

FINAL

**Clean Air Act Section 110(I) Noninterference
Demonstration to Remove 26 Counties from
North Carolina's Motor Vehicle Emissions
Inspection and Maintenance (I&M) Program**

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North Carolina Department of Environmental Quality
Division of Air Quality**

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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 26 counties from North Carolina's motor vehicle emissions inspection and maintenance program in accordance with Session Law 2017-10, Section 3.5.(a) of Senate Bill 131 enacted by the 2017 session of the North Carolina General Assembly.

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1.0 OVERVIEW

The 2017 session of the North Carolina General Assembly enacted Session Law 2017-10, Senate Bill 131 (An Act to Provide Further Regulatory Relief to the Citizens of North Carolina).

Section 3.5.(a) of the Act amended *North Carolina General Statute (NCGS) §143-215.107A(c)* to remove 26 of 48 counties from North Carolina's emissions inspection and maintenance (I&M) program. For the 22 counties remaining in the I&M program, the Act also amended *NCGS §20-183.2(b)* by changing the vehicle model year coverage. Specifically, the Act requires the following changes to North Carolina's I&M program:

- Eliminate the following 26 counties from vehicle I&M requirements: Brunswick, Burke, Caldwell, Carteret, Catawba, Chatham, Cleveland, Craven, Edgecombe, Granville, Harnett, Haywood, Henderson, Lenoir, Moore, Nash, Orange, Pitt, Robeson, Rutherford, Stanly, Stokes, Surry, Wayne, Wilkes, and Wilson.

Retain the vehicle I&M program in the following 22 counties: Alamance, Buncombe, Cabarrus, Cumberland, Davidson, Durham, Forsyth, Franklin, Gaston, Guilford, Iredell, Johnston, Lee, Lincoln, Mecklenburg, New Hanover, Onslow, Randolph, Rockingham, Rowan, Union, and Wake.

- For the 22 counties remaining in the program, change the model year vehicle coverage to:
 - (i) a vehicle with a model year within 20 years of the current year and older than the three most recent model years, or
 - (ii) a vehicle with a model year within 20 years of the current year and has 70,000 miles or more on its odometer. Previously, the program applied to (i) a 1996 or later model year vehicle and older than the three most recent model years, or (ii) a 1996 or later model year vehicle and has 70,000 miles or more on its odometer.
- Implementation schedule: Section 3.5.(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 to remove the 26 counties from the I&M program and change the model year vehicle coverage of the program for the remaining 22 counties. This SIP amendment must be submitted to EPA by September 30, 2017.

In accordance with Section 3.5.(d) of the Act, these revisions to the program become effective on the later of the following dates and apply to motor vehicles inspected, or due to be inspected, on or after that effective date:

- *October 1, 2017.*

- *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 subsection (c) of this section. The Secretary shall provide this notice along with the effective date of this act on its Web site and by written or electronic notice to emissions inspection mechanic license holders, emissions inspection station licensees, and self-inspector licensees in the counties where motor vehicle emissions inspection requirements are removed by this section.*

Figure 1 shows the 48 counties with an I&M program, the location of the counties that the Act removes from and retains in the program, the 2014-2016 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.¹

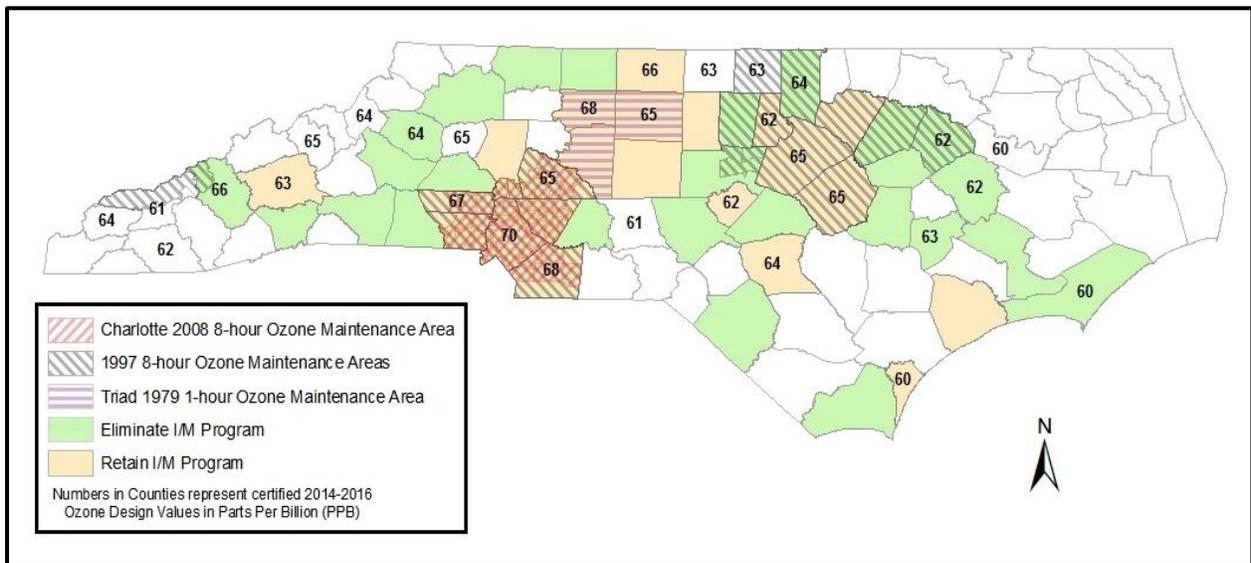


Figure 1. Counties to be Removed from and Retained in North Carolina’s I&M Program

Under the Clean Air Act (CAA), EPA has established National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: ozone, carbon monoxide (CO), lead, nitrogen

¹ 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.

dioxide (NO₂), fine and coarse particulate matter (PM_{2.5} or PM₁₀) and sulfur dioxide (SO₂). The EPA is required to review, and revise if necessary, the NAAQS every five years. Areas that violate a NAAQS are designated 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 Regulation (CFR) under Title 40 CFR Part 51.

