analysis Relative to Current MVEBs

Budget Area	NOx, kg/day	NOx MVEB, kg/day	Amount Below MVEB, kg/day	% Below NOx MVEB	VOC, kg/day	VOC MVEB, kg/day	Amount Below MVEB, kg/day	% Below VOC MVEB
CRMPO	4,708	6,543	-1,835	-28.0%	3,495	4,753	-1,258	-26.5%
CRTPO	17,661	22,417	-4,756	-21.2%	11,443	13,818	-2,375	-17.2%
GCLMPO	3,885	5,117	-1,232	-24.1%	2,771	3,583	-812	-22.7%

Notes: MVEB = motor vehicle emissions budgets; kg/day = kilograms per day.

[34] For example, on March 20, 2024, EPA announced a final rule, *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*, that sets new, more protective standards to further reduce air pollutant emissions from light-duty and medium-duty vehicles starting with model year 2027 (89 FR 27842, Thursday, April 18, 2024). This rule is not included in MOVES4.0.1 used for this analysis. This rule, along with a recent rule affecting emissions from heavy-duty vehicles (89 FR 29440, April 22, 2024), is not included in the MOVES 4.0.1 model that was used in this analysis.

Table 17. Charlotte-Gastonia-Salisbury Maintenance Area - 2026 Emissions with I&M - Analysis Relative to Current MVEBs

Budget Area	NOx, kg/day	NOx MVEB, kg/day	Amount Below MVEB, kg/day	% Below NOx MVEB	VOC, kg/day	VOC MVEB, kg/day	Amount Below MVEB, kg/day	% Below VOC MVEB
CRMPO	4,791	6,543	-1,752	-26.8%	3,640	4,753	-1,113	-23.4%
CRTPO	17,991	22,417	-4,426	-19.7%	12,019	13,818	-1,799	-13.0%
GCLMPO	3,947	5,117	-1,170	-22.9%	2,880	3,583	-703	-19.6%

Notes: MVEB = motor vehicle emissions budgets; kg/day = kilograms per day.

4.2 Noninterference with the Nitrogen Dioxide, Carbon Monoxide, Particulate Matter, Sulfur Dioxide, and Lead NAAQS

This section summarizes North Carolina's status with respect to the NO_2, CO, $PM_{2.5}$, SO_2, and lead NAAQS and explains why removing the 19 counties from the I&M program will not interfere with maintaining compliance with the NAAQS in the 19 counties.

4.2.1 Nitrogen Dioxide (NO_2)

The 2010 1-hour NO_2 NAAQS is set at 100 ppb, based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations. The annual standard of 53 ppb is based on the annual mean concentration.

North Carolina has always been in compliance with the NO_2 standards. To date, three near-road NO_2 monitors have been established in North Carolina, one in the Raleigh/Durham area in January 2014 and the other two in the Charlotte area in June 2014 and January 2024. There are also two area-wide monitors in North Carolina, each of the monitors in the aforementioned areas, and one monitor representing susceptible and vulnerable populations in the Winston-Salem area. Currently, all NO_2 monitors in the state are measuring well below the annual and 1-hour standards. Table 18 summarizes the annual and 1-hour NO_2 DVs for the near-road and area-wide monitors in the Charlotte and Raleigh areas.

MOVES4.0.1 emissions modeling results show only slight increases in anthropogenic NOx emissions for each county, ranging from a 0.02 tons/day increase in total NOx emissions (1.1%) for Franklin County to a 0.31 tons/day increase in total NOx emissions (1.1%) for Mecklenburg County in 2025. Based upon these emissions estimates and the fact that North Carolina is well below the annual and 1-hour NO_2 standards statewide, the DAQ concludes that slight increase in NO_2 emissions will not interfere with continued attainment of the annual and 1-hour NO_2 standards.

Table 18. Summary of Design Values (DVs) in the Charlotte, Winston-Salem and Raleigh Metropolitan Statistical Areas for the Annual and 1-Hour NO_2 NAAQS

	Annual NO_2 NAAQS DVs (Based on Certified Monitoring Data for 2023)	
Location	**Near-Road Monitors**	**Area-Wide (National Core Monitors)**
Charlotte	10 ppb (19% of the NAAQS)	6 ppb (11% of the NAAQS)
Raleigh	9 ppb (17% of the NAAQS)	7 ppb (13% of the NAAQS)
Winston-Salem	Not applicable	7 ppb (13% of the NAAQS)
	1-Hour NO_2 NAAQS DVs (Based on Certified Monitoring Data for 2021 - 2023)	
Location	**Near-Road Monitors**	**Area-Wide (National Core Monitors)**
Charlotte	36 ppb (36% of the NAAQS)*	37 ppb (37% of the NAAQS)
Raleigh	31 ppb (31% of the NAAQS)	36 ppb (36% of the NAAQS)
Winston-Salem	Not applicable	36 ppb (36% of the NAAQS)

* For 2022, the near-road monitor in the Charlotte metropolitan statistical area had a DV of 36 ppb; however, the monitoring data were incomplete since year 2022 had an incomplete calendar quarter. As a result, the 2022 DV was deemed invalid.

4.2.2 Carbon Monoxide (CO)

The primary NAAQS for CO include (1) an 8-hour standard of 9.0 ppm, measured using the annual second-highest 8-hour concentration for two consecutive years as the DV; and (2) a 1-hour average of 35 ppm, using the second-highest 1-hour average within a given year. The EPA adopted these standards in 1971 and has retained the standards without any changes since its last review in 2011.[35] Fifteen of the 19 counties have never been designated nonattainment for the CO standards. Although four counties (Durham, Forsyth, Mecklenburg, and Wake) were designated nonattainment for the CO standards over 30 years ago, the EPA approved an attainment/maintenance SIP for Forsyth County on September 21, 1994, while also subsequently approving an attainment/maintenance SIP for Durham, Mecklenburg, and Wake Counties on August 2, 1995.[36,37]

The entire State of North Carolina has been in compliance with the CO standards for over 30 years and current ambient air quality levels for CO are less than 20% of the standard. Currently, EPA's emphasis is on monitoring CO only at national core (NCore) and near-road monitoring stations in metropolitan statistical areas with over one million people. Thus, North Carolina currently monitors for CO only in the Charlotte and Raleigh metropolitan areas. Certified

[35] See EPA's "Table of Historical Carbon Monoxide (CO) National Ambient Air Quality Standards (NAAQS)," https://www.epa.gov/co-pollution/table-historical-carbon-monoxide-co-national-ambient-air-quality-standards-naaqs.
[36] 59 FR 48399-48402 (Vol. 59, No. 182), September 21, 1994.
[37] 60 FR 39258-39263 (Vol. 60, No. 148), August 2, 1995.

ambient monitoring data for 2023 for the counties with monitors (i.e., Mecklenburg and Wake) show an 8-hour DV of 1.8 ppm or less, or about 20% of the 9 ppm standard. Additionally, the two counties with monitors (i.e., Mecklenburg and Wake) show a 1-hour DV of 1.5 ppm or less, or about 4% of the 35 ppm standard, based on certified monitoring data for 2021-2023.

Onroad mobile emissions are known to be a large component of overall CO emissions. In 2025, MOVES4.0.1 model emissions modeling results show increases in anthropogenic CO emissions for each county, ranging from a 1.25 tons/day increase in total CO emissions (3.1%) for Franklin County to a 26.12 tons/day increase in total CO emissions (6.2%) for Mecklenburg County. The CO emissions are estimated to increase by 6.4% (128.67 tons/day) of total manmade emissions (2,021.74 tons/day) for all 19 counties combined. This projected increase in CO emissions is comparatively minimal and it is expected that the effect on ambient CO concentrations will be correspondingly minimal as well. Therefore, there is no expectation or concern that this change in CO emissions will interfere with continued attainment with the CO NAAQS in any of the counties or adjacent counties.

4.2.3 Particulate Matter ($PM_{2.5}$), Sulfur Dioxide (SO_2), and Lead

The 2012 24-hour $PM_{2.5}$ NAAQS is set at 35 micrograms per cubic meter ($\mu g/m^3$) and annual $PM_{2.5}$ NAAQS is set at 12 $\mu g/m^3$. In 2014, EPA's Administrator determined that, "no area within North Carolina violates the 2012 standard or contributes to a nearby violation of the standard."[38] In 2024, EPA strengthened the primary annual $PM_{2.5}$ NAAQS from 12 $\mu g/m^3$ to 9 $\mu g/m^3$ and retained the 24-hour standard at 35 $\mu g/m^3$. The designation process for the lower 9 $\mu g/m^3$ $PM_{2.5}$ NAAQS will not be completed until February 6, 2026. Based on certified monitoring data from 2021-2023, 19 out of 21 regulatory monitoring sites in North Carolina are meeting the revised standard. However, the 2023 data show two monitoring sites in the state were slightly above (9.2 ug/m^3) the revised standard, due to influences of Canadian wildfire smoke. These sites are in Mecklenburg and Davidson Counties. Without the influence from Canadian wildfire smoke, none of North Carolina's monitors would have exceeded the revised standard in 2023. In accordance with EPA's Exceptional Events (EE) rule, the DAQ is preparing an EE demonstration to support its recommendations to EPA (due February 7, 2025) for a statewide designation of "attainment/ unclassifiable" based on certified monitoring data for 2021-2023. Although removal of the I&M program in these counties will increase NOx emissions (a precursor pollutant to secondary $PM_{2.5}$ formation) slightly, the increase in NOx

[38] See EPA Administrator Gina McCarthy's designation letter to Governor Patrick McCrory dated December 18, 2014: https://files.nc.gov/ncdeq/Air%20Quality/planning/attainment/PM25_Nonattainment_Areas/EPA_PM25_Designations_12182014.pdf.

emissions is not anticipated to increase ambient $PM_{2.5}$ concentrations to levels that would trigger a violation of the revised NAAQS.

For large SO_2 sources subject to the SO_2 Data Requirements Rule, North Carolina demonstrated compliance through modeling or monitoring.[39] Brunswick County was designated "unclassifiable" on July 12, 2016, as part of the EPA's Round 2 action. Subsequently, on December 31, 2017, EPA designated the majority of the state as "attainment/unclassifiable" as part of its Round 3 designation. North Carolina conducted source-oriented monitoring for one facility each in Limestone Township in Buncombe, Beaverdam Township in Haywood, and Cunningham Township in Person County for calendar years 2017–2019 to develop DVs to support EPA's final Round 4 designations for the state. On December 21, 2020, EPA issued final "attainment/ unclassifiable" designations for these three remaining townships.[40]

The 2008 lead NAAQS is set at 0.15 $\mu g/m^3$, measured as a 3-month rolling average. On November 8, 2011, EPA designated the entire State of North Carolina as "attainment/ unclassifiable" with the standard. In October 2016, EPA completed its review of the 2008 standard and decided to retain the 2008 standard without any changes. North Carolina's ambient lead levels since the 2008 standard was adopted have remained, and are expected to remain, well below the standard. As explained in *North Carolina's 2020-2021 Annual Monitoring Network Plan*, the state no longer is required to monitor for lead under EPA monitoring criteria.[41]

MOVES4.0.1 modeling results indicate that removing 19 counties from the I&M program would not increase direct $PM_{2.5}$, SO_2, and lead emissions. This is because pollution control systems for light-duty gasoline vehicles subject to the I&M program are not designed to reduce emissions for these pollutants; therefore, removing counties from the I&M program is not expected to have any impact on ambient concentrations of these pollutants.

[39] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS), Final Rule, 80 FR 51052, August 21, 2015, https://www.govinfo.gov/content/pkg/FR-2015-08-21/pdf/2015-20367.pdf.
[40] Air Quality Designations for the 2010 Primary Sulfur Dioxide (SO_2) National Ambient Air Quality Standard - Round 4, Final Rule, effective on April 30, 2021, https://www.epa.gov/sulfur-dioxide-designations/epa-completes-fourth-round-sulfur-dioxide-designations.
[41] North Carolina's 2020-2021 Annual Monitoring Network Plan for the North Carolina Division of Air Quality, Volume 1, Network Descriptions, July 2, 2020.

4.3 Clean Air Action Section 175A(d) Contingency Provisions

Clean Air Action Section 175A(d) specifies contingency provisions for maintenance plans. In accordance with this requirement, the DAQ commits to adding the I&M program for each of the seven counties to the list of contingency measures in the Charlotte maintenance area SIP for the 2008 ozone NAAQS. Should the primary or secondary trigger be activated, the DAQ will analyze the adoption of necessary rules for ensuring attainment and maintenance of the 2008 8-hour ozone NAAQS for the area.[42] This analysis will include an evaluation of the measures included in the contingency measure list as well as other measures to determine what measures will be most effective to restore the area to attainment with the 2008 ozone NAAQS.

5.0 SUMMARY AND CONCLUSIONS

The DAQ recommends removing the 19 counties from North Carolina I&M SIP for the reasons cited in Sections 5.1 through 5.3.

5.1 Emissions and Program Benefits Decline Over Time

As shown in Table 19, in 2025, for all 19 counties combined, onroad vehicle NOx, VOC, and CO emissions would increase by 1.66 ton/day (2.0%), 2.61 ton/day (4.38%), and 128.7 tons/day (12.1%), respectively, representing a small overall increase in emissions associated with the operation of light-duty gasoline vehicles currently subject to the I&M program in the 19 counties. The small increase in emissions is not expected to translate into measurable ground-level ozone concentration changes in North Carolina; therefore, maintaining the 2015 and 2008 8-hour ozone NAAQS as well as the NAAQS for all other pollutants in each of the 19 counties or their adjacent counties is expected to be preserved.

One important factor to note is that nationally, NOx emission benefits associated with the I&M program have declined over time. As illustrated in Table 20, the benefits of the I&M program decline from 2018 through 2035 for the 19 counties. In 2018, the program benefit for the counties was 5.67 tons/day. By 2025, the I&M program benefit declined to 1.66 tons/day since the fleet of gasoline vehicles subject to the I&M program becomes cleaner (newer low-emitting vehicles are replacing older higher-emitting vehicles), and the emissions controls on these vehicles are more technologically advanced - thus lasting longer and less prone to malfunctions

[42] The primary trigger is activated when the three-year average of the 4th highest ozone value is equal to or greater than 0.076 ppm at a monitor in the Charlotte maintenance area. The secondary trigger is activated when no actual violation of the 2008 8-hour ozone standard has occurred but monitored ozone levels indicate that an actual ozone NAAQS violation may be imminent.

or failures - the emissions reductions due to the inspections continues to diminish over time. Additionally, cars are becoming even cleaner as new federal fuel and engine standards (Tier 3) began in 2017. These federal Tier 3 standards will result in significant emissions reductions from these newer vehicles, thus lowering the potential benefits of an I&M program. With the proposed changes, the I&M program benefit declines to 0.72 tons/day in 2035.