In accordance with Section 110(l) of the CAA, the Division of Air Quality (DAQ) is submitting this noninterference demonstration on behalf of the DEQ to request EPA's approval to remove the 26 counties from North Carolina's I&M SIP. Changing the vehicle model year coverage for the 22 counties remaining in the program will require revisions to North Carolina's air quality rule 15A NCAC 02D .1002; therefore, the DAQ will submit a separate noninterference demonstration that coincides with the schedule for revising the applicable air quality rules.

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 26 counties proposed for removal from the 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 26 counties from the I&M program. Section 4 presents the noninterference demonstration by summarizing the current ambient air quality monitoring and emissions data available for each of the 26 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 removal of the 26 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 “a program for testing emissions from motor vehicles and to adopt motor vehicle emission standards,” *NCGS §143-215.107(a)(6)*, “*Air quality standards and classifications.*” The EMC has adopted rules for a basic I&M program under *15A North Carolina Administrative Code (NCAC) Subchapter 2D, Section .1000 “Motor Vehicle Emissions Control Standards,”* that are federally enforceable by EPA under the Code of Federal Regulations (CFR) 40 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. 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 (Session Laws 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 nearby 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 2D, Section .1000, “Motor Vehicle Emission Control Standards,” references the General Statute.

The I&M program for the original 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 model year 1996 and newer light-duty gasoline vehicles and continued tailpipe testing of model year 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 model year 1996 and newer vehicles, and tailpipe testing for model year 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 2016, 4.86 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 Session Law 2012-199 which required DEQ and DMV to change the I&M program to exempt the three newest model year vehicles with less than 70,000 miles, and 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, 2015.²

² 80 FR 6455-6458 (Vol. 80, No. 24)

3.0 REQUEST FOR EPA APPROVAL OF REVISIONS TO NORTH CAROLINA'S I&M SIP TO REMOVE 26 COUNTIES FROM THE I&M PROGRAM

The purpose of this noninterference demonstration is to request EPA's approval for North Carolina to revise its I&M SIP to implement the following changes to North Carolina's I&M program as specified in Section 3.5.(a) of Senate Bill 131:

- Eliminate the following 26 counties from vehicle I&M requirements, effective per Section 3.5.(a) of the Act: Brunswick, Burke, Caldwell, Carteret, Catawba, Chatham, Cleveland, Craven, Edgecombe, Granville, Harnett, Haywood, Henderson, Lenoir, Moore, Nash, Orange, Pitt, Robeson, Rutherford, Stanly, Stokes, Surry, Wayne, Wilkes, and Wilson.

Retain the I&M program in the following 22 counties: Alamance, Buncombe, Cabarrus, Cumberland, Davidson, Durham, Forsyth, Franklin, Gaston, Guilford, Iredell, Johnston, Lincoln, Lee, Mecklenburg, New Hanover, Onslow, Randolph, Rockingham, Rowan, Union, and Wake.

The EPA's approval of this request would provide significant economic relief to North Carolina vehicle owners exempted from annual emissions inspection in the 26 counties.

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 in order for EPA to approve the revisions requested.

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

Table 1 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 General Statutes.

The pollutants that need to be reviewed are NO₂, CO, NO_x, and VOCs. Nitrogen oxides refer to nitric oxide (NO) and NO₂. Since NO_x includes NO₂, NO₂ 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}, SO₂, or lead; therefore, removing counties from the program is not expected to have any impact on ambient concentrations of these pollutants.

Table 1. Current National Ambient Air Quality Standards and Designation

| Pollutant | Year Adopted by EPA | Primary / Secondary NAAQS | Averaging Time | Level* | Designation Status |
|-------------------|---------------------|---------------------------|-------------------------|------------------------|---|
| 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 ₁₀ | 2012 | Primary and secondary | 24-hour | 150 µg/m ³ | Attainment Statewide |
| SO ₂ | 2010 | Primary | 1-hour | 75 ppb | EPA has designated Brunswick County as “unclassifiable.” EPA is expected to issue designations on all other areas (excluding areas with source oriented monitors) by December 31, 2017. |
| | | Secondary | 3-hour | 0.5 ppm | |

¹ ppm = parts per million, ppb = parts per billion, µg/m³ = micrograms per cubic meter.

North Carolina’s I&M program has been approved into the SIP to attain and maintain the ozone and CO NAAQS. In order to a remove county from the I&M program, North Carolina must submit to EPA for approval a demonstration that any emissions increases associated with removing a county from the program 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 removing the counties from the program 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 removal of the I&M program for the nonattainment area. However, since North Carolina is attaining the NAAQS for all of the 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 NO_x emissions, primarily due to the abundance of biogenic VOC emissions in this region.³ 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 percent 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 NO_x emissions for purposes of reducing ozone levels. In North Carolina, approximately 80 percent of statewide VOC emissions come from biogenic or natural sources, which cannot be controlled.⁴ Based on 20 years of experience and scientific research, North Carolina's approach to controlling anthropogenic NO_x 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 26 COUNTIES FROM THE I&M PROGRAM

In the following sections, the DAQ presents the ambient monitoring and emissions data necessary to show that removing 26 counties from the I&M program will not interfere with continued maintenance with all of the NAAQS. Section 4.1 presents the noninterference demonstration for the current 2015 8-hour ozone NAAQS. Section 4.2 presents the noninterference demonstration for the NO₂, CO, PM_{2.5}, SO₂, and lead NAAQS.

4.1 Noninterference with Ozone NAAQS

For each of the 26 counties, the study approach for ozone involved an analysis of daily NO_x and VOC emissions reductions 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 a county from the I&M program would possibly interfere with continued maintenance with the NAAQS.

³ 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).

⁴ Based on EPA's 2011v6ek modeling platform, biogenic VOC emissions were 79 percent and 84 percent of total statewide biogenic and anthropogenic VOC emissions in 2011 and 2017, respectively. Reference: "2011ek_2017ek_state_sector_daily_nox_voc_pm25.xlsx" downloaded on July 18, 2017, from EPA's FTP server at: <ftp://ftp.epa.gov/EmisInventory/2011v6/v3platform/reports/>.

4.1.1 Compliance with the Current 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).⁵ A total of 7 of the 26 counties to be removed from the program have ozone monitors, and certified DVs are available for 2014 through 2016 for all 7 counties.

Table 2 shows the 26 counties, the 2014-2016 three-year average ozone DV for counties that have monitors, and counties that are covered by a maintenance plan for ozone. The table also shows the total number of vehicle inspections conducted in 2016, and the total number of vehicles subject to the program as a percentage of all registered vehicles.

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).⁶ North Carolina has continued to maintain compliance with the 2015 ozone standard through October 31, 2017. Six of the 26 affected counties are maintenance for 1997 8-hour standard. These counties have subsequently been classified attainment with the more stringent 2008 standard. For the 7 counties that have ozone monitors, the ozone DVs for 2014-2016 range from a low of 60 ppb for Carteret County to a high of 66 ppb for Haywood County which are well below the 2015 standard of 70 ppb. This is in sharp contrast to the ambient air quality data when the vehicle I&M program was expanded to 48 counties. At that time, two-thirds of the state’s ozone monitors were violating the federal ozone standard. For the remaining counties without monitors, EPA has determined that there is sufficient evidence to demonstrate that they are meeting the NAAQS. As shown earlier in Figure 1, the counties to be removed from the I&M program are surrounded by counties with measurement data well below the 70 ppb NAAQS.

⁵ An ozone design value is the average of the 4th highest ozone measurements for each year of a three consecutive year period.

⁶ *Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)*, Final Rule, 82 FR 54232, November 16, 2017. This final rule is effective on January 16, 2018.

Table 2. Counties to be Removed from North Carolina’s I&M Program

| Counties to be Removed | Ozone NAAQS | Status | Ozone Design Value, ppb (2014-2016) | Total No. Vehicle Inspections in 2016 | Total I&M Vehicles (Model Years 1996-2014) as a Percentage of All 2017 Registered Vehicles |
|------------------------|-------------|-------------|-------------------------------------|---------------------------------------|--|
| Brunswick | - | - | | 67,690 | 76 |
| Burke | - | - | | 50,459 | 76 |
| Caldwell | - | - | 64 | 50,829 | 75 |
| Carteret | - | - | 60 | 42,547 | 78 |
| Catawba ¹ | - | - | | 110,338 | 77 |
| Chatham ² | 1997 8-hour | Maintenance | | 39,508 | 76 |
| Cleveland | - | - | | 57,407 | 77 |
| Craven | - | - | | 54,368 | 77 |
| Edgecombe | 1997 8-hour | Maintenance | 62 | 24,902 | 78 |
| Granville ³ | 1979 1-hour | Maintenance | 64 | 31,305 | 76 |
| | 1997 8-hour | | | | |
| Harnett | - | - | | 58,952 | 76 |
| Haywood | 1997 8-hour | Maintenance | 66 | 34,162 | 74 |
| Henderson | - | - | | 68,804 | 77 |
| Lenoir | - | - | 63 | 31,557 | 78 |
| Moore | - | - | | 54,777 | 74 |
| Nash | 1997 8-hour | Maintenance | | 57,242 | 78 |
| Orange | 1997 8-hour | Maintenance | | 68,752 | 78 |
| Pitt | - | - | 62 | 88,669 | 78 |
| Robeson | - | - | | 65,701 | 77 |
| Rutherford | - | - | | 38,468 | 76 |
| Stanly | - | - | | 38,466 | 77 |
| Stokes | - | - | | 27,557 | 74 |
| Surry | - | - | | 47,947 | 75 |
| Wayne | - | - | | 67,830 | 77 |
| Wilkes | - | - | | 42,436 | 74 |
| Wilson | - | - | | 45,983 | 78 |

¹ County is subject to a maintenance plan for the 1997 annual PM_{2.5} primary standard.

² Although only part of Chatham County is subject to a maintenance plan for the 1997 8-hour ozone NAAQS, the whole county is subject to the I&M program. Operation of the ozone monitor in Chatham County was discontinued after the 2015 ozone season as approved by EPA. The 2013-2015 DV for Chatham County is 58 ppb which is well below the 2015 ozone NAAQS.

³ Although only part of this county is subject to a maintenance plan for the 1979 1-hour ozone NAAQS, the whole county is subject to the I&M program.

4.1.2 Emissions Inventory

For each of the 26 counties, ozone season day NO_x and VOC emissions were estimated for mobile (on-road 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 available EPA datasets and the state’s best understanding of 2018 emissions levels to examine emission trends and their impact on ozone formation. Since October 1, 2017, is the earliest statutory deadline for removing the 26 counties from the program, the emissions inventory must be prepared for 2016, 2017, or 2018 to fulfill

EPA's "contemporaneous" requirement.⁷ Therefore, the DAQ prepared the emissions inventory for 2018 because this represents the first full calendar year in which the program change will take effect and because emissions inventory data are readily available from regional and national modeling efforts.

For each of the 26 counties, Tables 3 and 4 display ozone season day anthropogenic NO_x and VOC emissions, respectively, for all sectors for 2018. As expected, the results show that removing each county from the I&M program increases emissions for only on-road vehicles. As shown in Table 3, the Motor Vehicle Emission Simulator (MOVES2014) emissions modeling results for 2018 show only slight increases in anthropogenic NO_x emissions for each county, ranging from 0.08 to 0.25 ton/day. The percent increase in total NO_x emissions for a county ranges from 0.4 percent to 4.6 percent. The total increase in NO_x emissions associated with removing all 26 counties from the I&M program in 2018 is about 3.97 tons/day or 1.9 percent of total man-made emissions (205 tons/day).