Table 19. Summary of Onroad OSD NOx, VOC, and CO Emissions Increases Associated with Removing 19 Counties from the I&M Program

	NOx Emissions in 2025	VOC Emissions in 2025	CO Emissions in 2025
Total Onroad Emissions for 19 Counties in the Current I&M Program (tons/day)	81.44	60.37	1,065.04
Total Onroad Emissions after Removing 19 Counties from I&M Program (tons/day)	83.09	62.99	1,193.71
Onroad Emissions Increase (tons/day)	1.66	2.61	128.67
Percent Increase: Onroad only	2.0%	4.3%	12.1%
Percent Increase: Total Anthropogenic Emissions	1.0%	0.8%	6.4%

Table 20. I&M Related NOx Emissions Benefits for the 19 Counties Under the Current and Proposed Program

County	2018			2025			2035		
	I&M	No I&M	Emissions Increase	I&M	No I&M	Emissions Increase	I&M	No I&M	Emissions Increase
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS									
Cabarrus	4.14	4.33	0.19	3.09	3.15	0.06	1.09	1.12	0.03
Gaston	5.47	5.70	0.23	3.56	3.62	0.06	1.03	1.06	0.03
Iredell	5.55	5.75	0.20	3.98	4.04	0.06	1.23	1.26	0.03
Lincoln	2.34	2.43	0.09	1.6	1.63	0.03	0.45	0.46	0.01
Mecklenburg	18.91	19.8	0.89	13.44	13.75	0.31	5.69	5.83	0.14
Rowan	4.44	4.63	0.19	2.92	2.96	0.04	0.83	0.85	0.02
Union	3.48	3.64	0.16	3.03	3.09	0.06	1.13	1.16	0.03
Subtotals	44.33	46.28	1.95	31.62	32.24	0.62	11.45	11.74	0.29
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)									
Durham	6.59	6.9	0.31	3.92	4.01	0.09	1.44	1.47	0.03
Franklin	1.71	1.79	0.08	0.98	1.00	0.02	0.33	0.34	0.01
Johnston	6.06	6.31	0.25	4.07	4.14	0.07	1.39	1.42	0.03
Wake	15.86	16.65	0.79	11.01	11.29	0.28	4.71	4.85	0.14
Subtotals	30.22	31.65	1.43	19.98	20.44	0.46	7.87	8.08	0.21
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)									
Davidson	5.06	5.28	0.22	2.85	2.90	0.05	0.88	0.90	0.02
Forsyth	9.73	10.17	0.44	5.19	5.30	0.11	1.67	1.71	0.04
Guilford	12.13	12.69	0.56	6.87	7.01	0.14	2.35	2.41	0.06
Subtotals	26.92	28.14	1.22	14.91	15.21	0.30	4.90	5.02	0.12
Other Counties (Not Subject to an Ozone Maintenance Plan)									
Alamance	4.29	4.47	0.18	2.57	2.62	0.05	0.73	0.75	0.02
Buncombe	6.74	7.02	0.28	3.83	3.90	0.07	1.21	1.23	0.02
Cumberland	6.56	6.84	0.28	3.81	3.88	0.07	1.17	1.19	0.02
New Hanover	2.83	2.98	0.15	1.84	1.89	0.05	0.67	0.69	0.02
Randolph	4.92	5.1	0.18	2.88	2.92	0.04	0.74	0.76	0.02
Subtotals	25.34	26.41	1.07	14.93	15.21	0.28	4.52	4.62	0.10
Totals	126.81	132.48	5.67	81.44	83.1	1.66	28.74	29.46	0.72

5.2 Air Quality has Improved – No Violating Ozone Monitors

Another important factor is current air quality levels in the I&M counties. Great improvements have been realized in North Carolina over the last decade in both ozone and fine particle concentrations. On November 6, 2017, EPA designated the entire State of North Carolina "attainment/unclassifiable" for the 2015 8-hour ozone NAAQS (based on certified monitoring data for 2014-2016).[43] Subsequently, through October 31, 2023, North Carolina has not had a single ozone air quality monitor violate the 2015 8-hour ozone standard. Twelve of the 19 counties proposed for removal from the I&M program has an ambient ozone monitor.[44] For the Charlotte area, ozone DVs for 2021-2023 range from a low of 65 ppb for Lincoln and Rowan Counties to a high of 69 ppb for Mecklenburg County (see Figure 1). For the Triangle Area ozone DVs for 2021-2023 range from a low of 62 ppb for Durham County to a high of 64 ppb for Johnston County. For the remaining counties, ozone DVs for 2021-2023 range from a low of 61 ppb for Buncombe to 67 ppb for Cumberland County. This is in sharp contrast to the air quality conditions when the vehicle I&M program was expanded to 48 counties on January 1, 2006 (pursuant to S.L. 1999-328). At that time, two-thirds of the state's monitors were violating the 2008 8-hour ozone standard (based on 2003-2005 DV). The DAQ estimates that removing the 19 counties from the I&M program will not interfere with the state's ability to continue to attain and maintain all current air quality standards.

5.3 Conclusions

Modeling of onroad vehicle emissions using MOVES4.0.1 shows that the I&M program only controls NOx, VOC, and CO emissions; the program does not affect direct emissions of $PM_{2.5}$, SO_2, or lead. Based on the MOVES4.0.1 modeling analyses, this review shows that although removing the 19 counties from the program will yield slight increases in total NOx, VOC, and CO emissions for each county, the relatively small emissions reduction benefits of the program are no longer needed in the counties to maintain compliance with any of the NAAQS in North Carolina or its neighboring states especially since the emission reduction benefits of the I&M program are expected to decline each year as new, cleaner vehicles replace older vehicles.

[43] 82 FR 54232-54287 (Vol. 82, No. 220).

[44] The need for locating a monitor in a county is determined based on the monitoring objectives and general criteria listed in 40 CFR 58 Appendix D. These criteria include consideration of several factors including, but not limited to, the size of the geographic area and associated changes in population, emissions, meteorology, and air quality concerns; addition of a new or revisions to an existing NAAQS, and costs. The DAQ complies with these requirements on an on-going basis that are documented in its annual monitoring network plans that undergo public review and comment and subsequent approval by EPA and 5-year monitoring network assessments.

In addition, the analysis does not include additional NOx, VOC, and CO reductions that are expected from two onroad vehicle emissions regulations EPA promulgated after the January 2024 release of MOVES4.0.1. For light- and medium-duty vehicles, EPA promulgated on March 20, 2024, "*Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*."[45] These new standards, which cover both greenhouse gases (GHGs) and criteria air pollutants, phase-in over vehicle MYs 2027 through 2032. The EPA also promulgated on March 29, 2024, "*Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3*."[46] This new regulation sets more stringent standards to reduce GHG emissions from heavy-duty vehicles for vehicle MYs 2027 through 2032. These standards can be met with a range of heavy-duty vehicle technologies, including advanced internal combustion engine vehicles, hybrid vehicles, plug-in hybrid electric vehicles, battery electric vehicles, and hydrogen fuel cell vehicles. Although these standards specifically target GHG emissions, technologies adopted to achieve these standards will also reduce criteria air pollutant emissions and offset emissions increases associated with removing the counites from the I&M program.

For these reasons, the DAQ concludes that removing the 19 counties from North Carolina I&M SIP will not interfere with continued attainment or maintenance of any applicable NAAQS. With this submission, the North Carolina DAQ believes the requirements of Section 110(l) of the CAA relative to the proposed removal of the 19 counties from the I&M program have been met, and requests that EPA approve the proposed removal of the 19 counties from North Carolina's I&M SIP.

[45] EPA Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 89 FR 27842, April 18, 2024, effective date of June 17, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.
[46] EPA Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 89 FR 29440, Monday, April 22, 2024, effective date of June 21, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

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Pre-Hearing Draft

Appendix A

Onroad Mobile Source

Emissions Inventory Documentation

Clean Air Act Section 110(l) Noninterference Demonstration to Remove 19 Counties from North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program

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1.0 INTRODUCTION AND SCOPE

This appendix presents the data sources, methods, and results used to develop ozone season day emission estimates for oxides of nitrogen (NOx), volatile organic compounds (VOC), and carbon monoxide (CO) associated with onroad mobile sources in 2025. The NOx emissions for the entire 2025 ozone season (May 1 – September 30) are also presented. Additional county-level July weekday NOx modeling runs were completed for years 2018 and 2035 to provide data showing the declining NOx reduction benefits from the I&M program over that period. Modeling was also completed to demonstrate the effect of I&M program changes on 2025 and 2026 emissions for the Charlotte-Gastonia-Salisbury (CGS) 2008 ozone NAAQS nonattainment area, which includes six partial county areas.

The onroad mobile source inventories contain emissions from all motor vehicles that are licensed to use public roads. Onroad vehicles include passenger cars, motorcycles, and various classes of trucks and buses categorized according to vehicle weight and drive cycle characteristics.

2.0 SUMMARY OF EMISSIONS

Tables A-1, A-2, and A-3 summarize the 2025 ozone season day onroad mobile source $NO_{x,}$ VOC, and CO emissions modeling results for Alamance, Buncombe, Cabarrus, Cumberland, Davidson, Durham, Forsyth, Franklin, Gaston, Guilford, Iredell, Johnston, Lincoln, Mecklenburg, New Hanover, Randolph, Rowan, Union, and Wake Counties. Emissions with and without coverage under the North Carolina emissions inspection and maintenance (I&M) program are shown, along with the emissions changes that would result from removing the 19 counties from the program.

Table A-1. Onroad Source Ozone Season Day NOx Emissions in 2025 (Tons/Day)

County	Total Onroad NOx Emissions – with I&M Program Coverage (TPD)	Total Onroad NOx Emissions - without I&M Program Coverage (TPD)	NOx Emission Changes due to I&M Program Change (TPD)
Charlotte-Gastonia-Salisbury Maintenance Area for 2008 8-Hour Ozone NAAQS			
Cabarrus	3.09	3.15	0.06
Gaston	3.56	3.62	0.06
Iredell	3.98	4.04	0.06
Lincoln	1.60	1.63	0.03
Mecklenburg	13.44	13.75	0.31
Rowan	2.92	2.96	0.04
Union	3.03	3.09	0.06
Subtotals	**31.62**	**32.24**	**0.62**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)			
Durham	3.92	4.01	0.09
Franklin	0.98	1.00	0.02
Johnston	4.07	4.14	0.07
Wake	11.01	11.29	0.28
Subtotals	**19.98**	**20.44**	**0.46**
Triad Ozone Maintenance Area Counties (Greensboro/Winston-Salem/High Point)			
Davidson	2.85	2.90	0.05

County	Total Onroad NOx Emissions – with I&M Program Coverage (TPD)	Total Onroad NOx Emissions - without I&M Program Coverage (TPD)	NOx Emission Changes due to I&M Program Change (TPD)
Forsyth	5.19	5.30	0.11
Guilford	6.87	7.01	0.14
Subtotals	**14.91**	**15.21**	**0.30**
Other Counties			
Alamance	2.57	2.62	0.05
Buncombe	3.83	3.90	0.07
Cumberland	3.81	3.88	0.07
New Hanover	1.84	1.89	0.05
Randolph	2.88	2.92	0.04
Subtotals	**14.93**	**15.21**	**0.28**
Totals	**81.44**	**83.10**	**1.66**

Table A-2. Onroad Source Ozone Season Day VOC Emissions in 2025 (Tons/Day)

County	Total Onroad VOC Emissions – with I&M Program Coverage (TPD)	Total Onroad VOC Emissions - without I&M Program Coverage (TPD)	VOC Emission Changes due to I&M Program Change (TPD)
Charlotte-Gastonia-Salisbury Maintenance Area for 2008 8-Hour Ozone NAAQS			
Cabarrus	2.34	2.43	0.09
Gaston	2.55	2.65	0.10
Iredell	2.70	2.79	0.09
Lincoln	1.26	1.30	0.04
Mecklenburg	9.09	9.55	0.46
Rowan	2.21	2.28	0.07
Union	2.45	2.55	0.10
Subtotals	**22.60**	**23.55**	**0.95**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)			
Durham	2.83	2.96	0.13
Franklin	0.83	0.86	0.03
Johnston	2.59	2.70	0.11
Wake	8.77	9.24	0.47
Subtotals	**15.02**	**15.76**	**0.74**
Triad Ozone Maintenance Area Counties (Greensboro/Winston-Salem/High Point)			
Davidson	2.31	2.39	0.08
Forsyth	4.00	4.16	0.16
Guilford	5.02	5.24	0.22
Subtotals	**11.33**	**11.79**	**0.46**
Other Counties			
Alamance	1.99	2.06	0.07
Buncombe	2.83	2.94	0.11
Cumberland	2.74	2.86	0.12
New Hanover	1.79	1.88	0.09
Randolph	2.06	2.13	0.07
Subtotals	**11.41**	**11.87**	**0.46**
Totals	**60.36**	**62.97**	**2.61**

Table A-3. Onroad Source Ozone Season Day CO Emissions in 2025 (Tons/Day)

County	Total Onroad CO Emissions – with I&M Program Coverage (TPD)	Total Onroad CO Emissions - without I&M Program Coverage (TPD)	CO Emission Changes due to I&M Program Change (TPD)
Charlotte-Gastonia-Salisbury Maintenance Area for 2008 8-Hour Ozone NAAQS			
Cabarrus	39.38	44.07	4.69
Gaston	43.02	47.78	4.76
Iredell	43.99	48.64	4.65
Lincoln	18.32	20.15	1.83
Mecklenburg	194.21	220.33	26.12
Rowan	35.52	39.05	3.53
Union	39.01	43.61	4.60
Subtotals	**413.45**	**463.63**	**50.18**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)			
Durham	58.60	66.24	7.64
Franklin	11.67	12.92	1.25
Johnston	44.11	49.24	5.13
Wake	164.05	186.03	21.98
Subtotals	**278.43**	**314.43**	**36.00**
Triad Ozone Maintenance Area Counties (Greensboro/Winston-Salem/High Point)			
Davidson	33.13	36.37	3.24
Forsyth	69.28	77.28	8.00
Guilford	89.99	100.83	10.84
Subtotals	**192.40**	**214.48**	**22.08**
Other Counties			
Alamance	28.91	31.99	3.08
Buncombe	42.99	47.66	4.67
Cumberland	50.44	56.61	6.17
New Hanover	29.98	33.80	3.82
Randolph	28.45	31.12	2.67
Subtotals	**180.77**	**201.18**	**20.41**
Totals	**1,065.05**	**1,193.72**	**128.67**

Table A-4 shows the onroad NOx emissions with and without I&M program coverage and the NOx emissions changes for the 2025 ozone season (May 1 – September 30) for each county. It is estimated that removing the I&M program from these counties will lead to an increase of 240.26 tons of NOx during that period.

Table A-4. Onroad Source Ozone Season NOx Emissions in 2025 (Tons)

County	Total Onroad NOx Emissions – with I&M Program Coverage (tons/ozone season)	Total Onroad NOx Emissions - without I&M Program Coverage (tons/ozone season)	NOx Emission Changes due to I&M Program Change (tons/ozone season)
Charlotte-Gastonia-Salisbury Maintenance Area for 2008 8-Hour Ozone NAAQS			
Cabarrus	451.87	460.78	8.91
Gaston	520.83	529.68	8.85
Iredell	583.09	591.73	8.64
Lincoln	233.85	237.58	3.73
Mecklenburg	1,965.67	2,011.01	45.34
Rowan	425.00	431.47	6.47
Union	441.20	450.55	9.35
Subtotals	**4,621.51**	**4,712.80**	**91.29**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)			
Durham	583.44	596.02	12.58
Franklin	145.23	147.85	2.62
Johnston	605.13	614.78	9.65
Wake	1,631.62	1,672.64	41.02
Subtotals	**2,965.42**	**3,031.29**	**65.87**
Triad Ozone Maintenance Area Counties (Greensboro/Winston-Salem/High Point)			
Davidson	412.76	419.58	6.82
Forsyth	755.31	770.49	15.18
Guilford	999.73	1,020.14	20.41
Subtotals	**2,167.80**	**2,210.21**	**42.41**
Other Counties			
Alamance	374.67	381.06	6.39
Buncombe	558.65	568.89	10.24
Cumberland	569.12	579.97	10.85
New Hanover	269.72	277.28	7.56
Randolph	420.03	425.68	5.65
Subtotals	**2,192.19**	**2,232.88**	**40.69**
Totals	**11,946.92**	**12,187.18**	**240.26**

Table A-5 shows the estimated NOx increases due to removing the I&M program from each county in years 2018, 2025, and 2035, which also represent the NOx reduction benefits of the program. The total NOx reduction benefits decrease from 5.67 tons per day in 2018 to 0.72 tons per day in 2035.

Table A-1. I&M Related NOx Emissions Benefits for the 19 Counties Under the Current and Proposed Program (Tons/Day)

County	2018			2025			2035		
	I&M	No I&M	Emissions Increase	I&M	No I&M	Emissions Increase	I&M	No I&M	Emissions Increase
Charlotte-Gastonia-Salisbury Maintenance Area for 2008 8-Hour Ozone NAAQS									
Cabarrus	4.14	4.33	0.19	3.09	3.15	0.06	1.09	1.12	0.03
Gaston	5.47	5.70	0.23	3.56	3.62	0.06	1.03	1.06	0.03
Iredell	5.55	5.75	0.20	3.98	4.04	0.06	1.23	1.26	0.03
Lincoln	2.34	2.43	0.09	1.60	1.63	0.03	0.45	0.46	0.01
Mecklenburg	18.91	19.8	0.89	13.44	13.75	0.31	5.69	5.83	0.14
Rowan	4.44	4.63	0.19	2.92	2.96	0.04	0.83	0.85	0.02
Union	3.48	3.64	0.16	3.03	3.09	0.06	1.13	1.16	0.03
Subtotals	**44.33**	**46.28**	**1.95**	**31.62**	**32.24**	**0.62**	**11.45**	**11.74**	**0.29**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)									
Durham	6.59	6.9	0.31	3.92	4.01	0.09	1.44	1.47	0.03
Franklin	1.71	1.79	0.08	0.98	1.00	0.02	0.33	0.34	0.01
Johnston	6.06	6.31	0.25	4.07	4.14	0.07	1.39	1.42	0.03
Wake	15.86	16.65	0.79	11.01	11.29	0.28	4.71	4.85	0.14
Subtotals	**30.22**	**31.65**	**1.43**	**19.98**	**20.44**	**0.46**	**7.87**	**8.08**	**0.21**
Triad Ozone Maintenance Area Counties (Greensboro/Winston-Salem/High Point)									
Davidson	5.06	5.28	0.22	2.85	2.90	0.05	0.88	0.90	0.02
Forsyth	9.73	10.17	0.44	5.19	5.30	0.11	1.67	1.71	0.04
Guilford	12.13	12.69	0.56	6.87	7.01	0.14	2.35	2.41	0.06
Subtotals	**26.92**	**28.14**	**1.22**	**14.91**	**15.21**	**0.30**	**4.90**	**5.02**	**0.12**
Other Counties									
Alamance	4.29	4.47	0.18	2.57	2.62	0.05	0.73	0.75	0.02
Buncombe	6.74	7.02	0.28	3.83	3.90	0.07	1.21	1.23	0.02
Cumberland	6.56	6.84	0.28	3.81	3.88	0.07	1.17	1.19	0.02
New Hanover	2.83	2.98	0.15	1.84	1.89	0.05	0.67	0.69	0.02
Randolph	4.92	5.1	0.18	2.88	2.92	0.04	0.74	0.76	0.02
Subtotals	**25.34**	**26.41**	**1.07**	**14.93**	**15.21**	**0.28**	**4.52**	**4.62**	**0.10**
Totals	**126.81**	**132.48**	**5.67**	**81.44**	**83.10**	**1.66**	**28.74**	**29.46**	**0.72**

Tables A-6 and A-7 show the 2025 and 2026 NOx and VOC emissions changes for the counties in the Charlotte-Gastonia-Salisbury 2008 ozone NAAQS nonattainment area with and without the emissions I&M program in effect. Emissions values are reported as kilograms per summer day. The motor vehicle emissions budget (MVEB) areas associated with each county are also shown.

Table A-6. 2025 I&M Related Emissions Changes for the Charlotte-Gastonia-Salisbury 2008 ozone NAAQS Nonattainment Area

County	Motor Vehicle Emission Budget Area	2025 Emissions Changes - CGS 2008 Ozone Maintenance Area					
		Includes I&M for On-Road Light-Duty Vehicles (kg/day)		Excludes I&M for On-Road Light-Duty Vehicles (kg/day)		Increase from Removing I&M Program (kg/day)	
		NOx	VOC	NOx	VOC	NOx	VOC
Cabarrus*	CRMPO	2,788	2,121	2,844	2,211	56	90
Gaston*	GCLMPO	3,038	2,159	3,089	2,238	51	79
Iredell*	CRTPO	1,427	1,042	1,450	1,078	23	36
Lincoln*	GCLMPO	1,261	987	1,281	1,019	20	32
Mecklenburg	CRTPO	12,192	8,247	12,476	8,664	284	417
Rowan*	CRMPO	2,444	1,870	2,482	1,927	38	57
Union*	CRTPO	2,387	1,972	2,440	2,059	53	87
TOTAL		**25,537**	**18,398**	**26,062**	**19,196**	**525**	**798**

Table A-7. 2026 I&M Related Emissions Changes for the Charlotte-Gastonia-Salisbury 2008 ozone NAAQS Nonattainment Area

County	Motor Vehicle Emission Budget Area	2026 Emissions Changes - CGS 2008 Ozone Maintenance Area					
		Includes I&M for On-Road Light-Duty Vehicles (tons/day)		Excludes I&M for On-Road Light-Duty Vehicles (tons/day)		Increase from Removing I&M Program (kg/day)	
		NOx	VOC	NOx	VOC	NOx	VOC
Cabarrus*	CRMPO	2,657	1,968	2,708	2,060	51	92
Gaston*	GCLMPO	2,778	1,932	2,823	2,010	45	78
Iredell*	CRTPO	1,371	959	1,391	997	20	38
Lincoln*	GCLMPO	1,107	839	1,124	870	17	31
Mecklenburg	CRTPO	13,935	8,630	14,198	9,079	263	449
Rowan*	CRMPO	2,051	1,527	2,083	1,580	32	53
Union*	CRTPO	2,356	1,853	2,403	1,943	47	90
TOTAL		**26,255**	**17,708**	**26,730**	**18,539**	**475**	**831**

3.0 METHODOLOGY

For the 19 counties, the MOtor Vehicle Emissions Simulator (MOVES) model was used to develop 2025 emissions inventories that represent 1) the current I&M program coverage in effect for 2025, and 2) no I&M coverage. The differences between the model run results were used to calculate the county-level and overall changes in NOx, VOC, and CO emissions resulting from removing the counties from the I&M program. Emissions from all onroad mobile sources were modeled, including light-duty gasoline vehicles (LDGV) subject to I&M requirements as well as those exempt from the program, to allow evaluation of I&M related emissions changes relative to county-level emissions from all source categories. The 2025 inventories for each county also

reflect the impact of all vehicle emissions and fuel standards currently incorporated in the MOVES model. The MOVES Modeling Parameters listed in Table A-8 were selected for developing the emissions inventories for each county.

Table A-8. MOVES Modeling Parameters

MOVES Model Version	MOVES4.0.1
Pollutants	NOx, VOC, CO (NOx only for 2018, 2035, and 2025 full ozone season)
Modeled Spatial Domains	Whole counties subject to I&M; also partial counties for the CGS maintenance area
Temporal Emissions Time Period – Ozone Season Day	2025 Typical summer weekday (July weekday)
MOVES Calculation Type	Inventory mode
Temporal Emissions Time Period – Ozone Season NOx runs	May 1 – September 30, 2025
Temporal Emissions Time Period – Additional Ozone Season Day NOx runs	2018 and 2035, Typical summer weekday (July weekday)
Vehicle Types	All onroad vehicles
Road Types	All road types
Inspection and Maintenance Program Applicability	As per the North Carolina Inspection and Maintenance SIP, effective for July 2025

3.1 EMISSIONS MODELING APPROACH

Mobile source emissions were estimated by the methodologies suggested in the following U.S. Environmental Protection Agency (EPA) guidance documents: *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations* (EPA-454-B-17-002, May 2017); *MOVES4 Policy Guidance: Use of MOVES for State Implementation Plan Development, Transportation Conformity, General Conformity and Other Purposes* (August 2023, EPA-420-B-23-009); and *MOVES4 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity* (August 2023, EPA-420-B-23-011).

The EPA guidance requires the use of the latest approved mobile source emissions model. The North Carolina Division of Air Quality (DAQ) used MOVES4.0.1, which was the latest available version of the model at the time the modeling was performed. The guidance also recommends using local input data in lieu of the MOVES4.0.1 default data to represent local vehicle fleet and emissions characteristics more accurately. The DAQ used local data wherever possible as described in Section 3.2.

3.2 MOVES INPUT DATA

All input data for MOVES modeling was first compiled into county-level MariaDB databases which include separate tables for each type of input data needed. Output data from MOVES

modeling runs were also created as MariaDB databases. Due to their size and complexity, the MOVES input and output database files are provided electronically.

3.2.1 VMT DATA

For counties in the Charlotte area (Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, and Union), county-level VMT data were developed based on the latest available travel demand modeling (TDM) completed by the Charlotte Department of Transportation (CDOT). CDOT provided daily VMT results from the MRM22v2.0 version of the Metrolina Regional Model (MRM), dated December 19, 2022. Daily VMT by roadway functional classification for 2025 were interpolated from the MRM22v2.0 data.

For all other counties, county-level annual average daily VMT (AADVMT) data from North Carolina HPMS datasets were used to develop MOVES VMT input data. The 2025 VMT data for each county were derived from 2022 VMT data, using county-specific growth factors. The growth factors were developed by from county-level human population projections published by the North Carolina Office of State Budget and Management (NC OSBM) State Demographer's Office and future per capita VMT growth factors from the 2023 Annual Energy Outlook (AEO), published by the U.S. Energy Information Administration (EIA).

3.2.2 VEHICLE ACTIVITY BY ROAD TYPE

Vehicle activity by functional classification (road type) data are used to calculate the distribution of vehicle miles traveled (VMT) by vehicle type and by road type. The NCDOT compiles these data annually on a statewide basis, based on traffic survey and Highway Performance Management System (HPMS) data collected throughout the year. Table A-9 shows the vehicle activity summary by functional classification for 2022, the latest year available. The data are provided as the fractional distribution of VMT by vehicle type on each of 12 Federal Highway Administration (FHWA) road types. Table A-10 shows the data aggregated by HPMS functional system group and HPMS vehicle class group. Data from Table A-10 were used to develop factors for allocating VMT to the appropriate road types and HPMS vehicle types. The allocation factors were then applied to the county-level TDM and HPMS VMT data to create MOVES VMT input files.

3.2.3 ONROAD SPEEDS

Emissions modeling using MOVES requires vehicle speed input data formatted as fractions of vehicle hours traveled (VHT) in each of sixteen speed ranges, called "speed bins", for each combination of clock hour/day type (weekday or weekend day), vehicle type, and road type. Speed Bin 1 represents speeds from 0 to 2.5 miles per hour (mph), and Speed Bin 16 represents speeds of 72.5 mph and greater. Speed Bins 2 through 15 each represent 5 mph speed ranges between 2.5 mph and 72.5 mph. The fractions for each combination of vehicle type, road type, and hour/day type sum to one. The DAQ typically uses spreadsheet-based data converters developed by the EPA to process the speed data into the required format. However, in this instance, due to the lack of detailed county-specific speed data, the default MOVES4.0.1 speed data were used.

Table A-9. North Carolina Vehicle Activity Summary by Functional Classification - 2022

FC Code	Functional Classification	Samples	MC	Cars	2A4T	Bus	2ASU	3ASU	4ASU	4AST	5AST	6AST	5AMT	6AMT	7AMT
1	Rural Principal Arterial – Interstate	62	0.0039	0.6876	0.1500	0.0058	0.0216	0.0061	0.0001	0.0111	0.1085	0.0013	0.0026	0.0012	0.0001
2	Rural Principal Arterial – Other	459	0.0040	0.6682	0.2292	0.0071	0.0283	0.0074	0.0012	0.0124	0.0392	0.0018	0.0007	0.0003	0.0003
6	Rural Minor Arterial	513	0.0043	0.6710	0.2474	0.0062	0.0275	0.0063	0.0011	0.0094	0.0254	0.0012	0.0000	0.0000	0.0002
7	Rural Major Collector	750	0.0058	0.6431	0.2680	0.0068	0.0287	0.0072	0.0010	0.0097	0.0284	0.0011	0.0000	0.0000	0.0001
8	Rural Minor Collector	25	0.0155	0.6270	0.2758	0.0063	0.0295	0.0075	0.0004	0.0070	0.0285	0.0018	0.0000	0.0000	0.0008
9	Rural Local System	41	0.0089	0.6651	0.2318	0.0147	0.0469	0.0113	0.0011	0.0082	0.0107	0.0011	0.0000	0.0000	0.0002
11	Urban Principal Arterial – Interstate	127	0.0043	0.7490	0.1553	0.0048	0.0180	0.0057	0.0000	0.0049	0.0559	0.0006	0.0010	0.0004	0.0000
12	Urban Principal Arterial - Other Freeways or Expressways	125	0.0053	0.7256	0.1945	0.0054	0.0205	0.0064	0.0007	0.0078	0.0319	0.0010	0.0005	0.0002	0.0001
14	Urban Principal Arterial - Other	640	0.0048	0.7545	0.1874	0.0058	0.0211	0.0058	0.0009	0.0054	0.0124	0.0014	0.0002	0.0001	0.0003
16	Urban Minor Arterial	380	0.0047	0.7438	0.2047	0.0048	0.0211	0.0054	0.0009	0.0048	0.0085	0.0009	0.0001	0.0001	0.0002
17	Urban Collector	76	0.0040	0.7401	0.2080	0.0048	0.0225	0.0059	0.0005	0.0049	0.0084	0.0008	0.0000	0.0000	0.0002
19	Urban Local System	22	0.0087	0.7325	0.1872	0.0168	0.0313	0.0083	0.0003	0.0049	0.0084	0.0010	0.0004	0.0001	0.0001

*MC - motorcycles
Cars – passenger cars
2A4T – trucks with two axles, 4 tires
Bus – intercity, transit, and school buses
2ASU – two-axle single unit trucks
2ASU – three-axle single unit trucks
4ASU – four-axle single unit trucks
4AST – four-axle single trailer truck
5AST – five-axle single trailer truck
6AST – six-axle single trailer truck
5MST – five-axle multi-trailer truck
6AMT – six-axle multi-trailer truck
7AMT – seven-axle multi-trailer truck

Table A-10. 2022 HPMS Travel Activity by Vehicle Type by HPMS Functional System Group and HPMS Vehicle Class Group

FS Group	Functional System*	MC	Cars	2A4T	Buses	SU Trucks*	CU Trucks*
1	Rural Interstate	0.39%	68.77%	15.00%	0.58%	2.78%	12.48%
2	Rural Other Arterial	0.42%	66.97%	23.88%	0.67%	3.58%	4.48%
3	Rural Other	0.63%	64.37%	26.64%	0.72%	3.81%	3.83%
4	Urban Interstate	0.43%	74.90%	15.53%	0.48%	2.37%	6.29%
5	Urban Other Arterial	0.48%	74.79%	19.39%	0.54%	2.76%	2.04%
6	Urban Other	0.50%	73.85%	20.33%	0.75%	3.13%	1.44%

* Other Arterial includes Rural FC 2 & 6, Urban FC 14 & 16
Other includes Rural FC 7, 8, & 9, Urban FC 17 & 19
SU Trucks includes 2ASU, 3ASU, and 4ASU
CU Trucks includes 4AST, 5AST, 6AST, 5AMT, 6AMT, and 7AMT

3.2.4 SOURCE TYPE POPULATION

Source type (i.e., vehicle type) population data are used within MOVES to calculate off-network emissions, which include exhaust emissions from vehicle starts and evaporative emissions from parked vehicles. Off-network emissions are based on both the number and type of vehicles in the modeling domain. MOVES source type population input data consists of the number of each of 13 types of vehicles within the modeling domain. Descriptions of the categories, which are subsets of the six HPMS vehicle classes, are shown in Table A-11. The DAQ developed source type population input tables from 2023 statewide registration data obtained from the North Carolina Department of Transportation (NCDOT). The data included vehicle model year, make, body style, vehicle identification number (VIN), fuel type, county where registered, and other identifying information as described in the NCDOT *Title and Registration Manual* (15th Edition, Revised January 2023). Additional information for individual vehicles was obtained by decoding VINs using the vPIC Application Programming Interface (API) provided by the National Highway Traffic Safety Administration (NHTSA).[1] Each vehicle was assigned a MOVES source type ID value based on its registration and VIN decoding data, and a vehicle age ID based on its model year.

[1] NHTSA Product Information Catalog Vehicle Listing (vPIC) Application Programming Interface (API), https://vpic.nhtsa.dot.gov/api/

Table A-11. MOVES Source Types and HPMS Vehicle Types

Source Type ID	Source Types used in MOVES	HPMS Vtype ID	HPMS Vehicle Class
11	Motorcycle	10	Motorcycles
21	Passenger Car	25	Light Duty Vehicles
31	Passenger Truck	25	Light Duty Vehicles
32	Light Commercial Truck	25	Light Duty Vehicles
41	Intercity Bus	40	Buses
42	Transit Bus	40	Buses
43	School Bus	40	Buses
51	Refuse Truck	50	Single Unit Trucks
52	Single Unit Short-haul Truck	50	Single Unit Trucks
53	Single Unit Long-haul Truck	50	Single Unit Trucks
54	Motor Home	50	Single Unit Trucks
61	Combination Short-haul Truck	60	Combination Trucks
62	Combination Long-haul Truck	60	Combination Trucks

3.2.5 SOURCE TYPE AGE DISTRIBUTION

The 2023 county-level source type age distribution input files were then generated from the source type population data based on the source type ID and age ID values. Age distributions were then projected to appropriate future modeling year using the Age Distribution Projection Tool for MOVES4, provided by USEPA.

3.2.6 VEHICLE/EQUIPMENT: ONROAD VEHICLE EQUIPMENT

As per EPA guidance for state implementation plans and regional conformity analyses (see Section 3.1), the DAQ selected the appropriate fuel and vehicle type combinations that reflect the full range of vehicles that will operate in each county. All valid diesel, gasoline, CNG, ethanol, and electric vehicle and fuel combinations were selected.