As shown in Table 4, in 2018, MOVES2014 emissions modeling results also show only slight increases in anthropogenic VOC emissions for each county, ranging from 0.07 to 0.22 ton/day. The percent increase in total VOC emissions for a county ranges from 1.0 percent to 2.5 percent. The total increase in VOC emissions associated with removing all 26 counties from the I&M program in 2018 is about 3.29 tons/day or 1.6 percent of total man-made emissions (200 tons/day). When biogenic VOC emissions from natural sources (average of 2,390 tons/day during July using version 2 of EPA's 2011 National Emissions Inventory (NEI v2)) are added to the man-made emissions (200 tons/day), the actual VOC emissions increase is only about 0.1 percent ($3.29/2,590 \text{ tons/day} \times 100$).⁸ The DAQ does not believe that the very small changes to VOC emissions will translate into measurable ground-level ozone concentrations changes in North Carolina. Consequently, maintenance of the NAAQS is expected to be preserved.

The remainder of this section provides a summary of the methodologies applied to develop the 2018 year inventories for each sector.

⁷ To fulfill EPA's contemporaneous requirement, the emissions inventory must be prepared for a year that is plus or minus one year of the year in which a SIP revision is submitted to EPA.

⁸ Biogenic VOC emissions were obtained from EPA's 2011v6ek modeling platform (downloaded from EPA's FTP site: <ftp://ftp.epa.gov/EmisInventory/2011v6/v3platform/reports/>; file name: "2011ek_county_monthly_report.xlsx.") July VOC emissions for the 26 counties were summed and divided by 31 days to obtain July day emissions.

Table 3. Total Anthropogenic NOx Emissions for 2018 for 26 Counties (tons/day)

| Counties to be Removed | On-road | | | Nonroad | | Point | | 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 |
| Brunswick | 2.47 | 2.65 | 0.18 | 4.94 | 4.94 | 6.45 | 6.45 | 0.51 | 0.51 | 14.37 | 14.55 | 0.18 | 1.3 |
| Burke | 2.72 | 2.89 | 0.17 | 0.61 | 0.61 | 0.26 | 0.26 | 0.23 | 0.23 | 3.82 | 3.99 | 0.17 | 4.5 |
| Caldwell | 2.13 | 2.28 | 0.15 | 0.54 | 0.54 | 0.31 | 0.31 | 0.29 | 0.29 | 3.27 | 3.42 | 0.15 | 4.6 |
| Carteret | 1.18 | 1.28 | 0.10 | 5.39 | 5.39 | 0.11 | 0.11 | 0.30 | 0.30 | 6.98 | 7.08 | 0.10 | 1.4 |
| Catawba | 3.28 | 3.53 | 0.25 | 1.46 | 1.46 | 35.50 | 35.50 | 0.68 | 0.68 | 40.92 | 41.17 | 0.25 | 0.6 |
| Chatham | 2.14 | 2.28 | 0.14 | 0.66 | 0.66 | 1.51 | 1.51 | 0.22 | 0.22 | 4.53 | 4.67 | 0.14 | 3.1 |
| Cleveland | 3.25 | 3.45 | 0.20 | 0.92 | 0.92 | 9.13 | 9.13 | 0.29 | 0.29 | 13.59 | 13.79 | 0.20 | 1.5 |
| Craven | 1.80 | 1.93 | 0.13 | 0.80 | 0.80 | 5.33 | 5.33 | 0.31 | 0.31 | 8.24 | 8.37 | 0.13 | 1.6 |
| Edgecombe | 1.02 | 1.10 | 0.08 | 0.83 | 0.83 | 3.49 | 3.49 | 0.23 | 0.23 | 5.57 | 5.65 | 0.08 | 1.4 |
| Granville | 2.15 | 2.26 | 0.11 | 0.59 | 0.59 | 0.12 | 0.12 | 0.16 | 0.16 | 3.02 | 3.13 | 0.11 | 3.6 |
| Harnett | 2.44 | 2.60 | 0.16 | 0.81 | 0.81 | 0.07 | 0.07 | 0.47 | 0.47 | 3.79 | 3.95 | 0.16 | 4.2 |
| Haywood | 3.04 | 3.20 | 0.16 | 0.42 | 0.42 | 8.14 | 8.14 | 0.30 | 0.30 | 11.90 | 12.06 | 0.16 | 1.3 |
| Henderson | 2.48 | 2.65 | 0.17 | 0.78 | 0.78 | 0.28 | 0.28 | 0.40 | 0.40 | 3.94 | 4.11 | 0.17 | 4.3 |
| Lenoir | 1.33 | 1.43 | 0.10 | 0.54 | 0.54 | 0.28 | 0.28 | 0.30 | 0.30 | 2.45 | 2.55 | 0.10 | 4.1 |
| Moore | 1.93 | 2.07 | 0.14 | 0.77 | 0.77 | 0.13 | 0.13 | 0.42 | 0.42 | 3.25 | 3.39 | 0.14 | 4.3 |
| Nash | 3.25 | 3.44 | 0.19 | 1.17 | 1.17 | 0.56 | 0.56 | 0.55 | 0.55 | 5.53 | 5.72 | 0.19 | 3.4 |
| Orange | 4.07 | 4.28 | 0.21 | 1.06 | 1.06 | 0.58 | 0.58 | 0.50 | 0.50 | 6.21 | 6.42 | 0.21 | 3.4 |
| Pitt | 2.46 | 2.65 | 0.19 | 1.32 | 1.32 | 0.46 | 0.46 | 0.73 | 0.73 | 4.97 | 5.16 | 0.19 | 3.8 |
| Robeson | 4.28 | 4.53 | 0.25 | 2.02 | 2.02 | 1.56 | 1.56 | 0.57 | 0.57 | 8.43 | 8.68 | 0.25 | 3.0 |
| Rutherford | 1.65 | 1.76 | 0.11 | 1.10 | 1.10 | 0.31 | 0.31 | 0.24 | 0.24 | 3.30 | 3.41 | 0.11 | 3.3 |
| Stanly | 1.62 | 1.73 | 0.11 | 0.62 | 0.62 | 0.55 | 0.55 | 0.20 | 0.20 | 2.99 | 3.10 | 0.11 | 3.7 |
| Stokes | 1.20 | 1.28 | 0.08 | 0.31 | 0.31 | 20.26 | 20.26 | 0.15 | 0.15 | 21.92 | 22.00 | 0.08 | 0.4 |
| Surry | 2.84 | 3.01 | 0.17 | 0.68 | 0.68 | 0.19 | 0.19 | 0.31 | 0.31 | 4.02 | 4.19 | 0.17 | 4.2 |
| Wayne | 2.20 | 2.36 | 0.16 | 1.00 | 1.00 | 5.55 | 5.55 | 0.62 | 0.62 | 9.37 | 9.53 | 0.16 | 1.7 |
| Wilkes | 2.08 | 2.21 | 0.13 | 0.44 | 0.44 | 0.78 | 0.78 | 0.21 | 0.21 | 3.51 | 3.64 | 0.13 | 3.7 |
| Wilson | 2.17 | 2.30 | 0.13 | 1.55 | 1.55 | 1.31 | 1.31 | 0.34 | 0.34 | 5.37 | 5.50 | 0.13 | 2.4 |
| Totals | 61.18 | 65.15 | 3.97 | 31.33 | 31.33 | 103.22 | 103.22 | 9.53 | 9.53 | 205.26 | 209.23 | 3.97 | 1.9 |