3.2.7 ROAD TYPE

The MOVES model defines five different road types to categorize the roadways used in a particular MOVES modeling run. The five road types are:

- Off-Network (road type 1) – all locations where the predominant activities are vehicle starts, parking and idling (parking lots, truck stops, rest areas, freight or bus terminals).
- Rural Restricted Access (2) – rural highways that can only be accessed by an on-ramp.
- Rural Unrestricted Access (3) – all other rural roads (arterials, connectors, and local streets).
- Urban Restricted Access (4) – urban highways or freeways that can only be accessed by an on-ramp.
- Urban Unrestricted Access (5) – all other urban roads (arterials, connectors, and local streets).

The DAQ included all five road types in each modeling run as per EPA guidance. Including the Off-Network road type was necessary to account for emissions from vehicle starts, extended idle activity, and VOC emissions from evaporative processes.

3.2.8 POLLUTANTS AND PROCESSES

Onroad mobile source emissions of NOx, VOC, and CO for a typical summer day, specifically a July weekday, were modeled for 2025. The modeling results included emissions from all vehicular processes that generate NOx, VOC, or CO, such as running exhaust, start exhaust, and evaporative processes.

3.2.9 FUEL SUPPLY, FORMULATION, AND USAGE DATA

MOVES default fuel supply and fuel formulation data are categorized by fuel region ID – counties with the same fuel region ID have the same fuel supply and formulation for a given year. The state of North Carolina is covered by a single fuel region ID (100000000) for all counties. The default fuel supply and fuel formulations for fuel region ID 100000000 were used for all model runs. The MOVES default AVFT (fuel Type/vehicle technology) data and MOVES default county-specific fuel usage fractions were also used.

3.2.10 TEMPERATURE AND RELATIVE HUMIDITY DATA

Local temperature and humidity data are required inputs for the MOVES model. The 2023 average monthly 24-hour temperature and humidity profiles, based on data from the Automated Surface Observing System (ASOS) stations at the airports listed in Table A-12, were used to best represent the meteorological conditions for each county. The data were provided by the State Climate Office of North Carolina (http://www.nc-climate.ncsu.edu) and are included in each MOVES input database.

Table A-12. Weather Stations and Counties

Weather Station	Station ID	Counties
Asheville Airport	KAVL	Buncombe
Piedmont Triad International Airport	KGSO	Alamance, Davidson, Forsyth, Guilford, Randolph
Charlotte / Douglas International Airport	KCLT	Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Union, Rowan
Raleigh-Durham International Airport	KRDU	Durham, Franklin, Johnston, Wake
Fayetteville Regional Airport	KFAY	Cumberland
Wilmington International Airport	KILM	New Hanover

3.2.11 VEHICLE INSPECTION AND MAINTENANCE PROGRAM PARAMETERS

In 2002, North Carolina implemented a new vehicle emissions I&M program based on vehicle onboard diagnostics (OBDII). The program was initially implemented in 9 counties and was expanded to include a total of 48 counties between July 2002 and January 2006. Program

coverage was subsequently reduced to 22 counties, and then to 19 counties. All light-duty gasoline vehicles with a gross vehicle weight rating (GVWR) of less than 8,501 pounds are subject to the program. In the MOVES model these vehicles are designated as source type IDs 21, 31, and 32. For the emissions inventory period modeled (2025 July weekday), the vehicle model years covered included vehicles from the latest 20 model years (i.e., 2006 - 2025), with an exemption for vehicles from the three newest model years (i.e., 2023, 2024, and 2025) having less than 70,000 odometer miles.

All MOVES modeling runs were executed with the appropriate I&M program parameters to properly account for the emissions reductions resulting from implementation of the program. Within the MOVES model, the magnitude of the reductions is scaled by the I&M compliance factor parameters, which are calculated based on I&M program compliance rates and waiver rates. Also, the MOVES model allows for the exemption of specified model years of vehicles from the I&M program coverage. This is typically applied to the newest vehicles in the fleet. Table A-13 lists the current applicable I&M program parameters, which were used for all MOVES modeling runs.

Table A-13. Inspection and Maintenance Program Parameters

I&M Parameter	Parameter Value
Model Years Covered	20 latest model years (2006 – 2025)
Compliance Rate	96%
Waiver Rate	5%
Number of Latest Model Years Exempted	3 (2023 – 2025)

4.0 QUALITY ASSURANCE MEASURES

The detailed quality assurance and quality control procedures and measures, as outlined in the DAQ's Emissions Inventory Quality Assurance Project Plan, were applied to ensure the data meet specific data indicator goals and objectives. All raw data used to generate MOVES model inputs, such as speed and VMT values, were checked for reasonableness against historical data from the same data category and geographic area (county or state). All manual data entries were checked by a second party. All automated calculations and data processing operations performed by spreadsheet macros and database queries were validated by comparison to hand calculated results. All MOVES input file development and quality assurance activities were logged in a project design spreadsheet.

5.0 MOVES MODELING DATA FILES

Due to their size, format, and complexity, all MOVES data files were provided in electronic format. Three types of files are included:

- MOVES run specification (RunSpec) files – flat text files named in the format <ProjectName>_onroad_c<FIPS>y<YYYY>_<VMT>_<I&M>.mrs

- MOVES input databases – compressed archives of MOVES MariaDB input databases with file names in the format <ProjectName>_onroad_c<FIPS>y<YYYY>_<I&M>_cdb.zip
- MOVES output databases – compressed archives of MOVES MariaDB output databases with file names in the format < <ProjectName>_onroad_c<FIPS>y<YYYY>_<VMT>_<I&M>_out.zip

The file name < ProjectName>_onroad_c<FIPS>y<YYYY>_<I&M> describes the project, county, year modeled, VMT data source, and I&M parameters used for the MOVES model run as follows:

- <ProjectName> – name used internally to identify the MOVES modeling project.
- onroad – used to differentiate MOVES onroad and nonroad data files.
- <FIPS> - the 5-digit state-county Federal Information Processing Standard (FIPS) number for the county modeled.
- <YYYY> – calendar year modeled.
- <VMT> – indicates the source of VMT data (HPMS for Highway Performance Monitoring System, TDM for travel demand modeling).
- <I&M> – the I&M compliance rate, waiver rate, and number of latest model years exempted, or if no I&M program is modeled.

For example, "2024im110ldemo_onroad_c37183y2025_HPMS_9653_20MY" specifies a MOVES onroad model run within the project labelled "2024im110ldemo" for Wake County, NC (FIPS 37183) and CY 2025, with HPMS VMT data, with 96% I&M compliance rate, 5% waiver rate, and the 3 latest model year vehicles exempted from I&M requirements, and with I&M coverage of the 20 latest model year vehicles. Similarly, a file with the name "2024im110ldemo_onroad_c37119y2025_TDM_NOIM" specifies a model run for Mecklenburg County, NC (FIPS 37119) for 2025 with TDM-based VMT data and with no I&M requirements. Table A-14 lists the files provided.

Table A-14. MOVES Modeling Files Provided

County	Modeling Scenario	File Type	File Name
Alamance	With I&M	Run Spec File	2024im110ldemo_onroad_c37001y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37001y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37001y2025_hpms_9653_20my _out.zip
Alamance	Without I&M	Run Spec File	2024im110ldemo_onroad_c37001y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37001y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37001y2025_hpms_noim_out.zip
Buncombe	With I&M	Run Spec File	2024im110ldemo_onroad_c37021y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37021y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37021y2025_hpms_9653_20my_out.zip
Buncombe	Without I&M	Run Spec File	2024im110ldemo_onroad_c37021y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37021y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37021y2025_hpms_noim_out.zip
Cabarrus	With I&M	Run Spec File	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my_out.zip
Cabarrus	Without I&M	Run Spec File	2024im110ldemo_onroad_c37025y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37025y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37025y2025_tdm_noim_out.zip
Cumberland	With I&M	Run Spec File	2024im110ldemo_onroad_c37051y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37051y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37051y2025_hpms_9653_20my_out.zip
Cumberland	Without I&M	Run Spec File	2024im110ldemo_onroad_c37051y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37051y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37051y2025_hpms_noim_out.zip
Davidson	With I&M	Run Spec File	2024im110ldemo_onroad_c37057y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37057y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37057y2025_hpms_9653_20my_out.zip
Davidson	Without I&M	Run Spec File	2024im110ldemo_onroad_c37057y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37057y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37057y2025_hpms_noim_out.zip
Durham	With I&M	Run Spec File	2024im110ldemo_onroad_c37063y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37063y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37063y2025_hpms_9653_20my_out.zip
Durham	Without I&M	Run Spec File	2024im110ldemo_onroad_c37063y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37063y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37063y2025_hpms_noim_out.zip
Forsyth	With I&M	Run Spec File	2024im110ldemo_onroad_c37067y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37067y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37067y2025_hpms_9653_20my_out.zip
Forsyth		Run Spec File	2024im110ldemo_onroad_c37067y2025_hpms_noim.mrs

County	Modeling Scenario	File Type	File Name
	Without I&M	MOVES Input	2024im110ldemo_onroad_c37067y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37067y2025_hpms_noim_out.zip
Franklin	With I&M	Run Spec File	2024im110ldemo_onroad_c37069y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37069y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37069y2025_hpms_9653_20my_out.zip
Franklin	Without I&M	Run Spec File	2024im110ldemo_onroad_c37069y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37069y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37069y2025_hpms_noim_out.zip
Gaston	With I&M	Run Spec File	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my_out.zip
Gaston	Without I&M	Run Spec File	2024im110ldemo_onroad_c37071y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37071y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37071y2025_tdm_noim_out.zip
Guilford	With I&M	Run Spec File	2024im110ldemo_onroad_c37081y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37081y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37081y2025_hpms_9653_20my_out.zip
Guilford	Without I&M	Run Spec File	2024im110ldemo_onroad_c37081y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37081y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37081y2025_hpms_noim_out.zip
Iredell	With I&M	Run Spec File	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my_out.zip
Iredell	Without I&M	Run Spec File	2024im110ldemo_onroad_c37097y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37097y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37097y2025_tdm_noim_out.zip
Johnston	With I&M	Run Spec File	2024im110ldemo_onroad_c37101y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37101y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37101y2025_hpms_9653_20my_out.zip
Johnston	Without I&M	Run Spec File	2024im110ldemo_onroad_c37101y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37101y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37101y2025_hpms_noim_out.zip
Lincoln	With I&M	Run Spec File	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my_out.zip
Lincoln	Without I&M	Run Spec File	2024im110ldemo_onroad_c37109y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37109y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37109y2025_tdm_noim_out.zip
Mecklenburg	With I&M	Run Spec File	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my_out.zip
Mecklenburg		Run Spec File	2024im110ldemo_onroad_c37119y2025_tdm_noim.mrs

County	Modeling Scenario	File Type	File Name
	Without I&M	MOVES Input	2024im110ldemo_onroad_c37119y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37119y2025_tdm_noim_out.zip
New Hanover	With I&M	Run Spec File	2024im110ldemo_onroad_c37129y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37129y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37129y2025_hpms_9653_20my_out.zip
New Hanover	Without I&M	Run Spec File	2024im110ldemo_onroad_c37129y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37129y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37129y2025_hpms_noim_out.zip
Randolph	With I&M	Run Spec File	2024im110ldemo_onroad_c37151y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37151y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37151y2025_hpms_9653_20my_out.zip
Randolph	Without I&M	Run Spec File	2024im110ldemo_onroad_c37151y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37151y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37151y2025_hpms_noim_out.zip
Rowan	With I&M	Run Spec File	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my_out.zip
Rowan	Without I&M	Run Spec File	2024im110ldemo_onroad_c37159y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37159y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37159y2025_tdm_noim_out.zip
Union	With I&M	Run Spec File	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my_out.zip
Union	Without I&M	Run Spec File	2024im110ldemo_onroad_c37179y2025_tdm_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37179y2025_tdm_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37179y2025_tdm_noim_out.zip
Wake	With I&M	Run Spec File	2024im110ldemo_onroad_c37183y2025_hpms_9653_20my.mrs
		MOVES Input	2024im110ldemo_onroad_c37183y2025_hpms_9653_20my_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37183y2025_hpms_9653_20my_out.zip
Wake	Without I&M	Run Spec File	2024im110ldemo_onroad_c37183y2025_hpms_noim.mrs
		MOVES Input	2024im110ldemo_onroad_c37183y2025_hpms_noim_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37183y2025_hpms_noim_out.zip
Cabarrus – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37025y2025_tdm_9653_20my_naa_out.zip
Cabarrus – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37025y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37025y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37025y2025_tdm_noim_naa_out.zip
Gaston – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37071y2025_tdm_9653_20my_naa_out.zip
		Run Spec File	2024im110ldemo_onroad_c37071y2025_tdm_noim_naa.mrs

County	Modeling Scenario	File Type	File Name
Gaston – nonattainment area	Without I&M	MOVES Input	2024im110ldemo_onroad_c37071y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37071y2025_tdm_noim_naa_out.zip
Iredell – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37097y2025_tdm_9653_20my_naa_out.zip
Iredell – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37097y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37097y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37097y2025_tdm_noim_naa_out.zip
Lincoln – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37109y2025_tdm_9653_20my_naa_out.zip
Lincoln – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37109y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37109y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37109y2025_tdm_noim_naa_out.zip
Mecklenburg – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37119y2025_tdm_9653_20my_naa_out.zip
Mecklenburg – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37119y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37119y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37119y2025_tdm_noim_naa_out.zip
Rowan – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37159y2025_tdm_9653_20my_naa_out.zip
Rowan – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37159y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37159y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37159y2025_tdm_noim_naa_out.zip
Union – nonattainment area	With I&M	Run Spec File	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37179y2025_tdm_9653_20my_naa_out.zip
Union – nonattainment area	Without I&M	Run Spec File	2024im110ldemo_onroad_c37179y2025_tdm_noim_naa.mrs
		MOVES Input	2024im110ldemo_onroad_c37179y2025_tdm_noim_naa_cdb.zip
		MOVES Output	2024im110ldemo_onroad_c37179y2025_tdm_noim_naa_out.zip
Cabarrus – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37025y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37025y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37025y2026_tdm_9653_20my_out.zip
Cabarrus – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37025y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37025y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37025y2026_tdm_noim_out.zip
Gaston – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37071y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37071y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37071y2026_tdm_9653_20my_out.zip

County	Modeling Scenario	File Type	File Name
Gaston – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37071y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37071y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37071y2026_tdm_noim_out.zip
Iredell – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37097y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37097y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37097y2026_tdm_9653_20my_out.zip
Iredell – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37097y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37097y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37097y2026_tdm_noim_out.zip
Lincoln – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37109y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37109y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37109y2026_tdm_9653_20my_out.zip
Lincoln – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37109y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37109y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37109y2026_tdm_noim_out.zip
Mecklenburg – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37119y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37119y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37119y2026_tdm_9653_20my_out.zip
Mecklenburg – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37119y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37119y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37119y2026_tdm_noim_out.zip
Rowan – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37159y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37159y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37159y2026_tdm_9653_20my_out.zip
Rowan – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37159y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37159y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37159y2026_tdm_noim_out.zip
Union – nonattainment area	With I&M	Run Spec File	metrolina2ndmp_onroad_c37179y2026_tdm_9653_20my.mrs
		MOVES Input	metrolina2ndmp_onroad_c37179y2026_tdm_9653_20my_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37179y2026_tdm_9653_20my_out.zip
Union – nonattainment area	Without I&M	Run Spec File	metrolina2ndmp_onroad_c37179y2026_tdm_noim.mrs
		MOVES Input	metrolina2ndmp_onroad_c37179y2026_tdm_noim_cdb.zip
		MOVES Output	metrolina2ndmp_onroad_c37179y2026_tdm_noim_out.zip

Pre-Hearing Draft

Appendix B

Nonroad Mobile Source

Emissions Inventory Documentation

Clean Air Act Section 110(l) Noninterference Demonstration to Remove 19 Counties from North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program

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List of Tables

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1.0 INTRODUCTION AND SCOPE

This appendix presents the data sources, methods, and results used to develop ozone season day emission estimates for nitrogen oxides (NOx), volatile organic compounds (VOC), and carbon monoxide (CO) associated with nonroad mobile sources in 2025. The nonroad mobile source inventory contains emissions from mobile vehicles and equipment that are not licensed to use public roads. Nonroad mobile source equipment covers a diverse set of items including lawn mowers, chain saws, tractors, all-terrain vehicles, forklifts, and construction equipment. Freight and passenger railroads and commercial marine vessels (CMV) are the types of vehicles included in the nonroad mobile source category. Aircraft emissions, traditionally a nonroad category, are reported as point sources (see Appendix C) in keeping with the United States Environmental Protection Agency (EPA)'s practice for the National Emissions Inventory (NEI) where they are reported at the airports where they are generated.