Table 4. Total Anthropogenic VOC Emissions for 2018 for 26 Counties (tons/day)

| Counties to be Removed | On-road | | | Nonroad | | Point | | 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 |
| Brunswick | 1.66 | 1.80 | 0.14 | 1.78 | 1.78 | 2.64 | 2.64 | 3.50 | 3.50 | 9.58 | 9.72 | 0.14 | 1.5 |
| Burke | 1.83 | 1.97 | 0.14 | 0.46 | 0.46 | 1.75 | 1.75 | 3.41 | 3.41 | 7.45 | 7.59 | 0.14 | 1.9 |
| Caldwell | 1.73 | 1.86 | 0.13 | 0.74 | 0.74 | 3.01 | 3.01 | 4.42 | 4.42 | 9.90 | 10.03 | 0.13 | 1.3 |
| Carteret | 1.02 | 1.12 | 0.10 | 5.60 | 5.60 | 0.23 | 0.23 | 1.85 | 1.85 | 8.70 | 8.80 | 0.10 | 1.1 |
| Catawba | 2.61 | 2.83 | 0.22 | 1.38 | 1.38 | 4.95 | 4.95 | 12.83 | 12.83 | 21.77 | 21.99 | 0.22 | 1.0 |
| Chatham | 1.36 | 1.47 | 0.11 | 0.57 | 0.57 | 2.22 | 2.22 | 1.77 | 1.77 | 5.92 | 6.03 | 0.11 | 1.9 |
| Cleveland | 2.02 | 2.18 | 0.16 | 0.63 | 0.63 | 0.48 | 0.48 | 3.91 | 3.91 | 7.04 | 7.20 | 0.16 | 2.3 |
| Craven | 1.32 | 1.43 | 0.11 | 1.06 | 1.06 | 3.13 | 3.13 | 3.36 | 3.36 | 8.87 | 8.98 | 0.11 | 1.2 |
| Edgecombe | 0.78 | 0.85 | 0.07 | 0.32 | 0.32 | 0.28 | 0.28 | 2.66 | 2.66 | 4.04 | 4.11 | 0.07 | 1.7 |
| Granville | 1.17 | 1.25 | 0.08 | 0.43 | 0.43 | 0.89 | 0.89 | 1.65 | 1.65 | 4.14 | 4.22 | 0.08 | 1.9 |
| Harnett | 1.76 | 1.90 | 0.14 | 0.69 | 0.69 | 0.21 | 0.21 | 3.87 | 3.87 | 6.53 | 6.67 | 0.14 | 2.1 |
| Haywood | 1.49 | 1.60 | 0.11 | 1.23 | 1.23 | 4.64 | 4.64 | 1.61 | 1.61 | 8.97 | 9.08 | 0.11 | 1.2 |
| Henderson | 1.71 | 1.85 | 0.14 | 2.86 | 2.86 | 0.97 | 0.97 | 3.76 | 3.76 | 9.30 | 9.44 | 0.14 | 1.5 |
| Lenoir | 0.98 | 1.06 | 0.08 | 0.50 | 0.50 | 0.93 | 0.93 | 3.08 | 3.08 | 5.49 | 5.57 | 0.08 | 1.5 |
| Moore | 1.62 | 1.75 | 0.13 | 0.72 | 0.72 | 0.07 | 0.07 | 2.75 | 2.75 | 5.16 | 5.29 | 0.13 | 2.5 |
| Nash | 1.75 | 1.89 | 0.14 | 0.54 | 0.54 | 0.67 | 0.67 | 4.32 | 4.32 | 7.28 | 7.42 | 0.14 | 1.9 |
| Orange | 2.01 | 2.17 | 0.16 | 1.67 | 1.67 | 0.48 | 0.48 | 3.09 | 3.09 | 7.25 | 7.41 | 0.16 | 2.2 |
| Pitt | 1.89 | 2.06 | 0.17 | 0.82 | 0.82 | 1.67 | 1.67 | 5.45 | 5.45 | 9.83 | 10.00 | 0.17 | 1.7 |
| Robeson | 2.29 | 2.47 | 0.18 | 0.59 | 0.59 | 0.74 | 0.74 | 5.43 | 5.43 | 9.05 | 9.23 | 0.18 | 2.0 |
| Rutherford | 1.30 | 1.40 | 0.10 | 0.71 | 0.71 | 0.43 | 0.43 | 2.22 | 2.22 | 4.66 | 4.76 | 0.10 | 2.1 |
| Stanly | 1.20 | 1.30 | 0.10 | 0.89 | 0.89 | 1.21 | 1.21 | 2.58 | 2.58 | 5.88 | 5.98 | 0.10 | 1.7 |
| Stokes | 0.99 | 1.07 | 0.08 | 0.48 | 0.48 | 0.58 | 0.58 | 1.35 | 1.35 | 3.40 | 3.48 | 0.08 | 2.4 |
| Surry | 1.75 | 1.88 | 0.13 | 0.82 | 0.82 | 1.25 | 1.25 | 3.43 | 3.43 | 7.25 | 7.38 | 0.13 | 1.8 |
| Wayne | 1.75 | 1.89 | 0.14 | 0.72 | 0.72 | 1.41 | 1.41 | 4.83 | 4.83 | 8.71 | 8.85 | 0.14 | 1.6 |
| Wilkes | 1.54 | 1.66 | 0.12 | 0.57 | 0.57 | 1.99 | 1.99 | 2.73 | 2.73 | 6.83 | 6.95 | 0.12 | 1.8 |
| Wilson | 1.29 | 1.40 | 0.11 | 0.78 | 0.78 | 1.46 | 1.46 | 3.33 | 3.33 | 6.86 | 6.97 | 0.11 | 1.6 |
| Totals | 40.82 | 44.11 | 3.29 | 27.56 | 27.56 | 38.29 | 38.29 | 93.19 | 93.19 | 199.86 | 203.15 | 3.29 | 1.6 |