2.0 SUMMARY OF EMISSIONS

For 2025, Table B-1 displays total nonroad mobile source typical ozone season day NOx, VOC, and CO emissions by county.

3.0 METHODOLOGY

The overall approach to preparing the nonroad mobile source emissions inventory was to use the most recent data available for representing emissions in 2025. As discussed below, separate methodologies were used to estimate 2025 emissions for nonroad equipment and nonroad vehicles. Each sub-section below first provides an overview of the sources for which emissions were estimated, and then provides a description of the emissions estimation methodology.

3.1 NONROAD EQUIPMENT

The EPA includes more than eighty different types of equipment in the MOtor Vehicle Emission Simulator (MOVES) model version 4.0.1 was used to estimate nonroad equipment emissions.[1] To facilitate analysis and reporting, EPA groups the equipment types into the following categories:

Agricultural equipment	Lawn and garden equipment, commercial
Airport support equipment	Logging equipment
Commercial equipment	Oil field equipment
Construction and mining equipment	Pleasure craft
Industrial equipment	Railway maintenance equipment
Lawn and garden equipment, residential	Recreational equipment

The model estimates emissions for six different engine types: 2-stroke and 4-stroke spark ignition engines, diesel engines, liquid propane gas engines, and compressed natural gas engines.

[1] U.S. Environmental Protection Agency, "MOVES and Other Mobile Source Emissions Models, Latest Version of MOtor Vehicle Emission Simulator (MOVES), MOVES4: Latest Version of Motor Vehicle Emission Simulator," available from https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves, accessed February 2024.

Table B-1. Nonroad Mobile Source Ozone Season Day NOx, VOC, and CO Emissions in 2025 (Tons/Day)

County	Nonroad Model Categories			Freight and Passenger Railways			Class 1 & 2 Commercial Marine Vessels			Class 3 Commercial Marine Vessels			Totals		
	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS															
Cabarrus	0.789	1.178	22.244	0.402	0.017	0.090	-	-	-	-	-	-	1.192	1.194	22.334
Gaston	0.813	1.119	20.793	0.322	0.013	0.074	-	-	-	-	-	-	1.135	1.132	20.867
Iredell	0.863	0.838	14.048	0.102	0.004	0.023	-	-	-	-	-	-	0.965	0.842	14.070
Lincoln	0.342	0.460	7.597	0.030	0.001	0.008	-	-	-	-	-	-	0.372	0.461	7.604
Mecklenburg	5.884	10.530	200.342	0.611	0.025	0.141	-	-	-	-	-	-	6.495	10.555	200.483
Rowan	0.612	0.772	12.088	0.668	0.028	0.156	-	-	-	-	-	-	1.280	0.800	12.244
Union	1.459	2.109	39.100	0.360	0.015	0.089	-	-	-	-	-	-	1.819	2.124	39.189
Subtotals	**10.762**	**17.006**	**316.210**	**2.495**	**0.103**	**0.580**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**13.257**	**17.109**	**316.791**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)															
Durham	1.570	1.816	32.378	0.133	0.006	0.028	-	-	-	-	-	-	1.704	1.822	32.406
Franklin	0.266	0.356	6.418	0.004	0.000	0.001	-	-	-	-	-	-	0.270	0.356	6.419
Johnston	0.849	1.037	17.576	0.619	0.027	0.136	-	-	-	-	-	-	1.468	1.064	17.713
Wake	4.471	7.972	149.229	0.329	0.014	0.064	-	-	-	-	-	-	4.799	7.987	149.293
Subtotals	**7.156**	**11.181**	**205.602**	**1.085**	**0.047**	**0.228**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**8.241**	**11.229**	**205.831**
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)															
Davidson	0.748	0.857	15.318	0.804	0.034	0.173	-	-	-	-	-	-	1.552	0.891	15.491
Forsyth	1.422	2.047	40.808	0.081	0.003	0.015	-	-	-	-	-	-	1.503	2.050	40.823
Guilford	3.056	4.502	89.848	0.890	0.037	0.205	-	-	-	-	-	-	3.947	4.539	90.053
Subtotals	**5.226**	**7.406**	**145.973**	**1.775**	**0.074**	**0.393**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**7.001**	**7.480**	**146.367**
Other Counties (Not Subject to an Ozone Maintenance Plan)															
Alamance	0.812	1.491	28.568	0.139	0.006	0.029	-	-	-	-	-	-	0.951	1.497	28.597
Buncombe	1.027	1.844	26.623	0.280	0.012	0.062	-	-	-	-	-	-	1.307	1.855	26.685
Cumberland	1.040	1.804	31.656	0.540	0.023	0.117	-	-	-	-	-	-	1.580	1.827	31.773
New Hanover	1.145	1.911	32.790	0.008	0.000	0.001	0.734	0.026	0.142	0.241	0.028	0.046	2.128	1.965	32.979
Randolph	0.744	0.903	17.217	0.033	0.001	0.007	-	-	-	-	-	-	0.776	0.904	17.224
Subtotals	**4.767**	**7.953**	**136.854**	**1.000**	**0.042**	**0.216**	**0.734**	**0.026**	**0.142**	**0.241**	**0.028**	**0.046**	**6.743**	**8.049**	**137.258**
Totals	**27.912**	**43.546**	**804.640**	**6.355**	**0.267**	**1.418**	**0.734**	**0.026**	**0.142**	**0.241**	**0.028**	**0.046**	**35.243**	**43.866**	**806.246**

Note that "0.000" indicates that emissions are less than this value while "-" indicates that the source category does not exist in the county.

Ozone season day emissions of NOx, VOC, and CO were estimated by running the nonroad mobile source module of MOVES4.0.1. Model runs were performed for each county for 2025. The model runs were developed for a typical July weekday. Default data were used for the input files used in the MOVES4.01 Nonroad model. The MOVES RunSpec (MRS) file (wherein all the modeling variables are set) used in the MOVES4.01 Nonroad model was tailored to reflect North Carolina-specific information. For reporting purposes, the resulting emissions from the MOVES4.01 Nonroad model were totaled for each equipment category by county. The summary of the model results by equipment category, expressed in tons emitted per typical July weekday, are tabulated in Tables B-2, B-3, and B-4 for NOx, VOC, and CO emissions, respectively.

Table B-2. Nonroad Equipment: 2025 NOx Emissions (Tons/Day)

County	Agriculture	Airport Support	Commercial	Construction	Industrial	Lawn and Garden	Logging	Oil Field	Pleasure Craft	Railway Maintenance	Recreational	Totals
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS												
Cabarrus	0.067	0.000	0.075	0.270	0.191	0.181	0.000	0.000	0.002	0.002	0.001	0.789
Gaston	0.033	0.000	0.087	0.197	0.335	0.135	0.000	0.000	0.016	0.001	0.009	0.813
Iredell	0.139	0.000	0.098	0.257	0.262	0.055	0.001	0.000	0.041	0.000	0.010	0.863
Lincoln	0.058	0.000	0.030	0.072	0.110	0.048	0.000	0.000	0.018	0.001	0.005	0.342
Mecklenburg	0.017	0.071	1.003	2.293	0.863	1.555	0.000	0.000	0.048	0.002	0.032	5.884
Rowan	0.122	0.000	0.051	0.084	0.253	0.058	0.001	0.000	0.027	0.002	0.015	0.612
Union	0.274	0.000	0.109	0.480	0.244	0.339	0.000	0.000	0.005	0.001	0.006	1.459
Subtotals	**0.708**	**0.071**	**1.453**	**3.654**	**2.259**	**2.371**	**0.004**	**0.001**	**0.156**	**0.009**	**0.077**	**10.762**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)												
Durham	0.011	0.000	0.085	0.692	0.519	0.236	0.000	0.000	0.016	0.000	0.011	1.570
Franklin	0.084	0.000	0.015	0.045	0.061	0.052	0.002	0.000	0.006	0.000	0.001	0.266
Johnston	0.273	0.000	0.047	0.216	0.157	0.133	0.002	0.000	0.008	0.002	0.009	0.849
Wake	0.068	0.039	0.520	1.913	0.607	1.251	0.003	0.001	0.051	0.001	0.018	4.471
Subtotals	**0.436**	**0.039**	**0.668**	**2.867**	**1.344**	**1.671**	**0.007**	**0.001**	**0.081**	**0.004**	**0.040**	**7.156**
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)												
Davidson	0.095	0.000	0.072	0.103	0.351	0.086	0.001	0.000	0.032	0.002	0.005	0.748
Forsyth	0.046	0.000	0.209	0.402	0.466	0.282	0.001	0.000	0.007	0.001	0.009	1.422
Guilford	0.084	0.010	0.540	0.915	0.862	0.611	0.001	0.000	0.017	0.002	0.015	3.056
Subtotals	**0.225**	**0.010**	**0.821**	**1.421**	**1.679**	**0.979**	**0.003**	**0.000**	**0.055**	**0.005**	**0.029**	**5.226**
Other Counties (Not Subject to an Ozone Maintenance Plan)												
Alamance	0.058	0.000	0.070	0.142	0.280	0.246	0.001	0.000	0.009	0.001	0.005	0.812
Buncombe	0.043	0.001	0.138	0.310	0.330	0.150	0.000	0.000	0.008	0.001	0.043	1.027
Cumberland	0.108	0.001	0.082	0.275	0.297	0.253	0.002	0.000	0.012	0.002	0.010	1.040
New Hanover	0.004	0.001	0.134	0.459	0.188	0.235	0.000	0.000	0.112	0.000	0.011	1.145
Randolph	0.110	0.000	0.071	0.091	0.347	0.111	0.002	0.000	0.005	0.000	0.007	0.744
Subtotals	**0.323**	**0.004**	**0.494**	**1.277**	**1.443**	**0.994**	**0.006**	**0.000**	**0.146**	**0.004**	**0.076**	**4.767**
Totals	**1.692**	**0.123**	**3.436**	**9.219**	**6.724**	**6.015**	**0.020**	**0.002**	**0.438**	**0.021**	**0.222**	**27.912**

Table B-3. Nonroad Equipment: 2025 VOC Emissions (Tons/Day)

County	Agriculture	Airport Support	Commercial	Construction	Industrial	Lawn and Garden	Logging	Oil Field	Pleasure Craft	Railway Maintenance	Recreational	Totals
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS												
Cabarrus	0.007	0.000	0.127	0.057	0.034	0.942	0.002	0.000	0.004	0.000	0.004	1.178
Gaston	0.003	0.000	0.145	0.042	0.063	0.749	0.001	0.000	0.039	0.000	0.077	1.119
Iredell	0.013	0.000	0.160	0.054	0.051	0.332	0.004	0.000	0.097	0.000	0.128	0.838
Lincoln	0.006	0.000	0.049	0.015	0.020	0.263	0.001	0.000	0.042	0.000	0.063	0.460
Mecklenburg	0.002	0.008	1.670	0.486	0.145	7.754	0.002	0.000	0.119	0.000	0.344	10.530
Rowan	0.012	0.000	0.083	0.018	0.048	0.351	0.005	0.000	0.064	0.000	0.190	0.772
Union	0.027	0.000	0.182	0.102	0.046	1.670	0.001	0.000	0.012	0.000	0.068	2.109
Subtotals	**0.069**	**0.008**	**2.415**	**0.775**	**0.407**	**12.061**	**0.016**	**0.000**	**0.378**	**0.002**	**0.875**	**17.006**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)												
Durham	0.001	0.000	0.140	0.147	0.103	1.251	0.002	0.000	0.039	0.000	0.133	1.816
Franklin	0.008	0.000	0.026	0.010	0.010	0.276	0.007	0.000	0.015	0.000	0.004	0.356
Johnston	0.027	0.000	0.078	0.046	0.026	0.704	0.010	0.000	0.021	0.001	0.125	1.037
Wake	0.007	0.004	0.878	0.407	0.090	6.337	0.011	0.000	0.128	0.000	0.111	7.972
Subtotals	**0.043**	**0.004**	**1.123**	**0.609**	**0.229**	**8.568**	**0.029**	**0.001**	**0.202**	**0.001**	**0.374**	**11.181**
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)												
Davidson	0.009	0.000	0.118	0.022	0.070	0.492	0.005	0.000	0.076	0.000	0.065	0.857
Forsyth	0.004	0.000	0.338	0.085	0.084	1.489	0.002	0.000	0.016	0.000	0.029	2.047
Guilford	0.008	0.001	0.883	0.193	0.167	3.107	0.004	0.000	0.040	0.000	0.098	4.502
Subtotals	**0.022**	**0.001**	**1.339**	**0.300**	**0.320**	**5.088**	**0.011**	**0.000**	**0.132**	**0.001**	**0.192**	**7.406**
Other Counties (Not Subject to an Ozone Maintenance Plan)												
Alamance	0.006	0.000	0.117	0.030	0.055	1.240	0.004	0.000	0.023	0.000	0.018	1.491
Buncombe	0.004	0.000	0.213	0.065	0.059	0.798	0.002	0.000	0.018	0.000	0.684	1.844
Cumberland	0.011	0.000	0.138	0.059	0.046	1.383	0.009	0.000	0.029	0.000	0.128	1.804
New Hanover	0.000	0.000	0.221	0.097	0.031	1.228	0.001	0.000	0.200	0.000	0.132	1.911
Randolph	0.011	0.000	0.115	0.019	0.070	0.596	0.008	0.000	0.012	0.000	0.071	0.903
Subtotals	**0.031**	**0.000**	**0.804**	**0.270**	**0.261**	**5.245**	**0.024**	**0.000**	**0.282**	**0.001**	**1.033**	**7.953**
Totals	**0.165**	**0.014**	**5.681**	**1.954**	**1.218**	**30.961**	**0.080**	**0.001**	**0.993**	**0.005**	**2.474**	**43.546**

Table B-4. Nonroad Equipment: 2025 CO Emissions (Tons/Day)

County	Agriculture	Airport Support	Commercial	Construction	Industrial	Lawn and Garden	Logging	Oil Field	Pleasure Craft	Railway Maintenance	Recreational	Totals
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS												
Cabarrus	0.086	0.000	3.377	0.662	0.955	16.947	0.017	0.000	0.021	0.007	0.171	22.244
Gaston	0.042	0.000	3.893	0.481	1.804	13.220	0.009	0.004	0.200	0.006	1.133	20.793
Iredell	0.177	0.000	4.341	0.626	1.461	5.743	0.035	0.000	0.515	0.001	1.148	14.048
Lincoln	0.074	0.000	1.323	0.177	0.586	4.669	0.014	0.000	0.221	0.002	0.533	7.597
Mecklenburg	0.021	0.145	44.867	5.607	4.042	141.234	0.017	0.005	0.611	0.007	3.786	200.342
Rowan	0.155	0.000	2.250	0.206	1.391	6.084	0.053	0.004	0.337	0.007	1.600	12.088
Union	0.351	0.000	4.888	1.176	1.324	30.574	0.013	0.000	0.063	0.004	0.707	39.100
Subtotals	0.906	0.145	64.941	8.934	11.563	218.470	0.159	0.012	1.967	0.035	9.077	316.210
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)												
Durham	0.014	0.000	3.785	1.692	2.967	22.376	0.017	0.000	0.200	0.002	1.325	32.378
Franklin	0.107	0.000	0.692	0.111	0.292	4.902	0.068	0.000	0.074	0.000	0.171	6.418
Johnston	0.351	0.000	2.116	0.530	0.738	12.640	0.098	0.004	0.105	0.010	0.986	17.576
Wake	0.087	0.080	23.437	4.691	2.430	115.132	0.110	0.019	0.643	0.004	2.598	149.229
Subtotals	0.559	0.080	30.030	7.023	6.427	155.050	0.293	0.023	1.022	0.015	5.080	205.602
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)												
Davidson	0.121	0.000	3.211	0.252	2.020	8.639	0.047	0.000	0.400	0.008	0.618	15.318
Forsyth	0.059	0.000	9.264	0.979	2.386	26.736	0.023	0.002	0.084	0.002	1.274	40.808
Guilford	0.108	0.020	24.027	2.233	4.814	56.318	0.040	0.000	0.210	0.008	2.069	89.848
Subtotals	0.288	0.020	36.502	3.465	9.220	91.692	0.110	0.002	0.694	0.019	3.961	145.973
Other Counties (Not Subject to an Ozone Maintenance Plan)												
Alamance	0.074	0.000	3.133	0.347	1.576	22.511	0.037	0.000	0.116	0.002	0.770	28.568
Buncombe	0.055	0.003	5.981	0.748	1.705	14.212	0.018	0.000	0.105	0.005	3.793	26.623
Cumberland	0.138	0.002	3.679	0.675	1.259	24.579	0.093	0.002	0.148	0.007	1.075	31.656
New Hanover	0.005	0.003	6.048	1.129	0.871	22.309	0.009	0.000	1.083	0.000	1.334	32.790
Randolph	0.140	0.000	3.143	0.222	2.044	10.648	0.081	0.000	0.063	0.002	0.875	17.217
Subtotals	0.413	0.008	21.983	3.120	7.456	94.259	0.238	0.002	1.514	0.016	7.846	136.854
Totals	**2.167**	**0.253**	**153.457**	**22.542**	**34.666**	**559.471**	**0.799**	**0.038**	**5.197**	**0.085**	**25.965**	**804.640**

3.2 NONROAD VEHICLES

Version 2 of the EPA's 2018 Emissions Modeling Platform (2018v2) reports two major types of nonroad vehicle emissions in North Carolina: CMV and railroad locomotives.[2] Table B-5 displays a list of the nonroad vehicle source categories for which the 2018v2 platform reports annual emissions in the state. Railroad line-haul locomotives are categorized by size (Class I, Class II/Class III) and by use for passenger service. Class I line-haul railroads are larger in size (consisting of Norfolk Southern Corporation and CSX Corporation in North Carolina) compared to Class II and Class III railroads, which serve more localized markets. Amtrak and the North Carolina Department of Transportation's Rail Division provide passenger service in the state.