On-road Vehicles

The on-road mobile source inventory contains emissions from motor vehicles that are licensed to use public roads. On-road 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 NO_x and VOC emissions were modeled using MOVES2014. For each of the 26 counties, modeling was performed to generate emissions data both with and without the program parameters in place for 2018 to quantify emissions increases expected if the county is not subject to the program. The following summarizes key aspects of the on-road modeling framework; a detailed explanation is provided in Appendix A.

Pollutants Modeled:

- NO_x, VOC

Temporal Basis:

- MOVES2014 modeling runs were executed to model emissions for a typical ozone season workday (specifically a July weekday)

Inventory Year:

- 2018 was modeled (with and without the I&M program) as the future year 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 MOVES2014 model inputs, as per the latest approved North Carolina I&M SIP:
 - Compliance Rate: 96 percent
 - Waiver Rate: 5 percent
 - Inspection Frequency: Annual
 - Model years covered: 1996 to year modeled (2018)
 - Exempted vehicles: 3 years (latest model years)

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 ozone season day NO_x and VOC emission estimates for the nonroad mobile sources in 2018.

For nonroad equipment, ozone season day emissions of NO_x and VOC were estimated by running MOVES2014a in 2018. The EPA includes more than 80 different types of equipment in the MOVES2014a 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 |
| Commercial equipment | Logging equipment |
| Construction and mining equipment | Pleasure craft (recreational marine) |
| Industrial equipment | Railroad maintenance equipment |
| Lawn and garden equipment, residential | Recreational equipment |

Additionally, the model estimates emissions for five 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. The model runs were developed for a typical July weekday using meteorological data from 2014. Default data were used for the input files used in the MOVES2014a Nonroad model.⁹ The MOVES RunSpec file (MRS) (wherein all the modeling variables are set) used in the MOVES2014a Nonroad model were tailored to reflect North Carolina specific information. The resulting emissions from the MOVES2014a Nonroad model were totaled for each equipment category by county.

For freight and passenger railroads and CMV, annual emissions were obtained from the Mid-Atlantic Regional Air Management Association (MARAMA) 2017 Beta 2 air quality modeling platform for 2017 which is the best data available for representing emissions in 2018.¹⁰ Annual NOx and VOC emissions from the 2017 MARAMA Beta 2 inventory were divided by 365 days to estimate ozone season day emissions. The DAQ believes that dividing annual emissions by 365 days per year provides a reasonable estimate of typical ozone season day nonroad vehicle emissions. The 2017 MARAMA Beta 2 air quality modeling platform emissions were projected from EPA's 2011 base year air quality modeling platform emissions (referred to as version 6.2eh, or 2011v6.2eh).¹¹ The two modeling platforms and the 2011 NEI v2 all have undergone extensive stakeholder reviews and, for this reason, are the most comprehensive and accurate inventories available at the time that the inventory for this noninterference demonstration was prepared.

⁹ After the on-road inventory was prepared and prior to preparing the nonroad inventory, EPA released MOVES2014a which included revisions to the nonroad sector of the model. Therefore, MOVES2014a was used to prepare the nonroad inventory rather than MOVES2014.

¹⁰ Technical Support Document, Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. BETA2 Version, prepared by Julie R. McDill, P.E. and Susan McCusker, MARAMA, and Edward Sabo, CSRA International, Inc., December 21, 2016, <http://www.marama.org/technical-center/emissions-inventory/2011-2017-beta-regional-emissions-inventory>.

¹¹ *Technical Support Document (TSD), Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform*, August, 2015, <https://www.epa.gov/air-emissions-modeling/2011-version-62-technical-support-document>.