Table B-5. Nonroad Vehicle Categories in 2018v2 Modeling Platform for North Carolina

SCC	SCC Description
2280002101	Marine Vessels, Commercial/Diesel/C1C2 Port emissions: Main Engine
2280002102	Marine Vessels, Commercial/Diesel/C1C2 Port emissions: Auxiliary Engine
2280002103	Marine Vessels, Commercial/Diesel/C3 Port emissions: Main Engine
2280002104	Marine Vessels, Commercial/Diesel/C3 Port emissions: Auxiliary Engine
2280002201	Marine Vessels, Commercial/Diesel/C1C2 Underway emissions: Main Engine
2280002202	Marine Vessels, Commercial/Diesel/C1C2 Underway emissions: Auxiliary Engine
2280002203	Marine Vessels, Commercial/Diesel/C3 Underway emissions: Main Engine
2280002204	Marine Vessels, Commercial/Diesel/C3 Underway emissions: Auxiliary Engine
2285002006	Railroad Equipment /Diesel /Line Haul Locomotives: Class I Operations
2285002007	Railroad Equipment /Diesel /Line Haul Locomotives: Class II / III Operations
2285002008	Railroad Equipment /Diesel /Line Haul Locomotives: Passenger Trains (Amtrak)

For the CMV and railroad locomotive source categories, year 2018 monthly emissions were obtained from the 2018v2 modeling platform file "2018gg_county_monthly_report_03aug2022_v0.csv."[3] Year 2032 monthly emissions for CMV and railroad locomotive sources were obtained from the 2018v2 modeling platform file "2032gg2_county_monthly_report_23oct2023_v1.csv."[3] The North Carolina Division of Air Quality (DAQ) estimated July NOx, VOC, and CO 2025 emissions from the July 2018 and 2032 emissions in the 2018v2 modeling platform. The 2025 values were calculated as the mid-point between the 2018 and 2032 emissions. To develop average July day emissions, the DAQ divided the estimated 2025 July emissions by 31 days. The DAQ believes that dividing July emissions by 31 days provides a reasonable estimate of typical ozone season day CMV and railroad locomotive emissions.

[2] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.
[3] U.S. Environmental Protection Agency, "Index of /Air/emismod/2018/v2/reports," monthly emissions data available for download from https://gaftp.epa.gov/Air/emismod/2018/v2/reports/, accessed June 2024.

4.0 QUALITY ASSURANCE MEASURES

For the nonroad model runs, the MOVES RunSpecs (MRS) files (files that display the inputs used in a model run) and calculations were reviewed by a DAQ staff person who did not perform the actual runs. The file size for the output table for each county model run was consistent in size and viewed in HeidiSQL individually to ensure the emissionQuant field was properly filled. Additionally, the error table for each individual model run was checked in HeidiSQL to be sure no errors occurred. The model results were then evaluated by comparing one county to another to see if the results were reasonable (accounting for known differences between counties).

Because the 2018v2 modeling platform emissions were used by EPA in support of modeling for analysis of the impact of EPA's revised particulate matter National Ambient Air Quality Standards (NAAQS), these emissions underwent extensive quality assurance review prior to this use. The detailed quality assurance and quality control procedures and measures, outlined in the DAQ's Emissions Inventory Quality Assurance Project Plan, were applied to ensure the data meets data quality indicator acceptance criteria.

5.0 MOVES4.0.1 NONROAD MRS FILES

Due to their size, format, and complexity, all MOVES data files were provided in electronic format. Two types of files are included:

- MOVES run specification (RunSpec) files – flat text files named in the format <ProjectName_nonroad_cFIPSyYYYY>.mrs
- MOVES output databases – compressed archives of MOVES MariaDB output databases with file names in the format < ProjectName_nonroad_cFIPSyYYYY>_out.

The file name < ProjectName_nonroad_cFIPSyYYYY> describes the county, year modeled, and nonroad selection used for the MOVES model run as follows:

- ProjectName – internal name used to identify the MOVES modeling project
- Nonroad – indicated the MOVES model selection
- FIPS – the 5-digit state-county Federal Information Processing Standard (FIPS) number for the county modeled
- YYYY – calendar year modeled

For example, "2024im110ldemo_nonroad_c37001y2025" specifies MOVES model run within the project labelled "2024im110ldemo" for Alamance County, NC (FIPS 37001) for CY 2025.

There is one MRS file for each county and one corresponding output file as seen in Table B-6 below.

Table B-6. Nonroad Vehicle Modeling Platform Files for North Carolina

#	County	MRS file	Output File
1	Alamance	2024im110ldemo_nonroad_c37001y2025.mrs	2024im110ldemo_nonroad_c37001y2025_out
2	Buncombe	2024im110ldemo_nonroad_c37021y2025.mrs	2024im110ldemo_nonroad_c37021y2025_out
3	Cabarrus	2024im110ldemo_nonroad_c37025y2025.mrs	2024im110ldemo_nonroad_c37025y2025_out

#	County	MRS file	Output File
4	Cumberland	2024im110ldemo_nonroad_c37051y2025.mrs	2024im110ldemo_nonroad_c37051y2025_out
5	Davidson	2024im110ldemo_nonroad_c37057y2025.mrs	2024im110ldemo_nonroad_c37057y2025_out
6	Durham	2024im110ldemo_nonroad_c37063y2025.mrs	2024im110ldemo_nonroad_c37063y2025_out
7	Forsyth	2024im110ldemo_nonroad_c37067y2025.mrs	2024im110ldemo_nonroad_c37067y2025_out
8	Franklin	2024im110ldemo_nonroad_c37069y2025.mrs	2024im110ldemo_nonroad_c37069y2025_out
9	Gaston	2024im110ldemo_nonroad_c37071y2025.mrs	2024im110ldemo_nonroad_c37071y2025_out
10	Guilford	2024im110ldemo_nonroad_c37081y2025.mrs	2024im110ldemo_nonroad_c37081y2025_out
11	Iredell	2024im110ldemo_nonroad_c37097y2025.mrs	2024im110ldemo_nonroad_c37097y2025_out
12	Johnston	2024im110ldemo_nonroad_c37101y2025.mrs	2024im110ldemo_nonroad_c37101y2025_out
13	Lincoln	2024im110ldemo_nonroad_c37109y2025.mrs	2024im110ldemo_nonroad_c37109y2025_out
14	Mecklenburg	2024im110ldemo_nonroad_c37119y2025.mrs	2024im110ldemo_nonroad_c37119y2025_out
15	New Hanover	2024im110ldemo_nonroad_c37129y2025.mrs	2024im110ldemo_nonroad_c37129y2025_out
16	Randolph	2024im110ldemo_nonroad_c37151y2025.mrs	2024im110ldemo_nonroad_c37151y2025_out
17	Rowan	2024im110ldemo_nonroad_c37159y2025.mrs	2024im110ldemo_nonroad_c37159y2025_out
18	Union	2024im110ldemo_nonroad_c37179y2025.mrs	2024im110ldemo_nonroad_c37179y2025_out
19	Wake	2024im110ldemo_nonroad_c37183y2025.mrs	2024im110ldemo_nonroad_c37183y2025_out

Pre-Hearing Draft

Appendix C

Point Source

Emissions Inventory Documentation

Clean Air Act Section 110(l) Noninterference Demonstration to Remove 19 Counties from North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program

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1.0 INTRODUCTION AND SCOPE

This appendix presents the data sources, methods, and results used to develop typical ozone season day emissions for point sources for 2025. The point source inventory consists of emissions from individual facilities (point sources), airports, and wild, prescribed and agriculture fires.

Industrial or commercial facilities have equipment that emits air pollutants at levels classified as point sources by air quality regulatory programs and are generally required to have permits issued by the North Carolina Division of Air Quality (DAQ) and the three local programs located in Buncombe, Forsyth and Mecklenburg Counties. A subcategory of these permitted sources are combustion sources such as boilers and turbines that generate electricity for sale on the electric grid. Emissions for these electricity generating units (EGUs) are developed separately from the other point sources due to differences in how they operate compared to industrial and commercial sources. In the following discussion, these two categories of point sources are referred to as "EGU" and "Non-EGU Point."

Airports are not required to have air quality permits for construction and aircraft operations (although they could have equipment such as a boiler or generator that requires a permit). They do have fixed and known locations and their emissions quantities can be comparable to industrial sources so the United States Environmental Protection Agency (EPA)'s includes these emissions in the point source inventory even though they are traditionally considered nonroad mobile sources.

In addition, EPA includes wild and prescribed fires in the point source inventory because the extent of fire-event activity is defined by geographic coordinates. The EPA also develops agricultural fire emissions estimates using crop residue burning activity, which is derived from the Hazard Mapping System satellite detects identifying fires on agricultural lands. Because EPA compiles emission estimates from the three fire subcategories using a common framework, the DAQ has chosen to report all fire emission estimates in this point source inventory appendix.

2.0 SUMMARY OF EMISSIONS

Table C-1 shows point source typical ozone season day nitrogen oxide (NOx), volatile organic compound (VOC), and carbon monoxide (CO) emissions by county for 2025.

Table C-1. Point Source Ozone Season Day NOx, VOC, and CO Emissions in 2025 (Tons/Day)

	EGU			Non-EGU Point			Aircraft			Wild/Prescribed/Ag. Fires			Totals		
County	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS															
Cabarrus	0.123	0.159	0.019	1.459	0.973	0.793	0.057	0.036	0.640	0.000	0.000	0.000	1.639	1.168	1.452
Gaston	0.000	0.000	0.000	0.597	1.500	0.724	0.008	0.012	0.416	0.000	0.000	0.000	0.605	1.512	1.140
Iredell	0.404	0.055	0.016	1.638	1.454	1.633	0.009	0.014	0.424	0.008	0.022	0.155	2.059	1.545	2.227
Lincoln	0.615	1.851	0.014	0.121	0.415	0.067	0.018	0.015	0.296	0.035	0.409	1.719	0.789	2.690	2.095
Mecklenburg	0.073	0.077	0.006	1.006	0.650	2.069	6.617	2.340	20.085	0.000	0.000	0.000	7.696	3.066	22.160
Rowan	1.174	1.562	0.131	2.159	3.296	0.685	0.062	0.038	0.428	0.041	0.561	2.367	3.434	5.457	3.610
Union	0.005	0.005	0.002	0.635	1.415	0.532	0.027	0.028	0.682	0.068	0.742	3.249	0.735	2.190	4.464
Subtotals	**2.394**	**3.708**	**0.186**	**7.613**	**9.703**	**6.503**	**6.799**	**2.482**	**22.970**	**0.151**	**1.734**	**7.489**	**16.956**	**17.627**	**37.148**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)															
Durham	0.168	0.057	0.036	1.025	0.578	0.920	0.004	0.004	0.081	0.000	0.000	0.000	1.197	0.639	1.038
Franklin	0.000	0.000	0.000	0.134	0.637	0.261	0.050	0.039	0.757	0.382	4.689	19.910	0.566	5.365	20.928
Johnston	0.150	0.025	0.003	0.463	1.915	0.685	0.024	0.024	0.624	0.038	0.279	1.335	0.675	2.244	2.647
Wake	0.000	0.000	0.000	1.505	1.924	1.831	1.774	0.512	5.227	0.013	0.196	0.830	3.292	2.632	7.888
Subtotals	**0.317**	**0.083**	**0.039**	**3.127**	**5.055**	**3.698**	**1.851**	**0.579**	**6.689**	**0.433**	**5.164**	**22.075**	**5.729**	**10.880**	**32.501**
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)															
Davidson	0.156	0.017	0.007	2.369	1.948	0.682	0.018	0.012	0.173	0.018	0.113	0.335	2.562	2.090	1.198
Forsyth	0.309	0.188	0.026	1.422	3.419	1.876	0.036	0.025	0.361	0.000	0.000	0.000	1.766	3.631	2.262
Guilford	0.000	0.000	0.000	1.568	8.491	1.319	0.393	0.166	1.776	0.000	0.000	0.000	1.961	8.657	3.095
Subtotals	**0.465**	**0.204**	**0.033**	**5.358**	**13.857**	**3.876**	**0.448**	**0.203**	**2.310**	**0.018**	**0.113**	**0.335**	**6.289**	**14.378**	**6.555**
Other Counties (Not Subject to an Ozone Maintenance Plan)															
Alamance	0.000	0.000	0.000	0.401	1.362	0.548	0.016	0.017	0.456	0.065	0.727	2.927	0.482	2.106	3.930
Buncombe	0.064	1.864	0.033	0.391	0.891	0.347	0.264	0.113	1.104	0.000	0.000	0.000	0.719	2.867	1.484
Cumberland	0.405	2.864	0.006	0.941	2.401	0.896	1.987	0.957	2.780	0.023	0.378	1.602	3.356	6.599	5.285
New Hanover	0.459	1.585	0.024	1.276	0.836	0.568	0.223	0.108	0.862	0.000	0.000	0.000	1.957	2.529	1.454
Randolph	0.000	0.000	0.000	0.250	2.530	0.290	0.010	0.009	0.190	0.000	0.000	0.000	0.260	2.538	0.480
Subtotals	**0.928**	**6.312**	**0.064**	**3.259**	**8.020**	**2.649**	**2.500**	**1.204**	**5.391**	**0.087**	**1.105**	**4.529**	**6.774**	**16.641**	**12.633**
Totals	**4.104**	**10.307**	**0.322**	**19.358**	**36.636**	**16.726**	**11.598**	**4.468**	**37.360**	**0.690**	**8.115**	**34.429**	**35.749**	**59.526**	**88.837**

3.0 METHODOLOGY

The section discusses the methodologies applied to develop the emissions inventory for the EGU, non-EGU point, airports, and wild, prescribed, and agriculture fires source categories.

3.1 ELECTRICITY GENERATING UNITS

The following two subsections describe the development of emission estimates for (a) EGUs with a continuous emissions monitoring system (CEMS) and (b) EGUs without a CEMS.

3.1.1 Electricity Generating Units with a Continuous Emissions Monitoring System

Six EGUs are located in Buncombe County (37021), Cumberland County (37051), Lincoln County (37109), New Hanover County (37129), and Rowan County (37159) (see Table C-2). No EGUs are located in the remaining counties for which removal of the I&M program is modeled. For this inventory, EGUs are defined as units with a generating capacity greater than or equal to 25 megawatts (MW) and report hourly NOx emissions to EPA's Clean Air Markets Program Data (CAMPD). Table C-2 lists the EGUs in Buncombe, Cumberland, Lincoln, New Hanover, and Rowan counties. The methods for projecting 2025 emissions for these sources are discussed below.

Table C-2. EGUs with a Continuous Emissions Monitoring System

County	Facility	Boiler ID	Type
Buncombe (37021)	Duke Energy Progress, Inc. - Asheville Steam Electric Plant	3,4	Combustion Turbine
		CT5,CT7	Combined Cycle
Cumberland (37051)	Public Works Commission Butler-Warner Generation Plant	GT1,GT2,GT3,GT6, GT7,GT8	Combined Cycle
		GT4,GT5	Combustion Turbine
Lincoln (37109)	Duke Energy Corporation LCTS	1-17	Combustion Turbine
New Hanover (37129)	Duke Energy Progress, LLC - L.V. Sutton Electric Plant	4,5	Combustion Turbine
		01A,01B	Combined Cycle
Rowan (37159)	Duke Energy Carolinas, LLC - Buck Combined Cycle Facility	11C,12C	Combined Cycle
	Plant Rowan County	1-3	Combustion Turbine
		4,5	Combined Cycle

Year 2025 emissions were not readily available for EGUs. The DAQ downloaded 2023 daily NOx emissions for the month of July from EPA's CAMPD, which is available via EPA website,[1] and counted the number of days each unit operated in July 2023. The 2023 emissions were calculated for each EGU by dividing the total 2023 NOx emissions for the month of July by the number of days the unit operated in July of 2023. The DAQ assumes 2025 daily average NOx

[1] EPA Clean Air Markets Program Data, 2023 July Daily NOx Emissions for North Carolina https://campd.epa.gov/data/custom-data-download.

emissions are equal to 2023 daily average NOx emissions. See table C-3 for details on these calculations.

Table C-3. EGU Average July Day NOx Emissions Calculations

Facility Name	Unit ID	CAMPD 2023 July NOx Emissions (Tons)	Operating Days	2025 Avg. July Day NOx Emissions (Tons)
Asheville	3	2.855	7	0.408
	4	2.757	7	0.394
	CT5	16.186	31	0.522
	CT7	16.734	31	0.540
Buck	11C	6.580	31	0.212
	12C	6.464	31	0.209
Butler-Warner Generation Plant	GT-1	0.848	2	0.424
	GT-2	0.897	2	0.449
	GT-3	0.509	1	0.509
	GT-4	0.000	0	0.000
	GT-5	0.000	0	0.000
	GT-6	0.581	1	0.581
	GT-7	0.852	2	0.426
	GT-8	0.950	2	0.475
L V Sutton	4	0.032	1	0.032
	5	0.000	0	0.000
	01A	24.651	31	0.795
	01B	23.478	31	0.757
Lincoln Combustion Turbine	1	0.071	1	0.071
	2	0.075	1	0.075
	3	0.071	1	0.071
	4	0.070	1	0.070
	5	0.071	1	0.071
	6	0.000	0	0.000
	7	0.073	1	0.073
	8	0.075	1	0.075
	9	0.124	1	0.124
	10	0.124	1	0.124
	11	0.092	1	0.092
	12	0.096	1	0.096
	13	0.086	1	0.086
	14	0.087	1	0.087
	15	0.078	1	0.078
	16	0.005	1	0.005
	17	1.958	3	0.653
Plant Rowan County	1	4.421	18	0.246
	2	1.784	8	0.223
	3	2.892	12	0.241
	4	6.595	31	0.213
	5	6.664	31	0.215
Total				**9.720**

For VOC emissions, the 2025 daily average VOC emission were calculated for each EGU by first calculating the ratios of 2018 annual VOC to annual NOx from EPA's 2018v2 modeling platform, then using these ratios to multiply 2025 daily average NOx emissions to estimate 2025

July average day VOC emissions. The DAQ believes this calculation is a reasonable estimate of typical ozone season day emissions. See Table C-4 for details on these calculations.

Table C-4. EGU Average July Day VOC Emissions Calculations

Facility Name	Unit ID	2025 Avg. July Day NOx Emissions (Tons)	2018 Annual VOC Emissions (Tons)	2018 Annual NOx Emissions (Tons)	2018 Annual VOC to NOx Ratio	2025 Avg. July Day VOC Emissions (Tons)
Asheville	3	0.408	2.502	146.400	0.017	0.007
	4	0.394	2.736	145.696	0.019	0.007
	CT5*	0.522			0.018	0.009
	CT7*	0.540			0.018	0.010
Buck	11C	0.212	9.59	156	0.061	0.013
	12C	0.209			0.061	0.013
Butler-Warner Generation Plant	GT-1	0.424	0.014	10.617	0.001	0.001
	GT-2	0.449	0.012	9.684	0.001	0.001
	GT-3	0.509	0.015	11.666	0.001	0.001
	GT-4	0.000	0.011	4.691	0.002	0.000
	GT-5	0.000	0.009	8.869	0.001	0.000
	GT-6	0.581	0.014	11.290	0.001	0.001
	GT-7	0.426	0.015	11.656	0.001	0.001
	GT-8	0.475	0.310	50.618	0.006	0.003
L V Sutton	4	0.032	11.450	51.100	0.224	0.007
	5	0.000	9.140	42.600	0.215	0.000
	01A	0.795	2.500	234.600	0.011	0.008
	01B	0.757	2.530	223.300	0.011	0.009
Lincoln Combustion Turbine	1	0.071	0.046	7.520	0.006	0.000
	2	0.075	0.047	8.245	0.006	0.000
	3	0.071	0.040	5.022	0.008	0.001
	4	0.070	0.046	8.252	0.006	0.000
	5	0.071	0.043	5.863	0.007	0.001
	6	0.000	0.043	6.367	0.007	0.000
	7	0.073	0.045	7.044	0.006	0.000
	8	0.075	0.041	4.218	0.010	0.001
	9	0.124	0.040	5.124	0.008	0.001
	10	0.124	0.041	6.222	0.007	0.001
	11	0.092	0.041	5.438	0.008	0.001
	12	0.096	0.040	4.334	0.009	0.001
	13	0.086	0.040	4.062	0.010	0.001
	14	0.087	0.042	6.032	0.007	0.001
	15	0.078	0.043	6.456	0.007	0.001
	16	0.005	0.043	5.803	0.007	0.000
	17*	0.653			0.007	0.005

Facility Name	Unit ID	2025 Avg. July Day NOx Emissions (Tons)	2018 Annual VOC Emissions (Tons)	2018 Annual NOx Emissions (Tons)	2018 Annual VOC to NOx Ratio	2025 Avg. July Day VOC Emissions (Tons)
Plant Rowan County	1	0.246	1.180	29.320	0.040	0.010
	2	0.223	1.500	35.000	0.043	0.010
	3	0.241	1.500	36.100	0.042	0.010
	4	0.213	12.500	74.400	0.168	0.036
	5	0.215	12.600	68.700	0.183	0.039
Total		**9.720**				**0.208**

*For Asheville, using average VOC/NOx ratio of units 3 &4 for new units CT5, CT7.
*For Lincoln Combustion Turbine, using average VOC/NOx ratio of units 1-16 for new unit 17.

For CO emissions, the 2025 daily average CO emission were calculated for each EGU by first calculated the ratio of 2018 annual CO to annual NOx from EPA's 2018v2 modeling platform, then using the ratio to multiply 2025 daily average NOx emissions to calculation the 2025 average July daily CO emissions. The DAQ believes this calculation is a reasonable estimate of typical ozone season day emissions See table C-5 for details on these calculations.

Table C-5. EGU Average July Day CO Emissions Calculations

Facility Name	Unit ID	2025 Avg. July Day NOx Emissions (Tons)	2018 Annual CO Emissions (Tons)	2018 Annual NOx Emissions (Tons)	2018 Annual CO to NOx Ratio	2025 Avg. July Day CO Emissions (Tons)
Asheville	3	0.408	4.847	146.400	0.033	0.014
	4	0.394	5.221	145.696	0.036	0.014
	CT5*	0.522			0.034	0.018
	CT7*	0.540			0.034	0.019
Buck	11C	0.212	16.29	156	0.104	0.022
	12C	0.209			0.104	0.022
Butler-Warner Generation Plant	GT-1	0.424	0.922	10.617	0.087	0.037
	GT-2	0.449	0.848	9.684	0.088	0.039
	GT-3	0.509	1.014	11.666	0.087	0.044
	GT-4	0.000	0.548	4.691	0.117	
	GT-5	0.000	0.412	8.869	0.046	0.000
	GT-6	0.581	0.982	11.290	0.087	0.051
	GT-7	0.426	1.014	11.656	0.087	0.037
	GT-8	0.475	21.012	50.618	0.415	0.197
L V Sutton	4	0.032	65.900	51.100	1.290	0.041
	5	0.000	59.640	42.600	1.400	0.000
	01A	0.795	73.650	234.600	0.314	0.250
	01B	0.757	49.420	223.300	0.221	0.168
	1	0.071	2.587	7.520	0.344	0.024

Facility Name	Unit ID	2025 Avg. July Day NOx Emissions (Tons)	2018 Annual CO Emissions (Tons)	2018 Annual NOx Emissions (Tons)	2018 Annual CO to NOx Ratio	2025 Avg. July Day CO Emissions (Tons)
Lincoln Combustion Turbine	2	0.075	2.769	8.245	0.336	0.025
	3	0.071	1.585	5.022	0.316	0.022
	4	0.070	2.550	8.252	0.309	0.022
	5	0.071	2.101	5.863	0.358	0.025
	6	0.000	2.028	6.367	0.319	0.000
	7	0.073	2.379	7.044	0.338	0.025
	8	0.075	1.747	4.218	0.414	0.031
	9	0.124	1.544	5.124	0.301	0.037
	10	0.124	1.713	6.222	0.275	0.034
	11	0.092	1.712	5.438	0.315	0.029
	12	0.096	1.478	4.334	0.341	0.033
	13	0.086	1.537	4.062	0.378	0.033
	14	0.087	1.977	6.032	0.328	0.029
	15	0.078	2.110	6.456	0.327	0.025
	16	0.005	2.083	5.803	0.359	0.002
	17*	0.653			0.335	0.219
Plant Rowan County	1	0.246	14.220	29.320	0.485	0.119
	2	0.223	17.300	35.000	0.494	0.110
	3	0.241	17.400	36.100	0.482	0.116
	4	0.213	130.400	74.400	1.753	0.373
	5	0.215	131.400	68.700	1.913	0.411
Total		**9.720**				**2.717**

*For Asheville, using average CO/NOx ratio of units 3 & 4 for new units CT5, CT7.

*For Lincoln Combustion Turbine, using average CO/NOx ratio of units 1-16 for new unit 17.

3.1.2 Electricity Generating Units without a Continuous Emissions Monitoring System

For EGUs without a CEMS, the DAQ compiled emissions for 2022, which is the latest year of available data. To identify EGU facilities, the DAQ reviewed EGU records in EPA's 2018v2 Emissions Modeling Platform (EMP).[2] A different set of EGUs appear in the 2018v2 EMP's 2018 emissions file and 2032 emissions file. While the 2018 emissions represent actual historical data, the 2032 emissions reflect EGU sector projections from an EPA run of the Integrated Planning Model. A comprehensive list of EGUs from both the 2018 and 2032 files was developed, and then compared to the EPA's 2022 North Carolina point source inventory to identify the list of EGUs known to be currently operating. The DAQ compiled annual NOx, VOC, and CO emissions from the 2022 North Carolina point source inventory for these EGUs, and these emissions were divided by 365 to estimate typical ozone day emissions. This approach

[2] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.

is consistent with that used in estimating non-CEMS EGU emissions in DAQ's past Section 110(l) I&M program removal noninterference demonstrations. The EGUs operating in 2022 and their emissions are displayed in Table C-5.

Table C-6. 2022 Non-CEMS EGU Emissions

Facility Name	County	Facility ID	2022 Emissions (tons)					
			Annual			Daily		
			CO	NOx	VOC	CO	NOx	VOC
Concord Energy, LLC	Cabarrus	16601511	44.76	57.35	6.77	0.123	0.157	0.019
GRS CMS	Cabarrus	7959111	0.12	0.58	0.05	0.0003	0.002	0.0001
Davidson Gas Producers LLC	Davidson	17059411	57.10	6.10	2.60	0.156	0.017	0.007
MP Durham LLC	Durham	14639511	61.22	20.89	13.27	0.168	0.057	0.036
Salem Energy Systems, L.L.C.	Forsyth	9344111	73.89	40.34	2.92	0.202	0.111	0.008
Waste Management Piedmont LFGTE Project	Forsyth	8166911	38.76	28.20	6.40	0.106	0.077	0.018
Iredell County LFG Facility	Iredell	8298711	147.40	20.00	5.80	0.404	0.055	0.016
CII Methane Management IV, LLC	Johnston	17891111	54.60	9.29	1.14	0.150	0.026	0.003
Orbit Energy Charlotte	Mecklenburg	18882111	26.69	28.12	2.16	0.073	0.077	0.006
NC Municipal Power Agency No.1-Monroe	Union	16600711	1.85	1.92	0.57	0.005	0.005	0.002
TOTAL			**506.39**	**212.79**	**41.68**	**1.387**	**0.583**	**0.114**

3.2 NON-EGU POINT SOURCES, AIRPORTS, AND WILD/PRESCRIBED/AGRICULTURE FIRES

Emissions estimates for 2025 are not available for the non-EGU point source categories. Therefore, the overall approach was to estimate 2025-year emissions for these source categories by interpolating between 2018 and 2032 emissions included in EPA's 2018v2 EMP. The 2018v2 platform was created to support EPA's analysis of the impact of EPA's revised particulate matter National Ambient Air Quality Standards (NAAQS) and utilized the most up-to-date modeling and data sources.[3] The platform is generally considered to provide the most comprehensive and accurate inventories available at the time that this noninterference demonstration was prepared. Because of the difficulty with predicting wild, prescribed, and agriculture fires activity in the future, EPA held 2018 emissions constant to represent 2032 emissions in the 2018v2 modeling platform inventory. Year 2025 July NOx, VOC, and CO emissions from EPA's platform inventory were divided by 31 days to estimate typical ozone season day emissions. The DAQ believes that dividing July emissions by the 31 days in the month provides a reasonable estimate of typical ozone season day emissions for these point sources.

[3] Details on the methods used to develop this platform are described in "2018v2 Emissions Modeling Platform Technical Support Document," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform-technical-support-document.

4.0 QUALITY ASSURANCE MEASURES

Because the 2018v2 modeling platform emissions were used by EPA in support of modeling for their analysis of the impact of EPA's revised particulate matter NAAQS, these emissions underwent extensive quality assurance prior to this use. The detailed quality assurance and quality control procedures and measures, as outlined in the DAQ's Emissions Inventory Quality Assurance Project Plan, were applied to ensure the data meets data quality indicator acceptance criteria.

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Pre-Hearing Draft

Appendix D

Nonpoint (Area) Source

Emissions Inventory Documentation

Clean Air Act Section 110(l) Noninterference Demonstration to Remove 19 Counties from North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program

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1.0 INTRODUCTION AND SCOPE

This appendix presents the data sources, methods, and results used to develop the nonpoint (area) source emissions inventory for 2025. Nonpoint sources represent a collection of many small, stationary sources of air pollution emissions within a specified geographical area that individually emit less than the minimum emission levels prescribed for point sources. Because these sources are too small and/or too numerous to be surveyed and characterized individually, all nonpoint source activities are collectively estimated. The county is the geographic area for which emissions from nonpoint sources are compiled, primarily because counties are the smallest areas for which data used for estimating emissions are readily available. The following sections explain the methodology for developing typical ozone season day emissions for nonpoint sources.

2.0 SUMMARY OF EMISSIONS

Table D-1 shows total nonpoint source nitrogen oxide (NOx), volatile organic compound (VOC), and carbon monoxide (CO) emissions for 2025 by county and nonpoint source subsector. The following section discusses the approach for developing ozone season day emissions for the nonpoint source sector.

3.0 METHODOLOGY

The 2025 nonpoint source emissions inventory is based on interpolating between the 2018 historical and 2032 projected emissions in the United States Environmental Protection Agency (EPA)'s 2018v2 Emissions Modeling Platform.[1] The 2018v2 modeling platform has undergone extensive reviews and, for this reason, is considered to be the most comprehensive and accurate emissions data available at the time that the inventory for this noninterference demonstration was prepared. Table D-2 displays the list of nonpoint source categories with NOx, VOC, and/or CO emissions in the 2018v2 modeling platform for one or more of the 19 counties affected by this demonstration.

Year 2018 monthly emissions for nonpoint sources were obtained from the 2018v2 modeling platform file "2018gg_county_monthly_report_03aug2022_v0.csv."[2] Year 2032 monthly emissions for nonpoint sources were obtained from the 2018v2 modeling platform file "2032gg2_county_monthly_report_23oct2023_v1.csv."[2] The North Carolina Division of Air Quality (DAQ) estimated July NOx, VOC, and CO 2025 emissions from the July 2018 and 2032 emissions in the 2018v2 modeling platform. The 2025 values were calculated as the mid-point between the 2018 and 2032 emissions values. To develop average July day emissions, the DAQ divided the estimated 2025 July emissions by 31 days. The DAQ believes that average July day nonpoint source emissions provide a reasonable estimate of typical ozone season day nonpoint source emissions.