Stationary Point Sources

The point source inventory consists of emissions from individual facilities (point sources), airports, rail yards, wildfires, and prescribed fires. Industrial or commercial facilities having equipment that emits pollutants to the air have always been classified as point sources by air quality regulatory programs and are generally 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 “EGU” and “Non-EGU Point.”

Airports or rail yards are not required to have air quality permits for construction and operation as airports or rail yards (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, therefore, for purposes of EPA’s NEI, they are included in the point source inventory even though they are traditionally considered nonroad 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.

Emissions for 2018 were not available for any of these categories. Therefore, the overall approach was to use the most recent data available for representing 2018 year emissions. For the majority of the categories, the closest year of available forecast emissions was the 2017 MARAMA Beta 2 air quality modeling platform used to support ozone transport modeling.¹² The 2017 MARAMA Beta 2 air quality modeling platform was projected from EPA’s 2011 base year air quality modeling platform (referred to as version 6.2eh, or 2011v6.2eh).¹³ The EPA’s 2011v6.2eh modeling platform was developed from Version 2 of the 2011 NEI (NEI v2).¹⁴ The two modeling platforms and the 2011 NEI v2 all have undergone extensive stakeholder reviews and, for this reason, are considered to be the most comprehensive and accurate inventories available at the time that the inventory for this noninterference demonstration was prepared.

¹² Technical Support Document, Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. BETA2 Version, prepared by Julie R. McDill, P.E. and Susan McCusker, MARAMA, and Edward Sabo, CSRA International, Inc., December 21, 2016, <http://www.marama.org/technical-center/emissions-inventory/2011-2017-beta-regional-emissions-inventory>.

¹³ *Technical Support Document (TSD), Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform*, August, 2015, <https://www.epa.gov/air-emissions-modeling/2011-version-62-technical-support-document>.

¹⁴ *2011 National Emissions Inventory, version 2, Technical Support Document* which can be downloaded from <https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-documentation>.

Based on a review of North Carolina sources covered by the non-EGU sectors, the emissions for 2017 are unlikely to change significantly in 2018. The DAQ modified this approach for the EGU subcategory since actual NO_x and VOC emissions were available for year 2015 and the DAQ believes these data are more representative of EGU NO_x emissions in 2018 than the MARAMA 2017 projections. Appendix C documents the data sources, methods, and results used to develop ozone season day NO_x and VOC emission estimates for the point source categories to represent 2018 year emissions.

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 ozone season day emissions for area sources.

The area source emissions inventory is based on the MARAMA Beta 2 air quality modeling platform for the year 2017. The 2017 MARAMA Beta 2 air quality modeling platform was projected from EPA's 2011 base year air quality modeling platform (referred to as version 6.2eh, or 2011v6.2eh).¹⁵ The EPA's 2011v6.2eh modeling platform was developed from the 2011 NEI v2.¹⁶ As previously noted, the two modeling platforms and the 2011 NEI v2 all have undergone extensive stakeholder reviews and, for this reason, are considered to be the most comprehensive and accurate inventories available at the time that the inventory for this noninterference demonstration was prepared. Appendix D documents the methods and procedures applied to estimate emissions for the nonpoint (area) source categories.

¹⁵ *Technical Support Document (TSD), Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform*, August, 2015, <https://www.epa.gov/air-emissions-modeling/2011-version-62-technical-support-document>.

¹⁶ *2011 National Emissions Inventory, version 2, Technical Support Document* which can be downloaded from <https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-documentation>.

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 NO₂, CO, PM_{2.5}, SO₂, and lead NAAQS and explains why removing the 26 counties from the I&M program will not interfere with maintaining compliance with the NAAQS in the 26 counties or adjacent counties.

4.2.1 Nitrogen Dioxide (NO₂)

The 2010 1-hour NO₂ 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 NO₂ standards.

All NO₂ monitors in the state are measuring below the annual NO₂ standard, and all near-road monitors are measuring below the 1-hour NO₂ standard. The annual mean NO₂ concentration for the near-road monitor in the Charlotte metropolitan statistical area was 11 ppb in 2016 or 21 percent of the annual NO₂ NAAQS. The 2016 1-hour design value for the areawide monitor in the Charlotte area was 39 ppb or 39 percent of the NAAQS. To date, two near-road NO₂ monitors have been established in North Carolina, one in the Raleigh/Durham area in January 2014 and the other in the Charlotte area in June 2014.¹⁷ Sufficient data have not yet been collected to determine a design value at the near-road sites; however, data recorded by the near-road monitors in the state's two largest metropolitan areas indicate that 1-hour NO₂ concentrations are well below the standard. For example, the projected 2017 design value for the near-road Charlotte monitor is 39 ppb.

MOVES2014 emissions modeling results show only slight increases in NO_x emissions for each county, ranging from 0.08 to 0.25 ton/day in 2018. Based upon these emissions estimates and the fact that North Carolina is well below the annual and NO₂ standards statewide, the DAQ concludes that slight increase in NO₂ emissions will not interfere with continued attainment of the 1-hour and annual NO₂ standards.

¹⁷ A second near-road monitor may be required by 2019 in the Charlotte area if the Charlotte area's population exceeds 2.5 million people.

4.2.2 Carbon Monoxide (CO)

The primary NAAQS for CO include (1) an 8-hour standard of 9.0 parts per million (ppm), measured using the annual second-highest 8-hour concentration for two consecutive years as the design value; 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 of the standards in 2011.¹⁸ None of the 26 counties proposed for removal from the I&M program has ever been designated nonattainment for the CO standards.

Statewide, the current ambient air quality levels for CO are less than 20 percent of the CO standard and North Carolina has been in compliance with the CO standards for over 20 years. 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. Ambient monitoring data in the years 2015 and 2016 for the counties with monitors (i.e., Mecklenburg and Wake) show an 8-hour design value of 1.5 ppm or less, or about 17 percent of the 9 ppm standard. Additionally, ambient monitoring data in the years 2015 and 2016 for the two counties with monitors show a 1-hour design value of 2.3 ppm or less, or about 6.6 percent of the 35 ppm standard. To date, two near-road CO monitors have been established in North Carolina, one in the Raleigh area in January 2017 and the other in the Charlotte area in January 2017. Sufficient data have not yet been collected to determine a design value at the near-road sites.