[1] U.S. Environmental Protection Agency, "2018v2 Emissions Modeling Platform," available from https://www.epa.gov/air-emissions-modeling/2018v2-emissions-modeling-platform, accessed April 2024.
[2] U.S. Environmental Protection Agency, "Index of /Air/emismod/2018/v2/reports," monthly emissions data available for download from https://gaftp.epa.gov/Air/emismod/2018/v2/reports/, accessed June 2024.

Table D-1. Nonpoint (Area) Source Ozone Season Day NOx, VOC, and CO Emissions in 2025 (Tons/Day)

County	Residential Wood Combustion			Solvents			Livestock			All Other Categories			Totals		
	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC	CO
Charlotte-Gastonia-Salisbury Maintenance Area Counties for 1997 and 2008 8-Hour Ozone NAAQS															
Cabarrus	0.018	0.134	1.044	0.000	3.687	0.000	0.000	0.149	0.000	0.225	0.873	1.475	0.243	4.843	2.519
Gaston	0.018	0.135	1.047	0.000	3.787	0.000	0.000	0.082	0.000	0.302	1.520	1.649	0.320	5.525	2.696
Iredell	0.015	0.117	0.901	0.000	3.431	0.000	0.000	0.556	0.000	0.278	0.835	1.605	0.293	4.939	2.507
Lincoln	0.008	0.060	0.463	0.000	1.651	0.000	0.000	0.189	0.000	0.098	0.252	0.808	0.106	2.151	1.271
Mecklenburg	0.066	0.483	3.804	0.000	23.096	0.000	0.000	0.037	0.000	1.443	4.811	3.743	1.509	28.427	7.547
Rowan	0.012	0.090	0.691	0.000	3.177	0.000	0.000	0.150	0.000	0.205	0.638	1.102	0.217	4.055	1.793
Union	0.022	0.164	1.272	0.000	4.279	0.000	0.000	1.491	0.000	0.292	0.979	1.754	0.313	6.914	3.026
Subtotals	**0.159**	**1.182**	**9.222**	**0.000**	**43.110**	**0.000**	**0.000**	**2.654**	**0.000**	**2.843**	**9.908**	**12.136**	**3.002**	**56.854**	**21.358**
Triangle Ozone Maintenance Area Counties (Raleigh/Durham/Chapel Hill)															
Durham	0.023	0.169	1.318	0.000	5.761	0.000	0.000	0.020	0.000	0.489	0.879	2.545	0.512	6.829	3.863
Franklin	0.007	0.053	0.401	0.000	1.153	0.000	0.000	0.212	0.000	0.071	0.288	0.614	0.078	1.706	1.015
Johnston	0.016	0.124	0.957	0.000	4.140	0.000	0.000	1.381	0.000	0.219	0.734	1.742	0.236	6.378	2.699
Wake	0.068	0.503	3.933	0.000	19.983	0.000	0.000	0.030	0.000	1.145	3.950	4.100	1.212	24.466	8.033
Subtotals	**0.113**	**0.849**	**6.609**	**0.000**	**31.036**	**0.000**	**0.000**	**1.643**	**0.000**	**1.924**	**5.850**	**9.001**	**2.037**	**39.379**	**15.610**
Triad Ozone Attainment Area Counties (Greensboro/Winston-Salem/High Point)															
Davidson	0.015	0.118	0.904	0.000	2.493	0.000	0.000	0.142	0.000	0.220	0.723	1.310	0.235	3.475	2.214
Forsyth	0.025	0.186	1.447	0.000	6.046	0.000	0.000	0.023	0.000	0.492	0.970	1.625	0.517	7.224	3.071
Guilford	0.033	0.250	1.943	0.000	8.923	0.000	0.000	0.156	0.000	0.826	2.093	3.264	0.859	11.422	5.207
Subtotals	**0.073**	**0.553**	**4.293**	**0.000**	**17.461**	**0.000**	**0.000**	**0.321**	**0.000**	**1.538**	**3.786**	**6.200**	**1.611**	**22.121**	**10.493**
Other Counties (Not Subject to an Ozone Maintenance Plan)															
Alamance	0.014	0.105	0.809	0.000	3.509	0.000	0.000	0.109	0.000	0.238	0.817	1.198	0.252	4.540	2.007
Buncombe	0.022	0.174	1.334	0.000	4.778	0.000	0.000	0.078	0.000	0.429	1.363	3.032	0.451	6.393	4.366
Cumberland	0.022	0.164	1.279	0.000	5.187	0.000	0.000	0.809	0.000	0.264	0.973	1.391	0.286	7.133	2.669
New Hanover	0.018	0.130	1.022	0.000	4.032	0.000	0.000	0.025	0.000	0.260	0.637	1.309	0.278	4.824	2.330
Randolph	0.015	0.115	0.879	0.000	3.639	0.000	0.000	0.932	0.000	0.228	0.678	0.898	0.242	5.364	1.777
Subtotals	**0.090**	**0.688**	**5.323**	**0.000**	**21.146**	**0.000**	**0.000**	**1.952**	**0.000**	**1.419**	**4.468**	**7.828**	**1.510**	**28.253**	**13.150**
Totals	**0.435**	**3.273**	**25.446**	**0.000**	**112.752**	**0.000**	**0.000**	**6.570**	**0.000**	**7.724**	**24.013**	**35.164**	**8.159**	**146.607**	**60.611**

Table D-2. Nonpoint (Area) Source NOx, VOC, and/or CO Emissions Categories

SCC	DESCRIPTION	Pollutant		
		NOx	VOC	CO
2102006000	Stationary Source Fuel Combustion; Industrial; Natural Gas; Total: Boilers and IC Engines	√	√	√
2102011000	Stationary Source Fuel Combustion; Industrial; Kerosene; Total: All Boiler Types	√	√	√
2103006000	Stationary Source Fuel Combustion; Commercial/Institutional; Natural Gas; Total: Boilers and IC Engines	√	√	√
2103007000	Stationary Source Fuel Combustion; Commercial/Institutional; Liquified Petroleum Gas (LPG); Total: All Combustor Types	√	√	√
2103011000	Stationary Source Fuel Combustion; Commercial/Institutional; Kerosene; Total: All Combustor Types	√	√	√
2104004000	Stationary Source Fuel Combustion; Residential; Distillate Oil; Total: All Combustor Types	√	√	√
2104006000	Stationary Source Fuel Combustion; Residential; Natural Gas; Total: All Combustor Types	√	√	√
2104007000	Stationary Source Fuel Combustion; Residential; Liquified Petroleum Gas (LPG); Total: All Combustor Types	√	√	√
2104008100	Stationary Source Fuel Combustion; Residential; Wood; Fireplace: general	√	√	√
2104008210	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: fireplace inserts; non-EPA certified	√	√	√
2104008220	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: fireplace inserts; EPA certified; non-catalytic	√	√	√
2104008230	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: fireplace inserts; EPA certified; catalytic	√	√	√
2104008310	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: freestanding, non-EPA certified	√	√	√
2104008320	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: freestanding, EPA certified, non-catalytic	√	√	√
2104008330	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: freestanding, EPA certified, catalytic	√	√	√
2104008400	Stationary Source Fuel Combustion; Residential; Wood; Woodstove: pellet-fired, general (freestanding or FP insert)	√	√	√
2104008510	Stationary Source Fuel Combustion; Residential; Wood; Furnace: Indoor, cordwood-fired, non-EPA certified	√	√	√
2104008530	Stationary Source Fuel Combustion; Residential; Wood; Furnace: Indoor, pellet-fired, general	√	√	√
2104008610	Stationary Source Fuel Combustion; Residential; Wood; Hydronic heater: outdoor	√	√	√
2104008620	Stationary Source Fuel Combustion; Residential; Hydronic heater: indoor	√	√	√
2104008630	Stationary Source Fuel Combustion; Residential; Hydronic heater: pellet-fired	√	√	√
2104008700	Stationary Source Fuel Combustion; Residential; Wood; Outdoor wood burning device, NEC (fire-pits, chimeas, etc)	√	√	√
2104009000	Stationary Source Fuel Combustion; Residential; Firelog; Total: All Combustor Types	√	√	√
2104011000	Stationary Source Fuel Combustion; Residential; Kerosene; Total: All Heater Types	√	√	√
2302002100	Industrial Processes; Food and Kindred Products: SIC 20; Commercial Cooking - Charbroiling; Conveyorized Charbroiling		√	√

SCC	DESCRIPTION	Pollutant		
		NOx	VOC	CO
2302002200	Industrial Processes; Food and Kindred Products: SIC 20; Commercial Cooking - Charbroiling; Under-fired Charbroiling		√	√
2302003000	Industrial Processes; Food and Kindred Products: SIC 20; Commercial Cooking - Frying; Deep Fat Frying		√	
2302003100	Industrial Processes; Food and Kindred Products: SIC 20; Commercial Cooking - Frying; Flat Griddle Frying		√	√
2302003200	Industrial Processes; Food and Kindred Products: SIC 20; Commercial Cooking - Frying; Clamshell Griddle Frying		√	
2401001000	Solvent Utilization; Surface Coating; Architectural Coatings; Total: All Solvent Types		√	
2401005000	Solvent Utilization; Surface Coating; Auto Refinishing: SIC 7532; Total: All Solvent Types		√	
2401008000	Solvent Utilization; Surface Coating; Traffic Markings; Solvent Utilization; Surface Coating;		√	
2401015000	Solvent Utilization; Surface Coating; Factory Finished Wood: SIC 2426 thru 242; Total: All Solvent Types		√	
2401020000	Solvent Utilization; Surface Coating; Wood Furniture: SIC 25; Total: All Solvent Types		√	
2401025000	Solvent Utilization; Surface Coating; Metal Furniture: SIC 25; Total: All Solvent Types		√	
2401030000	Solvent Utilization; Surface Coating; Paper: SIC 26; Total: All Solvent Types		√	
2401040000	Solvent Utilization; Surface Coating; Metal Cans: SIC 341; Total: All Solvent Types		√	
2401055000	Solvent Utilization; Surface Coating; Machinery and Equipment: SIC 35; Total: All Solvent Types		√	
2401065000	Solvent Utilization; Surface Coating; Electronic and Other Electrical: SIC 36 - 363; Total: All Solvent Types		√	
2401070000	Solvent Utilization; Surface Coating; Motor Vehicles: SIC 371		√	
2401075000	Solvent Utilization; Surface Coating; Aircraft: SIC 372; Total: All Solvent Types		√	
2401080000	Solvent Utilization; Surface Coating; Marine: SIC 373; Total: All Solvent Types		√	
2401090000	Solvent Utilization; Surface Coating; Miscellaneous Manufacturing; Total: All Solvent Types		√	
2401100000	Solvent Utilization; Surface Coating; Industrial Maintenance Coatings; Total: All Solvent Types		√	
2401200000	Solvent Utilization; Surface Coating; Other Special Purpose Coatings; Total: All Solvent Types		√	
2415000000	Solvent Utilization; Degreasing; All Processes/All Industries; Total: All Solvent Types		√	
2420000000	Solvent Utilization; Dry Cleaning; All Processes; Total: All Solvent Types		√	
2425000000	Solvent Utilization; Graphic Arts; All Processes; Total: All Solvent Types		√	
2460030999	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; Lighter Fluid, Fire Starter, Other Fuels; Total: All Volatile Chemical Product Types		√	
2460100000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Personal Care Products; Total: All Solvent Types		√	
2460200000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Household Products; Total: All Solvent Types		√	
2460400000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Automotive Aftermarket Products; Total: All Solvent Types		√	

SCC	DESCRIPTION	Pollutant		
		NOx	VOC	CO
2460500000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Coatings and Related Products; Total: All Solvent Types		√	
2460600000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Adhesives and Sealants; Total: All Solvent Types		√	
2460800000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All FIFRA Related Products; Total: All Solvent Types		√	
2460900000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; Miscellaneous Products (Not Otherwise Covered); Total: All Solvent Types		√	
2461022000	Solvent Utilization; Miscellaneous Non-industrial: Commercial; Emulsified Asphalt; Total: All Solvent Types		√	
2461850000	Solvent Utilization; Miscellaneous Non-industrial: Commercial; Pesticide Application: Agricultural; All Processes		√	
2501011011	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Permeation		√	
2501011012	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Evaporation (includes Diurnal losses)		√	
2501011013	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Spillage During Transport		√	
2501011014	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Refilling at the Pump - Vapor Displacement		√	
2501011015	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Refilling at the Pump - Spillage		√	
2501012011	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Permeation		√	
2501012012	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Evaporation (includes Diurnal losses)		√	
2501012013	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Spillage During Transport		√	
2501012014	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Refilling at the Pump - Vapor Displacement		√	
2501012015	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Refilling at the Pump - Spillage		√	
2501050120	Storage and Transport; Petroleum and Petroleum Product Storage; Bulk Terminals: All Evaporative Losses; Gasoline		√	
2501055120	Storage and Transport; Petroleum and Petroleum Product Storage; Bulk Plants: All Evaporative Losses; Gasoline		√	
2501060053	Storage and Transport; Petroleum and Petroleum Product Storage; Gasoline Service Stations; Stage 1: Balanced Submerged Filling		√	
2501060201	Storage and Transport; Petroleum and Petroleum Product Storage; Gasoline Service Stations; Underground Tank: Breathing and Emptying		√	
2501080050	Storage and Transport; Petroleum and Petroleum Product Storage; Airports: Aviation Gasoline; Stage 1: Total		√	
2501080100	Storage and Transport; Petroleum and Petroleum Product Storage; Airports: Aviation Gasoline; Stage 2: Total		√	
2505030120	Storage and Transport; Petroleum and Petroleum Product Transport; Truck; Gasoline		√	
2505040120	Storage and Transport; Petroleum and Petroleum Product Transport; Pipeline; Gasoline		√	
2610000100	Waste Disposal, Treatment, and Recovery; Open Burning; All Categories; Yard Waste - Leaf Species Unspecified	√	√	√
2610000400	Waste Disposal, Treatment, and Recovery; Open Burning; All Categories; Yard Waste - Brush Species Unspecified	√	√	√
2610000500	Waste Disposal, Treatment, and Recovery; Open Burning; All Categories; Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	√	√	√

SCC	DESCRIPTION	Pollutant		
		NOx	VOC	CO
2610030000	Waste Disposal, Treatment, and Recovery; Open Burning; Residential; Household Waste (use 26-10-000-xxx for Yard Wastes)	√	√	√
2630020000	Waste Disposal, Treatment, and Recovery; Wastewater Treatment; Public Owned; Total Processed		√	
2680002000	Waste Disposal, Treatment, and Recovery; Composting; Mixed Waste (e.g., a 50:50 mixture of biosolids and green wastes); All Processes		√	
2805002000	Miscellaneous Area Sources; Agriculture Production - Livestock; Beef cattle production composite; Not Elsewhere Classified		√	
2805009100	Miscellaneous Area Sources; Agriculture Production - Livestock; Poultry production - broilers; Confinement		√	
2805018000	Miscellaneous Area Sources; Agriculture Production - Livestock; Dairy cattle composite; Not Elsewhere Classified		√	
2805045000	Miscellaneous Area Sources; Agriculture Production - Livestock; Goats Waste Emissions; Not Elsewhere Classified		√	
2805035000	Miscellaneous Area Sources; Agriculture Production - Livestock; Horses and Ponies Waste Emissions; Not Elsewhere Classified		√	
2805007100	Miscellaneous Area Sources; Agriculture Production - Livestock; Poultry production - layers with dry manure management systems; Confinement		√	
2805040000	Miscellaneous Area Sources; Agriculture Production - Livestock; Sheep and Lambs Waste Emissions; Total		√	
2805025000	Miscellaneous Area Sources; Agriculture Production - Livestock; Swine production composite; Not Elsewhere Classified (see also 28-05-039, -047, -053)		√	
2805010100	Miscellaneous Area Sources; Agriculture Production - Livestock; Poultry production - turkeys; Confinement		√	
2810025000	Miscellaneous Area Sources; Other Combustion; Charcoal Grilling - Residential (see 23-02-002-xxx for Commercial); Total	√	√	√
2810060100	Miscellaneous Area Sources; Other Combustion; Cremation; Humans	√	√	√
2810060200	Miscellaneous Area Sources; Other Combustion; Cremation; Animals	√	√	√

4.0 QUALITY ASSURANCE MEASURES

Because the 2018v2 modeling platform emissions were used by EPA in support of modeling for their analysis of the impact of EPA's revised particulate matter National Ambient Air Quality Standards (NAAQS), these emissions underwent extensive quality assurance prior to this use. The detailed quality assurance and quality control procedures and measures, as outlined in the DAQ's Emissions Inventory Quality Assurance Project Plan, were applied to ensure the data meets data quality indicator acceptance criteria.

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