On-road mobile emissions are known to be a large component of overall CO emissions. However, MOVES2014 mobile emissions modeling results show only slight increases in CO emissions for each of the 26 counties, ranging from 1.0 ton/day (Stokes County) to 4.3 tons/day (Robeson County) in 2018. 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.

¹⁸ 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>.

4.2.3 Particulate Matter (PM_{2.5}), Sulfur Dioxide (SO₂), and Lead

The 2012 24-hour PM_{2.5} NAAQS is set at 35 micrograms per cubic meter (µg/m³) and annual PM_{2.5} NAAQS is set at 12µg/m³. In 2014, EPA's Administrator determined that "no area in North Carolina violated the 2012 primary annual PM_{2.5} standard or contributes to a nearby violation of the standard."

For large SO₂ sources subject to the SO₂ Data Requirements Rule, North Carolina is on track to demonstrate compliance through modeling or monitoring. All remaining areas are recommended to be designated attainment. The EPA is expected to take a formal action on these areas and certain modeled/monitored areas before December 2017.

The 2008 lead NAAQS is set at 0.15 µg/m³, measured as a 3-month rolling average. On November 8, 2011, EPA designated the entire state of North Carolina as unclassifiable/attainment 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 continue to remain, well below the standard. As explained in North Carolina's 2016-2017 Annual Monitoring Network Plan, the state no longer is required to monitor for lead under EPA monitoring criteria.

MOVES2014 modeling results indicate that removing the 26 counties from the I&M program would not increase direct PM_{2.5}, SO₂, 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 program is not expected to have any impact on ambient concentrations of these pollutants.

5.0 CONCLUSIONS

The 26 counties are recommended for removal from the North Carolina I&M SIP for the reasons cited in Sections 5.1 and 5.2.

5.1 Emissions and Program Benefits Decline Over Time

One important factor is that the NO_x emission reductions benefits associated with the I&M program have declined over time as illustrated in Table 5 for the 26 counties proposed for removal from the program. As 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 the vehicles are more technologically advanced - thus lasting longer and less prone to malfunctions or failures – the emissions reductions due to the inspections diminishes over time. Additionally, cars are getting even cleaner as new federal fuel and engine standards (Tier 3) are phased in starting in 2017. Those federal Tier 3 standards will result in significant emissions reductions from these newer vehicles, thus lowering the potential benefits of an I&M program.

Table 5. Total On-road NOx Emissions for 26 Counties (tons/day)

| | 2014 | 2016 | 2018 |
|--------------------------------------|-------|------|------|
| With Emissions Inspection Program | 101.5 | 83.7 | 61.2 |
| Without Emissions Inspection Program | | 89.3 | 65.1 |
| Emissions Increase (Program Benefit) | | 5.6 | 3.9 |
| Percent Increase | | 6.7% | 6.4% |

By 2018, the DAQ estimates that NOx emissions reductions due to the I&M program will be 0.25 ton/day or less in each of the 26 counties recommended for removal from the program (see Tables 3 and 4). In addition, as shown in the Table 6, total NOx and VOC emissions would increase by 3.9 tons/day (2.4%) and 3.3 tons/day (2.8%), 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 26 counties. This small increase in emissions is not expected to significantly impact any of the NAAQS in any of the 26 counties.

Table 6. Summary of On-road NOx and VOC Emissions Increases Associated with Removing 26 Counties from the I&M Program

| | NOx Emissions in 2018 | VOC Emissions in 2018 |
|---|-----------------------|-----------------------|
| Total On-road Emissions for 48 Counties in Current I&M Program (TPD) | 168.0 | 117.6 |
| Total On-road Emissions after Removing 26 of 48 Counties from I&M Program (TPD) | 172.0 | 120.9 |
| Emissions Increases (TPD) | 3.9 | 3.3 |
| Emissions Increases (% of Total On-road Emissions for 48 Counties) | 2.4% | 2.8% |

5.2 Air Quality has Improved – No Violating 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. Through October 31, 2017, North Carolina does not have a single air quality

monitor violating any air quality standard including the new 2015 8-hour ozone standard recently adopted by EPA. In fact, 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). North Carolina has continued to maintain compliance with the 2015 ozone standard through October 31, 2017. For the 48 counties with a vehicle I&M program, ozone DVs for 2014-2016 range from a low of 60 ppb for Carteret and New Hanover Counties to a high of 70 ppb for Mecklenburg County. Seven of the 26 counties proposed for removal from the I&M program have monitors showing ozone DVs *at or below 65 ppb*. There has never been a need to site an ozone monitor in any of the remaining 19 counties based on EPA monitoring requirements.¹⁹ This is in sharp contrast to the air quality conditions when the vehicle I&M program was expanded to 48 counties. At that time, two-thirds of the state’s monitors were violating the federal ozone standard. The DAQ estimates that removal of 26 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.

Modeling of on-road vehicle emissions using MOVES2014 shows that the I&M program only controls NO_x, VOC, and CO emissions; the program does not affect direct emissions of PM_{2.5}, SO₂, or lead. Based on the MOVES2014 modeling analyses, this review shows that although removal of the 26 counties from the program will yield slight increases in total NO_x, 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.

For these reasons, the DAQ concludes that removing the 26 counties from the 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 removing the 26 counties from the I&M program have been met and requests that EPA approve removal of the 26 counties from the North Carolina I&M SIP.

¹⁹ 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 and 5-year monitoring network plans that undergo public review and comment and subsequent approval by EPA.